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3Ci Model of Care

Evidence report

March 2021

The ACI cardiac and respiratory networks

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Executive summary

Background

Delivering value-based healthcare for people living with chronic heart failure (CHF) and chronic obstructive pulmonary disease (COPD) as a part of the Leading Better Value Care (LBVC) initiative in NSW began in late 2016 by identifying and addressing unwarranted clinical variation. The majority of this work was undertaken within the inpatient environment throughout NSW Health facilities.

The name 3Ci reflects the four principles that underpin the 3Ci model of care for patients living with CHF and COPD: care, collaboration, clinical intervention and improving health literacy. The model of care builds on this clinical excellence-centred approach to structure care so that it delivers evidence-based clinical components in a seamless and person-centred way across the entire healthcare journey. The 3Ci Model of Care is informed by peer reviewed and experiential evidence and guided by clinical experts and experienced service managers from both the NSW Agency for Clinical Innovation Cardiac and Respiratory Networks.

Aim

The aim of this report is to provide a solid foundation to inform the development of the 3Ci Model of Care.

Report structure

The report has five sections.

1. A rapid evidence review of published peer reviewed literature
2. An exemplar site case study synthesis
3. Crowdsourcing challenge evidence synthesis
4. An overview of key care delivery framework components
5. Challenges that present future opportunities for innovation
6. Deliberations and expert consensus from the 3Ci deliberative workshop.

The results from the rapid evidence review and the individual exemplar site case study reports can be found in the appendices.

Summary of findings

A synthesis of the exemplar site case study reports and the crowdsourcing data collected using the Crowdicity platform showed strong correlation around the clinical components of care for people living with CHF and COPD, as well as a common successful care delivery framework to improve patient and system-centred outcomes. This is supported by the evidence base explored within the rapid evidence review. Three major challenges emerged experientially where the peer reviewed evidence base is still emerging. These represent opportunities to explore innovative solutions within the 3Ci Model of Care. These components include the role of virtual care in delivering care to people living with CHF and COPD, creating strong links between NSW Health and the primary healthcare sector to ensure care is seamless across the entire healthcare journey, and capturing local data to demonstrate success or inform decision making.

These challenges formed the basis of discussions held by expert clinicians and service managers at the 3Ci deliberative workshop, alongside other components that the workshop participants felt required further exploration. The workshop was highly successful in delivering expert consensus on the components of the care delivery framework that were unclear or conflicting. This provides a clear way forward on how these components could be incorporated into the model, and what issues need to be considered and addressed.

Contents

Section 1: Rapid evidence review

Background

In September 2020, a rapid review of peer reviewed publications was conducted by the NSW Agency for Clinical Innovation (ACI) Evidence Generation and Dissemination team. This review was peer reviewed by the 3Ci Model of Care Taskforce, a group of expert clinicians and service managers who are providing expert advice into the development of the 3Ci Model of Care.

Evidence check question

What organisational models of care have been shown to improve outcomes for patients with chronic obstructive pulmonary disease (COPD) or chronic heart failure (CHF)?

In brief

Due to a large amount of literature on the topic, this review was limited to systematic reviews published from 2015 to present.

Methods

PubMed was searched on the 21 September 2020. Searches for Australian guidelines were done on 10 December 2020. Search terms and inclusion criteria are included in appendix 2.

Results

The results are included in appendix 1. They are divided into CHF, COPD, chronic disease, and Australian guidelines. Synthesis of results can be found in the section below.

Synthesis of results

Chronic heart failure

Home-based care

Home-based cardiac rehabilitation has been shown to be similarly effective at reducing the mortality rate, improving the exercise capacity and health related quality of life compared with centre based rehabilitation.[1, 2] Hospital at home increased the time to first readmission, improved health related quality of life, and decreased readmission rates compared with routine hospitalisation.[3] Nurse-led or pharmacist-led home based care has been shown to decrease the risk for all-cause mortality and hospitalisation combined and reduced rates of hospitalisations and emergency visits, as well as improving quality of life.[4]

Transitional care

High intensity transitional care models, such as combining home visits with telephone follow up, have been shown to be effective, whereas low intensity models, such as telephone follow up, have not.[5, 6] In one review, eight themes of transitional care models were identified; discharge planning, multidisciplinary care, medication reconciliation, social support, managing signs and symptoms, outpatient follow up and advance care planning and palliative care.[7] Nurse-led transitional care delayed time to, and reduced, death or re-hospitalisation, improved treatment adherence and patient satisfaction, and reduced costs and length of re-hospitalisation stay.[8] Pharmacist-led transition care led to an increased likelihood of lower all-cause readmission rates of patients with congestive heart failure.[9]

Collaborative or integrative models

Person-centred collaborative goal setting models have been shown to improve care outcomes in people living with heart failure by reducing symptom burden and depressive symptoms and increasing health-related quality of life and activation levels.[10] Multidisciplinary heart failure clinics can lower all-cause mortality and heart failure related hospitalisations.[11, 12] Integrated case management had mixed results. Hospital-initiated case management reduced readmissions and length of stay. Community-based case management only showed a reduction in admissions in two of the four included studies.[13] A Cochrane review on case management, clinic-based models and multidisciplinary interventions found a lack of evidence for adverse effects, and conclusions on quality of life remain uncertain due to poor quality data.[14]

Telehealth (virtual care)

Six reviews showed that home-based telemonitoring is associated with decreased mortality by facilitating the early recognition of exacerbation of symptoms.[15-20]. One review found reduced planned hospital visits but no effect on cardiac mortality.[21] Telemonitoring (a home based monitoring system where data are automatically transmitted from home to the healthcare provider) and telephone-supported care were associated with significantly lower heart failure related admission rates compared to usual care.[22] Cardiac telerehabilitation has been shown to be as effective as traditional rehabilitation in increasing exercise capacity.[23, 24] Post-discharge virtual wards reduced the risk of mortality in people living with heart failure, in one review which included six trials.[25] Studies on telehealth and heart failure are heterogonous.[26]

Nurse-led care

Nurse-led education programs for heart failure patients can reduce hospitalisations, readmission and improve quality of life.[27]

Chronic obstructive pulmonary disease

Hospital at home or early discharge

In people living with COPD, home-based exercise programs have been shown to be equally effective as outpatient exercise programs.[28] Early discharge or hospital at home showed trends towards lower mortality compared with usual care.[29] For pulmonary rehabilitation, there were no differences in functional capacity or quality of life when compared with outpatient pulmonary rehabilitation.[30]

Self-management

Seven reviews on self-management for COPD were identified. Results are mixed. Two reviews concluded that self-management is not effective while two found insufficient evidence to determine effectiveness.[31-34] However, one review found self-management trials generally had positive effects on self-management behaviours, such as adherence to medication and physical activity.[34] Another showed improvements in quality of life and fewer emergency department (ED) visits.[35] Nurse led self-management had mixed findings on outcomes such as hospital admission, ED visits, anxiety, depression and self-efficacy, but improved findings on participants' feelings of self-confidence, coping behaviours, and wellbeing were identified in one review.[36, 37]

Telehealth (virtual care)

Telemonitoring for COPD has shown reduced rates of hospitalisation and improved quality of life, but no significant reduction in the mortality rate, outpatient visits, and length of stay during hospitalisation.[38-41] One review showed no statistically significant difference between telemonitoring and control groups while another found conflicting results of studies with some showing improved outcomes and others not.[42, 43] Quality of life was improved in telehealth models.[44, 45] Telehealth models for physical activity levels show some benefit.[46] A lack of pragmatic trial designs on telehealth was identified.[47]

Community settings

One review found potential benefits of community health worker models in improving asthma-related outcomes in adult patients.[48]

Chronic conditions

Integrative models

Across multiple chronic conditions, integrative models have been shown to improve outcomes such as depression and symptom control compared with usual care.[49-51] Interventions with greater number of components were more likely to improve quality of life.[52] Evidence in this area has been described as insufficient.[53]

Hospital at home or early discharge

A Cochrane review concluded hospital at home, with the option of transfer to hospital, may provide an effective alternative to inpatient care for a select group of elderly patients requiring hospital admission.[54] While another Cochrane review on early discharge or hospital at home found insufficient evidence of improved health outcomes.[55] In a review of systematic reviews that included eight articles, positive results in terms of patients' quality of life were reported in five reviews, and other three reviews found no association between home-based hospitalisation and quality of life.[56]

Self-management

Self-management interventions showed great diversity in mode, content, intensity, and duration.[57] In one review, it was found that most studies show improvement in health behaviour and disease control.[58] Nurse-led self-management interventions delivered by specially trained nurses are described as a promising routine primary care activity.[59]

Telehealth (virtual care)

Telehealth can have similar or improved benefits in managing some chronic conditions compared to usual face-to-face or telephone care.[60-63] Telerehabilitation can be as effective as centre-based rehabilitation, however there is a lack of compelling evidence.[64, 65] Pharmacy telemedicine models can improve clinical, disease management and adherence outcomes in patients.[66] Factors impacting the sustainability of programs included perceptions on effectiveness, tailoring to the patient's needs, communication, process, technology quality, capability and usability.[67]

Telehealth (virtual care) for Aboriginal people

Telehealth may have the potential to improve healthcare for Aboriginal people, however the modality needs to be culturally appropriate and the care received must be culturally tailored and culturally safe.[68, 69]

Transitional care

Four themes for transitional care in chronic conditions were identified: the impact of transitional care interventions initiated from the hospital, the role of specialised care settings, the comparison of inpatient and outpatient care, and the effect of chronic care coordination on the experience of people living with chronic disease.[70]

Group clinics

There is consistent and promising evidence for a positive effect of group clinics on some biomedical measures such as glycated haemoglobin A1c and improved systolic blood pressure, however this does not extend across all outcomes such as low-density lipoprotein cholesterol.[71]

Nurse-led care

Nurse-led care demonstrates either equivalent or better outcomes in chronic condition management including symptom burden, self-management and behavioural outcomes, disease-specific indicators, satisfaction and perception of quality of life, and health service use.[72] Nurse-directed early discharge planning programs can improve outcomes by reducing the rate and length of readmission, lowering mortality and enhancing quality of life.[73] Care led by specially trained nurses can achieve similar health or process outcomes as physician-led care for people living with chronic disease.[74]

Pharmacist-led care

Pharmacist-led interventions can improve treatment adherence and outcomes in blood pressure, cholesterol, and COPD and asthma management. Community pharmacist-led interventions did not improve outcomes in diabetes and depressive symptom management.[75] Pharmacist-led care had similar effect on the rates of office, urgent care and ED visits, as well as mortality and clinical events, compared to usual care.[76]

The chronic care model

The chronic care model outlines an organisational approach to improve the quality of chronic care with six key elements; the community, the health system, self-management support, delivery system design, decision support and clinical information systems. Self-management support is the most frequent chronic care model intervention that is associated with statistically significant improvements.[77] One review found that the proportion of people living with chronic disease who reached clinical targets greatly increased in the chronic care model compared with control groups.[78]

Patient-initiated appointment systems

A Cochrane review found these systems may have little or no effect on patient anxiety, depression and quality of life compared to consultant-led appointment systems.[79]

Limitations

This evidence check is limited to systematic reviews, so publications that report models outside of a systematic review are not included. This is a synthesis of existing reviews, and appraisal of the primary publications cited in the reviews was not undertaken. Models of care vary between conditions and contexts, as well as including different interventions and populations within. This variation, together with underpowered studies, heterogeneity of study methods used and the potential for bias, poses considerable challenges to evidence synthesis. Studies retrieved in the search broadly looking at models for chronic conditions were included when COPD or CHF was one of the chronic conditions, however due to challenges in capturing these studies with search strings, these may not be a complete list of publications for chronic conditions.

Section 2: Exemplar site case study synthesis

Background

Seven exemplar sites were visited in November and December 2020. Services were selected using guidance from the 3Ci Model of Care Taskforce. The alignment of sites with the proposed principles of the 3Ci model as well as available data to demonstrate their success were considered. The exemplar sites chosen were:

- Shoalhaven Hospital Respiratory Coordinated Care Program
- Concord Repatriation General Hospital Heart Failure Service
- Royal Prince Alfred Pulmonary Rehabilitation and Respiratory Coordinated Care Programs
- Goulburn Cardiorespiratory Team
- The Austin Hospital Chronic Heart Failure Service
- Hunter New England Local Health District Virtual Heart Failure Service (VHFS)
- Queensland Nurse Navigator Program
- Royal Prince Alfred Pulmonary Rehabilitation and Respiratory Coordinated Care Programs.

A semi-structured interview format was used to document information about these exemplar sites in relation to:

- key components or building blocks of their model of care
- clinical components of their model of care
- the evidence base on which the exemplar site built their model of care
- implementation approach
- data points used to measure impact and outcomes
- governance and partnerships
- funding and sustainability
- processes from the consumer perspective.

These interviews were documented as reports and validated by the service representatives interviewed. The reports can be found in appendices 3-9.

Summary of models

Exemplar sites had similar goals for people living with CHF and COPD.

- To support people living with CHF or COPD to live as independently as possible for as long as possible with the highest quality of life in their homes (5/7)
- To improve symptom management (3/7)
- To provide a continuum of care from hospital to home (4/7)

- To optimise medical management, increase patient health literacy, and improve self-management (3/7).

This was also expressed in terms of system performance.

- Reduced readmissions (7/7)
- Reduced average length of stay (7/7)
- Reduced total separations (3/7)
- Reduced total hospital bed days (3/7)
- Improvement in mortality rates (3/7).

Model of care design largely contained similar components.

- Inpatient in-reach (6/7)
- Specialist clinic (5/7)
- Strong integration with cardiac and/or pulmonary rehabilitation programs (6/7)
- Home visiting (6/7)
- Care coordination (7/7)
- Self-management strategies (7/7)
- Virtual care when appropriate (6/7)
- Education strategies for acute, primary care and community services staff (7/7).

Most exemplar sites operate as a relatively small clinical team 2-4 full time equivalents (FTE) that are either hospital or community based. These clinical teams then work across the continuum of care and operate within the framework components outlined above. This supports people living with CHF and COPD to navigate and engage with services as required by their condition.

Three exemplar sites differed in how their care delivery was organised. One exemplar site employs a specialist clinical team that coordinates CHF care which is then principally delivered by primary care and allied health. Virtual care and the active use of local services to deliver care are key strategies in this model. Another exemplar site is based on a collaborative partnership of dispersed services and programs that collaborate across settings to deliver coordinated specialist care. Another exemplar site operates under a nurse navigator model that facilitates the journey of people living with complex healthcare needs through the healthcare system.

All the NSW exemplar sites are building on activities to reduce unwanted clinical variation in COPD or CHF initiated under tranche 1 of the Leading Better Value Care (LBVC) program.

Service structure

Referral sources

Referral sources vary significantly across exemplar sites.

- Some exemplar sites receive close to 100% of referrals from acute inpatient admissions (3/6).

- Other exemplar sites have a significant percentage (30-48%) of self, community or general practitioner (GP) referrals (4/7).

Staffing

- Staffing at each exemplar site varies from 1.95 to 4 FTE. Mean: 2.95 FTE.
- All exemplar sites employ nursing staff.
- Most exemplar sites (5/7) have physiotherapy staff. Those exemplar sites without physiotherapy positions work closely with physiotherapy teams.
- Exemplar sites achieve a multidisciplinary structure by creating meaningful partnerships with local partners including pharmacy, occupational therapy, dietetics and social work.
- Some exemplar sites (2/7) have a dedicated cardiology or respiratory physician position. Teams without dedicated physician positions have close working relationships with specialists.

Patients

- Total patient enrolments in a year varies from 180 to 615. Mean: 331.
- Active patients at time of interview varied from 57 to 250. Mean: 116.

Care delivery framework

Table 1 outlines the key components that may comprise the care delivery framework employed within an exemplar site. The care delivery components are distinct from clinical components that are delivered by the exemplar site. Not all exemplar sites have the same configuration of components.

Table 1: Key components of the care delivery framework across seven exemplar sites

Key components of the care delivery framework	Shoalhaven	Concord	Royal Prince Alfred	Goulburn	Austin	Hunter New England	Queensland
Nurse led	Yes	Yes	R*	Yes	R*	Yes	Yes
Multidisciplinary care delivery	Yes	Yes	Yes	Yes	Yes	R*	R*
Local health district based	Yes	Yes	Yes	No	R*	Yes	R*
Access to CHF and/or COPD clinics	Yes	Yes	Yes	No	Yes	Yes	R*
Specialist physician expertise routinely available	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Integrated partnerships with cardiac and pulmonary rehabilitation	Yes	Yes	Yes	Yes	Yes	R*	R*
Five day/week service	R*	Yes	Yes	Yes	Yes	Yes	Yes
Acute inpatient in-reach	Yes	Yes	Yes	Yes	Yes	R*	Yes
Defined entry and exit criteria	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Established a tailored program	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Key components of the care delivery framework	Shoalhaven	Concord	Royal Prince Alfred	Goulburn	Austin	Hunter New England	Queensland
Model supports people living with CHF and people living with COPD	No	No	No	Yes	No	No	Yes
Delivers guideline-based care	Yes	Yes	Yes	Yes	Yes	R*	Yes
Provides home visiting	Yes	Yes	Yes	Yes	Yes	No	Yes
Enabled by virtual care	R*	R*	R*	R*	R*	Yes	Yes
Provides care coordination	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Supports self-management for people living with CHF or COPD	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Can adjust program in real time	Yes	Yes	Yes	Yes	Yes	R*	Yes
Consultation liaison service	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Proactive engagement with primary health sector	R*	R*	R*	R*	R*	Yes	Yes
Evidence-based	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Outcome data routinely collected and reported	R*	R*	R*	R*	R*	Yes	Yes
Service system data routinely collected and reported	R*	Yes	R*	R*	Yes	Yes	Yes

* Requires qualification or varies across settings

Nurse-led

The majority of exemplar sites have some all or of their core components led by specialist cardiac nurses with advanced knowledge in the management of heart failure, or specialist respiratory nurses with advanced knowledge in the management of COPD. In Goulburn, the team is led by a nurse practitioner whose scope of practice encompasses both CHF and COPD.

Multidisciplinary care delivery

The majority of care delivered at exemplar sites is delivered by and/or in strong partnership with a multidisciplinary care delivery structure. The minimum standard for a multidisciplinary structure includes nursing, physiotherapy and medical staff (both physicians and GPs). It may also include occupational therapy, pharmacist or social work staff. The Hunter New England Local Health District (HNELHD) Virtual Heart Failure Service (VHFS) seeks to direct patients to multidisciplinary teams located in community and primary health settings. The core team itself only provides navigation and care coordination services and is staffed by nurses. Similarly, the Queensland nurse navigator service facilitates multidisciplinary care, delivered to people who are supported and empowered to engage directly with their care providers.

Local health district based

Half of the exemplar sites surveyed are located in a hospital setting, which is used advantageously to support active engagement with relevant hospital units (such as medical wards and EDs), and to enable active case finding. Those services that are not hospital-based work closely with their local hospitals. The Queensland nurse navigator service location varies between health services and is a model that adapts according to patient needs and local circumstances.

Access to CHF and/or COPD clinics

CHF and COPD clinics are led by cardiologists and respiratory physicians with high level expertise in the diagnosis, treatment and management of patients with CHF and/or COPD. Clinics are often also staffed by specialist nurses and trainee medical staff.

The majority of exemplar sites have access to such clinics. Goulburn does not have an established clinic, though the nurse practitioner routinely partners with the respiratory physician and visiting medical officer cardiologists to deliver an equivalent service as required. HNELHD has access to a CHF clinic and it is a critical adjunct to their model of care.

Specialist advice routinely available

All exemplar sites have strong working partnerships with relevant medical specialists and have access to specialist advice as required. Prescribing capability is one attribute that is particularly valued. In one exemplar site a nurse practitioner is able to provide much of the required specialist advice and prescribing in partnership with a network of medical specialists.

Strongly integrated partnerships with cardiac and pulmonary rehabilitation

Most exemplar sites have strong partnerships with a cardiac or pulmonary rehabilitation program. Rehabilitation programs are a core component of the service. They provide holistic and evidence-based exercise training, education and support. This improves exercise tolerance, health-related quality of life and patient-led self-management.

In a number of sites, engagement with the cardiac or pulmonary rehabilitation program is often the first contact between the exemplar site's model of care and the person living with CHF or COPD. The rehabilitation program provides regular contact with the person which enables early detection of exacerbation and care coordination. When a specific program is not established, a suitably qualified physiotherapist provides an individual exercise prescription.

Provides a service five days per week

All exemplar sites operate on a five days per week basis. Most exemplar site clinicians feel that this enables sufficient support and engagement with people living with CHF and COPD to achieve positive outcomes and avoid unnecessary hospitalisations.

Acute inpatient in-reach

All exemplar site staff proactively work with the inpatient wards (and in some cases EDs) where CHF or COPD patients are likely to be treated. This in-reach strategy is used as an opportunity to identify people who would benefit from their model of care and to start providing education and information to people living with CHF and COPD about how to successfully manage their condition. Exemplar site team members also provide regular staff education sessions and consultation liaison support within the acute inpatient environment to build both referral networks and the knowledge and skills of inpatient staff in relation to CHF and/or COPD. This includes increased clinical supervision of people living with CHF and COPD when they are admitted for an acute exacerbation of their condition. This will ensure the delivery of guideline-based care in the acute inpatient setting, thereby reducing unwarranted clinical variation.

In the HNELHD, heart failure nurses and cardiologists work closely with inpatient services. However, the VHFS does not in-reach to acute services, rather enrolled people are identified directly by reviewing the electronic medical record.

Defined entry and exit criteria

All exemplar sites have defined criteria for enrolment and exit from their model of care. Some criteria are highly detailed and prescriptive. Other entry and exit criteria are minimalist, for example entry if the person is admitted with a CHF or COPD diagnosis and exit if they are stable and self-managing. All exemplar sites also exercise flexibility in the application of the entry and exit criteria for their model. If a person living with CHF and COPD is likely to benefit from the care delivered within that exemplar site’s model of care, they are usually enrolled.

Importantly, all exemplar sites are able to monitor and track the majority of people living with CHF or COPD who are enrolled in their model of care. This potentially enables the exemplar sites to evaluate the impact of their model of care by comparing outcomes of people enrolled living with CHF or COPD to those of people living with CHF or COPD who are not enrolled.

Many exemplar sites discharged people living with CHF or COPD who are able to self-manage and are stable from their electronic medical record system. However, most sites keep those people enrolled as inactive until such as time as they required further support.

Establishes a tailored program

Every enrolled person living with CHF or COPD has a comprehensive clinical assessment to guide the development of a tailored plan of care for the individual by a cardiologist, respiratory physician or nurse practitioner. In a number of exemplar sites, the plan is developed in collaboration with physiotherapists, specialist nurses or GPs. The plan directs the treatment and care the person receives in hospital and at home. All plans include an action plan based on the Heart or Lung Foundation templates.

Model supports people living with CHF and people living with COPD

The majority of exemplar sites (5/7) target either people living with CHF or people living with COPD. Goulburn enrols both people living with CHF and COPD.The staff at Goulburn developed clinical expertise within their team, supported by specialist input from a network of cardiac and respiratory specialists. The Queensland Nurse Navigation model of care enrols people living with chronic and complex disease more broadly and seeks to source specific disease expertise through strong collaborative partnerships with expert clinical teams that serve their site at the local level.

Delivers guideline-based care

All exemplar sites deliver guideline-based care, defined as those diagnostic or clinical interventions supported by the Lung Foundation of Australia and National Heart Foundation or Cardiac Society of Australia and New Zealand Guidelines.[80, 81] Exemplar sites either deliver these services themselves or co-deliver with partnering services.

Provides home visiting

The majority of exemplar sites deliver care in the person's home as much as possible. This is described by exemplar sites as an essential and defining component of their model of care. Home visits enable clinicians to assess the day-to-day social determinants that impact the health of people living with CHF or COPD, provide the opportunity to address any issues and support particular behaviours, such as exercise routines or the use of oxygen equipment, in the home environment.

The HNELHD VHFS service does not provide home visiting but establishes partnerships to support other community and primary health services to deliver support in the home.

Enabled by virtual care

All exemplar sites use telehealth or virtual communications media (such as Skype, Zoom or Face Time). Virtual care is used in a range of circumstances.

- A routine phone call (or Face Time) to stable patients to check on their wellbeing
- A phone call when the patient or family requires urgent advice
- A means of undertaking clinical assessment when home visiting is not an immediate option
- Use of smart phone devices to transfer diagnostic data to specialist or other team members
- Accessing specialist medical advice when visiting a patient in their home.

During the COVID-19 pandemic there has been a greater reliance on virtual care and related technologies. Some exemplar sites discovered that there are new and effective ways to support self-management (e.g. virtual rehabilitation clinics or support groups). However, 5/6 sites stated that a return to home visiting, as pandemic restrictions ease, would be positive because of the importance of the face-to-face home visiting component of the model of care.

The HNELHD VHFS relies on virtual care as the principal enabler of its service. The model of care uses virtual care as the primary technology that enables care coordination. Virtual care is used in this way due to limited access to specialists and specialist clinics. Because the service is only provided via telephone, it requires the expeditious transfer of home visiting and other services to community and primary health providers.

Provides care coordination

All exemplar sites deliver care coordination comprising both clinical services that may be required and other community support services necessary to optimise the health of the person living with CHF or COPD. The latter form of coordination was described by all exemplar sites as a critical function. Often the person's living circumstances are impacting negatively on their health outcomes. Resolving these issues delivers significant health benefits.

Most programs sought to transfer the responsibility for care coordination as the person's health stabilises, and/or when other more suitable care coordinators are identified (such as GP practices, My Aged Care support packages and other options for care provision).

The principal function of the HNELHD VHFS is to coordinate care and enable the coordination of clinical services across primary and community settings. All exemplar sites take primary responsibility for clinical care coordination until such time as the person living with CHF or COPD is self-managing their condition successfully. Many exemplar sites maintain contact with people living with CHF and COPD as an *inactive enrolment* until such time as the person's clinical condition determines that clinical services are again required.

Supports self-management for people living with CHF and COPD

All exemplar sites focus on the development and support of self-management for people living with CHF and COPD. They seek to engage and work with people and their relatives and carers to increase health literacy. This includes building skills to recognise signs of exacerbation and to enhance a range of capabilities relating to medication compliance, equipment use, exercise, dietary habits and other important guideline driven elements of care. It is also important to build capability in how to effectively access the healthcare system so that people living with CHF and COPD transition to a level of independence in identifying the right time, place and clinicians to deliver their care when required.

All exemplar sites use self-management support material from the Heart and Lung Foundations. Some exemplar sites have developed ancillary material.

Can adjust program in real time

This component refers to the clinician's ability to contact enrolled people and make immediate adjustments to their treatment regime to alleviate symptoms or prevent deterioration. All clinicians at exemplar sites have the ability to make these adjustments (in consultation with specialists and/or GPs). If HNELHD VHFS has transferred care coordination to a general practice, it relies on the practice contacting the team if specialist authorised treatment adjustments are required.

Consultation liaison

All exemplar sites provide consultation liaison to other services that are delivering treatment or care in support of the treatment plan. These services can include GPs, other primary health providers, community health, outpatient services, inpatient or acute services and EDs.

The exemplar sites all describe this as an important function of their service. Over time, many elements of the treatment and care of people living with CHF and COPD can be delivered effectively by other services other than the exemplar site team. However, this requires the development of knowledge and skills within these other services.

Proactive engagement with the primary health care sector

All exemplar sites acknowledge the important role of GPs and general practices in the treatment and management of people with CHF and COPD. They engage with the person’s GP and seek their assent or partnership in the enrolment of people living with CHF or COPD into programs and the delivery of treatment plans. Some exemplar sites will not enrol people without GP agreement and may end enrolment if the GP recommends.

All exemplar sites undertake a range of activities to provide education and support to GPs in the management of people living with CHF or COPD. These activities include regular education sessions, joint clinics and the documentation of health pathways.

Notwithstanding these activities, exemplar sites report that many GPs lack confidence or the skills to effectively manage patients and will default clinical decision making to the specialist teams in relation to these conditions.

The HNELHD VHFS service model relies on the provision of all non-acute treatment by community and primary health services. In particular, it relies on GPs to provide the medical management of patients, with support from the VHFS. Consultation liaison and other capacity building initiatives are deployed if GPs identify that they need support. The Queensland nurse navigator service also actively builds capability across settings to deliver the most appropriate care for people.

Evidence-based

All exemplar sites deliver evidenced-based care. In addition to the evidence base for clinical interventions outlined above, all exemplar sites referred to evidence in support of their models. Much of the evidence cited by models is captured by the ACI rapid peer evidence review, or was precursor evidence to literature cited in this review.

Many exemplar sites are active in generating evidence and have published evidence in support of their models of care.

Person-centred data routinely collected and reported

All exemplar sites collect person-centred outcome data. While there is a high degree of commonality among sites in relation to outcome data collected, some variation was found. The outcome measures included the following.

CHF

- Assessment for new or worsening signs or symptoms of heart failure
- Blood pressure
- Evaluation of peripheral oedema
- Heart rate and rhythm
- The Kansas City Cardiomyopathy Questionnaire
- The New York Heart Association Functional Classification
- The Self-Care of Heart Failure Index

- Weight

COPD

- Breathlessness
- The COPD Assessment Test
- Exercise capacity
- Health related quality of life: St George Respiratory Questionnaire
- Hospital Anxiety and Depression Scale
- Lung function testing
- Quality of life

Most exemplar sites use their outcome data to monitor people who are enrolled and modify treatment plans as required. Some exemplar sites routinely aggregate and review their outcome data as a team. Some exemplar sites are using patient reported experience measures and patient reported outcome measures to routinely collect data. Some exemplar sites use outcome data as evidence in published research. No exemplar sites routinely report on their outcome data beyond their team.

System-centred outcome data routinely collected and reported

All exemplar sites are able to collect system-centred outcome data. There is a high degree of commonality among exemplar sites in relation to service system data that is monitored with minimal but some variation. Commonly the following measures are monitored.

- Episodes of presentations
- 30-day readmission rates
- Bed days average length of stay
- In-hospital mortality

Some exemplar sites routinely or semi-routinely extract reports from the electronic medical record to monitor system impacts. Monitoring is usually in relation to system performance in previous years or in comparison with other hospitals within the local health district (LHD).

Austin Health in Victoria monitors system impacts in comparison to other hospitals via the Victorian Cardiac Outcomes Registry.

No exemplar sites are able to routinely compare enrolled to non-enrolled people living with CHF or COPD in relation to the above service indicators.

Clinical components

Most exemplar sites reviewed focussed either on people living with CHF or people living with COPD. Goulburn and Queensland are the only exemplar sites that provide care to people living with either condition. Queensland’s nurse navigator service manages a broad range of chronic conditions including CHF and COPD.

COPD

All exemplar sites delivering services to patients with COPD are guided by the Lung Foundation *COPD-X Guide* and other relevant clinical literature. This drives the consistency across services. [80]

Table 2 outlines the key clinical components of care delivered by exemplar sites targeting patients with COPD. There is minimal variation between these exemplar sites in relation to the clinical components offered with the exception of the Queensland nurse navigator service that can directly deliver clinical care but seeks to enable the delivery of that care from other services wherever possible.

Table 2: COPD clinical service components

COPD clinical service components	Shoalhaven	Concord	Royal Prince Alfred	Goulburn	Austin	Hunter New England	Queensland
COPD clinic	Yes	Not a COPD service	Yes	No	Not a COPD service	Not a COPD service	Yes
Respiratory assessment and monitoring	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	Yes
Diagnostic testing	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	Yes
Comprehensive pathology	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	Yes
Patient education and support for self-management	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	Yes
Medication reviews (including pharmacy led reviews)	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	Yes
COPD action plans	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	Yes
Spirometry – pre and post assessments	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	Yes
Medication device delivery review	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	Yes
Outpatient pulmonary rehabilitation	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	Yes
Home and maintenance rehabilitation	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	Yes
NIV review and education	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	R*
Physiotherapy	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	R*
Home oxygen review	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	R*
Smoking cessation services	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	R*

COPD clinical service components	**Shoalhaven**	**Concord**	**Royal Prince Alfred**	**Goulburn**	**Austin**	**Hunter New England**	**Queensland**
Occupational therapy assessment and review	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	R*
Managing tracheostomies and chest drains at home	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	R*
Referral to other disciplines and services as required (hospital in the home), community nurses, dietetics, home care)	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	R*
Advanced care directives and collaboration with palliative care	Yes	Not a COPD service	Yes	Yes	Not a COPD service	Not a COPD service	R*

*Requires qualification or varies across settings

CHF

All exemplar sites delivering services to patients with CHF are guided by the National Heart Foundation and Cardiac Society of Australia and New Zealand: *Guidelines for the Prevention, Detection, and Management of Heart Failure in Australia 2018* and other relevant clinical literature. This drives the consistency across services.[81]

Table 3 outlines the key clinical components of care delivered by exemplar sites targeting patients with CHF. There is minimal variation between these services in relation to the clinical components offered with the exception of the Queensland nurse navigator service and the HNELHD service that does not directly deliver clinical care.[†] In Goulburn the team is unable to perform echocardiogram but they can enable other pathology diagnostics.

Table 3: CHF clinical service components

CHF clinical service components	**Shoalhaven**	**Concord**	**Royal Prince Alfred**	**Goulburn**	**Austin**	**Hunter New England**	**Queensland**
CHF clinic	Not a CHF service	Yes	Not a CHF service	No	Yes	R*	R*
Heart failure assessment and	Not a CHF service	Yes	Not a CHF service	Yes	Yes	R*	R*
Diagnostic testing	Not a CHF service	Yes	Not a CHF service	Yes	Yes	R*	R*
Echocardiography and comprehensive	Not a CHF service	Yes	Not a CHF service	R*	Yes	R*	R*

[†] The service supports other community and primary health-based services to deliver clinical services in the home.

CHF clinical service components	Shoalhaven	Concord	Royal Prince Alfred	Goulburn	Austin	Hunter New England	Queensland
Physiotherapy flow assessment	Not a CHF service	Yes	Not a CHF service	No	No	No	No
Medication titration and reviews	Not a CHF service	Yes	Not a CHF service	Yes	Yes	R*	R*
Medication reviews	Not a CHF service	Yes	Not a CHF service	Yes	Yes	R*	R*
Heart failure action plans (euvolic or dry weight, fluid, salt)	Not a CHF service	Yes	Not a CHF service	Yes	Yes	R*	R*
Outpatient cardiac rehabilitation	Not a CHF service	Yes	Not a CHF service	Yes	Yes	R*	R*
Home and maintenance rehabilitation	Not a CHF service	Yes	Not a CHF service	Yes	Yes	R*	R*
Smoking cessation services	Not a CHF service	Yes	Not a CHF service	Yes	Yes	R*	R*
Patient education and support for self-management	Not a CHF service	Yes	Not a CHF service	Yes	Yes	Yes	R*
Physiotherapy (including home-based)	Not a CHF service	Yes	Not a CHF service	Yes	Yes	R*	R*
Occupational therapy assessment and review	Not a CHF service	Yes	Not a CHF service	Yes	Yes	R*	R*
Referral to other disciplines and services as required (hospital in the home, community nurses, dietetics, home care)	Not a CHF service	Yes	Not a CHF service	Yes	Yes	Yes	R*
Advanced care directives and collaboration with palliative care	Not a CHF service	Yes	Not a CHF service	Yes	Yes	Yes	R*

* Requires qualification or varies across settings

Stories of people living with CHF or COPD

Short stories of people living with CHF or COPD, who have been cared for by the clinical teams at each exemplar site, are documented in the case study reports found in Appendices 3-9. Exemplar sites were asked to describe people living with CHF or COPD who exemplified how the service or team made a difference in their treatment and the trajectory of their chronic condition. Although the individual stories varied markedly there were some common themes.

- People often had social or support challenges that made optimisation of their treatment difficult.
- Some people were socially isolated and the clinicians at exemplar sites had to reconnect them with neighbours or in one case arrange for transfer to a residential aged care facility.
- People often had co-morbidities that made concordance with guideline-based care or care delivery itself challenging. Anxiety in people living with CHF or COPD if breathing is difficult or other symptoms worsen was prevalent and led to exacerbations. Clinicians found that working with people living with CHF and COPD in their homes and understanding their routines and living circumstances was critical to improved outcomes.

These stories demonstrate that many people living with chronic conditions can be at high risk of frequent admissions to hospital. Often this risk profile is common across CHF and COPD and driven by circumstances other than the disease itself. Getting to know people who are living with these conditions in their living environment enables clinicians to optimise the benefits of evidence-based treatment and deliver improved outcomes.

Implementation

Table 4 outlines the key implementation factors that exemplar sites identified as critical to the successful establishment and maintenance of models of care at the sites. The majority of sites employed these factors in their establishment and development. A blank square means that the site did not highlight this factor during the semi-structured questionnaire process.

Table 4: Key implementation factors nominated by exemplar site as important

Implementation factors	Shoalhaven	Concord	Royal Prince Alfred	Goulburn	Austin	Hunter New England	Queensland
Partnerships and collaborative relationships across care delivery settings	Yes	Yes	Yes	Yes	Yes	Yes	Yes
A clinical champion	Yes	Yes	Yes	Yes			Yes
Knowledgeable and skilled staff and workforce development	Yes	Yes		Yes			Yes
Access to a specialist with clinical expertise	Yes	Yes	Yes	Yes	Yes	Yes	
Executive sponsorship and project support	Yes	Yes	Yes	Yes		Yes	
Secure funding	Yes	Yes	Yes		Yes		
Communication strategy	Yes						Yes

Implementation factors	Shoalhaven	Concord	Royal Prince Alfred	Goulburn	Austin	Hunter New England	Queensland
Using the evidence to build a case for change			Yes				
Regularly capturing and learning from local data	Yes				Yes		
Home visiting focus	Yes		Yes				
Adaptability			Yes				
Profile raising (through initiatives such as LBVC)		Yes		Yes			
Virtual care to enable the service						Yes	
Primary care capacity building						Yes	
Build your model starting with the end in mind						Yes	Yes

Partnerships and collaborative relationships across care delivery settings

Every site emphasised the importance of partnerships and collaborative relationships across care delivery settings. Positive partnerships are established within the host organisation, and across care delivery settings along the care continuum. Exemplar sites consistently refer to partnership with:

- EDs
- inpatient wards
- hospital, outpatient and community health services
- consultant specialists
- GPs and GP practices
- Commonwealth funded aged care services
- private health and wellness providers
- community support and self-help groups.

Partnerships and collaborative relationships are forged through a range of activities:

- education sessions
- capacity building exercises
- consultation liaison
- opportunistic occasions of service.

Exemplar sites emphasised that building effective partnerships and collaborative relationships rely on:

- flexibility
- being available to problem solve with their partners
- demonstrating clinical expertise and ability to improve outcomes within the exemplar site's model of care
- building a shared sense of purpose
- demonstrating the positive benefits of the exemplar site's model of care for the patient and the health system.

A clinical champion

A number of exemplar sites (3/6) stated that having a clinical champion who promotes and articulates the benefits of the program is pivotal to the establishment of the model. The attributes of the clinical champion include:

- a vision of what can be achieved by the program
- enthusiasm about managing people living with CHF or COPD
- strong communication skills
- capacity to 'think outside the box' to develop solutions to problems that others may see as insurmountable.

Knowledgeable and skilled staff and workforce development

Some exemplar sites (3/6) identify the importance of establishing a specialist clinical team that is knowledgeable and skilled. The team needs to be well trained or experienced in the diagnosis, treatment and management of people living with CHF and/or COPD. A number of exemplar sites state that clinical staff without that experience can acquire the knowledge and skills relatively quickly with the support of an experienced mentor, but that these clinical staff should not be solely responsible for leading the service during the phase of building clinical capability.

Clinical staff also need to be confident working autonomously in the community and visiting people at home.

Building the knowledge and skills of organisational partners is also identified as an important activity. It enables partners to know how and when to engage with the exemplar site. It also supports partners to better deliver clinical care and advice to support the ongoing management of CHF or COPD.

Access to a specialist physician with clinical expertise

All exemplar sites emphasise the importance of expert medical support in the establishment and development of their model of care. Diagnosing and treating people living with CHF or COPD is specialised. It requires both up-to-date clinical knowledge and perseverance to apply, sequence and assess evidence-based interventions to optimise outcomes.

Executive sponsorship and project support

Executive sponsorship is a critical success factor in many exemplar sites. Senior level management often create the opportunity to design and trial the model of care. Sponsorship often enables the team developing the model of care at the exemplar site to learn from mistakes and modify the way clinical care within the model is delivered. A number of exemplar sites discuss how roadblocks in relation to the building of partnerships and collaborative relationships or the sourcing of necessary clinical and allied health resources are resolved in partnership with the sponsor.

The provision of project support is also identified as an important implementation factor. This support includes:

- business planning
- implementation planning
- project sponsorship
- establishing an implementation team
- data extraction.

Funding source

A secure source of funding is an important success factor in many exemplar sites. In some circumstances the sponsor guaranteed the security of funding.

Alternatively, a number of sites work with local finance teams to use activity based funding (ABF) to calculate how the program can be sustainably financed under existing financial constraints. In one case it has been calculated that the model of care operates efficiently under the existing costing arrangements and delivers a surplus for the facility. Other sites have calculated the overall benefit to hospital efficiency and have determined that saved bed days more than meet the cost of the service. Services also generate revenue through Medicare bulk billing of services delivered in outpatient clinics.

Communication

When initiating a new model of care, a communication strategy may be required to engage the range of stakeholders needed to initiate, implement and sustain the model. Consistent messaging about the model of care and its operations delivered through a range of media, can assist to pre-inform and reinforce discussions and communications as the model is established. This was particularly important for the statewide nurse navigator model in Queensland.

Using the evidence to build a case for change

One site stated that there is strong evidence that these approaches to the treatment and management of people living with COPD and CHF work. The promotion of the evidence and the outcomes that can be achieved can help to build local cases for the establishment of models of care.

Regularly capturing and learning from local data

It assists model of care establishment if stakeholders can see the local evidence that the model is having an impact. Building systems to capture local service data relating to the model of care provides both an important promotional tool and an opportunity to implement data driven improvement strategies.

Home visit focus

All exemplar sites agree that services need to be delivered to people living with CHF and COPD in their homes to achieve both person and system-centred outcomes. Some exemplar sites consider home visiting by the clinical team a component of the care delivery framework that is fundamental to program success.

Adaptability

Exemplar sites that seek to deliver effective treatment and support solutions to people living with COPD and CHF need to be flexible and adaptable. This is particularly the case when seeking to deliver or broker solutions that will work in the person’s home.

Profile raising

Initiatives, such as the LBVC program, have assisted to raise the profile of the models of care at the exemplar sites. A number of exemplar sites discussed how earlier iterations of the LBVC program focusses on reducing unwarranted clinical variation to improve outcomes for patients with COPD and CHF. This focus on evidence-based practice raises the profile of these types of models and reinforces their value.

Primary care capacity building

HNELHD identifies primary care capacity building as critical to the delivery of the VHFS. An ongoing partnership and strongly collaborative relationship with primary health underpins the model. The model requires a capable and stable primary health sector that can partner with the service to collaboratively deliver the required treatment interventions.

Build a model with the end outcomes in mind

It is important to be clear about what success looks like and build a change process that will deliver this. Do not try to achieve a full implementation immediately and consider building in a discovery phase to allow refinement over time.

Evidence of success

There is evidence of the impact of the chronic disease models of care, such as those delivered at the exemplar case study sites, on both patient outcomes and hospital performance. The case studies described in this document all seek to replicate and build on the models of care that deliver these outcomes. Sites deliver similar results and have locally available data.

Data is available to demonstrate success at 5/7 sites. The exemplar site case study reports are available in appendices 3-9. This data can also be triangulated to performance data contained in the Bureau of Health Information reports on 30 day readmissions for people living with CHF and COPD and 30 day mortality for people living with CHF and COPD.[82, 83]

Attributes and enablers

Attributes

Based on the evidence and experience of seven exemplar sites, a successful model will have the following attributes.

- Finds potential enrolees in the inpatient setting
- Clear entry and exit criteria
- Nurse led, multidisciplinary team
- Provides care coordination
- Access to CHF and/or COPD clinic and/or specialist expertise routinely available
- Delivers evidence-based, guideline driven clinical care
- Establishes a tailored program that can be adjusted in real time
- Access to cardiac and pulmonary rehabilitation
- Provides home visiting
- Supports self-management
- Improves health literacy
- Supported by virtual care.

Enablers

Based on the evidence and experience of seven exemplar sites, a successful model will have the following enablers.

- Collaborative working relationships with key wards and services in the acute inpatient setting
- Effective collaborative partnerships with primary health providers
- A knowledgeable and energetic clinical champion
- A focus on recruiting and building a knowledgeable and skilled workforce
- Access to a specialist with clinical expertise
- Executive sponsorship and project support
- Access to a funding source
- Capacity to capture and report on local performance and outcome data
- Teaching and building knowledge for hospital and primary healthcare providers.

Opportunities to explore innovative solutions

Creating strong links between NSW Health and the primary health care sector

Most exemplar sites acknowledged that more work was required to support GPs to partner with NSW Health clinicians.

There are significant challenges in equipping the primary health sector to co-deliver care to people living with CHF and COPD in collaboration with NSW Health clinical staff. However, a number of new models are being pioneered that seek to determine appropriate scopes of practice and use new technologies and approaches to build such partnerships. The employment of virtual care, shared care clinics and supportive specialist teams are promising strategies to continue building effective specialist primary health partnerships. Extending this innovatively within the 3Ci model of care is an opportunity that was explored at the expert deliberative workshop.

The role of virtual care

Most exemplar sites recognise that virtual care has a role in their model. The majority strongly reinforce the need for face-to-face care as the core component of care delivery, such as regular home visiting, that cannot be replaced by virtual care.

HNELHD are delivering care using a model where the care coordination components of the service are entirely delivered through virtual care. The face-to-face, home visiting components are delivered by clinical partners in primary and community health who are responsible for the clinical service delivery.

In regional and rural NSW regular home visiting can be challenging, due to large and widely spaced geographical regions. Virtual care provides options to supplement face-to-face home visiting in circumstances where these visits cannot be conducted on the required regular basis. The 2020 experience of COVID-19 taught many exemplar sites that virtual care was a necessary adjunct when home visiting was not an option. These are key learnings to consider in an innovative way for the 3Ci Model of Care and they were explored at the expert deliberative workshop.

Access to specialists with clinical expertise in rural and remote settings

Regular and routine access to a specialist with clinical expertise is highlighted by all sites as necessary to successful implementation. However, in rural and remote settings there is often limited access to senior medical clinicians with expertise in COPD or CHF. This may be a major impediment to successful implementation outside of major urban areas. Therefore, this access will be an important implementation consideration to successfully establish the 3Ci Model of Care in rural and remote settings.

Capturing local person-centred and system-centred outcomes data

There is some routine capture and reporting of service and patient outcome data by exemplar sites. However, in many sites there is an absence of systems or sponsorship to capture and report data on a routine basis. When data is captured it is not possible to disaggregate enrolled from non-enrolled patients.

All sites report that the technical capabilities exist to extract the data required to measure program success in relation to both program performance and patient outcomes. However, the systems and resources need to be established to enable routine capture and reporting.

One exemplar site emphasised the importance of being clear about the value proposition and how it is quantified and demonstrated.

Capturing clinical and system outcomes through data is a key consideration to demonstrate the success of the 3Ci Model of Care which will require ongoing multi-agency collaboration.

Working with Aboriginal, culturally and linguistically diverse and remote communities

Aboriginal and culturally and linguistically diverse and remote communities are often over-represented in the prevalence data for CHF and COPD. Many of the exemplar sites undertake the majority of their case finding in inpatient units. These communities may be less likely to access hospital services or engage with the type of ongoing care that would be provided through the 3Ci or similar models as frequently as other communities.

Most exemplar sites have undertaken activities to engage with these communities. However, most sites sought to adapt existing aspects of their program to deliver an appropriate service for these communities. Innovative design methods like codesign and human centred design may need to be considered for the 3Ci Model of Care to ensure that service design and implementation is optimised to deliver positive results for these communities.

Summary of findings

The exemplar site semi-structured interviews provide important insights for consideration in the development of the 3Ci Model of Care.

There is significant alignment between the exemplar sites. All exemplar sites are delivering guideline-based care for CHF and COPD. This drives a consistent approach to the clinical components of the model of care.

Exemplar sites largely employ the same key components to deliver services through the care framework. The variation observed in relation to the care delivery framework is principally in relation to the organisation and interplay of these components. Appropriately, that variation in design is in response to local community needs and/or conditions. Design variations also reflect specific service capabilities.

In order to achieve the true measure of success in both person and system-centred outcomes within the 3Ci Model of Care, flexibility and adaptability will need to be built into the model. Enabling autonomous decisions about how the care within the model can be organised across locally available services and expertise at the LHD and local site level will facilitate the best experience of care. This will accelerate the delivery of value-based healthcare for people living with CHF and COPD across NSW, leading to better outcomes for people living with these conditions into the future.

Section 3: Crowdsourcing challenge evidence synthesis

Background

Crowdsourcing is an innovative way of engaging external clinicians and consumers to capture knowledge and new ideas.[84] It is a complementary method of evidence generation used to gather evidence to inform the 3Ci Model of Care.

Method

The 3Ci crowdsourcing challenge was conducted from November to mid December 2020. Invitations to participate in the challenge were disseminated through email and the social media platform Twitter to reach broader audiences. Email distribution was through the Cardiac and Respiratory Networks at ACI, which include both health professionals and consumers. Engagement at all levels was fostered using existing established networking relationships of both the Cardiac and Respiratory Network managers. Twitter was used to promote the challenge to broader audiences including nationally and internationally. The crowdsourcing challenge was conducted with the support of the ACI Evidence Generation and Dissemination team using Crowdicity, an online software through Medallia Crowdicity. An analysis of all content shared through the challenge was conducted by the 3Ci project team by theming content around the care delivery framework that emerged from the exemplar sites case study synthesis. The content included individual posts from users and content shared through comments and blogs.

Engagement in the crowdsourcing challenge

Summary of clinical engagement

Clinical engagement in the 3Ci crowdsourcing challenge was broad and spread across:

- cardiac, respiratory and chronic disease professional groups
- NSW and national participants
- medical, nursing and allied health disciplines
- clinicians from metropolitan, regional, rural and remote geographical locations
- clinicians working with cohorts from differing demographic backgrounds with a wide range of social determinants of care.

In total, 66 users joined the challenge, with the majority from NSW (58). Eight users were from other states and territories in Australia. One consumer joined the challenge.

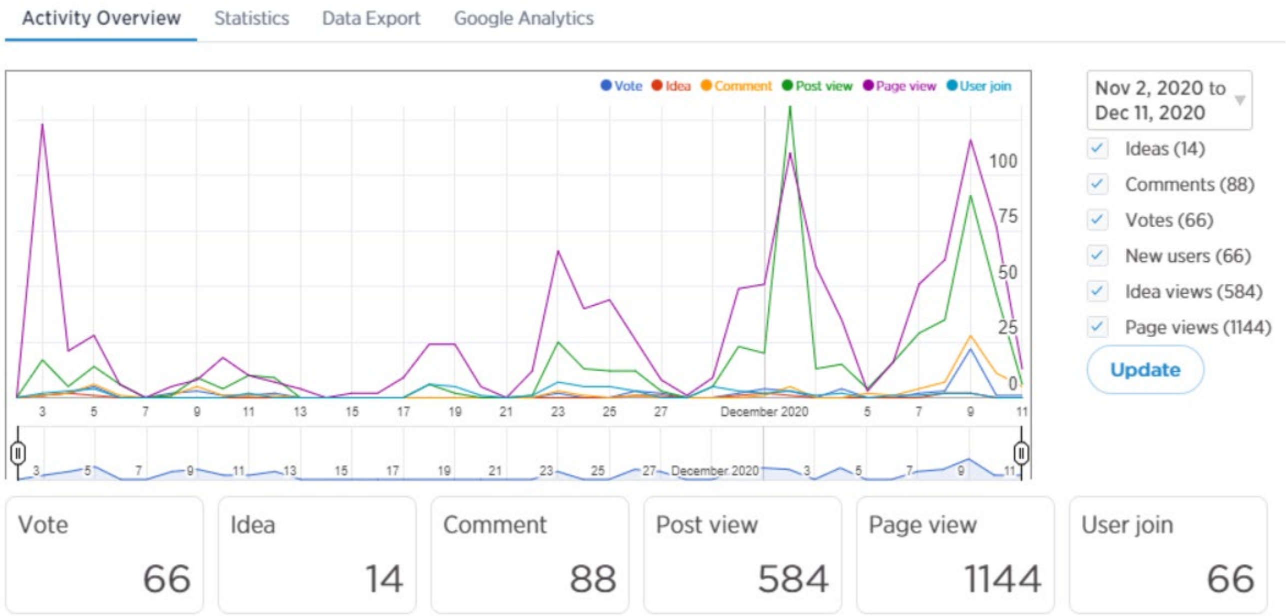
There were international users who attempted to join the challenge. They reflected that the levels of security required to join the Crowdicity platform made it difficult for them to access the challenge and with the difference in time zones they were not able to access support from the ACI team in real time to overcome these difficulties.

3Ci crowdsourcing challenge community analytics

Crowdicity’s data analytics were used to extract data around the activity within the 3Ci crowdsourcing challenge during the time the challenge was open. The data reflects that there was strong engagement from the challenge participants overall.

Community analytics data is outlined in figure 1.

Figure 1: 3Ci crowdsourcing challenge community analytics data



Nov 2, 2020 to Dec 11, 2020

☑ Ideas (14)
☑ Comments (88)
☑ Votes (66)
☑ New users (66)
☑ Idea views (584)
☑ Page views (1144)

Vote	Idea	Comment	Post view	Page view	User join
66	14	88	584	1144	66

Overall, there were four blogs, as well as 14 posts with 88 comments.

In addition to the data presented in the community analytics, it is interesting to note the following.

- Towards the beginning of the challenge, participants were more likely to interact with colleagues already known to them.
- As the challenge reached its mid-way point, more engagement was noticed within professional groups that extended outside of known colleagues. This helped begin to build recorded ideas.
- As the challenge was drawing to a close, interaction had extended beyond professional groups and disciplines. This extended the ideas into exploring innovative solutions across both CHF and COPD disease cohorts.

Common emerging themes

Analysis of the ideas recorded and the interactions that built on them reveal strong emerging themes. These are presented in a structure similar to the case study synthesis for ease of overall evidence synthesis.

Service structure

- When mentioned, referral sources were mostly from the acute inpatient space.
- Staffing levels are described within ideas posted as mainly nursing staff, with varied levels of allied health staffing to support the model of care.

Care delivery framework

- Most models described are hospital based, with a small portion based out of community health services.
- Access to specialist care is described as essential in all 14 ideas posted.
- Cardiac and pulmonary rehabilitation is described within all posted ideas as fundamental and integrated with care delivery.
- Acute inpatient in-reach is considered as essential and reflected within posted ideas as either case finding or to ensure reduction in unwarranted clinical variation.
- All ideas reflect models of care that establish individual person-centred programs for people living with CHF or COPD.
- All ideas describe models of care that are structured around guideline-based care.
- Home visiting is reflected as integral in supporting care across the healthcare continuum within many of the ideas posted.
- Care coordination underpins most models described within posted ideas, and this is reflected as facilitating a reduction in care fragmentation.
- Support for and transition to self-management is reflected as a key outcome within models of care described within posted ideas.
- Care delivery is able to be adjusted in real time so that clinicians can respond to deliver or organise a clinical intervention to treat an exacerbation earlier in its trajectory in order to prevent hospitalisations. This is considered fundamental within all posted ideas.
- Engagement with the primary healthcare sector is reflected in most posted ideas to provide more seamless care across the care continuum.
- Data collection and review of both person-centred and system-centred outcomes data is evident within all posted ideas, with most reflecting success in relation to both of these measures.

Clinical components

- Clinical components reflected across ideas posted are strongly themed around evidence-based, guideline concordant care. This is described across diagnostics, exacerbation management, and ongoing care management post-discharge.
- Appropriate and timely end of life care is emphasised within posted ideas as key in preventing unnecessary hospital admissions, with many reflecting that accessing palliative care services for people living with chronic diseases like CHF and COPD is challenging.

Implementation

Some key common elements to ensure implementation success were recorded within the 14 ideas posted.

- Establishing strong collaborative partnerships across care delivery settings.
- Having champions for models of care at both the clinical and executive sponsorship level.
- Planning to develop a workforce that can continue to support the model of care across time, including upskilling and mentoring more junior staff.
- Supportive executive sponsorship is described as essential to establishing, developing and embedding new models of care.
- Using evidence to create the case for change is clearly important to creating new models of care.
- Capturing and learning from local data is key in developing models of care, and in initiating quality improvement activities, including innovative projects and solutions outside of the box for people living with CHF and COPD.
- Establishing strong links with primary care and supporting GPs and practice nurses with some of the more specialist nuances of caring for people living with CHF and COPD are fundamental to support successful care across the care continuum.

Evidence of success

All models described within the 14 ideas were able to demonstrate their success. Data reflecting this success were described within four major categories:

- clinical outcome measures
- patient-reported measures
- system-centred measures (most particularly reduction in readmission rates)
- cost saving measures.

Attributes and enablers

The main attributes of models of care reflected within the 14 posted ideas were:

- person-centred care
- access to a multidisciplinary team structure
- care coordination to provide a seamless transition of care across care settings
- ability to provide or organise rapid clinical interventions in the event of a deterioration in condition or acute exacerbation in order to prevent hospitalisation
- improving health literacy is built into models of care, including both disease and self-management education, as well as developing the ability of people living with CHF and COPD to navigate an increasingly complex healthcare system.

Enablers of success reflected within the 14 posted ideas were:

- secure or ongoing funding to ensure adequate resource provision
- proactive and supportive executive sponsorship
- models of care delivered by clinically experienced staff
- models that are able to establish strong collaborative partnerships across clinical teams and care delivery settings in order to reduce care fragmentation.

Story of a person living with COPD

Russell Winwood, a person living with COPD, joined the 3Ci crowdsourcing challenge to share what is important to successful care across the patient journey for a person living with COPD. Russell describes these as the four pillars of wellness.

- Medication
- Exercise
- Knowledge and information to enable self-management
- Strong partnerships with care providers, including GPs and respiratory specialists.

It is interesting to note that these pillars are strongly aligned to both the principles of the 3Ci Model of Care, and the common emerging care delivery framework and clinical components of care.

Opportunities to explore innovative solutions

All 14 ideas posted were common in the gaps in service provision or reflected areas where system barriers represent opportunities for innovation. The three common emerging opportunities are:

- challenges in creating strong links between the acute care sector and the primary care sector due to the system barriers across these two sectors
- the role of virtual care, where large variances in adoption of this style of care are reflected
- data collection, where it is reflected that collecting data is vital to demonstrate success, but this was time consuming and sometimes difficult for clinicians to access. Lack of available real time data to inform clinical decision making across the healthcare continuum is a common frustration discussed throughout the 3Ci crowdsourcing challenge.

Summary of findings

The 3Ci crowdsourcing challenge provided important insights to take forward for consideration in the development of the 3Ci Model of Care.

There is strong commonality across emerging themes contained within all 14 ideas posted. All clinicians reflected a commitment to delivering guideline-based care for people living with CHF and COPD. This drives a consistent approach to the clinical components of the model of care that emerged from the 14 ideas.

All 14 ideas and extensions to these largely employed the same key components to deliver services through a commonly constructed care delivery framework. Any variation is principally in relation to the organisation and interplay of those components, which is driven by local community needs and/or conditions.

In order to achieve the true measure of success in both person and system-centred outcomes within the 3Ci Model of Care, ideas posted reflected that innovative solutions will be need to be developed within the model to address commonly identified challenges being experienced broadly across the clinical community delivering care to people living with CHF and COPD.

Section 4: Overview of key components

Across the rapid evidence review, the case study synthesis and the crowdsourcing challenge, key components for inclusion in the 3Ci Model of Care were identified. These are summarised in table 5, with a key reflecting whether the component was demonstrated within each form of evidence gathered.

Table 5: Overview of the key components of the care delivery framework

Key component	Literature review	Exemplar case studies	Crowdsourcing data
Nurse led	Mostly seen	Mostly seen	Mostly seen
Multidisciplinary care delivery	Mostly seen	Mostly seen	Mostly seen
LHD based	Sometimes seen	Mostly seen	Mostly seen
Access to CHF and/or COPD clinics	Mostly seen	Mostly seen	Mostly seen
Specialist physician expertise routinely available	Mostly seen	Mostly seen	Mostly seen
Integrated partnerships with cardiac and pulmonary rehabilitation	Mostly seen	Mostly seen	Mostly seen
Five day/week service	Rarely seen	Mostly seen	Sometimes seen
Acute inpatient in-reach	Sometimes seen	Mostly seen	🟩
Defined entry and exit criteria	Sometimes seen	Mostly seen	Sometimes seen
Established a tailored program	Mostly seen	Mostly seen	Mostly seen
Delivers guideline-based care	Mostly seen	Mostly seen	Mostly seen
Provides home visiting	Sometimes seen	Mostly seen	Sometimes seen
Enabled by virtual care	Sometimes seen	Sometimes seen	Sometimes seen
Provides care coordination	Mostly seen	Mostly seen	Mostly seen
Supports self-management for people living with CHF or COPD	Sometimes seen	Mostly seen	Mostly seen
Can adjust program in real time	Rarely seen	Mostly seen	Mostly seen
Consultation liaison service	Sometimes seen	Mostly seen	Rarely seen
Proactive engagement with primary health sector	Rarely seen	Sometimes seen	Mostly seen
Outcome data routinely collected and reported	Sometimes seen	Sometimes seen	Mostly seen
Service system data routinely collected and reported	Rarely seen	Sometimes seen	Sometimes seen

Section 5: Opportunities to explore innovative solutions

Across the rapid evidence review, the case study synthesis and the crowdsourcing challenge, three key opportunities for innovation emerged that required further input from expert clinicians and service managers around their inclusion in the 3Ci model of care. These deliberations took place at the 3Ci model of care deliberative workshop and consensus achieved on these components is detailed in section 6 of this report.

The role of virtual care for people living with CHF and COPD

All the exemplar site case studies demonstrated that virtual care can be one method of care delivery for people living with CHF and COPD. The degree to which it was employed at each site is highly variable. This ranges from using virtual care in a very select cohort of patients for whom it is deemed suitable, to a model that relies on virtual care as its only means of care delivery. The rapid evidence review demonstrates an emerging evidence base around the use of virtual care. The crowdsourcing challenge revealed that for the most part, clinicians are not confident that virtual care can be the main method of care delivery for people living with CHF and COPD.

However, all forms of evidence reflect that the current COVID-19 pandemic has necessitated an increased reliance on virtual care for care delivery. This increased engagement with virtual care provides a timely opportunity for the consideration of extending innovation in this area within the 3Ci Model of Care. This could be as a direct method of care delivery, or in a supportive function that brings clinical expertise to rural and remote sites to enable the delivery of specialist care to isolated communities. There may even be a role for virtual care to strengthen links between NSW Health and the primary healthcare sector for people living with CHF and COPD to reduce care fragmentation.

Creating strong links between NSW Health and the primary care sector

Exemplar site case studies demonstrate that links between clinical teams within NSW Health delivering care for people living with CHF and COPD and their primary healthcare providers is essential for reducing care fragmentation and improving outcomes. Most sites expressed that the reality of achieving this is fraught with challenges often created by the system barriers that naturally occur when traversing state-based and federally governed healthcare sectors. Only one exemplar site is able to achieve continued success in this regard, though it relies on a very stable primary care base that may not exist within other LHDs across the state.

The rapid evidence review indicates that strong links with primary care are essential for improved outcomes, but evidence on how this might be achieved with success is emerging at best.

The crowdsourcing challenge demonstrated that while local sites can achieve some links with primary care through localised knowledge and establishing of strong partnerships, it also reflected that the system barriers between state and federal are a challenge that limits success.

The ongoing imperative to establish strong links between NSW Health and the primary care sector is highly evident across the ACI's Cardiac and Respiratory Network clinicians who care for people living with CHF and COPD. The challenges of traversing state and federal systems to establish these links might lend themselves to innovative solutions to achieve this end goal. Options to consider might include case conferencing models, used in the context of other chronic diseases, and the use of virtual care to create a joint working space between NSW Health clinicians and primary care providers. The input of people living with CHF and COPD and their peak representative consumer bodies to develop solutions in this space will be valuable to solution design.

Capturing and learning from local data

All the exemplar site case studies, the rapid evidence review, and the crowdsourcing challenge demonstrated that capturing and learning from local data is imperative to demonstrating success and informing decision making both at the clinical and service delivery level. However, all forms of evidence suggested that significant challenges to this exist. This is either due to lack of automated data capture necessitating the need for clinicians to manually collect data (impacting on their available time to deliver clinical care), or lack of access to teams within LHDs that can assist with data extraction.

Some exemplar case study sites and crowdsourcing challenge participants have robust processes in place for regular clinical and service data review. Others either do not, or only have the opportunity on a once off basis when data capture is supported by a team within the LHD capable of extracting data in response to a specific request.

Innovation may play a role to effect solutions, as might robust systems of data review at a statewide level within the ACI Cardiac and Respiratory Networks. However, it is worth noting that as data extraction to inform clinical and service level decision making has been identified as a system problem across all LBVC initiatives within NSW Health, there are system-wide solutions under development that will support clinicians with future data extraction. Such systems will form a crucial component of the data reporting and review framework needed to demonstrate the success of the 3Ci Model of Care.

Section 6: Deliberative workshop

Background to the 3Ci Model of Care deliberative workshop

The evidence gathered from the rapid evidence review, the exemplar case study synthesis and the crowdsourcing challenge identified key components for inclusion in the 3Ci model of care, as summarised in table 5 in section 4 of this report.

The exemplar site case study synthesis differentiates between the *clinical components of care* which are the most efficacious clinical interventions, and the *care delivery framework* which is how the delivery of the clinical components could be structured within a framework across the healthcare continuum.

There is overwhelming consensus that the delivery of clinical components should continue to be guided by current Australian guidelines for CHF and COPD.[80, 81] This was confirmed by the taskforce.

The strength of evidence from the exemplar sites supporting *how* the delivery of care could be structured ranges from emerging to peer-reviewed. To develop expert consensus around the care delivery components where the evidence was not clear, a 3Ci Model of Care deliberative workshop was convened on 15 January 2021.

Deliberative workshop methodology

The 3Ci Model of Care deliberative workshop was held virtually using the Microsoft Teams meeting platform due to COVID-19 restrictions in place at the time. Twenty-three clinical experts and health system managers with expertise in the management of CHF and/or COPD and service delivery participated, supported by staff from ACI.

To achieve clarity and a strong sense of direction, the workshop employed a deliberative process using small groups, polling and plenary sessions to drive consensus. The Microsoft Teams chat function was used to encourage discussions within the meeting and collect detailed commentary.

The taskforce agreed that the focus of the workshop should be on the components documented in the care delivery framework that required further development. These were components that were supported by emerging evidence, where application to the NSW context required more detailed consideration.

Workshop participants were asked to reflect on the information included in sections 1 to 5 of this report and identify components that needed further exploration in the first session of the workshop. The following care delivery components were identified as requiring exploration and deliberation.

- The delivery of multidisciplinary care
- Care coordination of clinical services
- Integrated partnerships with cardiac and pulmonary rehabilitation
- The routine collection and reporting of outcome data.

In addition, the taskforce nominated two care delivery components for discussion within sessions two and three.

- Identifying how virtual care can be used effectively and incorporated in the model
- Identifying how GP and primary care engagement with the model can be increased.

Confirmation of the emerging framework for the 3Ci Model of Care

The workshop introductory presentations outlined the list of care delivery components identified in the 3Ci evidence report which had been endorsed by the taskforce. This was presented in the context of an emerging framework for the proposed 3Ci Model of Care. Participants were asked to comment on or raise concerns about the list of components being used as a foundation for the model. Discussion was focused on acceptance of the list.

No dissenting views were expressed in the small groups, the plenary sessions or the chat room discussions in relation to the evidence report's findings regarding the care delivery components.

Care delivery components requiring further development

Four breakout groups explored the care delivery components requiring further development that were identified in a pre-workshop poll. Each group identified important themes that fed into five key statements for deliberation within the plenary discussion to drive consensus on how the component could be incorporated within the 3Ci Model of Care.

Group 1: Multidisciplinary care

Breakout group one explored multidisciplinary care. They made recommendations on what needed to be considered in order to incorporate multidisciplinary care into the 3Ci Model of Care and reported a number of themes to the plenary.

> *People living with CHF and COPD are likely to need interventions delivered by various health professionals. They will have multiple service contacts in primary, community and acute settings.*
>
> *In settings such as residential aged care facilities, the local staff are not qualified to deliver the required specialist team care. In these circumstances, effective care delivered by a multidisciplinary team is imperative. It is important to include a multidisciplinary approach across all healthcare settings.*

Defining multidisciplinary care

It is important to define what is meant by multidisciplinary care to ensure that the right healthcare professionals are involved at the right time. Multidisciplinary care refers to the contribution of various health professionals of differing healthcare expertise, based on the person's clinical and social needs. In the best scenarios, these health professionals operate as a team, whether formally or informally, to deliver the required care. Specialist input and membership of the multidisciplinary care team is critical to ensure that the care delivered is underpinned by CHF and COPD evidence-based guidelines.

Shared care planning is crucial to success

Shared care planning is the key to the successful delivery of multidisciplinary care. Yet there is often a significant disconnect between clinical care delivered by acute and primary care services. Facilitating open and reciprocal communication provides an opportunity to bridge this gap. A comprehensive shared care planning process is required to develop an effective care plan.

Timely access to care

Timely access to care is important when there is an exacerbation of symptoms. A common shared care plan, including actions to be taken when exacerbations occur, ensure that people living with CHF and COPD have access to the right care at the right time and in the right place.

The importance of understanding social determinants of care

Understanding the person’s home environment is critical to delivering effective person-centred care. Home visits identify aspects of a person’s living situation that may contribute to an exacerbation of symptoms. To deliver truly person-centred care that addresses factors that contribute to poor health outcomes or exacerbation of symptoms, multidisciplinary care will often include social prescribing and/or social care providers (such as human services agencies and support from non-government organisations). An effective response often requires including informal teams comprising care providers from other health and social disciplines wrapping around the person in a coordinated fashion.

Plenary deliberative polling

Workshop participants used deliberative polling to rank five factors to consider when incorporating multidisciplinary care into the model of care. Following polling, these factors were ranked as listed.

1. Open and reciprocal communication is needed between multidisciplinary care providers. It is critical to bridging the gap between acute services and primary care.
2. A coherent shared care planning process is the foundation of quality multidisciplinary care. The process should deliver an effective shared care plan that is a useful, workable document for communication and guiding actions within the multidisciplinary team.
3. Improving timely access to multidisciplinary care is critical.
4. A clear definition of multidisciplinary care is essential.
5. Multidisciplinary care must include social prescribing to provide truly person-centred care.

The plenary discussion confirmed the key points made by group one. There were no amendments recommended in relation to the five considerations to incorporating multidisciplinary care into the 3Ci model.

Group 2: Care coordination of clinical services

Breakout group two explored the issue of care coordination across acute, primary and community settings. They made recommendations on what needed to be considered in order to incorporate this care delivery component into the 3Ci Model of Care and reported a number of themes to the plenary.

> *For many people living with CHF and COPD, their journey between services and across settings is highly complex. We know, for example, that the transition from hospital to home, and transfer of care to the primary sector, is not seamless. Any model that seeks to improve the clinical care experience and outcomes should help people living with CHF and COPD to effectively navigate that potentially complex journey. Care coordination is needed to improve the health care journey across the care continuum.*

Links across the healthcare continuum need a system-based solution

The development of a 3Ci Model of Care presents opportunities to help people living with CHF and COPD navigate and coordinate services. The burden of making links between acute, primary and community care systems needs to shift from the person living with CHF or COPD to a system solution. When people living with CHF or COPD are admitted to acute care, the clinical care delivered to that person from that point onwards should be characterised by care coordination, with communication and collaboration links significantly strengthened. It is important to involve GP practices early on. They may not recognise the value they can add through coordination of services to enhance the provision of care. Care coordination needs to align with GP business models using collaborative approaches that clearly define the roles of primary health and other clinical care providers. It is important to routinely promote coordination of services to GP practices to maintain their involvement.

Knowledge of the different services that are available locally is critical

Effective care coordination will improve the clinicians understanding of how different services work together. This knowledge enables care coordination services to assist people to navigate and access those services. Applied local knowledge is often not available to specialists or GPs. Consequently, dedicated care coordination services that can navigate, access and leverage this information are required.

Timely, clear and accountable communication is essential

Consistent, effective communication between the person's specialists and general practitioners is important, however, solutions are challenging due to the complexities of the health system. Nevertheless, there are opportunities for improvement of information transfer between acute services and primary care. Clinicians in the primary health sector are not always cognisant of what hospital-based clinicians expect when a person is discharged into the community. Conversely, specialists may not be informed of an exacerbation of symptoms until the person is acutely ill. Systems of information transfer can be improved in terms of the content in key documents, such as discharge summaries, as well as better channels to deliver information, such as exploring electronic communication formats.

The importance of health system navigation

Evidence shows that a key clinician needs to act as a system navigator, with nurse led models being one solution to the issue of timely, clear and accountable care coordination. Although less well documented, there is no reason to assume that other similarly experienced clinicians (from allied health or other disciplines) could not achieve similar results in relation to coordination of clinical services. Navigators work most effectively when they have significant clinical knowledge and experience. They have a critical role to play in building the health literacy of people living with CHF or COPD and the broader health system.

Plenary deliberative polling

Workshop participants used deliberative polling to rank five factors to consider when incorporating care coordination of clinical services into the model of care. Following polling, these factors were ranked as listed.

1. Communication and collaborative links across all sectors providing care to people living with CHF and COPD need to be significantly strengthened for that care to be coordinated well.
2. The burden of making links between acute, primary and community care needs to shift from the people living with CHF or COPD to a system solution.
3. Systems of information transfer needs improvement in content and timeliness.
4. It is essential to know what services are available locally, and the context in which those services operate.
5. Models of care using system navigators need to build the health literacy of people living with CHF or COPD and the broader health system.

The plenary discussion confirmed the key points made by group two. There were no amendments recommended in relation to the five considerations for incorporating coordination of clinical services into the 3Ci model.

Group 3: Outcome data routinely collected and reported

Breakout group three explored the issue of the routine collection and reporting of data. They made recommendations on what needed to be considered in order to incorporate this care delivery component into the 3Ci Model of Care and reported the following themes to the plenary.

> *The collection, analysis and reporting of outcome data supports value-based healthcare and enables clinical care improvement. Health service delivery systems are becoming more sophisticated and complex. Accordingly, the collection and analysis of outcome data needs to be well designed and supported. Data needs to be recognised as useful to collect, report on and use for improvement purposes. It should be of benefit to the system, the clinician and people living with CHF or COPD.*

Clinician driven data collection is time consuming and complex

Many clinicians identified that a significant amount of time can be spent collecting data, which takes them away from delivering clinical care. Frequently clinicians are unable to access the data they have collected. When data is made available, it often relates to system key performance indicators. While such data is important to reflect on system performance, it is not always directly relevant to optimising the delivery of clinical care. Clinicians need to be confident that data will be used to drive improvements in the system, including the delivery of clinical care. To promote the benefits of data reporting we need to build a positive culture of continuous quality improvement.

Data should be relevant, meaningful and accessible to clinical care providers

Clinicians are more likely to support data collection that has clear clinical value and utility, relevance to clinical care and service provision, relates directly to clinical assessment or management, and can be benchmarked against other areas. NSW Health should work towards automated data collection which is routinely reviewed and used to support clinical activity. Sufficient local resources, skills and expertise are required to ensure that data has genuine utility for quality improvement activities. Promoting and articulating the benefits of outcome measurement and reporting to staff who are collecting the data will help to normalise and ultimately embed data collection as part of routine clinical practice.

Work is needed to link data across the health care continuum

It is important to work towards improved data accessibility across all health system settings (acute, community and primary health) to enable monitoring of outcomes across the whole healthcare journey. This can be technically challenging because of the range of information technology systems across LHDs and the broader health system. Routine data collection and reporting across public and private practice may also raise cultural, privacy and confidentiality concerns in the NSW population. An example of emerging convergence in connected data collection across settings are patient reported outcome and experience measures. These tools are acceptable and workable in many general practices. The same outcome tools are often also deployed in acute and community settings. The scope of the outcome data collected for the 3Ci model needs to be carefully considered to ensure it is realistic given the data constraints and issues currently experienced in the system.

Plenary deliberative polling

Workshop participants used deliberative polling to rank five factors to consider when incorporating routine collection and reporting of outcome data into the model of care. Following polling, these factors were ranked as listed.

1. Data collection should be relevant and meaningful to clinical care and service provision.
2. The analysis and interpretation of data needs to be accessible and visible to clinicians.
3. Data collection should be continuous across the health system so the healthcare journey can be monitored to streamline care.
4. Data collection strategies need to incorporate patient reported measures.

5. Acceptability of data collection across public and private practice must be explored in terms of the technical and cultural issues it encompasses.

The plenary discussion confirmed the key points made by group three. There were no amendments recommended in relation to the five considerations for incorporating the collection and reporting of routine outcome data into the 3Ci model.

Group 4: Integrated partnerships with cardiac and pulmonary rehabilitation

Breakout group four explored the role of integrated partnership approaches to the delivery of cardiac and pulmonary rehabilitation. They made recommendations on what needed to be considered in order to incorporate this care delivery component into the 3Ci Model of Care and reported the following themes to the plenary.

> *Rehabilitation has a significant role to play in the treatment of CHF and COPD. As we aim to deliver more person-centred services, it is important to consider how rehabilitation services can be better delivered to people living with these conditions. Key to this aim is consideration of how multidisciplinary partnerships can be put in place to achieve better outcomes, improved quality of life and adherence to treatment. The interdisciplinary nature of rehabilitation and the collaborative aspects of the 3Ci Model of Care provide opportunities for enhanced integration across the healthcare journey.*

Barriers to accessing rehabilitation programs need to be considered

There are many barriers for people living with CHF and COPD to successfully participate in rehabilitation programs. Many people living with CHF or COPD have comorbidities such as frailty, or other chronic physical or mental health conditions. Some people fail to attend because they are very ill, and their condition is unstable. Language barriers may discourage others from participating in programs.

The approach to rehabilitation needs to be multidisciplinary and interdisciplinary

The 3Ci model provides an opportunity to improve access to rehabilitation for people living with CHF and COPD. The availability of a shared care plan supported by dedicated care coordination may help improve participation and adherence to an exercise prescription.

Referral to rehabilitation from a 3Ci service should be appropriately timed

For people living with CHF and COPD, often the first time they are referred to rehabilitation is after a hospital admission for an acute exacerbation of symptoms. It may be more difficult for people to engage with exercise and educational sessions when they are acutely unwell, compared with when their symptoms are stable. Timely referrals earlier in the healthcare journey may lead to improved outcomes.

The 3Ci Model of Care should increase understanding of the value of rehabilitation

It is important for the 3Ci model to help primary care to understand the value of pulmonary and cardiac rehabilitation. Working with primary care will assist GPs to know how to access high quality cardiac and pulmonary rehabilitation. If this is successful, cardiac and pulmonary rehabilitation services are likely to receive referrals for a broader range of people living with CHF and COPD much earlier in their disease trajectory.

People living with CHF and COPD should be referred to the most appropriate type of rehabilitation

Recognising the different needs of people who may potentially access and benefit from cardiac, heart failure specific or pulmonary rehabilitation is important. There was consensus that most people living with CHF and COPD will benefit from an individualised exercise prescription. The needs of people in different disease groups may vary to the extent that they should ideally access separate rehabilitation services. Clinicians need to refer people to the type of rehabilitation that is best suited to the individuals assessed needs.

Plenary deliberative polling

Workshop participants used deliberative polling to rank five factors to consider when incorporating integrated partnerships with cardiac and pulmonary rehabilitation into the model of care. Following polling, these factors were ranked as listed.

1. An interdisciplinary and multidisciplinary approach to referring people to rehabilitation and supporting compliance will deliver better outcomes.
2. Supporting the primary care sector to understand the value of early referral to pulmonary and cardiac rehabilitation is important.
3. A single entry point for all rehabilitation referrals may be more efficient.
4. Delineation between pulmonary and cardiac rehabilitation and determining where CHF sits needs to be considered.
5. Cardiac and pulmonary rehabilitation needs to be tailored to an individual’s needs in the context of available resources.

The plenary discussion confirmed the key points made by group four. There were no amendments recommended in relation to the five considerations to incorporating integrated partnerships with cardiac and pulmonary rehabilitation into the 3Ci model.

Virtual care

Four breakout groups explored the role of using virtual care. A plenary session identified important themes to be considered when incorporating this care delivery component into the 3Ci Model of Care.

> *The use of virtual care is an emerging clinical care approach. Digital approaches to clinical care received additional attention during the COVID-19 pandemic. However, it is also a highly contested arena of healthcare delivery. There is debate about when, where and how*

digital technology should be used to achieve better outcomes for people living with CHF or COPD, and where such approaches are not appropriate.

A clear definition of what virtual care means is essential

Virtual care may refer to phone communication, video conference, a multidisciplinary meeting via phone or video or transmitting clinical data from the point of testing to a specialist in another location. Each modality has a different function and varying implications (including risks) in relation to the person and the clinical conditions being treated. All these modalities have value and will likely enhance the delivery of the 3Ci model if they are clearly defined and described.

The use of virtual care should be flexible, person-centred and context specific

Virtual care can be a useful tool when it clearly contributes to the continuity of care and is used with people who are well known to the clinician. It is very important that virtual care interventions are only targeted to people who are amenable to their use. Additionally, it is important that the clinician consider other factors, such as the person’s ability to effectively operate and interact with virtual care. Some people have cognitive impairment and may not be capable of using the required technology and others find the use of technology difficult and stressful. Limited access to digital technology may impede the use of virtual care.

Virtual care cannot replace home visiting

The development of effective shared care plans and care coordination often relies on visiting people living with CHF or COPD in their home environment. Initial engagement with people at home assists in assessment of living conditions and identifies any challenges that impact on care. Virtual care does not provide the same opportunities to observe and work with the person in their living environment. It may also limit the clinician’s capacity to make effective environmental assessments. Face-to-face visits provide the opportunity to support people to effectively manage equipment or practice prescribed exercise programs.

There are opportunities to be gained from using virtual care

There are many circumstances where virtual care is likely to expand and enhance the services that can be delivered by the 3Ci model. For example, when it allows specialist services to reach more people. People living in residential aged care facilities with CHF or COPD have been followed up with virtual care which has been successful because when a nurse is present during the consultation, there is a guarantee that the outcomes of the consultation will be followed-up.

Virtual care is useful for people living in rural and remote settings

People living in rural and remote settings often have limited access to specialist care in a timely fashion as there are fewer local specialists. People may delay seeking care until their symptoms are severe. Integrating multidisciplinary shared care approaches with digital delivery could make access to care more equitable. Specialist virtual care consults can work well for consultations where the person is sitting with their GP, or where a health practitioner is present in the home to enable the use of specialist equipment to provide real time reporting of a person’s condition direct to a specialist. This has been used successfully to identify and manage symptom exacerbation early.

Assessment of care needs and local capabilities should underpin the use of virtual care

Guidance should be developed on when and where virtual care should be employed and for which types of people needing clinical care for CHF and COPD. It is important to complete a risk assessment to determine whether it is appropriate to use virtual care.

The availability of resources and technical support is critical to the safe and effective use of virtual care

Clinicians often don't have the time or skills to troubleshoot technical problems as they emerge. It is critical to provide support for clinicians in their work setting to ensure that the technology supports clinically safe interventions. The support needs to include dedicated staff with specific skills in the use of information technology enabled services. It is also important to consider how services support people living with CHF or COPD in relation to their home set-up, and the safe use of virtual care devices.

Plenary deliberative polling

Workshop participants used deliberative polling to rank factors to consider when incorporating virtual care into the model of care. Following polling, these factors were ranked as listed.

1. Decisions to use virtual care should be led by the needs and requirements of people living with CHF or COPD.
2. Virtual care should be flexible and context specific to meet the needs of services as well as people living with CHF and COPD.
3. Virtual care assessment is often not as effective as a face-to-face assessment. It is an adjunct rather than a replacement for a face-to-face assessment.
4. Hybrid models can work well, combining face-to-face and virtual delivery of care.
5. Equitable access to virtual care should be a universal goal.
6. Using virtual care for case conferences with the team members bolsters the team approach.
7. People living with CHF and COPD and clinicians need technical support to reliably use video consultations.
8. Virtual care has a significant place across metropolitan areas and large rural and regional geographical areas.
9. The costs of providing virtual care should be properly understood, including the additional training and equipment required.
10. Symptom monitoring using virtual care can be very effective to pick up early exacerbations.
11. Careful patient selection is critical. The 3Ci model needs to define the populations who will benefit from virtual care and detail the health outcomes that will be achieved.

12. The integration of virtual care into the delivery of care for people living with chronic conditions should be encouraged and supported.
13. A supportive environment is required as telemonitoring can increase anxiety and stress.
14. It is important to clearly define virtual care and the modalities that are available locally.
15. Using virtual care delivers tangible benefits to people living with CHF and COPD living in rural locations.
16. The benefits of technology should be capitalised to enable real-time reporting.
17. Visibility is key to enable observational assessments, rather than telephone self-reporting by individuals to clinicians. Virtual care is enhanced when the clinician can see and hear the person.

The plenary discussion confirmed the key points made by the groups. There were no amendments recommended in relation to the considerations needed to incorporate virtual care into the 3Ci model.

The following themes were emphasised in the plenary session.

- The decision to use virtual care must follow a thorough assessment of the needs and capabilities of the person living with CHF or COPD.
- Virtual care could be an important and useful tool for delivering clinical care. It may provide the opportunity to deliver care to people who would not otherwise receive it.
- A one size fits all approach will not work. In many contexts, virtual care may not be appropriate and may disrupt the continuity of care.
- Assessing and understanding people and their environments by meeting with them face-to-face is critical to providing care, particularly for the initial assessment and transfer of care phases.

Links with NSW Health and the primary care sector

Four breakout groups explored the role of links between NSW Health and the primary care sector. A plenary session identified important themes to be considered when incorporating this care delivery component into the 3Ci Model of Care.

> *The delivery of person-centred care across the care continuum requires collaboration between the acute and primary care sectors. Collaboration has structural, technological, cultural and interpersonal elements and challenges.*

System drivers make linking NSW Health and primary care challenging

There are a range of system challenges related to managing chronic conditions across the healthcare continuum. State and commonwealth systems do not integrate easily, health boundaries do not always align, government funding and service reforms differ, and sometimes, compete or duplicate. Most of these challenges impact all programs that seek to integrate care.

The 3Ci model cannot solve the longstanding system challenges. However, it can identify strategies to build effective collaboration to mitigate some of these challenges.

Service provider roles and responsibilities need to be clearly understood

Building effective links between LHDs and primary care in support of the 3Ci model requires a clearly defined understanding of the roles of different service providers. GP engagement is absolutely crucial however, we need to consider different general practice business models. This can drive very different general practice responses to approaches from LHDs for partnerships. For example, a challenge in rural settings is the itinerant locum population of GPs who often only work in a community for 12 months. GPs that live permanently in rural areas know how to link to local resources, however, building relationships and effective communication systems with a revolving population of GPs in rural areas can be very difficult.

Established tools can be enablers

Using tools such as *HealthPathways* can be a useful way to link hospital and community across the continuum of care.[85] Such approaches help to build shared understanding in relation to the entry and exit criteria of different services. That information can be negotiated and owned by GPs and acute care services. Maintaining the currency of that knowledge takes significant effort as local health environments continuously change**.**

Disconnected digital platforms need innovative solutions

It is difficult to progress better alignment of digital platforms and information services between LHDs and primary care. Noting those challenges, several local settings have brokered solutions such as transfer of discharge summaries to My Health Record, prioritisation of discharge summaries for transfer to GPs, and building communication mechanisms to support local health pathways.

Bi-directional communication is essential

To develop effective collaborative relationships the flow of information in both directions is essential. Using a strengths-based approach, rather than a problem-based approach, is also important to building local collaboration. For example, one of the key strengths of primary care providers is the diversity of knowledge. The model should facilitate using these strengths to increase relationships and trust between primary care providers and LHDs.

Cultural change is needed to foster partnerships

Experience with other partnership programs indicates that cultural change requires a sustained effort over a long period of time. A large part of effective collaboration relates to cultural, rather than technical aspects. The model should strike a balance between a whole-of-system solution, for example more timely discharge summaries and supporting GP education, and what is needed at the local level to encourage engagement with the 3Ci model. Key collaborative actions could include:

- GP involvement in the model development

- a culture of working together to establish strong working relationships
- clear and shared understanding of local roles, responsibilities and expectations to establish a collaborative approach
- partnering to develop local implementation solutions.

Plenary deliberative polling

Workshop participants used deliberative polling to rank factors to consider when incorporating links with NSW Health and the primary care sector into the model of care. Following polling, these factors were ranked as listed.

1. Information technology issues are a major barrier to sharing information. There may be other technology-based solutions to enhance cross-sector communication, however, they will need significant long-term resourcing to be developed.
2. Invest in cultural change strategies to re-establish relationships between general practice and LHDs.
3. Establish collaborative relationships to enable a reciprocal dialogue about care using communication and technology.
4. Work together locally to develop discharge summaries that have content that GPs can act on. Timely delivery of discharge summaries will lead to improved outcomes.
5. Establish clear pathways for care. Consider functional, clinical integration and communications components.
6. Clarify the roles and responsibility of the teams across the healthcare journey.
7. Build local working models that support integration and are context-specific to services.
8. Build local relationships and support them with formal partnership agreements.
9. Provide GPs with a single point of access for referrals.
10. Consider which governance systems are required to support shared care.
11. Seek to deliver specialist allied health services within the primary health environment.
12. Strengths based approach will be more successful than a problem-based approach.
13. Periodic joint consultations across both sectors would be useful and should be promoted.
14. Identify opportunities locally and at a system level to establish shared data sets.
15. Integration across acute and primary healthcare is vitally important for improving outcomes.
16. Work with primary health networks to build local and regional collaborative strategies to engage with GPs.
17. Overlay and align the 3Ci model with GP care coordination models where appropriate and achievable.
18. The model needs to consider the engagement challenges of locum GP workforces and how best to enhance continuity of care.

19. Outreach to GPs works best when targeted and underpinned by local interpersonal relationships.
20. Identify educational opportunities to help build partnerships.

The plenary discussion confirmed the key points made by the groups. There were no amendments recommended in relation to the considerations needed to incorporate links with NSW Health and the primary care sector into the 3Ci model.

The following themes were emphasised in the plenary session.

- Identifying mechanisms or systems to support good communications and referrals between hospitals and primary care will greatly assist the creation of stronger links.
- Successful integration is often local and personal. There needs to be a local focus on building relationships, skills and capacity.
- It is important to keep learning about the challenges of collaboration from the GP perspective, understand what has and hasn't worked in the past and how to use implementation science to support change.
- Executive sponsorship and support for collaboration is essential.

Workshop evaluation

There was a high degree of energy, enthusiasm and participation in the workshop. The motivation to contribute to the work needed to build a model of care was very evident.

An online evaluation was conducted following the workshop. Take up of the evaluation was high, with 17 of the 23 participants providing feedback.

Participant responses were overwhelmingly positive. This is particularly noteworthy given the workshop was originally designed to be delivered face-to-face. A pivot to a virtual format was required four days before the workshop was scheduled, in order to deliver it in a manner that complied with COVID-19 pandemic restrictions.

According to participants, the workshop clearly achieved its primary aim of achieving consensus across a wide range of clinical issues.

88 percent of respondents thought that the workshop achieved the purpose of using clinical and systems-based expertise to achieve consensus

> *Very well planned and extremely useful to have free and respectful sharing of perspectives across all provider groups. Guest attendees were a terrific way to expand the scope of input and feedback on thinking thus far …*
>
> *Well organised … enabled discussion in breakout rooms and the variety of participants was good …*

> *The workshop provided responses from a variety of personnel from hospitals and community care providers. The information gained should provide valuable insight into the next steps to achieve standardised models of care that improve outcomes.*

88 percent of respondents thought that they were able to contribute

> *The workshop provided plenty of opportunity for my involvement …*
>
> *It was great to able to interact with such knowledgeable clinicians.*

94 percent of respondents agreed they would come to another workshop to support the 3Ci Model of Care development

> *Well organised. Quite fun!! We spent this workshop delineating the problem and now we need to workshop the solution further …*
>
> *The next phase needs to focus on the model itself …*
>
> *Thanks for making the day very productive. I look forward to developing the next steps in ensuring people living with CHF and COPD can receive world class care.*

Conclusion

The aim of this evidence report is to provide a strong foundation to inform the 3Ci Model of Care. The synthesis of the results reflect strong emerging themes that will translate into components of care. A great diversity of chronic disease models is discussed in the literature, across the exemplar case study sites and are evident more broadly across the crowdsourcing challenge. Some have a strong focus on self-management or focus on a health systems navigation approach. Only a few have a focus on the strong participation of community services and the primary healthcare sector, while others include selected chronic disease interventions for people living with CHF and COPD.

Most importantly, the overall synthesis demonstrates not only an emerging framework for care delivery, but it also validates the proposed principles of the 3Ci Model of Care, and the notion that principles-based models of care are best placed to deliver improved clinical outcomes and system efficiencies. This is due to their ability to deliver aligned principles with potentially autonomous methods of clinical component provision that can be adapted to local requirements.

The workshop was highly successful in in delivering an expert consensus view around care delivery components where the evidence was unclear or conflicting. In doing this, it provided a clear way forward on how these components could be incorporated into the model, and what issues needed to be considered and addressed.

A number of strategic themes that identified challenges to the success of the 3Ci Model of Care recurred across the evidence review and workshop deliberations. Constructive conversations occurred during plenary sessions at the workshop that demonstrated a passion within the expert clinician base to extend innovation into these areas, and to shift from a problem-based approach to a solution-based approach within the 3Ci Model of Care. The ability for people living with CHF and COPD to contribute to the development of the model of care needs to be considered to ensure that 3Ci will meet the needs of these people, and engages them in a way that continues to improve their clinical and patient reported outcomes and experience measures over time.

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3Ci Model of Care Taskforce

The ACI 3Ci Model of Care project team would like to thank the members of the 3Ci Model of Care taskforce for their expert review and guidance in compiling all aspects of this report.

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ACI Cardiovascular Clinical Expert Reference Group Co-Chairs and the ACI Respiratory Network Co-Chairs

The ACI 3Ci Model of Care project team would like to thank the ACI Cardiovascular Clinical Expert Reference Group Co-Chairs and the ACI Respiratory Network Co-Chairs for their continued expert guidance and support for the 3Ci Model of Care work.

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ACI Respiratory Network Co-Chairs	
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3Ci Model of Care deliberative workshop participants

The ACI 3Ci Model of Care project team would like to thank the attendees of the 3Ci Model of Care deliberative workshop, held over a half day on 15/01/2021. The deliberations and expert consensus will be integral when writing the 3Ci model of care. The expert participants in the 3Ci Model of Care deliberative workshop included all members of the 3Ci Model of Care taskforce and these additional attendees.

Professor Peter Wark	Staff Specialist (Respiratory Physician) – Hunter New England LHD The Centre for Healthy Lungs – Hunter Medical Research Institute
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Jane Cotter	Nurse Practitioner (Chronic Care) – Southern NSW LHD
Maria Sheehan	Nurse Practitioner (Heart Failure) – St Vincent's Health Australia
Anne-Maree Cheffins	Nurse Practitioner (Chronic Disease and Rural Emergency) – Northern NSW LHD Multipurpose Service Network
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Professor Jenny Alison	Professor of Respiratory Physiotherapy – Sydney LHD and University of Sydney
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The ACI Evidence Generation Directorate

The ACI 3Ci Model of Care project team would like to thank to Laura Holliday from the ACI Evidence Generation Directorate for compiling the rapid review of the peer reviewed evidence contained within this report. The team would also like to acknowledge the support provided by Tara Dimopoulous-Bick for the 3Ci Model of Care (#3Cichallenge) crowdsourcing challenge conducted on the Crowdicity platform.

Appendix 1: Rapid evidence review PubMed search terms and inclusion and exclusion criteria

PubMed search terms

(("pulmonary disease, chronic obstructive"[MeSH Terms] OR COPD[title/abstract] OR "chronic obstructive pulmonary disease"[title/abstract] OR "Heart Failure"[MeSH Terms] OR "chronic heart failure"[title/abstract] OR "CHF"[title/abstract] OR “congestive heart failure”[title/abstract] OR "Chronic Disease"[MeSH Terms] OR "Chronic Disease*"[title/abstract] OR "Chronic condition*"[title/abstract]))

AND (Models, Organizational[MeSH] OR organizational innovation[MeSH] OR "Patient-Centered Care/organization and administration"[Mesh] OR Delivery of Health Care, Integrated[MeSH] OR "model of care"[tiab] OR "models of care"[tiab] OR "care model*"[tiab] OR "care delivery model*"[tiab] OR "organisation of care"[tiab] OR "organisational model*"[tiab] OR "organisation model*"[tiab] OR "organization of care"[tiab] OR "organizational model*"[tiab] OR "organization model*"[tiab] OR "healthcare delivery model*"[tiab] OR "integrated care"[tiab] OR "integrated model*"[tiab] OR “coordinated care”[title/abstract] OR “patient centred care”[title/abstract] OR “value based health care”[title/abstract] OR “care navigation”[title/abstract] OR "nurse-led"[title/abstract] OR “nurse model”[title/abstract] OR “heart failure program”[title/abstract] OR "pharmacist-led"[title/abstract] OR "home-based"[title/abstract] OR "hospital at home"[title/abstract] OR "community-based"[title/abstract] OR tele*[title] OR virtual [title] OR multidisciplinary[title] OR integrated[title] OR "primary care"[title])

AND ((systematic review[Filter] OR “systematic review”[title]) AND (English[Filter]))) AND (2015:2020[pdat])

= 306 hits on 21 Sep 2020

Australian guidelines were searched on google using the terms ‘Australian guideline COPD/CHF’, and by searching ‘COPD/CHF’ on the *International Networks Guideline Library*.[86] Full spelling and abbreviations were searched. Guidelines were included in the table if they were Australian and published from 2015 onwards.

Inclusion and exclusion criteria

Inclusion	Exclusion
• Organisational models of care (the way in which the care is delivered) • Published 2015 to present • English language • Study types: systematic reviews and meta-analysis	• Study types: all other study types • COPD and/or CHF care (studies that focus on what the care is, rather than the way in which care is delivered) • Studies on specific interventions such as inhalation technique • Studies describing chronic conditions that do not include COPD or CHF, or studies that are non-

Inclusion	Exclusion
• chronic obstructive pulmonary disease (COPD), chronic heart failure (CHF), studies combining chronic conditions that include COPD or CHF	specific such as those in elderly who may have chronic conditions • Cost only as outcome (no clinical outcomes)

Appendix 2: Results of rapid peer evidence review

Chronic heart failure

Source	Model	Summary
Peer reviewed sources		
Home-based versus centre-based cardiac rehabilitation Anderson, et al. 2017 [1]	Home-based care	• Cochrane review including 23 trials and 2,890 subjects. • Intervention: home-based cardiac rehabilitation. • Model: home-based versus centre-based. • Home-based and centre-based programs in 24 of the included trials were similarly effective at reducing the mortality rate and improving the exercise capacity and health-related quality of life (HRQoL). • This review concludes that both the home-based and centre-based programs had similar benefits in improving clinical and quality of life (QoL) outcomes.
Home-based cardiac rehabilitation for people with heart failure: A systematic review and meta-analysis Zwisler, et al. 2016 [2]	Home-based care	• Systematic review including 19 trials and 1,290 subjects. • Intervention: home-based cardiac rehabilitation. • Model: home-based versus centre-based or usual care. • Home-based interventions significantly improved the exercise capacity, total Minnesota Living with Quality of Life score compared to usual care. There was no difference in the mortality and hospitalisation rates. • Home-based and centre-based intervention had similar effects on exercise capacity, HRQoL, and rates of hospitalisation. • This review concludes that home-based cardiac rehabilitation could serve as an alternative to centre-based rehabilitation.
Care in the home for the management of chronic heart failure: systematic review and cost-effectiveness analysis Fergenbaum, et al 2015 [4]	Home-based care	• Systematic review including six trials. • Intervention: nurse-led or pharmacist-led management of chronic heart failure (CHF) in the home. • Model: home-based care versus usual care. • Care in the home decreased the risk for all-cause mortality and hospitalisation combined and reduced the rates of hospitalisations and emergency visits. • Care in the home, led by nurses, improved the QoL. • Care in the home led to a reduction in costs and a gain of 0.11 quality-adjusted life years.

Source	Model	Summary
Peer reviewed sources		
		• This review concludes that home-based care for CHF patients can be a cost-effective and improved alternative to usual care.
Efficacy of hospital at home in patients with heart failure: a systematic review and meta-analysis Qaddoura, et al. 2015 [3]	Home-based care	• Systematic review including three trials (203 participants) and three observational studies. • Intervention: substitutive hospital-level care in the patient's home. • Model: hospital at home care versus routine hospitalisation. • Hospital at home care increased the time to first readmission, improved HRQoL, and decreased readmission rates and costs of index hospitalisation compared to routine hospitalisation. • This review concludes that the limited yet moderate quality evidence supports the benefits of hospital at home care in reducing the hospital readmissions and the costs and improving the HRQoL.
Transitional care for patients with congestive heart failure: a systematic review and meta-analysis Vedel, et al. 2015 [5]	Transitional care	• Systematic review including 41 randomised controlled trials (RCTs). • Intervention: monitoring and management. • Model: transitional care models (combining home visits with telephone follow up, clinic visits, or both). • High intensity transitional care models reduced readmission risk regardless of duration of follow up. • Moderate intensity interventions (home visit only; or telephone plus outpatient clinic; remote monitoring) were efficacious if implemented for over six months. • Low intensity models (structured telephone follow up or periodic outpatient clinic; no home visits) were not efficacious.
A systematic review of transitional-care strategies to reduce rehospitalization in patients with heart failure Albert 2016 [7]	Transitional care	• Systematic review including 46 studies. • Interventions varied including medication adherence, follow up, monitoring signs and symptoms, diet modifications, activity and exercise and limiting alcohol and tobacco use. • Model: transitional care. • Individual study outcome results reported in table in publication with varied efficacy.

Source	Model	Summary
Peer reviewed sources		
		• Review identified eight themes of transition of care models. ○ Discharge planning ○ Multidisciplinary care, communication, and collaboration, provision of timely and organised information ○ Medication reconciliation and adherence ○ Social and community support ○ Managing signs and symptoms and providing patient education ○ Outpatient follow up ○ Advanced care planning and palliative care.
Comparative effectiveness of transitional care services in patients discharged from the hospital with heart failure: a systematic review and network meta-analysis Van Spall, et al. 2017 [6]	Transitional care	• Systematic review including 53 RCTs (12,356 patients). • Intervention: disease management. • Model: transitional care (various models, nurse visits, telemonitoring, pharmacy interventions, disease management clinics). • Nurse home visits and disease management clinics decrease all-cause mortality after hospitalisation for heart failure. Along with nurse case management, they also reduce all-cause readmissions, with no significant difference in comparative effectiveness.
The clinical effectiveness and cost-effectiveness of clinical nurse specialist-led hospital to home transitional care: a systematic review Bryant-Lukosius, et al. 2015 [8] *Abstract only*	Transitional care (nurse-led)	• Systematic review including 13 studies (2,463 patients). • Includes multiple conditions including heart failure. • Intervention: transitional care. • Model: clinical nurse specialists. • For patients with heart failure, clinical nurse specialist care delayed time to and reduced death or re-hospitalisation, improved treatment concordance and patient satisfaction, and reduced costs and length of re-hospitalisation stay.
Systematic review and meta-analysis of pharmacist-led transitions of care services on the 30-day all-cause	Transitional care (pharmacist-led care)	• Systematic review including six studies. • Intervention: transitions of care pharmacist services. • Model: pharmacist-led. • Three studies met inclusion criteria for a meta-analysis. The pooled effect of the included articles found that

Source	Model	Summary
Peer reviewed sources		
readmission rate of patients with congestive heart failure McKay, et al. 2019 [9] *Abstract only*		pharmacist-led transitions of care services for patients with CHF had an increased likelihood of having lower all-cause readmission rates of patients with CHF.
Home telemonitoring in heart failure: a systematic review and meta-analysis Pekmezaris, et al. 2018 [15]	Models using telehealth (virtual care)	• Systematic review including 26 trials and 4,923 subjects. • Intervention: home telemonitoring. • Model: home-based versus centre-based or usual care. • Home telemonitoring was associated with 40% decrease in all-cause mortality at 180 days (12 trials); it showed no effect on mortality at 365 days. • Home telemonitoring was associated with a 61% decrease in heart failure-related mortality at 180 days compared to usual care in two of the trials. • Home telemonitoring was not associated with a change in all-cause hospitalisation rates at 90 days (three trials) and 180 days (seven trials) respectively. • Home telemonitoring significantly increased the rates of all-cause emergency visits at 180 days compared to usual care in three of the trials. • This review concludes home telemonitoring can decrease the mortality by facilitating early recognition of exacerbation symptoms.
Clinical effectiveness of telemedicine for chronic heart failure: a systematic review and meta-analysis Lin, et al. 2017 [22]	Models using telehealth (virtual care)	• Systematic review including 39 trials and 4,923 subjects. • Intervention: telemedicine intervention for CHF. • Model: telemedicine (tele-transmission and telephone-supported care) intervention versus usual care. • Tele-transmission was associated with significantly lower heart failure-related hospital admission rate, all-cause and heart failure-related mortality, and heart failure-related length of stay compared to usual care. • Telephone-supported care was associated with significantly lower heart failure-related admission rate compared to usual care. • This review concludes telemedicine can improve outcomes in heart failure-related hospitalisation and mortality.

Source	Model	Summary
Peer reviewed sources		
A systematic review of recent cardiac rehabilitation meta-analyses in patients with coronary heart disease or heart failure Oldridge, et al. 2019 [87] *Abstract only*	Models using telehealth (virtual care)	- Systematic review including 30 meta-analysis. - Intervention: cardiac rehabilitation. - Model: telemedicine based. - Of the 127 point estimates identified in the 30 meta-analyses identified (mortality, n=12; hospitalisation, n=11; oxygen consumption, n=40; exercise capacity, n=20; strength, n=18; HRQoL, n=26), 60% were statistically significant and 35% clinically important.
Comparative effectiveness of telemonitoring versus usual care for heart failure: a systematic review and meta-analysis Yun, et al. 2018 [16]	Models using telehealth (virtual care)	- Systematic review including 37 RCTs. - Intervention: monitoring various clinical indices. - Model: telemonitoring. - The risks of all-cause and heart failure-related mortality were significantly lower in the telemonitoring group than in the usual care group. Telemonitoring showed a significant benefit when ≥3 biologic data are transmitted or when transmission occurred daily. - Telemonitoring reduced mortality risk in studies that monitored patients' symptoms, medication adherence, or prescription changes.
Smartphones in the secondary prevention of cardiovascular disease: a systematic review Hamilton, et al. 2018 [24]	Models using telehealth (virtual care)	- Systematic review including nine studies. - Intervention: cardiac rehabilitation and secondary prevention. - Model: mobile health. - Studies showed that smartphone health delivery for cardiac rehabilitation and heart failure management is feasible with high rates of participant engagement, acceptance, usage, and adherence. - Smartphone health delivery of cardiac rehabilitation was as effective as traditional centre-based cardiac rehabilitation with significant improvement in QoL. Hospital utilisation for heart failure patients showed inconsistent reductions.
Exercise telemonitoring and telerehabilitation compared with traditional cardiac	Models using telehealth (virtual care)	- Systematic review including eight trials and 782 subjects. - Intervention: exercise telemonitoring and telerehabilitation.

Source	Model	Summary
Peer reviewed sources		
and pulmonary rehabilitation: a systematic review and meta-analysis Chan, et al. 2016 [23]		- Model: Telemonitoring and telerehabilitation versus traditional cardiac and pulmonary rehabilitation. - Telerehabilitation and usual care had similar effects on exercise outcomes (peak oxygen consumption, peak workload and six-minute walk test) for patients with cardiac and pulmonary conditions. - This review concludes telerehabilitation can be as effective as traditional rehabilitation on exercise capacity with no adverse effects.
Effect of telemonitoring of cardiac implantable electronic devices on healthcare utilization: a meta-analysis of randomized controlled trials in patients with heart failure Klersy 2016[21]	Models using telehealth (virtual care)	- Systematic review including 11 trials and 5,702 participants. - Intervention and model: device telemonitoring versus standard of care. - Device telemonitoring reduced the total number of planned, unplanned and emergency department visits in patients with heart failure compared to standard care. - There was no significant difference in the rates of cardiac hospitalisation, unplanned hospital visits or hospitalisations between the device telemonitoring and standard care groups. - Device monitoring increased the total number of emergency room or unscheduled visits compared to standard care group. - There was no difference in the cardiac mortality between groups. - This systematic review concludes that device telemonitoring is associated with reduced planned hospital visits with no effect on cardiac mortality.
Structured telephone support or non-invasive telemonitoring for patients with heart failure Inglis, et al. 2015[17]	Models using telehealth (virtual care)	- Systematic review including 41 studies. - Intervention and models: structured telephone support or non-invasive telemonitoring. - Non-invasive telemonitoring resulted in a 20% reduction in all-cause mortality risk (17 studies, 3,740 participants, and moderate quality evidence) and 29% reduction in heart failure-related hospitalisations (8 studies, 2,148 participants, with moderate quality evidence). - Structured telephone supported resulted in a 13% reduction in all-cause mortality risk (22 studies, 9,222 participants, moderate quality evidence) and 15%

Source	Model	Summary
Peer reviewed sources		
		reduction in heart failure related hospitalisations (16 studies, 7,030 participants, moderate quality evidence). • Low quality evidence shows either types of interventions had an effect on all-cause hospitalisations. • This review concludes that structured telephone support or non-invasive telemonitoring can benefit the management outcomes of patients with CHF.
Effects of home telemonitoring interventions on patients with chronic heart failure: an overview of systematic reviews Kitsiou, et al. 2015 [18]	Models using telehealth (virtual care)	• Overview of 15 systematic reviews. • Intervention and model: home telemonitoring with chronic heart failure patient's versus usual care. • Five main types of non-invasive telemonitoring technologies included: ○ video consultation ○ mobile telemonitoring ○ automated device based telemonitoring ○ interactive voice response ○ web-based telemonitoring. • Home telemonitoring reduced the risk of all-cause mortality and hospitalisations (especially in those who had been recently discharged from an acute care facility) and heart failure-related hospitalisations (especially in those with stable heart failure) compared to usual care. • Post-hoc analysis found that only the device-based telemonitoring and mobile telemonitoring had a positive effect of reducing the all-cause mortality and heart failure related hospitalisation. • This review concludes that based on moderate to low quality evidence, home telemonitoring interventions could have favourable effects on mortality and hospitalisation outcomes in patients with heart failure, especially in those who were recently discharged.
Comparative effectiveness of different forms of telemedicine for individuals with heart failure (HF): a systematic review and network meta-analysis	Models using telehealth (virtual care)	• Systematic review including 30 trials and 10,193 participants. • Intervention: structured telephone support, telemonitoring, electrocardiogram monitoring. • Model: telemedicine versus usual post-discharge care. • Structured telephone support and telemonitoring reduced the risk of heart failure-related mortality and hospitalisations.

Source	Model	Summary
Peer reviewed sources		
Kotb, et al. 2015 [19]		- Electrocardiogram monitoring interventions reduced the risk of heart failure-related hospitalisations. - This review concludes that structured telephone support and telemonitoring can both be effective in reducing heart failure-related mortality and hospitalisation rates.
Telehealth in the elderly with chronic heart failure: what is the evidence? Clark, et al. 2018 [20] *Abstract only*	Models using telehealth (virtual care)	- Systematic review including 27 studies. - Intervention: structure telephone support of telemonitoring. - Model: telehealth. - Structured telephone support and telemonitoring interventions reduced mortality. Structured telephone support interventions reduced heart failure-related hospitalisations.
Understanding heart failure; explaining telehealth – a hermeneutic systematic review Greenhalgh, et al. 2017 [26]	Models using telehealth (virtual care)	- Systematic review including 7 systematic reviews of review, 32 systematic reviews, six mega trials and over 60 addition relevant empirical studies and commentaries. - Intervention: heart failure management. - Model: telehealth. - The single most striking feature of experimental trials of telehealth in heart failure is their heterogeneity. - Different trials of telehealth in heart failure rendered different results. - In one review, 60 studies reported positive outcomes (almost all of them only weakly positive) and only one a (weakly) negative outcome. - Despite the beneficial effects of telehealth reported in several meta-analyses, a number of large, recent RCTs have demonstrated no statistically significant impact from comparable telehealth interventions and patient groups.
Effect of post-discharge virtual wards on improving outcomes in heart failure and non-heart failure populations: A systematic review and meta-analysis Uminski, et al. 2018 [25]	Virtual wards	- Systematic review including seven studies. - Intervention: management in the transition from hospital to home. - Model: virtual wards as an alternative to usual community-based care, includes multidisciplinary team management. - In patients with heart failure, a post-discharge virtual ward reduced risk of mortality in six trials. - Heart failure-related readmissions were reduced, although all-cause readmission was not.

Source	Model	Summary
Peer reviewed sources		
		• In contrast, a post-discharge virtual ward did not reduce death or hospital readmissions for patients with undifferentiated high-risk chronic diseases in four trials.
The effect of nurse-led education on hospitalisation, readmission, quality of life and cost in adults with heart failure. A systematic review Rice, et al. 2018 [27]	Nurse-led care	• Systematic review including seven trials • Intervention: nurse-led 1:1 patient education session. • Model: nurse-led education versus usual care. • Nurse-led education programs in two of the included trials reduced the heart failure-related readmissions by 50% and 23% respectively compared to the usual care. • Nurse-led education programs in two of the included trials had lower rates of heart failure-related hospitalisations compared to the usual care. • Nurse-led education programs in two of the included trials improved the QoL and functioning at follow-ups compared to the usual care. • This review concludes nurse-led education programs for heart failure patients can reduce hospitalisations, readmission and improve QoL.
The gap between policy and practice: a systematic review of patient-centred care interventions in chronic heart failure Kane, et al. 2015 [10]	Patient-centred care	• Systematic review of 10 trials and 2,540 participants. • Intervention: collaborative goal setting between the patient and healthcare professional, with common components including: ○ holistic assessment ○ shared decision making ○ education and training ○ multidisciplinary approach ○ support. • Model: patient-centred care versus usual care. • Three out of six studies reported a positive effect of patient-centred care on HRQoL. • One out of four studies reported patient-centred care significantly reduced the depression symptoms in patients. • Two out of three studies reported patient-centred care significantly reduced symptom burden in patients. • Three out of four studies reported patient-centred care significantly increased the patient activation scores.

Source	Model	Summary
Peer reviewed sources		
		- This review concludes that patient-centred care can improve care outcomes in heart failure patients by reducing symptom burden and depressive symptoms and increasing HRQoL and activation level.
Multidisciplinary heart failure clinics are associated with lower heart failure hospitalization and mortality: systematic review and meta-analysis Gandhi, et al. 2017 [11]	Multidisciplinary team model	- Systematic review including 16 trials and 3,999 participants. - Intervention and model: multidisciplinary heart failure clinics versus usual care. - Multidisciplinary heart failure clinics had a significantly lower rates of heart failure related hospitalisation and mortality, especially among patients attending non-nurse-led clinics and clinics that followed up after three months, had mean ejection fraction ≤30% and with recent hospitalisation history. - Multidisciplinary heart failure clinics did not have an effect on the all-cause hospitalisation rate. - This review concludes that multidisciplinary heart failure clinics can lower all-cause mortality and heart failure related hospitalisations.
Disease management interventions for heart failure Takeda, et al. 2019 [14]	Various models	- Cochrane review including 47 RCTs (10,869 participants). - Intervention: disease management. - Models: 28 were case management interventions, 7 were clinic-based models, 9 were multidisciplinary interventions, and 3 could not be categorised as any of these. - Case management may reduce all-cause mortality, and multidisciplinary interventions probably also reduce all-cause mortality, but clinic-based interventions had little or no effect on all-cause mortality. - Readmissions due to heart failure or any cause were probably reduced by case-management interventions. Clinic-based interventions probably make little or no difference to heart failure readmissions and may result in little or no difference in readmissions for any cause. Multidisciplinary interventions may reduce the risk of readmission for heart failure or for any cause. - There was a lack of evidence for adverse effects, and conclusions on QoL remain uncertain due to poor-quality data. Variations in study location and time of occurrence hamper attempts to review costs and cost-effectiveness.

Source	Model	Summary
Peer reviewed sources		
What is the impact of systems of care for heart failure on patients diagnosed with heart failure: a systematic review Driscoll, et al. 2016 [12]	Various models	• Systematic review including 29 studies. • Intervention: patient education, patient planning, patient management. • Model: systems of care in the workforce, primary care, in-hospital, transitional care, outpatients and telemonitoring. • Several studies found that access to a specialist heart failure team or service reduced hospital readmissions and mortality. • In primary care, a collaborative model of care where the primary physician shared the care with a cardiologist, improved patient outcomes compared to a primary physician only. • During hospitalisation, quality improvement programs improved the quality of inpatient care, resulting in reduced hospital readmissions and mortality. • In the transitional care phase, heart failure programs, nurse-led clinics, and early outpatient follow up reduced hospital readmissions. • There was a lack of evidence as to the efficacy of telemonitoring with many studies finding conflicting evidence.
Does case management for patients with heart failure based in the community reduce unplanned hospital admissions? A systematic review and meta-analysis Huntley, et al. 2016 [13]	Case management (integrated care)	• Systematic review including 22 studies (17 RCTs, 5 non-randomised trials). • Intervention: planning, coordinating and reviewing the care. • Model: community-based case management – collaborative process. • Hospital-initiated case management reduced readmissions and length of stay in favour of case management compared with usual care. • There were four studies of community-initiated case management versus usual care (two RCTs and two non-randomised trials) with only the two non-randomised trials showing a reduction in admissions.

Chronic obstructive pulmonary disease

Source	Model	Summary
Peer reviewed sources		
Comparison of outpatient and home-based exercise training programmes for COPD: A systematic review and meta-analysis Wuytack, et al. 2018 28	Home-based and /or community care	• Systematic review including 10 trials and 934 participants. • Intervention: exercise training programs. • Model: outpatient versus home-based. • Outpatient and home-based programs in seven of the included trials were equally effective at improving HRQoL on the Chronic Respiratory Questionnaire and on the St George's Respiratory Questionnaire. • Outpatient and community-based programs in three of the included trials were equally effective at improving HRQoL. • There was no difference in exercise capacity. • This review concludes there is low to moderate evidence that outpatient and home-based exercise training programs are equally effective.
Application of the community health worker model in adult asthma and COPD in the U.S.: a systematic review Parekh, et al. 2019 48	Home-based and/or community care	• Systematic review including four trials and 825 participants. • Intervention: home visits and community education sessions by community health workers. • Model: Community health worker model. • Community health worker home visit intervention in one of the included trials had a significantly a greater level of physical activity in patients compared to the comparison group. There was no significant difference in how well patients felt managing their asthma. • Home visit intervention in one of the included trials significantly increased the Mini Asthma Related QoL scores. There was no significant difference in pulmonary function testing between groups. • Home visit program in one of the included trials significantly reduced the home trigger scores, including the use of chlorine and aerosols, and lack of air filters. There was no significant difference in the utilisation of healthcare, or to the severity of asthma symptom and albuterol use at follow-up. • Group session and home visit program in one of the included trials significantly improved patients’ asthma total self-efficacy, asthma QoL, and coping scores. There was no significant difference in asthma knowledge, use of spacer and inhaled steroids and number of nights with symptoms.

Source	Model	Summary
Peer reviewed sources		
		- This review concludes the available evidence suggests potential benefits of community health worker models in improving asthma-related outcomes in adult patients. However, further randomised controlled trial studies with consistent outcome measures are warranted to examine the effectiveness of such programs.
Home or community-based pulmonary rehabilitation for individuals with chronic obstructive pulmonary disease: a systematic review and meta-analysis Fratti Neves, et al. 2016 [30]	Home-based and/or community care	- Systematic review including 23 studies. - Intervention: rehabilitation. - Model: Home-based or community care. - Home or community-based pulmonary rehabilitation proved superior to controls based on functional capacity in the six minute walk test and incremental shuttle walk test and based on dyspnoea and QoL in the Saint George's Respiratory Questionnaire and the Chronic Respiratory Questionnaire. - When home or community-based pulmonary rehabilitation and outpatient pulmonary rehabilitation were compared, there were no effective differences in functional capacity or QoL.
Early supported discharge/hospital at home for acute exacerbation of chronic obstructive pulmonary disease: a review and meta-analysis Echevarria, et al. 2016 [29]	Early discharge or hospital at home	- Systematic review including eight RCTs. - Intervention: patient education and management. - Model: early discharge or hospital at home. - Compared to usual care, early discharge or hospital at home showed a trend towards lower mortality. - If return to hospital during the acute period was not considered a readmission, early discharge or hospital at home was associated with fewer readmissions, but if considered a readmission, the benefit was lost.
Effectiveness of tele-monitoring by patient severity and intervention type in chronic obstructive pulmonary disease patients: A systematic review and meta-analysis Hong, et al. 2019 [38]	Models using telehealth (virtual care)	- Systematic review including 27 trials. - Intervention: telemonitoring on chronic obstructive pulmonary disease (COPD). - Model: telemonitoring versus usual or other standard care. - Telemonitoring interventions in 11 of the included trials significantly reduced the rates of emergency room visits and hospitalisations, especially in patients with severe to moderate disease severity. - Telemonitoring interventions in the included trials did not show a significant reduction in the mortality rate, outpatient visits, or length of stay during hospitalisation.

Source	Model	Summary
Peer reviewed sources		
		• Telemonitoring interventions in two of the included trials showed a significant improvement to mental health QoL score on the Short Form-36 Scale. • This review concludes telemonitoring reduces the rates of emergency visits and hospitalisations.
Home telemonitoring effectiveness in COPD: a systematic review Cruz, et al. 2014 [39]	Models using telehealth (virtual care)	• Systematic review including nine trials. • Intervention: home telemonitoring. • Model: Home telemonitoring versus usual care. • Telemonitoring interventions in eight of the included trails significantly reduced the rates of hospitalisations compared to usual care groups. • Telemonitoring interventions in two of the included trials significantly improved the HRQoL on the St George's Respiratory Questionnaire compared to usual care groups. • Telemonitoring interventions in two of the included trials significantly reduced the number of respiratory exacerbations. • Included studies did not find significant differences in the length of hospital stay, rates of emergency visits or mortality rates. • This review concludes that managing COPD using home telemonitoring can reduce the number of hospitalisations and respiratory exacerbations and can improve QoL.
Systematic review of telemonitoring in COPD: an update Pedone, et al. 2015 [40]	Models using telehealth (virtual care)	• Systematic review including 12 trials. • Intervention: Home telemonitoring. • Model: Home telemonitoring versus usual care. • Telemonitoring interventions in three of the included trails significantly reduced the rates of hospitalisations for any cause. • Telemonitoring interventions did not show a significant effect on the rates of emergency visits or COPD-related hospital admissions in majority of the included studies. • This review concludes that available evidence is insufficient or of poor quality to draw a definite conclusion on the effect of telemonitoring on COPD management outcomes.

Source	Model	Summary
Peer reviewed sources		
Tele-healthcare in COPD: a systematic review and meta-analysis on physical outcomes and dyspnea Lundell, et al. 2015 [46]	Models using telehealth (virtual care)	- Systematic review including nine trials and 982 participants. - Intervention and model: telehealth care in COPD using telephone, mobile phone or websites versus ordinary care. - Telehealth significantly improved the physical activity level compared to ordinary care. - Telehealth and ordinary care had similar effect on physical capacity with no significant difference. - This review concluded that telehealth may lead to better outcomes in increasing the physical activity level.
Effectiveness of telemonitoring versus usual care for chronic obstructive pulmonary disease: a systematic review and meta-analysis Sul, et al. 2020 [42]	Models using telehealth (virtual care)	- Systematic review including 28 RCTs. - Intervention: monitoring COPD. - Model: telemonitoring. - Meta-analysis revealed that there were no variables showing a statistically significant difference between telemonitoring and control groups. - Subgroup analysis showed that telemonitoring reduced exacerbation rates when the intervention continued for longer than six months or where pulmonary function was monitored.
Effectiveness of telemedicine intervention for chronic obstructive pulmonary disease in china: a systematic review and meta-analysis Liu, et al. 2020 [44] *Abstract only*	Models using telehealth (virtual care)	- Systematic review including 24 studies. - Intervention: unspecified telemedicine interventions. - Model: telemedicine. - Quality of life in the group of the telemedicine intervention was better than that in the control group, but the heterogeneity is high. The rates of hospitalisation were lower than those in the control group, and the heterogeneity was low.
A systematic map and in-depth review of European telehealth interventions efficacy for chronic obstructive pulmonary disease Gaveikaite, et al. 2019 [47]	Models using telehealth (virtual care)	- Systematic review including 12 systematic reviews and an in-depth review of 14 clinical trials in Europe. - Intervention: varied, such as remote assessment, education, self-management or telemonitoring. - Model: telehealth. - The mapping study revealed that systematic reviews with a meta-analysis often report positive clinical outcomes.

Source	Model	Summary
Peer reviewed sources		
		• The review identified a lack of pragmatic trial design affecting the synthesis of reported outcomes.
Telemonitoring to manage chronic obstructive pulmonary disease: systematic literature review Kruse, et al. 2020 [43]	Models using telehealth (virtual care)	• Systematic review including 29 studies. • Intervention: symptom monitoring and/or management. • Model: telemonitoring. • Primarily, 13 out of 29 (45%) articles stated that patient outcomes were improved overall with telemonitoring, while 11 of 29 (38%) indicated no improvement. • Facilitators included reduced need for in-person visits, better disease management, and bolstered patient-provider relationship. • Barriers included low-quality data, increased workload for providers, and cost.
Do telemedical interventions improve quality of life in patients with COPD? A systematic review Gregersen, et al. 2016 [45]	Models using telehealth (virtual care)	• Systematic review including 18 studies. • Intervention: disease management. • Model: telemedical interventions. • Three studies found statistically significant improvements in QoL for patients allocated to telemedical interventions. However, all of the other included studies found no statistically significant differences between control and telemedical intervention groups in terms of QoL.
Clinical and cost effectiveness of nurse-led self-management interventions for patients with COPD in primary care: A systematic review Baker, et al. 2017 [36]	Nurse-led self-management	• Systematic review including 20 trials and 3,384 participants. • Intervention: nurse-led self-management in the community. • Model: nurse-led self-management versus usual care. • Nurse-led self-management interventions in included trials had mixed effects on HRQoL. Only 1 study reported significant improvements in the generic HRQoL while 5 other studies reported no effect; 5 studies reported significant improvements in COPD related QoL, while 11 other studies reported no effect. • Nurse-led self-management interventions in included trials had mixed effects on hospital admissions. Three trials reported a significant reduction in all-cause hospital admissions while three other studies reported no effect; only one study reported significant reduction in COPD related hospital admission rates, while seven other studies reported no effect.

Source	Model	Summary
Peer reviewed sources		
		• Nurse-led self-management interventions in included trials had mixed effects on the rates of emergency department visits. Three trials reported a significant reduction in all cause emergency visits while two other studies reported no effect; three studies reported a significant reduction in rates of unscheduled physician visits, while two other studies reported no effect. • Nurse-led self-management interventions in included trials had mixed effects on anxiety and depression. Three trials reported a significant reduction in anxiety symptoms while two other studies reported no effect; only one study reported significant reduction depressive symptoms, while eight other studies reported no effect. • Nurse-led self-management interventions significantly improved the self-efficacy in 6 out of 10 trials assessing this outcome. • Nurse-led self-management interventions did not have an effect on satisfaction (five studies) and exacerbation frequency (six studies). • This review concludes that although some studies had shown benefits, the mixed findings in the included trials do not allow for a definite conclusion on the effects of nurse-led self-management interventions in the community.
Patient perceived impact of nurse-led self-management interventions for COPD: A systematic review of qualitative research Baker, et al. 2019 [37]	Nurse-led self-management	• Systematic review of qualitative studies including 14 articles. • Intervention: nurse-led self-management. • Model: nurse-led self-management in the community. • Framework analysis of the included articles identified four key themes: ○ empowerment through new knowledge ○ psychological wellbeing ○ expanding social worlds ○ increased social activity. • This review concludes that social and psychological support along with provision of knowledge improved participants' feelings of self-confidence, coping behaviours, and wellbeing.
Features of self-management interventions for people with COPD	Self-management	• Systematic review including 26 RCTs identified from 11 systematic reviews.

Source	Model	Summary
Peer reviewed sources		
associated with improved health-related quality of life and reduced emergency department visits: a systematic review and meta-analysis Newham, et al. 2017 [35]		• Intervention: intervention descriptions were coded for behaviour change techniques that targeted self-management behaviours to address symptoms, physical activity, and mental health. • Model: self-management. • Patients receiving self-management interventions reported improved HRQoL and made fewer emergency department visits compared to patients who received usual care. • Patients receiving self-management interventions targeting mental health alongside symptom management had greater improvement of HRQoL and fewer emergency department visits than patients receiving self-management interventions focused on symptom management alone.
Systematic review of the effectiveness of community-based self-management interventions among primary care COPD patients Jolly, et al. 2018 [31]	Self-management	• Systematic review including 12 trials and 10,647 participants. Five trials were included in a meta-analysis. • Intervention: community-based self-management in primary care patients with COPD delivered by a variety of healthcare professionals. • Model: community-based self-management versus usual care. • Community-based self-management interventions in five of the included trials did not make a significant difference in HRQoL on the St George Respiratory Questionnaire. • Community-based self-management intervention in four of the included trials did not make a significant difference in the anxiety and depression scores on the Hospital Anxiety and Depression Scale. • This review concludes community-based self-management interventions are not effective, as evidenced by the included studies.
Supported self-management for patients with COPD who have recently been discharged from hospital: a systematic review and meta-analysis Majothi, et al 2015 [33]	Self-management	• Systematic review including nine trials and 1,466 participants. • Interventions: highly supported multi-component self-management interventions and home-based interventions with less support and less contact with health professionals. • Supported self-management interventions had no effect on all-cause mortality and there is no clear evidence of an effect on all-cause hospital admissions.

Source	Model	Summary
Peer reviewed sources		
		- Supported self-management interventions had positive effect on HRQoL on the St George's Respiratory Questionnaire. - The review concludes that the current evidence is not sufficient to draw a definite conclusion.
Effectiveness of chronic obstructive pulmonary disease self-management interventions in primary care settings: a systematic review Hosseinzadeh, et al. 2019 [34]	Self-management	- Systematic review including 10 RCTs. - Interventions: varied, such as some education, some integrated team approaches targeting symptoms, or monitoring. - Model: self-management. - The review found that COPD self-management trials had positive effects on COPD knowledge and improved self-management behaviours such as adherence to medication, physical activities and smoking cessation in some cases. - The effect on hospitalisation rate, QoL and healthcare utilisation were not conclusive. - There was also not enough evidence to suggest that the trials were efficient in improving self-efficacy, a major driver of self-management behaviours.
Supported self-management for patients with moderate to severe chronic obstructive pulmonary disease (COPD): an evidence synthesis and economic analysis Jordan, et al. 2015 [32]	Self-management	- Systematic review including 186 RCTs (answering four questions). - Interventions: various, including rehabilitation, exercise or strength training. - Model: self-management. - Available studies were heterogeneous, and many were of poor quality. - Meta-analysis identified no evidence of benefit of post-discharge self-management support on admissions, mortality and most other health outcomes. A modest improvement in HRQoL was identified but this was possibly biased due to high loss to follow up.
Continuity of care to prevent readmissions for patients with chronic obstructive pulmonary disease: a systematic review and meta-analysis	Various models	- Systematic review including 31 RCTs. - Intervention: various including health education, comprehensive nursing intervention and telemonitoring. - Model: various including nurse-led, home visits and telehealth.

Source	Model	Summary
Peer reviewed sources		
Yang, et al. 2017 [41]		• The results showed that health education reduced all-cause readmission at three months. • Health education, comprehensive nursing intervention and telemonitoring reduced all-cause readmissions over 6 to 12 months, and the effect of comprehensive nursing intervention was best because it also reduced COPD-specific readmissions. • Home visits also reduced COPD-specific readmissions (the quality more than moderate), but it did not reduce the risk for all-cause readmissions. • There was no statistically significant difference in reducing mortality and QoL among various continued cares.

Chronic conditions

Source	Model	Summary
Peer reviewed sources		
Can chronic disease be managed through integrated care cost-effectively? Evidence from a systematic review Cronin, et al. 2017 [49]	Integrated care	• Systematic review, including six studies (three full economic evaluation and three partial economic evaluation). • Intervention: management of chronic conditions including stroke, diabetes, COPD and cardiovascular disease. • Model: integrated care models versus usual care • Four chronic conditions, including stroke, diabetes, cardiovascular disease and COPD were examined. • Two full economic evaluations focused on stroke and found integrated care services reduced costs and improved health benefits. • One full economic evaluation focused on diabetes and found the integrated care model reduced costs associated with additional expected life years. • One partial economic evaluation found integrated care model of type 2 diabetes reduced all-cause mortality and hospitalisations and did not increase costs compared to usual care. • One partial economic review found integrated service for coronary artery disease reduced healthcare costs and improved health outcomes.

Source	Model	Summary
Peer reviewed sources		
		• One partial economic review found integrated service for COPD reduced healthcare costs and improved health gains. • This review concludes that integrated care for chronic disease management can be cost-effective and have greater health benefits
Shared care across the interface between primary and specialty care in management of long term conditions Smith, et al. 2017 [50]	Integrated care	• Systematic review including 42 trials and 18,859 participants. • Intervention: shared care for chronic disease management. • Model: shared care (defined as shared management of chronic disease between primary care and specialist physicians) versus usual care. • Shared care models for hypertension, chronic kidney disease and stroke in a small number of moderate quality trials showed little to no improvements in clinical outcomes except for blood pressure (mean difference 3.47, 95% confidence interval 1.68 to 5.25). • Stepped care design of the shared care models for mental health in the included trials showed an improvement in outcomes related to depression treatment (six high-certainty studies) and depression recovery (10 high-certainty studies). • There is limited evidence to show that shared care models improve patient reported outcome measures, process of care and participation and default rates in shared care models. • There is little to no evidence to show that shared care models make a difference to hospital admissions, service utilisation and patient health behaviours. • This review concludes that shared care models may improve outcomes in depression, however, may have limited impact on the other chronic disease clinical and management outcomes.
Integrated palliative care in Europe: a qualitative systematic literature review of empirically-tested models in cancer and chronic disease	Integrated care	• Systematic review including 14 trials. • Intervention: integrated care involving multidisciplinary teams in chronic disease management, oncology and end of life pathways in palliative care settings. • Model: integrated care models versus usual care.

Source	Model	Summary
Peer reviewed sources		
Siouta, et al. 2016 [51]		• Integrated care models in 13 of the included trials (lower quality) improved outcomes in symptom control, QoL, patient-family-provider communication, caregiver burden, patients dying in their preferred place and cost-effectiveness. • This review proposes an integrative palliative care model that fosters a multidisciplinary team throughout the care trajectory of treatment, consulting and training.
The effectiveness of integrated care interventions in improving patient quality of life (QoL) for patients with chronic conditions. An overview of the systematic review evidence Flanagan, et al. 2017 [52]	Integrated care	• Review of systematic review evidence including 41 review studies. • Intervention: case management, chronic care model, discharge management, multidisciplinary teams, complex interventions, primary versus. secondary care follow-up and self-management. • Model: integrated care model versus usual care. • Two of the included reviews reported positive effect of case management model on QoL, while four other reviews reported either mixed or no effect. • Six of the included reviews reported positive effect of the Chronic Care Model on QoL, while four other reviews reported mixed effect. • Four of the included reviews reported positive effect of discharge management model on QoL, while one other review reported mixed effect and three reported no effect. • Three of the included reviews reported positive effect of multidisciplinary team model on QoL, while seven other reviews reported mixed effect. • One of the included reviews reported no effect of complex intervention on QoL. • One of the included reviews reported mixed effect of primary versus secondary care follow-up on QoL. • One of the included reviews reported positive effect of self-management model on QoL, while three other reviews reported mixed effect and one reported no effect. • Interventions with greater number of components were more likely to improve QoL. • Interventions were more likely to have positive effect on condition specific QoL than global QoL.

Source	Model	Summary
Peer reviewed sources		
		• This review concludes that despite mixed findings, integrated care interventions can be promising in improving the QoL in people living with chronic disease.
Effectiveness of comprehensive care programs for patients with multiple chronic conditions or frailty: a systematic literature review Hopman, et al. 2016 [53]	Integrated care (comprehensive care)	• Systematic review including 19 publications. • Three programs focused on older people with (a combination of) specific chronic conditions such as diabetes mellitus and heart failure. • Intervention: programs varied in target groups, settings, interventions and number of comprehensive care management components addressed. • Model: comprehensive care; many different terms are being applied to comprehensive care including integrated care, guided care, case management, and shared care. • Providing comprehensive care might result in more patient satisfaction, less depressive symptoms, a better HRQoL or functioning of multimorbid or frail patients, but the evidence is insufficient. • There is no evidence that comprehensive care reduces the number of primary care or general practice visits or healthcare costs. • Regarding the use of inpatient care, the evidence was insufficient.
Implications of interprofessional primary care team characteristics for health services and patient health outcomes: A systematic review with narrative synthesis Wranik, et al. 2019 [88]	Interprofessional primary care team	• Systematic review including 77 studies. • The primary search focused on four specific conditions: diabetes, asthma, ischemic heart disease and hypertension, as well as general chronic disease management. • Intervention: general management, receiving recommended care and care plans, multidisciplinary care, etc. • Model: interprofessional primary care team. • Despite heterogeneity of contexts, some trends are observable: shared space, common vision and goals, clear definitions of roles, and leadership as important to good teamwork. The impacts of these on healthcare outputs or patient health are not clear.
The role of hospitals in bridging the care continuum: a systematic review of coordination of care	Transitional care	• Systematic review including 32 studies. • Intervention: chronic disease management. • Model: hospital coordinated transitional care.

Source	Model	Summary
Peer reviewed sources		
and follow-up for adults with chronic conditions De Regge, et al. 2017 [70]		- Hospitals can play an important role in transitional care interventions and the coordination of chronic care with better outcomes for the patients by taking a leading role in integrated care programs. - Four themes were identified: the impact of transitional care interventions initiated from the hospital's side, the role of specialised care settings, the comparison of inpatient and outpatient care, and the effect of chronic care coordination on the experience of patients.
Characteristics and components of medical group visits for chronic health conditions: a systematic scoping review Parikh, et al. 2019 [89] *Abstract only*	Medical group visits	- Systematic review including 55 eligible studies (9 RCTs and 46 observational studies). - The three most frequently studied groups include a combination of several chronic conditions (n=12), chronic pain conditions (n=10), and cardiovascular disease (n=9). - Intervention: pain management, and lifestyle and/or educational component that comprised of talks on nutrition, exercise, stress, and sleep. - Model: medical group visits. - Substantial heterogeneity was observed in the recruitment, implementation, curriculum components, and outcomes reported.
Admission avoidance hospital at home Shepperd, et al. 2016 [54]	Hospital at home	- Cochrane review including 16 RCTs and 1,814 participants. - Three trials recruited participants with chronic obstructive pulmonary disease, two trials recruited participants recovering from a stroke, six trials recruited participants with an acute medical condition who were mainly elderly, and the remaining trials recruited participants with a mix of conditions. - Intervention: active treatment by healthcare professionals. - Model: hospital at home. - Admission avoidance hospital at home, with the option of transfer to hospital, may provide an effective alternative to inpatient care for a select group of elderly patients requiring hospital admission. - Evidence is limited by the small RCTs included in the review, which adds a degree of imprecision to the results for the main outcomes.

Source	Model	Summary
Peer reviewed sources		
Indicators of home-based hospitalization model and strategies for its implementation: a systematic review of reviews Casteli, et al. 2020 [56]	Home based hospitalisation model	• Systematic reviews including 15 systematic reviews. • Most reviews included a mix of medical conditions (n=12; 80%), including COPD, stroke, heart failure, elective surgery, pneumonia, psychiatric disease, pulmonary embolism, complicated diverticulitis, and cellulitis. • Intervention: varied, including multidisciplinary team care, home visits, provision of 24-hour cover if required, with access to a doctor and monitoring, diagnostic testing, home nursing care for the administration of intravenous medications and a safe home environment. • Model: home-based hospitalisation. • Three reviews found negative indicators, two reviews found neutral indicators, and one found positive indicators on risk outcomes and safety. • Positive indicators on the QoL of patients were reported in five reviews, and three other reviews found no association between home-based hospitalisation and QoL.
Early discharge hospital at home Goncalves-Bradley, et al. 2017 [55]	Hospital at home	• Cochrane review including 32 trials. • The studies looked at the effect of these services in patients with different types of conditions: patients who had a stroke, older patients with different types of medical conditions, such as heart failure and COPD, and patients who had surgery. • Intervention: early discharge management of patients. • Model: hospital at home. • Despite increasing interest in the potential of early discharge hospital at home services as a less expensive alternative to inpatient care, this review provides insufficient evidence of economic benefit (through a reduction in hospital length of stay) or improved health outcomes.
What is the evidence for the effectiveness, appropriateness and feasibility of group clinics for patients with chronic conditions? A systematic review Booth, et al. 2015 [71]	Group clinics	• Systematic review including 13 systematic reviews, 22 RCTs, 12 qualitative papers, 4 surveys and 8 cost studies. • Intervention: delivering specialist-led care. • Model: group clinics. • There is consistent and promising evidence for an effect of group clinics for some biomedical measures (primarily glycated haemoglobin systolic blood pressure in diabetes patients), however this effect does not extend across all outcomes.

Source	Model	Summary
Peer reviewed sources		
A systematic review examining whether community-based self-management programs for older adults with chronic conditions actively engage participants and teach them patient-oriented self-management strategies Warner, et al. 2019 [58]	Self-management	- Systematic review including 31 studies. - Adults 65 years of age and older (of any ethnicity) who had one or more chronic conditions defined as 'conditions requiring management over a period of years or decades'. - Intervention: varied and dependent on condition e.g. stroke self-management program, education, pain self-management, nutrition interventions, etc. - Model: self-management program. - 71% of the studies assessing health behaviour and disease controlling outcomes showed significant differences between the intervention and control groups, compared to 37% of the studies assessing global QoL.
Identifying components of self-management interventions that improve health-related quality of life in chronically ill patients: Systematic review and meta-regression analysis Jonkman, et al. 2016 [57]	Self-management	- Systematic review including 47 trials and10,596 patients. - Patients with CHF, COPD, or type 2 diabetes mellitus were included. - Intervention: education, symptom monitoring, problem solving, medication adherence, physical activity, dietary intake and/or smoking cessation. - Model: self-management. - Self-management interventions showed great diversity in mode, content, intensity, and duration. - Although self-management interventions overall improved HRQoL at 6 and 12 months, meta-regression showed counterintuitive negative effects of standardised training of interventionists and peer interaction on HRQoL at 6 months.
Clinical and economic outcomes of nurse-led services in the ambulatory care setting: a systematic review Chan, et al. 2018 [72]	Nurse-led care	- Systematic review including 25 studies and 180,308 participants. - Intervention: chronic disease management in the ambulatory care setting. - Model: nurse-led care. - Of the 16 studies that measured and reported on HRQoL outcomes, the majority of studies (n=13) reported equivocal outcomes; with three studies demonstrating superior outcomes and one demonstrating inferior outcomes in comparison with physician led and standard care. - Nurse-led care demonstrated either equivalent or better outcomes for a number of outcomes, including symptom burden, self-management and behavioural outcomes,

Source	Model	Summary
Peer reviewed sources		
		disease-specific indicators, satisfaction and perception of quality of life, and health service use.
Effectiveness of nurse-led early discharge planning programmes for hospital inpatients with chronic disease or rehabilitation needs: a systematic review and meta-analysis Zhu, et al. 2015 [73]	Nurse-led care	- Systematic review including 10 trials and 3,438 participants. - Intervention and model: nurse-directed early discharge planning programs for inpatients with chronic disease and rehabilitation requirements versus standard care. - Nurse-led early discharge programs significantly reduced the rates of hospital admissions, duration of inpatient hospital readmissions and all-cause mortality compared to standard care. - Nurse-led early discharge did not have an effect on the length of stay of the index admission. - Nurse-led early discharge programs may reduce costs associated with readmission and increase satisfaction and overall QoL. - This review concludes that nurse-led early discharge programs can improve care outcomes for patients by reducing the rate and length of readmission, and by lowering mortality rate and enhancing quality of life.
The effect of physician-nurse substitution in primary care in chronic diseases: a systematic review Martinez-Gonzalez, et al. 2015 [74]	Nurse-led care	- Systematic review including 14 trials and 10,743 participants. - Intervention and model: substituting physician led care with nurse-led care. - One of the included studies reported no effect of nurse-led care on adherence to practical guidelines. - Two of the included studies reported positive effect of nurse-led care on managing blood pressure according to guidelines, however this effect did not sustain at 14 and 48 months. - One of the included studies reported positive effect of nurse-led care on adequate management of lipids. However, this effect did not sustain at 14 and 48 months. - One of the included studies reported no effect of nurse-led care on the number of patients meeting glycated haemoglobin target values compared to physician led care. - One of the included studies reported a positive effect of nurse-led care on reducing the body mass index at 6

Source	Model	Summary
Peer reviewed sources		
		months, compared to physician led care, however this effect did not sustain at 12 and 14 months. • One of the included studies reported a positive effect of nurse-led care on correct inhalation technique at 12 months compared to physician-led care, however this effect did not sustain at 24 months. • One of the included studies reported a positive effect of nurse-led care on secondary prevention of heart disease through appropriate aspirin intake, low fat diet, or physical activity at 12 months, compared to physician led care, however this effect did not sustain at 48 months except for physical activity. • Two of the included studies found no effect of nurse-led care on treatment concordance. • This review concludes that nurse-led care provided by specially trained nurses can lead to similar health or process outcomes as the physician led care for patients with chronic disease.
Are community-based nurse-led self-management support interventions effective in chronic patients? Results of a systematic review and meta-analysis Massimi, et al. 2017 [59]	Nurse-led care	• Systematic review including 29 articles, with 29 included in qualitative synthesis and 13 included in meta-analysis. • Intervention and model: nurse-led self-management support intervention. • Seven out of 12 studies with systolic blood pressure level as a primary outcome found a significantly lower blood pressure level among nurse-led self-management group than control group. Meta-analysis of 10 studies found a significant reduction in systolic and diastolic blood pressure in the intervention group. • Four out of 29 studies glycated haemoglobin level as a primary outcome found a significantly lower glycated haemoglobin level among nurse-led self-management group than control group. Meta-analysis of seven studies found a reduction in glycated haemoglobin in the intervention group. • Two out of four studies with morality outcome reported a significant decrease in mortality rates in the intervention group. • Nurse-led self-management interventions were more likely to significantly improve outcomes if the target population were diabetic or had cardiovascular disease patients and nurses were specifically trained.

Source	Model	Summary
Peer reviewed sources		
		• This review concludes that nurse-led self-management interventions delivered by specially trained nurses can be a promising routine primary care activity.
Community pharmacist-led interventions and their impact on patients' medication adherence and other health outcomes: a systematic review Milosavljevic, et al. 2018 [75]	Pharmacist led care	• Systematic review including 22 original studies. • Intervention: community pharmacist-led interventions. • Model: pharmacist-led care versus usual care. • Nine of the included studies reported statistically significant positive effect of pharmacist led interventions on patient concordance with treatment, while six other studies reported no effect, five did not report on statistical significance and two reported a mixed effect. • Three of the included studies reported statistically significant positive effect of pharmacist-led interventions on goal blood pressure, while two other studies reported no effect and one did not report on statistical significance. • Four of the included studies reported statistically significant positive effect of pharmacist-led interventions on reducing the systolic blood pressure, while one other study reported no effect. • One of the included studies reported statistically significant positive effect of pharmacist led interventions on reducing glycated haemoglobin and blood glucose levels, while two other studies reported no effect. • Two of the included studies reported statistically significant positive effect of pharmacist-led interventions on lowering non-fasting cholesterol and low-density lipoprotein cholesterol levels. • Four of the included studies reported statistically significant positive effect of pharmacist-led interventions on outcomes relating to COPD and asthma control. • Three of the included studies reported no effect of pharmacist-led interventions on improving depression symptoms. • This review concludes that community pharmacist-led interventions can improve treatment concordance and outcomes in blood pressure, cholesterol, COPD and asthma management. Community pharmacist led interventions did not improve outcomes in diabetes and depressive symptom management.

Source	Model	Summary
Peer reviewed sources		
Pharmacist-led chronic disease management: a systematic review of effectiveness and harms compared to usual care Greer, et al. 2016	Pharmacist-led care	• Systematic review including 63 studies and 33,409 participants. • Intervention: medication monitoring, medication therapy review, patient medication education, prescribing authority, disease self-care and support, immunisations. • Model: pharmacist-led chronic disease management. • Pharmacist-led care had similar effect on the rates of office, urgent care and emergency department visits, as well as mortality and clinical events, as usual care. • Pharmacist-led care led to increased number of medication and dosage and higher rates of patients meeting glycaemic, blood-pressure or lipid goals. • This review concludes that pharmacist-led care can have similar outcomes as the usual care in terms of health utilisation and may improve the physiological goal attainment.
Pharmacist services for non-hospitalised patients De Barra, et al. 2018 [90]	Pharmacist-led care	• Cochrane review including 116 trials. • Review focuses on services provided by pharmacists to non-hospitalised patients, that is individuals living in community or ambulatory-care settings, with any clinical condition. • Intervention: non-dispensing services on non-hospitalised patient outcomes. • Model: pharmacist led. • The results demonstrate that pharmacist-led services have varying effects on patient outcomes compared with usual care. • No studies comparing services delivered by pharmacists with other healthcare professionals that evaluated the impact of the intervention on the six main outcome measures were found.
Benefits and limitations of implementing Chronic Care Model (CCM) in primary care programs: A systematic review Yeoh, et al. 2018 [78]	The Chronic Care Model	• Systematic review including 25 studies. • Authors focused on programs targeting diabetes mellitus, hypertension and cardiovascular disease. • Intervention: primary care management of chronic conditions. • Model: Chronic Care Model which consists of 6 key components, including health system or a health organization, clinical information systems, decision support, delivery system design, self-management

Source	Model	Summary
Peer reviewed sources		
		support and community-including organizations and resources for patients. - Among the 25 enrolled programs, there were 3 programs focusing on hypertension, 4 programs on cardiovascular disease and 1 program on COPD. - Among these studies, there are 6 programs. After 6 months to 1 year, the outcomes obtained from the follow up of these programs showed that the proportion of people living with chronic disease who reached clinical targets greatly increased.
A systematic review of chronic disease management interventions in primary care Reynolds, et al. 2018 [77]	The Chronic Care Model in primary care	- Systematic review including 157 original studies. - Intervention: healthcare organisation interventions including delivery system design, decision support and clinical information systems, as well as community resources and policies interventions including self-management support. - Model: the chronic care model versus usual care. - 71 of the included studies reported on self-management as a primary intervention element and more than half of them reported improvements in patient-level outcomes such as physiological measures of disease, risk behaviour, satisfaction and knowledge. - 33 of the included studies reported on delivery system design as a primary intervention element and findings showed benefits in improving either the patient-level or professional-level outcomes (adherence to guidelines and change in medication). - Decision support interventions showed benefits in improving professional-level outcome, and clinical innovation systems showed benefits for both the patient level and professional level outcomes. - This review concludes that Chronic Care Model with self-management support is the most frequent Chronic Care Model intervention that is associated with statistically significant improvements.
Effectiveness of chronic care models: opportunities for improving healthcare practice and health outcomes: a systematic review	Various chronic care models	- Systematic review including 77 studies. - Intervention: self-management support, delivery system design, clinical information systems, decision support, case management, health system, community support, and family support. - Model: chronic care models versus usual care.

Source	Model	Summary
Peer reviewed sources		
Davy, et al. 2015 [91]		- Self-management support (50 articles) and delivery system design (39 articles) interventions were most commonly reported, followed by clinical information systems (37 studies) and decision support (36 studies). - The majority of the included studies reported a positive effect of chronic care models on either the healthcare practice or health outcomes, while two reported a negative effect on health outcomes (decreased high-density and increased low-density lipoproteins) and one reported a negative effect on healthcare practice (documentation). - This review concludes that while chronic care models led to improved healthcare practice and health outcomes, it was not clear which intervention elements or combination of elements contributed such improvements.
An overview of chronic disease models: a systematic literature review Grover, et al. 2014 [92]	Various chronic care models	- Systematic review including 23 studies. - Intervention: Chronic Care Model, Improving Chronic Illness Care, and Innovative Care for Chronic Conditions, Stanford Model and Community-based Transition Model. - Model: chronic disease models. - Self-management support and delivery system design interventions were most commonly reported (87%), followed by clinical information systems and decision support (57%) and health system organisation (57%). - Other elements of chronic disease models were reported in fewer studies included: centre care on the patient and family (13%), patient safety (4%), community policies (4%), built integrated healthcare (4%) and remote patient monitoring (4%). - This review concludes that there is lack of evidence on the applicability of chronic disease models among different populations and locations, which warrants further research.
Rural chronic disease research patterns in the United Kingdom, United States, Canada, Australia and New Zealand: a systematic integrative review	Various chronic care models	- Systematic review including 160 studies. - Intervention: not specified. - Model: innovative service models are of increasing interest with 30% of papers reporting on various models of care. Telehealth care is similarly of increasing interest with 10% papers found in this review directly addressed the use of telehealth in the rural context.

Source	Model	Summary
Peer reviewed sources		
Disler, et al. 2020 [93]		- 53% focused on cardiovascular disease; 27% diabetes mellitus; 8% COPD and 13% chronic kidney disease. - Rural populations. - Only 10% of the included papers measured mortality within their outcomes. - Outcomes relating to Indigenous populations were scarce with only 19% papers including data in this context.
Patient-initiated appointment systems for adults with chronic conditions in secondary care Whear, et al. 2020 [79]	Patient-initiated appointment systems	- Cochrane review including 17 RCTs, 3,854 participants. - Six chronic conditions including cancer, rheumatoid arthritis, asthma, COPD, psoriasis and inflammatory bowel disease. - Intervention and model: patient-initiated appointment systems compared with consultant-led appointment systems. - Patient-initiated appointment systems may have little or no effect on patient anxiety, depression and quality of life compared to consultant-led appointment systems.
Use of telehealth for health care of Indigenous peoples with chronic conditions: a systematic review Fraser, et al. 2017 [68]	Models using telehealth (virtual care)	- Systematic review including articles (n=32) examined effectiveness (n=11), critiqued telehealth from the perspectives of the person living with chronic disease (n=10), healthcare professionals (n=8), and examined feasibility (n=12). - Intervention: chronic conditions management in the care of Indigenous people. - Model: telehealth. - Studies reported Indigenous people tend to be satisfied with telehealth but are sceptical about its cultural safety. Evidence for the effectiveness of telehealth from a western biomedical perspective was found. - Telehealth is promising, however a lack of robust studies in this review make tangible conclusions difficult. - Telehealth may have the potential to improve health care for Indigenous people, however the modality needs to be culturally competent and the care received must be culturally safe.
Interactive telemedicine: effects on professional	Models using telehealth (virtual care)	- Systematic review including 93 trials and 22,047 participants. - Intervention and model: interactive telemedicine ±usual care versus usual care.

Source	Model	Summary
Peer reviewed sources		
practice and health care outcomes Flodgren, et al, 2015 [60]		- Interactive telemedicine was provided as an alternative to usual care in 57% of studies, as an addition in 32% of studies, and as a partial substitute in 11% of studies. - 55 studies provided remote monitoring and 38 studies provided real-time videoconferencing. The telemedicine functions included: ○ monitoring for early signs of deterioration of chronic disease ○ providing treatment or rehabilitation ○ education on self-management ○ specialist consultation ○ real-time assessment ○ screening. - Telemedicine in 16 of the included trials (moderate to high certainty evidence) had no effect on all-cause mortality for patients with heart failure. - Telemedicine in 11 of the included trials (moderate certainty evidence) had mixed effect on rates of hospital admissions, ranging from 64% decrease to 60% increase across studies. - Telemedicine in five of the included trials (moderate certainty evidence) had a positive effect on QoL. - Telemedicine in 16 of the included trials (high certainty evidence) had a positive effect on glycated haemoglobin levels in diabetic patients with lower levels compared to usual care. - Telemedicine in included trials (moderate certainty evidence) resulted in lower low-density lipoprotein (four studies) and blood pressure (four studies) compared to usual care. - This review concludes that telemedicine can have similar or improved benefits in managing heart failure and diabetes compared to usual face-to-face or telephone care.
A systematic review of the effects of telerehabilitation in patients with cardiopulmonary diseases	Models using telehealth (virtual care)	- Systematic review including 11 trials. - Intervention and model: home-based telerehabilitation vs centre-based rehabilitation. - Telerehabilitation was equally effective at improving exercise capacity and QoL as centre-based rehabilitation.

Source	Model	Summary
Peer reviewed sources		
Hwang, et al 2015 [64]		- Telerehabilitation had higher adherence rates than centre-based exercise. - This review concludes that although telerehabilitation can be as effective as centre-based rehabilitation, there is a lack of compelling evidence.
Telehealth interventions to support self-management of long-term conditions: a systematic metareview of diabetes, heart failure, asthma, chronic obstructive pulmonary disease, and cancer Hanlon, et al. 2017 [61]	Models using telehealth (virtual care)	- Meta-review of 53 systematic reviews, including 232 trials. - Model: telehealth interventions to support self-management. - Telemonitoring had shown a significant improvement in glycaemic control for type 2 diabetes across included reviews with height-weighted quality. Telemonitoring showed no effect on glycaemic control for type 1 diabetes - Some of the included reviews found telemonitoring and self-management support significantly reduced mortality and hospital admissions, while the others did not find this. - Telemonitoring and telephone support had mixed effect (no effect or positive effect) on outcome related to asthma, COPD and cancer. No negative effect was reported. - This review concludes that telehealth can be a safe alternative to usual care, especially among diabetic and heart failure patients.
Impact of clinical pharmacist services delivered via telemedicine in the outpatient or ambulatory care setting: a systematic review Niznik, et al. 2018 [66]	Models using telehealth (virtual care)	- Systematic review including 34 original studies. - Intervention: pharmacist-led telephonic clinics, post-discharge follow-up, medication counselling, virtual management, remote monitoring, medication therapy management, automated text message reminders and instructional videos. - Model: clinical pharmacy telemedicine model in the outpatient or ambulatory care settings. - 19 of the included studies reported a positive effect of clinical pharmacy telemedicine model on clinical outcomes (lab values, hospitalisation rates, and emergency department visits), while eight reported no effect and one reported negative effect. - Two of the included studies reported a positive effect of clinical pharmacy telemedicine model on disease management outcomes (self-monitored blood pressure and inhaler use technique).

Source	Model	Summary
Peer reviewed sources		
		- Five of the included studies reported a positive effect of clinical pharmacy telemedicine model on adherence, while three reported no effect. - Scheduled models of interventions had higher positive impact rate (72.4%) than responsive or reactive models (25%). - This review concludes that clinical pharmacy telemedicine models can improve clinical, disease management and adherence outcomes in patients, especially when scheduled models via telephone were implemented.
Telehealth and Indigenous populations around the world: a systematic review on current modalities for physical and mental health Dawson, et al. 2020 [69]	Models using telehealth (virtual care)	- Systematic review including six studies. - Review specific to telehealth and Indigenous populations around the world. - Studies included at least one of the following mental health (depression, post-traumatic stress disorder, suicide) and physical health (mortality, blood pressure, glycated haemoglobin, cholesterol, quality of life) outcomes. - Intervention: varied; telephone outreach intervention, routine tests and monitoring, psychoeducational program and a lifestyle intervention. - Model: telehealth. - Intervention technologies ranged from telephone outreach, internet-based, text messaging, and video conferencing. - Outcomes of interest included low-density lipoprotein, glycated haemoglobin, blood pressure, mortality, and QoL but were not explicitly reported in the review. - The review highlights the importance of culturally tailoring programs despite the modality in which they are delivered and recommends telephone-based delivery facilitated by a trained health professional.
The effect of telehealth versus usual care for home-care patients with long-term conditions: a systematic review, meta-analysis and qualitative synthesis	Models using telehealth (virtual care)	- Systematic review including 9 studies and 2,611 participants. - Review included adult home-care patients diagnosed with at least one long term condition. - Intervention: not specified in abstract. - Model: technology-enabled healthcare in the community. - Telehealth was not statistically significantly different versus standard home care for QoL, psychological

Source	Model	Summary
Peer reviewed sources		
McFarland, et al. 2019 [63] *Abstract only*		wellbeing, physical function, anxiety, depression, disease specific outcomes or bed days of care at 3, 6, 9 and 12 months.
The efficacy of telehealth delivered educational approaches for patients with chronic diseases: a systematic review Rush, et al. 2018 [62]	Models using telehealth (virtual care)	• Systematic review including 16 studies. • Patients included those with diabetes, COPD, irritable bowel syndrome and heart failure. • Intervention: education. • Model: telehealth. • Telehealth modalities included the web, telephone, videoconference, and television. • In 11 of 16 studies, virtually delivered interventions significantly improved outcomes compared to control conditions. In the remaining five studies, virtual education showed comparable outcomes to the control conditions.
Telehealth interventions delivering home-based support group videoconferencing: systematic review Banbury, et al. 2018 [94]	Models using telehealth (virtual care)	• Systematic review including 17 studies. • Intervention: group-based intervention for patient education or social or mental health support. • Model: videoconferencing. • Overall acceptability was high with access from the home highly valued and little concern of privacy issues. Some participants reported preferring face-to-face groups. • A range of improved outcomes were reported but because of the heterogeneity of studies, comparison of these across studies was not possible. There was a trend for improvement in mental health outcomes.
Barriers and facilitators for sustainability of tele-homecare programs: a systematic review Radhakrishnan, et al. 2016 [67]	Models using telehealth (virtual care)	• Systematic review including 16 articles • Included articles that addressed the management of the chronic diseases of heart failure, hypertension, diabetes, and COPD in older adults age 65 years or above. • Intervention: home health nursing agencies for chronic disease management. • Model: tele-home care programs. • The following factors impacted the sustainability of the programs: perceptions on effectiveness of tele-home care programs for achieving intended outcomes and tailoring of tele-home care programs to patient characteristics and needs.

Source	Model	Summary
Peer reviewed sources		
		• Relationship and communication between patient, nurse, and other healthcare professional users of tele-home care impacted outcomes. • Home health organisational process and culture were also found to impact outcomes, and technology quality, capability, and usability were prevalent sources of impact on outcomes.
A systematic review of the effectiveness of telerehabilitation interventions for therapeutic purposes in the elderly Velayati, et al. 2020 [65] *Abstract only*	Models using telehealth (virtual care)	• Systematic review including eight articles. • Intervention: rehabilitation. • Model: telerehabilitation versus usual care. • Telerehabilitation was used for the elderly after stroke, COPD, total knee replacement, and in patients with the comorbidity of COPD and CHF. • In most studies, there was no significant difference between the intervention and control groups and the level of improvements was similar for most outcomes.

Australian guidelines

Source	Summary
COPD	
The COPD-X plan: Australian and New Zealand guidelines for the management of chronic obstructive pulmonary disease Lung Foundation Australia 2020 [80]	• These guidelines aim to effect changes in clinical practice based on sound evidence, and shift the emphasis from a predominant reliance on pharmacological treatment of COPD to a range of interventions which include patient education, self-management of exacerbations and pulmonary rehabilitation. • The coverage includes the management of established disease and exacerbation. • Recommendations were graded using the US National Heart, Lung and Blood Institute scheme, the National Health and Medical Research Council levels of evidence and the GRADE system. • Key recommendations are included on: ○ case finding and confirming diagnosis ○ optimising function ○ preventing deterioration ○ developing a plan of care ○ managing exacerbations.

Source	Summary
	- Note there are additional variations of this guide such as the *COPD-X Concise Guide*.
Australia and New Zealand pulmonary rehabilitation clinical practice guidelines Lung Foundation Australia and Thoracic society of Australia and New Zealand 2017 [95]	- The aim of the *Pulmonary Rehabilitation Guidelines* is to provide evidence-based recommendations for the practice of pulmonary rehabilitation (PR) specific to Australian and New Zealand healthcare contexts. - The guidelines methodology adhered to the Appraisal of Guidelines for Research and Evaluation (AGREE) II criteria. - The patient populations to whom the guidelines apply are those with chronic respiratory disease, primarily COPD, with some evidence presented for patients with bronchiectasis, interstitial lung disease, and pulmonary hypertension. - The guidelines panel recommended: o That people with mild to severe COPD should undergo PR to improve QoL and exercise capacity and to reduce hospital admissions. o That PR could be offered in hospital gyms, community centres or at home and could be provided irrespective of the availability of a structured education program. o That PR should be offered to people with bronchiectasis, interstitial lung disease and pulmonary hypertension, with the latter in specialised centres. o The guidelines panel was unable to make recommendations relating to PR program length beyond eight weeks, the optimal model for maintenance after PR, or the use of supplemental oxygen during exercise training.
Pocket guide to COPD diagnosis, management and prevention Global Initiative for Chronic Obstructive Lung Disease 2020 [96]	- The guide was developed from the *Global Strategy for the Diagnosis, Management and Prevention of COPD 2020 Report*. Detailed methodology is not provided and the evidence base for the document is unclear. - The guide provides key points under the following headings: definition and overview, diagnosis and assessment of COPD, evidence supporting prevention and maintenance therapy, management of stable COPD, management of exacerbations and comorbidities.
Heart failure	
Guidelines for the prevention, detection, and management of heart failure in Australia 2018 National Heart Foundation of Australia and Cardiac Society of	- The guidelines were developed using reference groups, an external literature review and public consultation. - Recommendations cover prevention of heart failure (non-pharmacological and pharmacological), diagnosis, acute heart failure, pharmacological management of CHF, non-pharmacological management, models of care to improve evidence-based practice, devices, surgery and percutaneous procedures, cardiac resynchronisation therapy, implantable cardioverter defibrillators, pressure monitoring, surgical management and procedures,

Source	Summary
Australia and New Zealand 2018 [81]	hypertension, atrial fibrillation, diabetes, sleep disordered breathing, anaemia, iron deficiency, treatment of heart failure with recovered ejection fraction and palliative care. • Specific to models of care delivery recommendations included: ○ referral to a multidisciplinary heart failure disease management program for some patients ○ multidisciplinary telemonitoring or a telephone support group for follow up where access to face-to-face is limited ○ nurse-led medication titration is recommended in some patients ○ educating patients and their carers about the self-management of heart failure is recommended ○ regular exercise is recommended in patients with stable CHF. • A concise summary of this guideline has been published for general practitioners in *Medicine Today* in 2019.
NSW clinical service framework for chronic heart failure NSW Agency for Clinical Innovation 2016 [97]	• The *NSW Clinical Service Framework for Chronic Heart Failure 2016* provides nine evidence-based standards to assist clinicians to prevent, detect and manage chronic heart failure. • Detailed methodology of how the document was developed is not provided. • Key principles ○ Management should align with the nine evidence-based standards described in the framework. ○ Framework may be used by general practitioners, nurses, doctors, allied health staff and Aboriginal health service providers. ○ Framework provides guidance for a range of clinical settings. ○ Health services need to be reconfigured to be more integrated, coordinated and patient focused. ○ Access to different levels of care at various stages of the disease trajectory is needed to reduce presentations to hospital. ○ The general practitioner or other primary care provider plays a central coordinating role in the person-centred medical home model. ○ Supported self-management underpins the aims of services.
Clinical standard for Heart Failure Support Services Queensland Health 2019 [98]	• Document describes Heart Failure Support Services as a model of care for people with heart failure. • Detailed methodology of how the document was developed is not provided. • The objective of this standard for Heart Failure Support Services is to ensure that all patients with symptomatic heart failure have access to appropriate specialist medical review and management, as well as coordinated nursing and allied health care.

Source	Summary
	• Heart Failure Support Services are multidisciplinary services that provide and support individually tailored programs that include: disease management, case management, self-management and rehabilitation. • Document covers: timing of support, referrals and inclusion criteria, assessment and management, discharge criteria, benchmarking and outcomes, workforce levels skill mix and roles.

Appendix 3: Shoalhaven Respiratory Chronic Care Program exemplar report

Introduction and summary

The aim of the Shoalhaven Respiratory Chronic Care Program (RCCP) is to maintain people with advanced chronic lung disease (in particular chronic obstructive pulmonary disease (COPD)) living as independently as possible, for as long as possible, with the highest possible quality of life, in their own homes. The RCCP optimises patient medical management and increases patient health literacy and self-management. The program provides a continuum of care during and post transition from hospital to home.

The program's health service goals are to reduce:

- total separations
- readmissions
- average length of stay
- total hospital bed days for patients with advanced lung disease.

The model is a hospital-based, respiratory-specific service, delivered to targeted people living with chronic respiratory disease. It is delivered to people in their home on a regular basis, usually weekly, by a multidisciplinary team.

The team is supported by specialist respiratory physicians. The adjunct RCCP pulmonary rehabilitation program and Shoalhaven respiratory clinic (run by the respiratory staff specialist) is integral to the RCCP Model. A trusting working relationship with the respiratory physicians and the clinic is critical.

Site dashboard

The dashboard below provides a high-level overview of the features of the Shoalhaven RCCP as an exemplar site

Table 1: Shoalhaven RCCP dashboard

Feature	Provided
Local health district based	Yes
Provides home visiting	Yes
Five days/week service	Requires qualification or varies across settings
Established a tailored program	Yes
Defined entry and exit criteria	Yes
Multidisciplinary care delivery	Yes
Specialist physician expertise routinely available	Yes

Evidence-based	Yes
Model supports people living with chronic heart failure and people living with COPD	No
Outcome data routinely collected and reported	Requires qualification or varies across settings
Service system data routinely collected and reported	Requires qualification or varies across settings
Enabled by virtual care	Requires qualification or varies across settings

Service structure

Referral sources

Referral sources for the Shoalhaven RCCP in an average year are approximately 70% from specialists, 20% from general practitioners (GPs) and 10% from other sources including patients.

Entry and exit criteria

These criteria can be applied flexibly when a person may benefit from enrolment, for example, a young person with cystic fibrosis.

Entry criteria

- 60 years of age or older
- 45 years of age or older if an Aboriginal person
- Severe COPD (forced expiratory volume in 1 second (FEV1) less than 50%) or advanced lung disease
- Two or more respiratory admissions in 12 months
- Cognitively intact and psychosocially stable
- Care is optimised by a respiratory physician
- GP approves person’s participation.

Exit criteria

- Person living with COPD is stable and able to self-manage with GP support.
- Move into a high level care facility.
- Move out of catchment area.
- Patient or GP no longer supports participation.
- Person living with COPD is able to self-manage (evidenced by <1 respiratory admission in previous two years).

- Cognitive dysfunction/non-compliance (if person is living alone staff must refer to appropriate disciplines prior to discharge from RCCP service).
- Deceased.

Caseload

The caseload for 2020 has been 221 people living with chronic respiratory disease, with 75 currently active. The program sees a minimum of seven people living with chronic respiratory disease per day and around 30 to 35 of these each week.

Staffing

Clinical staffing for the Shoalhaven RCCP is 1.95 full-time equivalent (FTE) comprising:

- clinical nurse consultant, respiratory 1.0 FTE (multiple roles across program)
- physiotherapist 0.7 FTE
- occupational therapist 0.2 FTE
- pharmacist (one hour per week) 0.03 FTE.

Care delivery framework

A hospital-based program transitioning people living with COPD from acute care back home

The RCCP is a hospital-based community program. This is a critical part of its success. The team meets many people living with COPD on the ward in hospital after a respiratory event. The liaison between the patient's experience on the ward and the adaptations they need to make at home is an important component.

A tailored rehabilitation plan driven by a comprehensive clinical assessment

Every person living with COPD enrolled in the RCCP service or the RCCP outpatient pulmonary rehabilitation program has a comprehensive clinical assessment by the referring respiratory physician. The respiratory physiotherapists or clinical nurse consultant assesses and tailors specific exercise programs for those people referred for pulmonary rehabilitation.

Every person living with COPD has a COPD action plan signed off by their GP

This plan tells the person when to commence their plan in case of exacerbation of symptoms. It is documented in the electronic medical records and includes the person's medications.

Regular home visiting with specialist equipment provided to people living with COPD

People living with COPD are seen regularly in their home, usually weekly. The person's health status is checked, and the team continuously provide the person with education about their condition, how best to manage it and what they can do in terms of self-management at home.

The program facilitates the organisation of any necessary equipment, such as oxygen, and helps people to make lifestyle adjustments that will enhance their health.

RCCP equipment lending pool can provide NIV devices, nebulisers, mobility aids, high flow nasal cannula and oxygen concentrators. The latter being frequently used to facilitate early discharge, instead of people living with COPD waiting on domiciliary oxygen which could take a further 24 to 48 hours to deliver.

Visiting the person at home is fundamental to the RCCP's success. Seeing the person in their actual living environment provides valuable information and insights including:

- the person's management of medications
- the condition of medical equipment and devices
- lifestyle factors and social determinants of care, and how these might impact the person's health outcomes.

Specialist clinical expertise trusted by respiratory physicians

RCCP staff have specialist clinical expertise in relation to advanced chronic lung disease. They are knowledgeable and clinically proficient in diagnosis, symptom mitigation and treatment. They have a close working relationship with, and are trusted by, respiratory physicians.

First port of call for people living with COPD means emergency admissions can be avoided or managed

People living with COPD can contact the RCCP during the week, or in an emergency if they are feeling unwell, or just needing advice. The RCCP is generally the first port of call as opposed to calling the ambulance.

RCCP staff are available to provide advice to key health services about patients enrolled in the program in real time. If a patient contacts their GP or attends the emergency department (ED) with an acute episode, RCCP staff can assess and respond. Their detailed knowledge of the patient ensures that the exacerbation is effectively managed, the patient receives the right treatment and they can return or stay at home.

The team promptly assesses and adjusts services depending on the needs of people living with COPD

The RCCP promptly assesses and adjusts services needed by people living with COPD. If a person becomes unwell, the RCCP can stream them into the respiratory clinic for treatment rather than the ED. If a person's condition is stable or improving, the RCCP may see them every two weeks.

Clinical components

The RCCP delivers and/or supports a range of required clinical services for a person living with advanced chronic lung disease including:

- advance care directive
- COPD action plans
- COPD clinic
- education and support for self-management
- education for residential aged care facility staff
- emergency call outs (currently five days per week)
- home and maintenance rehabilitation
- intravenous antibiotics (push only) if required
- managing tracheostomies and chest drains at home
- medication delivery device review
- medication reviews (including pharmacist led reviews)
- NIV review and education
- occupational therapy assessment and review
- outpatient pulmonary rehabilitation
- oxygen review and ventilation
- physiotherapy
- referral to other disciplines and services as required, for example hospital in the home, community nurses, dietician, home care, connecting care
- resource and patient assessment for residential aged care facility
- respiratory assessment and monitoring
- smoking cessation services
- spirometry, pre and post assessments
- ward, ED or intensive care unit clinical nurse consultant patient reviews.

Point of care diagnostic equipment

Point of care diagnostic equipment is used to support clinical decision making. The team routinely employs oximetry devices, stethoscopes for distinguishing breath sounds, oxygen analyser (to determine the efficacy of oxygen delivery systems), blood glucose level monitors, and spirometers. The program is purchasing a point of care ultrasound and testing point of care arterial blood gas.

The team addresses both the chronic aspects of COPD as well as symptom exacerbation

Establishing and demonstrating the RCCP's ability to address both chronicity and exacerbation is important to the program's viability.

Story of people living with COPD enrolled in the Shoalhaven RCCP service

Clinician quote

'Seeing the person is important. People living with COPD are incredibly stoic and sometimes downplay their symptoms. We had a person who didn't complain much, and his wife thought he was asleep. When we checked something had gone wrong with his oxygen and he had CO_2 narcosis.

I recently did a home visit with another person, John, an 80-year-old man who lives alone. John had almost completed a second course of antibiotic for a suspected chest infection, prescribed by his GP and aligned with John's action plan.

John said he was still not feeling well and could only speak in words or very short phrases. A lung assessment indicated bibasal crepitations, reduced air entry in the right lower lobe, respiratory rate of 22 breaths per minute, heart rate of 90 (regular). He had a large amount of thick brown phlegm. John was using a home oxygen concentrator and his peripheral oxygen saturation was 88% (90% is the baseline for this GOLD (Global Initiative for Chronic Obstructive Lung Disease) 4 COPD patient). His other indicators included jugular venous pressure not elevated, mild ankle oedema, an elevated temperature and increased shortness of breath with accessary muscle use.

The results of a point of care arterial blood gas [assessment] indicated respiratory failure type 1.

I rang John's respiratory physician from John's bedside, and we decided to cannulate John and commence him on 1g IV ceftriaxone push over three consecutive days, increase his oxygen for three days and give him a burst dose of prednisone over five days (via action plan). I also contacted John's GP to keep them in the loop. The good news is John recovered and is back to his baseline, and we avoided an ED presentation and likely hospital admission.'

Implementation

Lessons learned from establishing several RCCPs in multiple hospitals

Key factors for an effective start-up of an RCCP include:

- a well-documented business case
- executive sponsorship that is engaged and regularly informed of progress
- clinical sponsorship from respiratory physician(s)
- champion(s) who can lead the implementation
- clear communication with program stakeholders (including tailored tools, messages and channels)
- designated project team.

Partnerships are pivotal to the success of the program

It is critical to have an active and trusting relationship with the **respiratory physicians** who refer to and clinically support the RCCP. Those respiratory physicians need to trust the observation and clinical judgements of the RCCP team, particularly when the team contacts them for specialist advice during or following a home visit. In the absence of such a partnership the program cannot operate effectively.

General practitioners are also important partners. People living with COPD cannot be enrolled without the consent of their GP. Ideally the GP is engaged on an ongoing basis with the RCCP. The GP can contribute to key aspects of the program by:

- monitoring of other medical interventions particularly relating to co-morbid chronic disease
- supporting the patient's ongoing mental health, particularly in relation to anxiety and depression
- providing ongoing input about the person's general health and wellbeing.

The person living with COPD, their family and carers are central

A fundamental focus of the program is to educate and empower people living with COPD and their carers to have an increasingly informed and active role in the monitoring and management of their condition.

Health and medical staff are key allies

Health and medical staff are key allies in identifying and enrolling eligible people living with COPD into the program. The RCCP has strong partnerships with staff working in the ED, medical wards, aged services emergency team, chronic disease management programs and aged health. The team provides education and in-service sessions for stakeholders.

Executive and board member support

Key members of the Shoalhaven Executive (such as the director of nursing and director of finance) monitor, sponsor or support the program. Executive input and leadership support the successful operation of the program. A respiratory physician is on the local health district board, which also brings board level support for the program.

Workforce development is important

The clinical staff delivering the program need to be well trained in the diagnostics and treatment of advanced lung disease. If they are not highly competent, the respiratory physicians won't have confidence in them and in cases of doubt, people living with COPD will inevitably be admitted to hospital. Team's need to be developed and supported to be confident working in the community and visiting people in their homes.

Innovative ways to fund the program

Funding for the RCCP is recurrent and comes from the ABF revenue generated by the outpatient pulmonary rehabilitation program, run by the RCCP at Shoalhaven District Memorial Hospital.

The RCCP is efficient and operates at a cost less than the determined ABF that is allocated. The RCCP calculates that for a team of 3.5 FTE conducting 6,000 visits a year there is surplus revenue of $323K. The RCCP also estimates a facility saving of 702 respiratory bed days (over $1M saving).

Evidence of success

Shoalhaven RCCP reports a significant reduction in COPD related bed days, admissions, readmissions and hospital length of stay between its establishment in 2014/15 and 2017/18. More information about how this data was collected can be found below.

Despite the COPD prevalence in local community, and the rates of smoking being around 30%, the Shoalhaven RCCP has:

- reduced the demand for inpatient beds by reducing the number of COPD episodes by **44%**
- maintained a high standard of clinical care and further reduced the number of readmissions within 28 days by **77%**
- reduced the average length of stay by **21%.**

The effectiveness of the program is also illustrated by the Shoalhaven District Memorial Hospital COPD occupied bed days being reduced from **1,438** in 2014/15 to **831** in 2017/18.

An RCCP program can reduce hospitalisations in people living with COPD and overall costs in the COPD setting.[99]

Data collection and monitoring

The RCCP collects local (Shoalhaven) data for people living with COPD (diagnosis related groups E65A/E65B) in relation to hospital admissions, readmission rates and length of stay per patient per year. Results are compared with other like hospitals to determine level of performance.

With the support of the casemix team, the RCCP collects data from the local electronic medical record. Comparison data is obtained from publicly available Bureau of Health Information data.

The program also collects process and clinical outcome measures using:

- the COPD Assessment Test
- Hospital Anxiety and Depression Scale
- the St George Respiratory Questionnaire (optional)
- locally designed surveys.

The RCCP sees capturing local data as critical to success. It demonstrates the impact that the program is having on the health and wellbeing of people living with COPD and on the performance of the hospital.

Opportunities to explore innovative solutions

Expanding the reach of the RCCP

Currently the RCCP conducts home visits five days per week with plans to expand to a seven-day service in the near future. It is anticipated this will deliver better services for patients and health outcomes for the health system.

The RCCP patient ratio for home visits, operates at 1:35. If staffing could expand to 3.5 FTE, seven days/week, it is estimated that 120 people living with chronic respiratory disease would be seen by the service on a weekly basis. This would generate 6,000 occasions of service annually and easily fund the program with additional net revenue generated via ABF.

The RCCP rarely has to deliver interventions out of hours. The team's maintenance of the action plans of people living with COPD, ongoing education and regular home visits and phone calls usually pre-empt a crisis. When people are experiencing a crisis situation, the RCCP can often implement action plans to ameliorate issues, in addition to rapid assessment in response to event-driven criteria.

Working with specific populations can be challenging

The program found that people from low socio-economic status communities can be difficult to access and engage. Often the home visit reveals that living conditions are contributing to an exacerbation of symptoms.

Working with specific cultural groups, such as Aboriginal and Torres Strait Islander or culturally and linguistically diverse communities, can require significant effort to build trust and credibility with community leaders, people living with COPD and their families. Working with local health district staff such as Aboriginal health officers and multicultural health workers has assisted with building better relationships.

Lessons learnt from the use of virtual care during the COVID-19 pandemic

Virtual care has been an important tool in 2020. It assisted the RCCP to deliver services without jeopardising the health of people living with COPD. While virtual care can be used for specific cohorts, there is inconclusive evidence to suggest it can be used to manage people living with chronic and complex respiratory disease.

These tools are not a substitute for home visits but could be used as an adjunct where appropriate. Many people living with COPD are not technology savvy and may not have internet access at home. Some state they have no desire to participate in this type of health approach. The face-to-face component of the service is integral to its success.

Other chronic conditions would benefit from the RCCP model

The fundamental principles and components of this model would work for other conditions, such as heart failure. However, a key component of the model is the condition specific clinical expertise of the team and the trust relationship with respiratory physicians. A combined COPD and chronic heart failure care coordination program would have to develop clinical expertise across two conditions or have two separate clinical teams. They should remain separate as the RCCP model of care is flexible and can accommodate or be applied to other chronic disease cohorts with equal success, robustness and self-funded sustainability via ABF.

Appendix 4: Concord cardiac chronic care program service exemplar report

Introduction and summary

The aims of the Concord cardiac chronic care program are for people with chronic heart failure (CHF) and other chronic cardiac concerns to:

- improve symptom management
- improve mortality
- reduce 30-day readmissions to hospital
- decrease average length of stay when admission to hospital is necessary.

The program supports patients to manage the condition well in the community for as long as possible.

The program is based in Concord Repatriation General Hospital. People living with CHF and other chronic cardiac concerns who will benefit are enrolled into the program. The program comprises:

- inpatient in-reach
- heart failure clinic
- cardiac rehabilitation clinic
- home visiting
- virtual care for a small cohort of patients where this style of care is appropriate.

The program is staffed by heart failure nurses (HFNs) and medical staff including cardiologists and medical registrars. The program uses other specialist hospital staff, from physiotherapy and occupational therapy, to deliver the broad range of services under the program. People living with CHF receive care from across these services, depending on individual requirements.

Site dashboard

The dashboard in table 1 provides a high level overview of the features of the Concord program as an exemplar site.

Table 1: Concord cardiac chronic care program dashboard

Feature	Provided
Local health district based	Yes
Provides home visiting	Yes
Five days/week service	Yes
Established a tailored program	Yes
Defined entry and exit criteria	Yes

Multidisciplinary care delivery	Yes
Specialist physician expertise routinely available	Yes
Evidence-based	Yes
Model supports people living with CHF and people living with chronic obstructive pulmonary disease	No
Outcome data routinely collected and reported	Requires qualification or varies across settings
Service system data routinely collected and reported	Yes
Enabled by virtual care	Requires qualification or varies across settings

Service structure

Referral sources

From May to October 2020, referrals were received from Concord Repatriation General Hospital inpatient admissions (80) and a smaller number from other hospitals (10), cardiology rooms and general practices (10).

Entry and exit criteria

Entry criteria

- Every identified person diagnosed with CHF admitted to Concord Repatriation General Hospital.
- For the CHF clinic, people who are high risk, at risk of getting much sicker or dying and/or will benefit from a quaternary clinic.
- Resides in the Sydney Local Health District catchment area.
- Consent from the person living with CHF.

Exit criteria

- Person living with CHF is stable and adhering to medication, fluid, diet and exercise regime.
- HFN determines that the person is able to self-manage.
- Person makes a decision to exit program if they are confident to self-manage.
- Move out of catchment area.
- Deceased.

Caseload

There are around 120 people enrolled on the program per year, approximately 10 to 15 per month. Thus far, there are 108 people enrolled for 2020 (Jan-Sep 2020) with a current active caseload of 115. Some people living with CHF will be enrolled on the program for months and others for several years.

Staffing

- Clinical nurse consultants 2.0 full-time equivalent (FTE) (multiple roles across program)
- Senior staff specialists 0.4 FTE (shared across two specialists)
- Physiotherapist (FTE not program funded. Provided by hospital physiotherapy department.)
- Occupational therapist (FTE not program funded. Provided by hospital occupational therapy department.)
- Pharmacist (FTE not program funded. Provided by hospital pharmacy department.)
- Cardiologist 0.3 FTE (FTE not program funded. Provided by cardiology department.)

Care delivery framework

This is a hospital-based community program with home visits. People living with CHF are identified and introduced to the program whilst on the ward after a heart failure event, or otherwise referred by a general practitioner (GP) or specialist. They are enrolled in the program after discharge. The program supports transition between the person's treatment in hospital and adaptations they need to make at home. Entry criteria is flexible and inclusive.

A tailored program driven by a comprehensive clinical assessment

Every person living with CHF has a comprehensive clinical assessment by a cardiologist or GP, and this drives a program tailored specifically for them. The implementation of that program is supported in hospital and at home by a specialist HFN. The program will include a medication regime, exercise program, diet recommendations and a range of other self-management actions such as weight management, fluid management and monitoring salt intake.

Every person has a heart failure action plan developed following their comprehensive clinical assessment, to continue to guide their care successfully in the community. This plan includes information on:

- how people living with chronic cardiac conditions can manage their condition
- what to do with their medications
- what to do at home if new or worsening signs or symptoms of heart failure emerge
- when to contact the GP, HFN or cardiologist in case of exacerbation of symptoms
- when to call an ambulance.

Specialist clinical expertise

The program is staffed by experienced clinicians with specialist expertise in relation to the management of people living with chronic cardiac conditions. They are knowledgeable and clinically proficient in diagnosis, symptom management and treatment.

Knowledgeable and skilled heart failure nurses

The HFNs who deliver and/or support all key components of the program are highly competent and well trained in the treatment and management of CHF. They are also confident working in the community and visiting people at home.

A cardiologist with heart failure expertise

The diagnosis and treatment of people living with CHF is difficult and requires both clinical perseverance and expertise in relation to the condition. Having experienced cardiologists who can provide such leadership to the program is essential.

The program can promptly assess and adjust heart failure action plans

If a person living with CHF becomes unwell, they can receive advice from an HFN. If the person is frail or deteriorating, they can be streamed into the heart failure clinic for review and specialist intervention.

GP partnerships

The program works closely with GPs and engages them as partners in the management of people living with CHF. This is supported by regular GP education events and the development of tools to support management such as the *CHF HealthPathway*.[85]

Coordinated care

The program identifies other health or social conditions that may be exacerbating the patient’s condition and seeks to mobilise solutions to address those conditions.

Clinical components

Clinical services delivered by the program include:

- heart failure assessment and monitoring
- diagnostic testing and pathology
- echo and comprehensive pathology
- PhysioFlow assessment (non-invasive hemodynamic monitor)
- medication titration and reviews
- education and support for self-management
- medication reviews

- heart failure action plans euvolic or dry weight, fluid, salt
- outpatient cardiac or heart failure rehabilitation
- home and maintenance rehabilitation
- referral to home-based physiotherapy
- referral to smoking cessation services
- referral to occupational therapy assessment and review
- referral to other disciplines and services as required, for example hospital in the home, community nurses, dietician, and home care connecting care
- advanced care directive
- referral and collaboration with community palliative care
- education to residential aged care facility staff.

This clinical care is delivered in a variety of settings. These are described below.

Heart failure clinic

People living with CHF who are high risk, at risk of getting much sicker or dying are referred to the (weekly) heart failure clinic. A team of specialist doctors and nurses monitor the person's condition, undertake diagnostic tests and adjust medications, exercise and review fluid management. The clinic can support early discharge by optimising the care of people who are complex or fragile.

Heart failure rehabilitation

People living with CHF who require specialist advice and support to implement their exercise prescription are referred to the rehabilitation program for supervised rehabilitation sessions.

Regular home visits

People living with CHF are visited on a regular basis, usually weekly, in the initial phase of the program. The service is available from Monday to Friday. On the initial visit the HFN will take the following actions.

- Create an individualised plan.
- Conduct a risk assessment.
- Work through educational material (Heart Foundation) with the patient.
- Undertake medication reconciliation.
- Develop a weight management and fluid monitoring plan.
- Demonstrate home exercises and/or enrol patient in cardiac rehabilitation.
- Develop rapport with the person and their carers or other family.
- Provide a fridge magnet with contact details.

On subsequent home visits the HFN provides care coordination and case management and the following actions.

- Conducts a clinical assessment.
- Checks on how the person is managing generally.
- Provides further education and support in relation to any aspects of the person's treatment plan.
- Refers to other relevant clinicians and services, for example, cardiologist, GP, physiotherapist, other specialist, or palliative care.
- Addresses other issues that may be impacting the person's health, for example housing conditions, social circumstances or mental health issues.

Virtual care

The program can alternate home visits with virtual care contacts. For some people living with CHF the components of the program's services, such as cardiac rehabilitation, can be delivered through virtual clinics. Clinicians noted that virtual options were not suitable for all people as some do not admit that they are becoming unwell when contacted by phone and subsequently present to hospital. Physical examination is not possible in a virtual environment and some elderly people living with CHF are not able to use devices or technology to support virtual care.

Story of a person living with CHF enrolled in the Concord chronic cardiac care program

Clinician quote

'Cognitive impairment is really common with our people living with CHF – often the executive functions are impacted, so people may have good intentions but struggle to organise themselves.

We need to be aware of this, how it impacts on their ability to manage their medications and condition, and what adjustments need to be made so the person can still self-manage to the best of their ability.

We had a person with a history of about 12 admissions per year. He ate fish and chips daily, drank coke and missed his medications every day. We had to work hard to develop a regime he could stick to. In the end, we had him take all his medications first thing every morning. He had a hospital in the home nurse every day because he couldn't take his medications properly without assistance.

He had a history of trauma in his life, including during the war when he was a prisoner of war. This no doubt contributed to his behaviour.

Another one of the challenges with him was his GP was not very engaging and didn't return calls. This was problematic in being able to successfully manage him at home.

However, at the end of the day, we made a difference with him. The team arranged for the man to live at a residential aged care facility. We tracked him pre and post entering the program, and for *the last nine months he hasn't required admission. This was a good outcome for such a complex person living with CHF'.*

Implementation

Partnerships and relationships

Building partnerships and goodwill is critical to the success and operation of the program. The HFNs regularly provide educational sessions to hospital wards with people living with chronic heart conditions. The program participates in a weekly multidisciplinary team meeting to discuss people living with CHF on the wards that might benefit from the program.

The program also provides education and outreach to residential aged care facilities and general practices. The program has collaborated with the local primary health network to develop a CHF pathway and other related resources for GPs.

The person living with CHF, along with their family and carers, are central partners in the program. A fundamental focus of the program is to educate and empower people and their carers to have an increasingly informed and active role in the monitoring and management of their condition.

A champion

Having a champion is critical to program success. The champion needs to have 'fire in the belly', be enthusiastic about managing people with CHF and be prepared to go the extra mile for people who others might give up on.

Executive sponsorship

Executive sponsorship greatly assists the program. The local health district executive promotes the program as a flagship service. This has increased the program's profile and supports the partnerships necessary to its success.

Funding security

Funding for the program is now recurrent and comes from the Concord Repatriation General Hospital budget. The program also generates revenue through Medicare bulk billing for services delivered through the heart failure clinic. The program has attracted one-off funding from other sources in the past.

Evidence of success

Data collection and monitoring

The program accesses local Concord Repatriation General Hospital data:

- episodes of presentations
- 28-day readmission rates (cumulative and monthly)
- bed days (average length of stay)
- in-hospital mortality.

Data are extracted from the electronic medical record using the STARS (Sydney Local Health District Targeted Activity and Reporting System) system and codes all people living with CHF. The reports do not disaggregate results for people enrolled in the program and other non-enrolled people living with CHF. Data are compared to previous years' performance and other hospitals in the Sydney Local Health District.

The program also collects process measures:

- referrals received
- external referrals from cardiologists, other hospitals and GPs
- people living with CHF seen in hospital
- people living with CHF seen by the program
- people living with CHF not seen due to lack of capacity
- time between discharge and first phone call
- time between discharge and first home visit.

Clinical measures recorded during the home visits include:

- blood pressure
- heart rate and rhythm
- respiratory rate
- peripheral oxygen saturation
- temperature
- chest auscultation
- evaluation of jugular venous pressure
- evaluation of peripheral oedema
- weight
- assessment for new or worsening signs or symptoms of heart failure.

Opportunities to explore innovative solutions

Home visits

Visiting people living with CHF at home is fundamental to the program's success. Seeing the person in their living environment provides information and insights that cannot otherwise be obtained about the physical condition of the person, their cognitive ability, their understanding of the health literature presented, the set-up of their home and living conditions, their systems of managing medications and their lifestyle choices. All these insights from the home visits help in understanding peoples' individual barriers or supports for optimal self-management of a chronic cardiac condition.

Virtual care

Virtual care has been an important tool in 2020 because of COVID-19. It has assisted the program to deliver services without jeopardising the health of people living with CHF. The program views virtual care as a useful tool for people who are stable and do not require routine face-to-face visits. Home visiting is a critical component of the program and virtual care cannot be substituted. Additionally, many people living with CHF are not digitally literate and/or do not have internet access at home.

Profiling CHF and other chronic cardiac condition programs

Statewide clinical programs, such as Leading Better Value Care, assist in raising the profile of programs such as this. It assists the program to build partnerships and engagement with other critical services. This makes the work of improving coordination and service delivery for CHF patients easier to achieve. Continued association with Leading Better Value Care must be maintained to continue raising the program's visibility.

Appendix 5: Royal Prince Alfred Hospital respiratory chronic care program and pulmonary rehabilitation service exemplar report

Introduction and summary

The Royal Prince Alfred Hospital (RPAH) Pulmonary Rehabilitation Program (PRP) and the Respiratory Coordinated Care Program (RCCP) are hospital-based programs with community outreach, including home visiting.

They aim to improve the quality of life of people living with a chronic respiratory condition (including chronic obstructive pulmonary disease (COPD) and to prevent avoidable hospital admissions. The programs deliver evidence-based care tailored to the identified goals and needs of each person.

The programs' health service goals are to reduce the following for people living with COPD:

- total separations
- 30-day readmissions
- average length of stay
- total hospital bed days.

They operate as separate yet collaborative services that jointly manage a person's transition from hospital to the community.

The PRP delivers exercise and education programs to optimise the health and wellbeing of people living with COPD by increasing exercise capacity, health related quality of life and reducing breathlessness.

The RCCP is an integrated in-reach and outreach model of care with a multidisciplinary team approach. It supports people living with COPD in the community, by coordinating and connecting their complex care needs.

Both programs are supported by close links with respiratory specialists and the RPAH chest clinic.

Most people living with COPD are supported by both services. Together the services support a transition of care from the hospital to the person's home.

Site dashboard

The dashboard in table 1 provides a high level overview of the features of the RPA PRP and RCCP as an exemplar site.

Table 1: RPAH program dashboard

Feature	Provided
Hospital based	Yes
Provides home visiting	Yes
Five days/week service	Yes
Established a tailored program	Yes
Defined entry and exit criteria	Yes
Multidisciplinary care delivery	Yes
Specialist physician expertise routinely available	Yes
Evidence-based	Yes
Model supports people living with chronic heart failure and people living with COPD	No
Outcome data routinely collected and reported	Requires qualification or varies across settings
Service system data routinely collected and reported	Requires qualification or varies across settings
Enabled by virtual care	Requires qualification or varies across settings

Service structure

Referral sources

Referral sources for the RCCP program in an average year are approximately 53% from respiratory physicians, 37% from hospital inpatients and 10% self-referral from patients.

Entry and exit criteria

Entry criteria

- Any chronic respiratory conditions (COPD, idiopathic pulmonary fibrosis, pulmonary arterial hypertension, bronchiectasis, lung cancer).
- Two or more admissions within six weeks flags mandated enrolment.
- Zero or one admission within six weeks does not exclude enrolment.
- Anyone within the RPAH campus can refer to either of the services.
- Referrals come from:
    - multidisciplinary teams
    - specialist’s rooms

  - respiratory and geriatric wards
  - general practitioners (GPs)
  - self-referrals.
- Must be registered in the electronic medical record.

Exit criteria

- Patient able to self-manage independently.
- Move into a high-level care facility.
- Move out of catchment area.
- Patient managed by other chronic disease program.
- Patient transferred to palliative care.
- Patient no longer supports participation.
- Patient not cooperating with the program, for example, not willing to participate with goals or plans.
- Deceased.

Caseload

The PRP caseload for 2020, noting it was not a normal year, is 221 patients referred and enrolled, 121 patients commencing the program, 57 completing the program and 57 currently active. COVID-19 restrictions limit the number of patients able to attend face-to-face classes in the gym to four per class. Most patients undertake classes via telerehabilitation.

The RCCP case load data was not available at the time of printing this report.

Staffing

Clinical staffing for both the PRP and RCCP is 4.00 full-time equivalent (FTE) comprising:

- PRP – physiotherapist 2.0 FTE
- RCCP – clinical nurse consultant 1.0 FTE
- RCCP – clinical nurse specialist 1.0 FTE

Care delivery framework

Services that span hospital and community settings

The RCCP and PRP are hospital-based services that can provide both in-reach and outreach care. The PRP operates an outpatient rehabilitation program in RPAH and can also deliver face-to-face rehabilitation services to the wards or via virtual care into the homes of people living with COPD.

Specialist clinical expertise

The services are staffed by experienced clinicians with specialist expertise in relation to the management of people living with COPD. They are knowledgeable and clinically proficient in diagnosis, symptom mitigation and treatment.

People living with COPD are supported and encouraged to self-manage their condition

People living with COPD, as well as their family and carers, are central partners in the services delivered by PRP and RCCP. A fundamental focus is to educate and empower people and their carers to have an increasingly informed and active role in the monitoring and management of their condition.

Pulmonary rehabilitation

Every person living with COPD is able to access the pulmonary rehabilitation program from the ward, hospital outpatient settings and at home. The pulmonary rehabilitation program is person-centred and goal-focused. The program delivers evidence-based exercise training, education and support. It works with people living with COPD to achieve improved exercise capacity and health related quality of life. These achievements are measured using standardised patient reported measures. The program treats more than one chronic condition, for example, they also take patients from rheumatology if they are experiencing breathlessness following an admission to the intensive care unit.

Regular home visits delivering coordination of care

The RCCP component coordinates care for people living with COPD in the context of other comorbidities. Expert nurses transition people from hospital to the community and offer diagnostic testing, referrals and exacerbation management. The nurses educate people living with COPD about lung disease management and support action plans. People are visited on a regular basis, usually weekly. The program identifies other health or social conditions that may be exacerbating the person’s condition and seeks to mobilise solutions to address those conditions.

The program is available from Monday to Friday. People have 24-hour telephone access if they require additional support.

Support from specialist respiratory physicians

RPAH has an outpatient chest clinic that refers directly to the RCCP and PRP. Other private respiratory physicians, operating in RPAH, also see people enrolled in the RCCP and work closely with both programs. The nurses, physiotherapists and respiratory consultants have a close and trusting working relationship. Respiratory consultants are on week-by-week rotation to support the expert nurses through the RCCP.

GP partnerships

The programs work closely with GPs and engage them as partners in the management of people living with chronic respiratory disease.

Virtual care

The RCCP can alternate home visits with virtual care contacts. For some people living with COPD the components of the program's services, such as pulmonary rehabilitation, can be delivered through virtual clinics.

Clinical components

The pulmonary rehabilitation program and RCCP jointly deliver and/or support the delivery of a range of clinical services for a person with COPD including:

- respiratory assessment and monitoring
- education and support for self-management
- medication reviews
- medication delivery device review
- COPD action plans
- spirometry, pre and post assessments.
- outpatient pulmonary rehabilitation
- home and maintenance rehabilitation.
- chest physiotherapy.
- non-invasive ventilation review and education
- oxygen review and ventilation
- smoking cessation services
- occupational therapy assessment and review
- referral to other disciplines and services as required, for example hospital in the home, community nurses, dietician, home care, connecting care
- Intravenous antibiotics (push only) if required.
- COPD clinic
- advanced care directives
- education to residential aged care facility staff
- resource and assessment for residential aged care facilities
- ward, emergency department or intensive care unit clinical nurse consultant patient reviews.

Every person living with COPD has a tailored plan driven by a comprehensive clinical assessment

Every person living with COPD has a comprehensive clinical assessment. The person works with the respiratory specialist and the programs to set goals and document a plan tailored specifically for them. The plan is communicated to the person's GP in a letter and a phone call. The implementation of that program is supported in hospital and at home by expert respiratory nurses and physiotherapists.

The person's plan includes an action plan (based on the Lung Foundation Plan) that tells them how to manage mild exacerbations and when to contact the RCCP or emergency department in case of significant exacerbation of symptoms.

The programs can promptly assess and adjust plans

If a person living with COPD becomes unwell, they can receive advice from either an expert nurse or physiotherapist or be referred to a respiratory physician. There is close communication between the three areas (PRP, RCP and respiratory medicine) with the RCCP using video links to consult with specialists during home visits.

Story of a person living with COPD

Clinician quote

We see lots of issues impacting on people's outcomes via the home visiting program. We had one person living with COPD who presented with acute respiratory failure five times in two months. The respiratory consultant referred him to the RCCP. The person needed to be put on non-invasive ventilation at night. But when we visited him at home and checked the equipment, it was obvious he had a lot of problems with cockroach infestation. We had to get cleaners and pest control.

The person also had difficulties with memory and organising himself. We found six purple bags of medications sitting on the floor unused – these were the medications left by the ambulance when they dropped him home each time he was discharged – they were still there when I did my first home visit. He also needed someone to tell him to put his non-invasive ventilation on, otherwise he forgot. So, for this patient, he needed someone to organise his medications and we also called him daily at 7pm to remind him to put his non-invasive ventilation on. He is now well; his house is clean, and he has lost a couple of kilos.

Home visits are really valuable as you can see the person's living conditions and circumstances. It's really important to sort out the psychosocial issues that are impacting on health outcomes.

Implementation

Champions with energy

Having people who are enthusiastic and will not quit is essential to establishing and maintaining the services. Staff who have real empathy and concern for the people living with COPD are also very important.

Evidence

Using and promoting the strong evidence base that supports these programs. In particular it gives hospital leadership the confidence that the program will work and is worth the investment.

Executive sponsorship

Executive sponsorship is very important. The local health district executive provided the redesign opportunities, the resources and the sponsorship for both services to expand.

Senior respiratory physicians

Having the support and engagement of respiratory physicians who engage with, refer to and clinically support the PRP and RCCP is critical. When there is a trusting partnership between respiratory physicians and the component services, it enables the health outcomes to be fully realised. This enables the services to optimise circumstances to support people living with COPD to live safely at home.

Partnerships

Education of internal staff and external stakeholders is very important. This builds partnerships and goodwill that is critical to the success and operation of the services. When GPs and ward staff recognise the benefits of the services, it creates an environment where there are more referrals and greater collaboration to optimise patients' health.

Multidisciplinary team approach

The multidisciplinary team works together across service settings, supports the delivery of coordinated care and can respond quickly and effectively to the changing circumstances and needs of a person living with COPD. Both the RCCP and PRPs identify multidisciplinary needs during assessment and refer accordingly.

Focus on people living with COPD and their family and carers

People living with COPD and their family and carers are central partners. A fundamental focus of the programs is to educate and empower people and their carers to have an increasingly informed and active role in the monitoring and management of their condition. Often the best advocates for the programs are the people living with COPD themselves.

Home visiting is important

Working with people living with COPD at home means that the health professionals can see the barriers to health improvement that the person faces at home. That helps the services to customise plans and target interventions to the challenges that individual people face.

Adaptability

There are many different ways to deliver these services. During the COVID-19 pandemic, the teams found that they could adapt to circumstances and still achieve service goals. Pulmonary rehabilitation can be delivered in many different settings and ways. The RCCP found that interspersing virtual care consults with home visits could also be effective in achieving care coordination.

Evidence of success

Both services are strongly evidence-based.

The pulmonary rehabilitation program is based on the *Australian and New Zealand Pulmonary Rehabilitation Guidelines*. [95] The development and validation of those guidelines are documented on the Lung Foundation website and have been published in the peer reviewed journal *Respirology.* [100]

The evidence about early rehabilitation during an acute exacerbation in people with COPD is growing in strength. Because of the risks of deconditioning during an acute exacerbation of COPD and the related healthcare costs, early rehabilitation should start at the bedside. However, more research is required to determine the best way to provide early rehabilitation for people with acute exacerbation of COPD. [95]

A 2016 meta evaluation found that self-management interventions exert positive effects in people living with COPD on respiratory-related and all-cause hospitalisations and modest effects on 12-month health-related quality of life, supporting the implementation of self-management strategies in clinical practice. Benefits seem similar across the subgroups studied and limiting self-management interventions to specific patient subgroups cannot be recommended. [100]

Data collection and monitoring

The RCCP and pulmonary rehabilitation program can view local (RPAH) data for enrolled people living with COPD in relation to episodes of presentation, 28-day readmission rates and average length of stay. This data is not routinely accessed. It can be extracted from the electronic medical record using the STARS (Sydney Local Health District Targeted Activity and Reporting System) system on a request basis. Reports can disaggregate results for enrolled and non-enrolled people.

The pulmonary rehabilitation program collects clinical outcome measures:

- exercise capacity
- quality of life
- Hospital Anxiety and Depression Scale
- COPD Assessment Test
- Health related quality of life (HRQoL): St George Respiratory Questionnaire.

The RCCP follows patient admissions, discharges and length of stay on the program.

Opportunities to explore innovative solutions

Engaging the primary health sector

It can be challenging communicating and profiling the benefits of the RCCP and pulmonary rehabilitation programs to GPs. Ongoing education is required to inform GPs that a person living with a COPD can remain independent and at home with the right supports.

Establishing consistent, informed relationships between people living with COPD and GPs can also be an obstacle to effective coordinated care and rehabilitation.

Working with specific populations can be challenging

The programs have found that people living with COPD from low socio-economic status communities can be difficult to access and engage. Often the home visit reveals that living conditions are contributing to exacerbation of symptoms.

Working with specific communities such as Aboriginal and Torres Strait Islander or culturally and linguistically diverse communities can require significant effort to build trust and credibility with community leaders and members. Working with local health district staff, such as Aboriginal health officers and multicultural health workers, has assisted the services to build better relationships

Appendix 6: Goulburn Cardiorespiratory Care Team exemplar report

Introduction and summary

The Goulburn Cardiorespiratory Team (GCRT) delivers and coordinates care for people living with chronic heart failure (CHF) or chronic obstructive pulmonary disease (COPD). The team aims to:

- improve symptom management
- reduce readmissions to hospital
- decrease average length of stay when admission to hospital is necessary.

The team supports patients to have a seamless transition of care across clinical teams and care settings.

The team is based in the community in Goulburn. It is a combined CHF and COPD service delivered to people who are enrolled into the program. The program comprises:

- inpatient in-reach to Goulburn Base Hospital
- pulmonary or cardiac rehabilitation
- home visiting
- care coordination
- virtual care for patients when this style of care is appropriate.

The team is staffed by a nurse practitioner, registered nurse and physiotherapist. Every person enrolled receives care across these services, with a focus on increasing health literacy and improving self-management of their condition.

Site dashboard

The dashboard in table 1 provides a high-level overview of the features of the GCRT as an exemplar site.

Table 1. GCRT dashboard

Feature	Provided
Local health district based	No
Provides home visiting	Yes
Five days/week service	Yes
Established a tailored program	Yes
Defined entry and exit criteria	Yes
Multidisciplinary care delivery	Yes
Specialist physician expertise routinely available	Yes

Feature	Provided
Evidence-based	Yes
Model supports people living with CHF and people living with COPD	Yes
Outcome data routinely collected and reported	Requires qualification or varies across settings
Service system data routinely collected and reported	Requires qualification or varies across settings
Enabled by virtual care	Requires qualification or varies across settings

Service structure

Referral sources

Referral sources for the GCRT in an average year are approximately 49% from Goulburn Base Hospital electronic medical records, 33% from central intake (general practitioners (GPs), self-referral and community service referral) and 18% from pulmonary rehabilitation.

Entry and exit criteria

Entry criteria

- Every identified person diagnosed with CHF or COPD admitted to Goulburn Base Hospital
- 16 years of age or older
- Person resides in Northern Cluster of Southern NSW Local Health District.

Exit criteria

- Deceased
- Move out of catchment area
- Person living with CHF or COPD is stable, self-managing well.

People living with CHF or COPD will be discharged from the program on the electronic medical record but remain as non-active clients of the team until re-referred to the team or admitted to hospital.

Caseload

Around 615 people living with CHF or COPD are enrolled each year. In November 2020, the active caseload of the team was 51, with 47 people receiving pulmonary rehabilitation.

Staffing

Staffing for the GCRT is 2.8 full-time equivalent (FTE). This is made up of:

- nurse practitioner 1.0 FTE
- registered nurse (clinical nurse specialist1) 0.8 FTE
- physiotherapist 1.0 FTE.

Care delivery framework

The GCRT is a nurse practitioner led community-based team that enrols people living with CHF or COPD on the ward in hospital after an exacerbation event (unless otherwise referred by GP or specialist). The program starts through in-reach into the acute inpatient environment and actively finds cases in the inpatient setting, supports the transition of treatment from acute to community settings and supports adaptations people need to make at home.

A tailored program driven by a comprehensive clinical assessment

Every person living with CHF or COPD has a comprehensive clinical assessment undertaken by a chronic disease nurse practitioner, collaborating when necessary with the person’s specialist or GP. This drives a treatment and management program tailored specifically for the person. The implementation of that program is supported in hospital and at home by the GCRT.

Every person living with CHF or COPD has an action plan developed following their comprehensive clinical assessment to continue to guide their care successfully in the community. This plan includes information on:

- how people living with CHF or COPD can manage their condition
- what to do if symptoms get worse
- who to contact and when, in case of a continuing exacerbation of symptoms.

Specialist clinical expertise

The program is staffed by clinicians with specialist clinical expertise in relation to the management of people living with CHF or COPD. The team is knowledgeable and clinically proficient in diagnosis, symptom management and treatment.

Knowledgeable and skilled CHF and COPD multidisciplinary team

The nurse and physiotherapist are confident working in the community and visiting people at home.

A nurse practitioner with CHF and COPD expertise

The diagnosis and management of people living with CHF and COPD is difficult and requires clinical expertise in relation to these conditions.

The program promptly responds when people living with CHF or COPD are deteriorating

If a person living with CHF or COPD becomes unwell, they can be reviewed in line with their action plan and Clinical Emergency Response Systems by the nurse or physiotherapist from the GCRT, who can escalate to the nurse practitioner and/or ambulance to receive advice if necessary. The appropriate clinical intervention is then arranged based on this assessment.

GP, inpatient and community partnerships

The program aims to engage with GPs as partners in the management of people living with CHF or COPD in the community. This is supported by regular GP education events.

In addition to delivering specialist care in inpatient settings, the team models best clinical practice for inpatient staff and conducts regular information and education sessions.

The team has established a strong partnership with a local personal trainer who runs a *Lungs in Action* exercise program for people living with CHF or COPD to follow on from the GCRT team cardiopulmonary rehabilitation programs.[101] This allows a multidirectional flow of referrals between both services.

Self-management

The team provides education material to support people living with CHF or COPD to optimise their self-management skills and to make realistic plans for the future. They also upskill people living with CHF or COPD in health literacy, enabling them to access the right care by the right practitioner at the right time and in the right place.

Coordinated care

The team identifies other health or social conditions that may be exacerbating the condition of a person living with CHF or COPD and seeks to mobilise solutions to address those conditions. An example of this is the strong relationship that the GCRT has with their local palliative care service, which helps link a person’s end of life care to their current care and health practitioners.

Clinical components

The GCRT major clinical components include a medication regime, exercise prescription and dietary advice. More specifically, the range of clinical interventions it can deliver includes:

- advanced care directive
- CHF and COPD action plans
- CHF and COPD assessment and monitoring
- education and support for self-management
- facilitation of echo tests and comprehensive pathology
- health coaching and support for health literacy
- home rehabilitation
- link to maintenance programs such as Lungs in Action and support groups such as Goulburn Gaspers
- medication titration and reviews

- outpatient pulmonary and cardiac rehabilitation
- physiotherapy
- referral to other disciplines and services as required, for example palliative care, hospital in the home, community nurses, dietician, and home care
- smoking cessation services (using smokealyser, a point of care test smoking cessation aid)
- specialist diagnostic testing and monitoring
- spirometry – pre and post assessments.

This clinical care is delivered in a variety of settings.

Goulburn Base Hospital inpatient wards

The GCRT delivers specialist in-reach services for people living with CHF or COPD in Goulburn Base Hospital as required by inpatient clinical teams. These services include:

- comprehensive clinical assessments
- initiation and interpretation of diagnostic interventions
- initiation and evaluation of therapeutic management plans
- medication initiation and dose adjustment
- review of therapies and patient management
- provision of home oxygen, education and follow up for long term oxygen therapy.

Regular home visits

People living with CHF or COPD are visited on a regular basis, usually weekly, as determined by need. The service is available from Monday to Friday. On the initial visit the GCRT will complete the following actions.

- Conduct a risk assessment.
- Conduct a physical assessment.
- Work through educational material (from the Heart and Lung Foundations) with the person.
- Undertake medication reconciliation.
- Develop or review a diet and fluid management plan.
- Educate on symptom management.
- Demonstrate medication delivery equipment.
- Demonstrate and supervise home exercises.

On subsequent home visits the team will complete the following actions.

- Conduct a clinical assessment.
- Check how the person is managing generally.

- Provide further education and support in relation to any aspects of the person's treatment plan.
- Refer to other relevant clinicians or programs, for example the Stepping On [102] falls prevention program or pulmonary rehabilitation.[102]
- Address other issues that may be impacting the person's health, for example housing conditions, social circumstances or mental health issues.

Cardiac and pulmonary rehabilitation

The majority of people living with CHF or COPD are exercise tested and provided with an exercise prescription to initially attend an outpatient rehabilitation program. The GCRT promotes and uses the rehabilitation component as an essential treatment and maintenance intervention for people. Alternatively, after an assessment, people are supported to participate at home with a customised eight-week home rehabilitation program, if that is their preference. People are strongly encouraged to follow up their rehabilitation by joining a community-based maintenance program such as Lungs in Action.

Virtual care

The program can alternate home visits with virtual care contacts. The program prefers to work with people living with CHF or COPD face-to-face in their home. However, it is possible to deliver components of the program's services, such as rehabilitation, through virtual clinics. Virtual options are not suitable for all patients because of their location (poor reception) or access to technology. Physical examination and assessment of the environment is not easily undertaken using virtual care, but this can be overcome by having an initial assessment face-to-face.

Story of a patient living COPD enrolled in the Goulburn Cardiorespiratory Team service

A 39-year-old male, weighing 250 kilograms, living with advanced lung disease was told that he would die unless he significantly changed his lifestyle. His initial exercise prescription was two minutes in a chair. The GCRT developed a treatment plan that included a diet and weight management plan in conjunction with dietetics and a graduated exercise prescription. The team also resolved a number of financial and support issues for the patient. Today the patient weighs 115 kilograms, walks up to five kilometres every day and no longer requires oxygen.

Implementation

A champion

Having a champion is critical to program success. The champion needs to have a depth of clinical experience working with people living with CHF or COPD. They also need to be prepared to try different methods of developing the service with a clear focus on the end goals for people.

Executive sponsorship

Executive sponsorship is very important to establishing this program. The local health district executive provided advice about challenges the team confronted and was able to support the team to remove blocks to the service functioning effectively.

Partnerships and relationships are critical to support patient management

Building partnerships, goodwill and a profile across its health services is critical to the success and operation of the GCRT. The team regularly provides education sessions to hospital wards who care for people living with CHF or COPD, and education and outreach to residential aged care facilities and general practices. Linking with other service providers, such as community pharmacists, is also important to support the management of people living with CHF or COPD.

People living with CHF or COPD and their family and carers are central partners. A fundamental focus of the program is to educate and empower people and their carers to have an increasingly informed and active role in the monitoring and management of their condition.

Mentoring

The input and support of clinical mentors strongly supported the team’s establishment and growth. The nurse practitioner role received strong clinical support and guidance from the Goulburn Base Hospital respiratory physician. The nurse practitioner mentors other team members to build and develop clinical skills and knowledge required for the service.

Access to medical specialists

In a rural setting it is important to build relationships with medical specialists. The team keeps visiting cardiologists and respiratory physicians regularly informed about the status of people living with CHF or COPD who are at a high risk of readmission to hospital, and seeks their advice about clinical issues confronting the team.

Evidence of success

Data collection and monitoring

The GCRT collects data for people living with CHF and COPD (diagnosis related groups: E65A, E65B, E74A, E74B, F62A, F62B) in relation to:

- inpatient occasions of service
- non-admitted patient occasions of service
- 30-day readmission rates
- average length of stay
- referrals to and completions of cardiac/pulmonary rehabilitation.

Data is extracted by the team from the electronic medical record on an ad hoc or as needed basis.

A management intern analysis of activity based management portal data for Goulburn Base Hospital in 2017-18 calculated that the team saved 1,020 bed days, equivalent to $1.5M.

Bureau of Health Information data for that period shows:

- 35% reduction in unplanned admissions
- 21% reduction in average length of sta.
- 52% reduction in inpatient bed days.

The GCRT collects patient outcomes including:

- forced expiratory volume
- six-minute walk distance
- Modified Medical Research Council mMRC dyspnoea scale
- body mass index
- Health related quality of life.

Using a range of instruments including, the BODE (body mass index, obstruction [forced expiratory volume], dyspnea [modified Medical Research Council dyspnea scale], and exercise capacity [six-minute walk distance]) Index.

Outcome data is used to tailor treatment programs for people living with CHF or COPD. The GCRT does not provide routine outcome reports.

Opportunities to explore innovative solutions

Nurse practitioner role

The GCRT is nurse practitioner led. This leadership brings diagnostic and prescribing capabilities to the service. It also brings clinical credibility. Notwithstanding these attributes, the team believes the model can replicated as a nurse specialist or nurse consultant led model.

Community pathology and diagnostic availability

The GCRT is unable to request necessary pathology and diagnostic services in the community setting as nurse practitioners do not have access to the Medicare Benefits Schedule. Medicare Benefits Schedule listed services can only be accessed via Goulburn Base Hospital.

Profiling CHF and COPD programs

Statewide clinical programs such as Leading Better Value Care assist in raising the profile of programs such as the GCRT. It assists the team to build partnerships and engagement with other critical services. This makes the work of improving coordination and service delivery for people living with COPD and CHF easier to achieve. Opportunities to raise the profile of the service via Leading Better Value Care need to continually be sought in order to maintain the additional traction the service achieves through its alignment with Leading Better Value Care.

Working with specific populations

Some populations require a different approach. Patients living in remote or isolated communities can be difficult to access and engage. Often the home visit reveals that living conditions are contributing to the exacerbation of symptoms.

Working with Aboriginal and Torres Strait Islander communities can require significant effort to build trust and credibility with community leaders and members. Building trusting relationships with local Aboriginal Elders has raised the profile of GCRT. Working with local health district Aboriginal staff also assists the team to build better relationships. The team also works closely with the Goulburn Aunty Jean's Program that provides health support and maintenance rehabilitation programs for Aboriginal people with chronic disease.

Appendix 7: The Austin Hospital Heart Failure Service exemplar report

Introduction and summary

The aims of the Austin Heart Failure Service (AHFS) are for people living with chronic heart failure (CHF) to:

- improve mortality
- reduce 30-day unplanned readmissions to hospital.
- Decrease average length of stay.
- Improve function, optimise health and maximise independence.

The service delivers quality CHF clinical care across inpatient, outpatient and community settings that supports the transition of people living with CHF from hospital to home. The AHFS supports, coordinates and enhances existing cardiology and health services to deliver ccoordinated care.

The AHFS is made up of a range of services and programs including:

- inpatient services
- specialist CHF outpatient clinics
- CHF exercise program
- health independence programs (HIP), that is home visiting and coordinated care
- self-management and support services.

The services and programs align and collaborate across multiple services to deliver the best practice treatment and support for people living with CHF across multiple care settings:

- inpatient (Austin Hospital)
- outpatient (Heidelberg Repatriation Hospital)
- community.

Services meet on a bi-monthly basis (the Heart Failure Alliance) to support a coordinated approach to service delivery.

Site dashboard

The dashboard in table 1 provides a high-level overview of the features of the AHFS as an exemplar site.

Table 1: Austin Heart Failure Service dashboard

Feature	Provided
Local health district based	Requires qualification or varies across settings
Provides home visiting	Yes
Five days/week service	Yes
Established a tailored program	Yes
Defined entry and exit criteria	Yes
Multidisciplinary care delivery	Yes
Specialist physician expertise routinely available	Yes
Evidence-based	Yes
Model supports people living with CHF and people living with chronic obstructive pulmonary disease	No
Outcome data routinely collected and reported	Requires qualification or varies across settings
Service system data routinely collected and reported	Yes
Enabled by virtual care	Requires qualification or varies across settings

Service structure

Referral sources

Referral sources for the AHFS vary according to the journey of the person living with CHF. The majority of people first contact with the service is in an inpatient setting. However, people living with CHF may be directly referred by their general practitioner (GP) or a community service before accessing either inpatient or outpatient services.

In an average year, the sources of HIP referrals are approximately 85% from inpatients, 10% from GPs and 5% from consultants. The specialist CHF clinic in an average year, receives approximately 90% of referrals from an inpatient setting and 10% from other sources.

Entry and exit criteria

Entry and exit criteria for the AHFS vary according to the journey of the person living with CHF and which component of the service a patient is accessing. Different component services have specific entry and exit criteria. Additionally, people may exit one element of the service, for example the outpatient clinic, and enter another service element, such as HIP.

The following criteria generally apply to patient’s accessing the AHFS.

Entry criteria

- For inpatient and outpatient clinics, people living with CHF have a diagnosed of or are suspected of pre-existing CHF

- Entry to titration clinic is heart failure with reduced ejection fraction
- HIP CHF outreach:
    - 18 years of age or older who have newly diagnosed CHF, or
    - CHF and other chronic and complex health conditions, and/or
    - have had a recent emergency department presentation, and/or
    - are at high risk of an inpatient admission, and
    - who have the capacity to benefit from the service, and
    - are in the Austin catchment (some exceptions).

Exit criteria

- Inpatients: discharge from hospital.
- Titration clinic: optimised on CHF medications.
- Outpatient clinic or virtual care: once stable extended time to review rather than discharge (for example 12 month review).
- CHF exercise: completion of program.
- HIP CHF outreach:
    - Person is stable and adhering to medication, diet and exercise regime.
    - Person is able to self manage.
    - Deceased.
    - Move out of catchment area.

Caseload

Between 2,500 and 3,000 people living with CHF are admitted to the Austin Hospital annually. Of those patients, approximately 1,000 are seen by the specialist CHF outpatient clinics. Over 250 patients are referred to HIP annually. The HIP length of stay varies significantly for each individual person living with CHF and is generally 8-12 months. Some people remain on the program for up to 18 months.

Staffing

Staffing for the AHFS involves a range of clinicians who have multiple roles in their specific settings including contributing to AHFS. For example, cardiologists or general medicine physicians may support one of the specialist CHF outpatient clinics as a fraction of their time.

The CHF clinic is staffed by five cardiologists for one session per week. The rapid review clinic is staffed by a one cardiologist for one session per week.

Noting that the AHFS aims to support, coordinate and optimise existing cardiology and health services for people living with CHF, the key positions that lead the service's activities are:

- cardiologist 0.1 full-time equivalent (FTE) (varies – see above)
- physiotherapist 0.3 FTE
- HIP CHF clinical nurse consultants 2.47 FTE
- HIP CHF and respiratory liaison nurse 0.4 FTE
- nurse practitioners (NPs) 0.6 FTE
- chronic and complex care services manager 1 FTE (across CHF, respiratory, diabetes, generalist care management, post-acute care services, HIP central intake)
- complex care team leader 1 FTE (across HIP CHF, HIP respiratory, HIP diabetes and HIP generalist care management).

Clinical components

The AHFS delivers or supports the range of clinical interventions recommended for people living with CHF including:

- CHF assessment and monitoring
- diagnostic testing
- echo and comprehensive pathology
- medication titration and reviews
- education and support for self-management
- rapid post-discharge review within 10 days of discharge
- optimisation of CHF management
- CHF action plans
- CHF rehabilitation
- smoking cessation services
- referral to other disciplines and services as required
- in patient discharge planning and referral to CHF clinic or virtual care review, CHF HIP program and CHF exercise program
- referrals to community palliative care, community health, aged care and support services.

This clinical care is delivered in a variety of settings, described below.

Inpatient services

People living with CHF are admitted to an inpatient cardiology service located at the Austin Hospital (comprising a ward with 33 dedicated cardiac beds and 11 elective day procedure beds). A state-of-the-art diagnostic area is adjacent to the ward. Older and more complex people living with CHF may also be admitted under general medicine to a medical ward. The CHF nurse practitioner inpatient service will also see those patients who develop acute CHF during their inpatient stay, such as oncology patients in the cancer wards.

The AHFS, led by NPs, identifies eligible people in these settings and delivers the services tailored to the individual person's needs. The NP provides CHF education, optimisation of medications and management based on diagnostic results, discharge planning and referrals to other services. Additionally, the NPs support the person's transition to other services such as outpatient clinics, hospital in the home for intravenous furosemide if required, and HIP. They also have a virtual care clinic for discharged people who live out of the catchment area of Austin Health.

Outpatient clinics

A range of outpatient clinics are delivered by AHFS (principally at Heidelberg Repatriation Hospital).

Heart failure clinic

Five heart failure specialist cardiologists adjust medications, provide education to people living with CHF and their carers about CHF, develop a management plan for GPs, order invasive and non-invasive diagnostic investigations and referrals to other services.

Rapid review clinic

Working with general medicine staff, CHF specialist cardiologists adjust medications, provide education to people living with CHF and their carers about CHF, develop a management plan for GPs, order invasive and non-invasive diagnostic investigations, and referrals to other services. This clinic sees people within seven days of discharge.

Nurse practitioner led titration clinic

This clinic optimises CHF medications. The NP sees people living with CHF fortnightly until medications are optimised. The NP liaises with the GP and provides a management plan. This clinic also provides rapid review of people who are deteriorating and administers intravenous furosemide. These people are followed up by CHF HIP within two days of intravenous furosemide.

Discharge rapid access clinic

This clinic sees people living with CHF within seven days of discharge.

Austin Health Independence Program

HIP programs accessed by heart failure patients include sub-acute ambulatory care services, post-acute care services and hospital admission risk program services. HIP chronic and complex care services programs manage people with chronic disease, aged and/or complex needs who frequently use hospitals or are at risk of hospitalisation. The chronic disease stream includes CHF.

AHFS patients transferred to HIP chronic and complex care services can receive intensive service provision through to generalist care. Patients requiring intensive care coordination may receive:

- specialist medical and GP management

- advice 8:30am - 4:30pm Monday - Friday
- additional services where appropriate
- self-management support.

These services are delivered by nurses who can visit the person living with CHF in their home and ensure that the CHF plan is being actioned, and that the person knows what they can do to optimise their treatment plan. Services are time limited and people are encouraged and assisted to access community services as soon as possible.

The HIP CHF rehabilitation service provides exercise sessions that are staffed by a physiotherapist, exercise physiologist and a CHF clinical nurse specialist.

Care delivery framework

The AHFS delivers quality care across inpatient, outpatient and community settings to support the transition of people living with CHF from hospital to home. The AHFS supports, coordinates and enhances existing services to deliver ccoordinated care. The services and programs align and collaborate across settings to deliver the best possible treatment and support for people living with CHF.

Specialist clinical expertise

The service is led and delivered by experienced clinicians with specialist clinical expertise in relation to the management of people living with CHF. They are knowledgeable and clinically proficient in diagnosis, symptom management and treatment.

Cardiologists with heart failure expertise

The delivery of quality care across service settings is challenging and requires clinical expertise and leadership. It requires the ability to forge effective clinical partnerships across a range of settings. Having experienced CHF cardiologists who can provide such leadership to the service is essential.

Nurse practitioner led heart failure inpatient service

Heart failure NPs, in collaboration with CHF cardiologists, optimise the care of people living with CHF in inpatient settings.

NP actions

- Identify people living with CHF in any ward throughout the hospital.
- Work with treating specialists to deliver the suite of recommended diagnostic and treatment interventions.
- Co-deliver outpatient clinics.
- Provide CHF consultation liaison to clinicians across all settings.
- Ensure that identified people living with CHF have a tailored treatment plan developed.

- Optimise CHF medications.
- Provide CHF education and self-management to people living with CHF and their carers.
- Refer people living with CHF to other services such as HIP.
- Provide virtual care reviews post-discharge for people residing out of the catchment area.

Knowledgeable and skilled community-based nurses (HIP)

The nurses who support or deliver the community-based components of the service are highly experienced with relevant post graduate qualifications in the treatment and management of heart failure. They are confident working in the community and visiting people at home.

A tailored plan driven by a comprehensive clinical assessment

Every identified person living with CHF has a comprehensive clinical assessment that drives an evidence-based plan developed specifically for them by a nurse practitioner and/or CHF cardiologist. That plan directs the treatment and care they receive in hospital and at home. Every person has a heart failure action plan developed in partnership with them, based on the Heart Foundation template.[103]

The service can promptly assess and adjust heart failure action plans

In inpatient and outpatient settings treatment is routinely modified if a person living with CHF has an exacerbation of their condition. In community settings the HIP nurses know when and how to escalate treatment when a person living with CHF deteriorates or exacerbates. There is a rapid access pathway for CHF clinic review for people who are deteriorating. Intravenous furosemide can be administered in the clinic or a referral to hospital in the home can be made for intravenous furosemide over a longer period of time if required. The CHF HIP service is supported by cardiologists who are contacted to escalate management.

Self-management

The service uses a range of activities to maximise self-management including face-to-face and virtual care clinic reviews; home visits by CHF clinical nurse consultants; health literacy activities in the home; CHF rehabilitation programs; and community support groups.

GP and community partnerships

The service seeks to work closely with GPs and provides them with the specialist expertise and tools that will empower GPs to optimally manage people living with CHF. A GP liaison position facilitates engagement with the primary health sector.

Enabled by virtual care

AHFS offers a virtual clinic once a week for people who live out of area. During the COVID-19 pandemic, all people engaged with the clinic could access a virtual clinic on a Monday (staffed by five cardiologists and heart failure NP) or Wednesday (staffed by one cardiologist). Service is now returning to face-to-face. The majority of people will return to a face-to-face clinic, but some will continue with virtual care.

Coordinated care

AHFS (principally through HIP) identifies other health or social conditions that may be exacerbating the condition of a person living with CHF. HIP is able to identify risks and mobilise solutions to address those conditions.

Implementation

Building partnerships and effective governance is critical to the operation of AHFS. The service operates across settings involving different teams. This requires a collaborative approach and shared purpose.

The key governance mechanism to support this approach is the Heart Failure Alliance. This bi-monthly meeting is chaired by the HIP chronic and complex care services manager. Attendees at the meeting include general medicine specialists, cardiology team members (heart failure services director and inpatient heart failure NP), continuing care geriatrician, HIP CHF outreach and CHF rehabilitation clinicians, and hospital GP liaison officers.

Issues can be identified and resolved by team members representing a range of different services during the meeting.

Access to service data

Access to service data has assisted to drive and promote improvement processes. The establishment of the Victorian Cardiac Outcomes Registry has enabled the measurement of progress in improving outcomes across a number of years and compared to other health services. In particular the Victorian Cardiac Outcomes Registry provides data on hospital performance in relation to in-hospital mortality and readmission. Access to data also enables the promotion of the service to key stakeholders and decision makers.

Clinical leadership

Champions who are committed to delivering quality CHF services are very important. The treatment evidence for CHF keeps evolving and requires leadership that ensures that treatment and services align with the evidence. Having team members who are active in both treatment and research greatly supports and promotes the AHFS.

Funding security

Funding for the AHFS is now recurrent and comes from the Austin Hospital budget. The service also generates revenue through Medicare bulk billing for services delivered through the CHF clinics. The service has attracted one-off funding from other sources in the past.

Evidence of success

Data collection and monitoring

The AHFS has access to service performance data from Victorian Admission Episode Data 3, 6 or 12 monthly Victorian Cardiac Outcomes Registry:

- in-hospital mortality
- 30-day readmission rates.

The AHFS also collects patient-reported experience and outcomes measures in inpatient and outpatient settings:

- quality of life measures.
- depression score.
- New York Heart Association Classification.

In community settings HIP collects:

- New York Heart Association Classification
- Kansas City Cardiomyopathy Questionnaire 12
- Patient Health Questionnaire-2 (extending to Patient Health Questionnaire-9 as required).

Opportunities to explore innovative solutions

Funding

The range of programs that comprise AHFS are funded from a number of sources with variable levels of funding security. Expanding and consolidating funding bases for the service and some of its constituent elements, such as the outpatient clinics, would enable the service to realise greater benefits for patients and improve the efficiency of the hospital system.

Developing inpatient services

The AHFS primarily delivers services in outpatient and community settings, notwithstanding its inpatient NP and specialist services. Significant clinical gains would be realised if CHF cardiologist and NP positions were increased in inpatient services.

General practitioners

GPs are partners in the management of people living with CHF who access the AHFS. GPs could potentially take on greater CHF management and treatment roles. However, AHFS experience and related research indicate a lack of clinical expertise and confidence among many GPs. Equipping and empowering GPs in the management of CHF could be an important quality improvement initiative in the future. Currently AHFS resources are prioritised to the direct treatment and support of people living with CHF.

Appendix 8: The John Hunter Hospital Virtual Heart Failure Service exemplar report

Introduction and summary

The Hunter New England Local Health District Virtual Heart Failure Service (VHFS) is a hospital-based outpatient service that takes referrals for people being discharged from hospital after a heart failure event.

There are two VHFS currently operating at Greater Newcastle (based at John Hunter Hospital and commenced Feb 2019) and Lower Hunter (based at Maitland Hospital and commenced July 2020) sectors.

People living with chronic heart failure (CHF) receive regular telephone-delivered care coordination, support and education from the service as required.

The virtual care model has been developed, based on a comprehensive re-design process underpinned by evidence. [17]

The aim of the VHFS is to provide coordinated, equitable access and person-centred chronic heart failure care for people transitioning between acute and primary care, in the Greater Newcastle and Lower Hunter sectors.

Objectives of the service

- Reduce length of stay for people living with CHF who are admitted to hospital with an exacerbation of their condition.
- Reduce 28-day readmission rate for CHF as a primary diagnosis.
- Improve the experience for people living with CHF transitioning from acute facilities to the community.

The service supports people living with CHF and the primary care sector to manage the condition well in the community for as long as possible.

Service provision

- Virtual care follow-up for people living with CHF post-acute care discharge.
- Medicine reconciliation against Heart Failure Guidelines.[81]
- Care coordination, including a VHFS central point of contact for primary care providers, allied health, specialists and the person living with CHF.
- Improved health literacy.
- Education strategies for acute, primary care and community services staff.
- Assertive use of the range of health, allied health and community services available in the locality of the person living with CHF.

Staff

The service is staffed by a heart failure clinical nurse specialist (CNS) with ad hoc access to cardiology clinical nurse consultants and a heart failure cardiologist. Every person living with CHF enrolled in the service receives heart failure care coordinated by the CNS.

The VHFS team supports the clinical delivery of interventions to the appropriate practitioners in the local community, or in acute care, depending on the needs assessment of the person living with CHF.

Site dashboard

The dashboard in table 1 provides a high-level overview of the features of the VHFS as an exemplar site.

Table 1: Virtual heart failure service dashboard

Feature	Provided
Local health district based	Yes
Provides home visiting	No
Five days/week service	Yes
Establishes a tailored program	Yes
Defined entry and exit criteria	Yes
Multidisciplinary care delivery	Requires qualification or varies across settings
Specialist physician expertise routinely available	Yes
Evidence-based	Yes
Model supports people living with CHF and people living with chronic obstructive pulmonary disease	No
Outcome data routinely collected and reported	Yes
Service system data routinely collected and reported	Yes
Enabled by virtual care	Yes

Service structure

Referral sources

Referral sources for the VHFS are inpatient only.

Entry and exit criteria

Entry criteria

- Every identified patient, 18 years or older, diagnosed with CHF and admitted to JHH is eligible.
- Patient participation is voluntary. Only those that consent to participate are enrolled.
- Exclusion criteria include
  - people under age 18 years
  - adults with:
    - adult congenital heart failure
    - cor-pulmonale – right sided heat failure from primary pulmonary hypertension
    - heart failure secondary to reversible non-cardiac cause, for example hyperthyroidism.

Exit criteria

- Patient stable and able to self-manage with general practitioner (GP) support.
- Patients are assessed ready for VHFS discharge on evaluation by:
  - Kansas City Cardiomyopathy Questionnaire-12
  - review of optimal tolerated medication therapy and action plan
  - key clinicians and other service supports in place
- Patients who have frequent episodes of destabilisation after discharge can be referred again for ongoing support.
- Deceased.

Caseload

The Greater Newcastle service contacts approximately 25-30 people living with CHF each week, with about 100 patients who are actively managed by the service at any one time. Approximately 4% of people are identified as having high needs and require extended VHFS support. There are 300-350 people enrolled per year, and some people are discharged from the service then re-enrolled multiple times if required.

The Lower Hunter service moved to the VHFS model in July 2020 and has had a significant increase in activity and service capacity with the changed service model.

Staffing

Clinical staffing for the VHFS is 1.0 full-time equivalent CNS at Greater Newcastle and 0.6 full-time equivalent CNS at the Lower Hunter Service.

Although functionally based in the acute hospital system, because the service is delivered via virtual care, staff can physically be based anywhere within the geographic footprint. The only restraint is they must have access to electronic medical records.

Care delivery framework

Access to the service

Case finding is done using existing electronic database and health records, as well as direct inpatient referrals.

Specialist clinical expertise

The service is staffed by experienced heart failure CNS clinicians with specialist expertise in the management of CHF.

The team is knowledgeable and clinically proficient in diagnosis, symptom management and treatment.

The CNS is confident delivering education for GPs, practice nurses, community nurses and allied health staff who deliver the interventions people living with CHF need.

Other staff such as the cardiology clinical nurse consultant, heart failure cardiologist and other cardiologists are used to provide advice to the service but are not employed by the service.

Addressing the service gap for CHF patients living outside large cities

The VHFS model aims to deliver equity of access to care for people living with CHF. Research underpinning the pilot indicated only 26% of people living with CHF were receiving care post discharge from hospital compared to 70% who are now linked into the VHFS.

Coordinated care

Along with virtual delivery, the provision of coordinated care is a defining feature of the service. The VHFS staff act as specialist heart failure *navigators*, ensuring the person living with CHF receives the heart failure healthcare necessary to manage their condition from the range of health providers already in the system, rather than from the VHFS staff. The team builds the capacity of the primary care system to deliver heart failure interventions within its scope of practice.

The VHFS may also identify other health or social conditions that may be exacerbating the condition of the person living with CHF and seeks to mobilise solutions to address these issues as appropriate.

GP partnerships

The program works closely with GPs and engages them as the primary managers of people living with CHF in the community. This is supported by regular GP telephone consultations about individuals, education events and the development of tools to support management such as the heart failure community *HealthPathway*.[85]

The service can promptly assess and adjust heart failure action plans

If a person living with CHF becomes unwell, they or their GP can contact the VHFS for advice. If the person is frail or deteriorating, they maybe streamed for review and specialist intervention or to palliative care if necessary.

A tailored heart failure discharge plan checklist is proposed

A tailored heart failure discharge plan checklist driven by a comprehensive clinical assessment has been identified as an important part of the service model but has *not yet* been implemented. Once implemented, every enrolled person will have a comprehensive heart failure discharge plan checklist that drives a program tailored specifically for them that:

- promotes safety through improved clinical handover between acute and primary care providers
- provides a clear action plan for GP interventions, including end of life discussions
- clearly communicates medication changes to the GP with guidance for titration of medications
- provides clarity to the person and GP on self-management, including an action plan should the person's symptoms exacerbate.

Clinical components

The VHFS's major clinical components include a medication reconciliation, support for self-management including daily weight and fluid management, end of life assessment and referral to health and social services as required. More specifically, the range of clinical interventions it can coordinate to be delivered includes:

- individual risk stratification to prioritise care need
- heart failure assessment review
- diagnostic testing escalation
- echo and comprehensive pathology review
- medication titration support for GP
- education and support for self-management
- heart failure action plans (euvolic or dry weight, fluid, salt)
- recognition of symptoms indicating final year of life identified in people with advanced CHF
- use of community health pathways.
- collaboration with key clinicians to facilitate handover of care and care transition to primary care, Aboriginal liaison service, pharmacy care and a residential aged care facility
- outpatient cardiac rehabilitation prioritisation and escalation
- smoking cessation services
- referral and liaison to other disciplines and services as required (for example hospital in the home, community nurses, dietician, palliative care and Connecting Care).
- advance care planning discussions
- education to primary care and residential aged care facility staff
- central point of contact for GPs and practice nurses to build capacity in primary care
- Kansas City Cardiomyopathy Questionnaire 12 heart failure data collection.

This clinical care is delivered in a variety of ways and settings.

People living with CHF are assessed on entry

All people living with CHF referred to the VHFS have an indirect case review prior to direct contact with the CNS. In the case review, the CNS assesses and prioritises who is followed up and identifies whether the person has accessed or requires other services, such as cardiac rehabilitation or palliative care, if they are eligible. An individual risk stratification process prioritises care needs.

Medication reconciliation

The VHFS CNS reviews the medications of people living with CHF after they are discharged from the hospital to identify any medication reconciliation or self-administration errors. Medication variances are discussed with the discharging inpatient team or the person’s GP. Education and support for medication administration is provided to the person or their carer and may also extend to the person’s community pharmacist.

Virtual care and regular telehealth contact with the person living with CHF

The CNS delivers all supports to the person living with CHF via the telephone. People are phoned on a regular basis, depending on their needs. The person’s GP is also contacted as required. This service is available from Monday to Friday.

In the initial phone call the VHFS care coordinator completes the following actions.

- Conducts a heart failure risk stratification assessment.
- Medication reconciliation and liaises with GP and pharmacist as required.
- Works through educational material (Heart Foundation) with the person.
- Reinforces the fluid management plan.
- Reviews the person’s needs and escalates referral to cardiac rehabilitation if appropriate.
- Provides contact details and other information the person may need.
- Refers to other health providers such as community services, emergency department or local GP for clinical care escalation.
- May identify social or environmental concerns.

On subsequent phone calls the VHFS care coordinator completes the following actions.

- Conducts a symptom identification clinical assessment.
- Checks on how the person is managing generally.
- Medication reconciliation or titration support with GP and cardiologist as required.
- Provides further education and support in relation to any aspects of the person’s treatment plan.
- Identifies the need for referral to other relevant clinicians and services (for example cardiologist, GP, physiotherapist, other specialist, and palliative care).

- Identifies other issues that may be impacting the person’s health (for example housing conditions, social circumstances or mental health issues) and liaises with appropriate services to discuss identified issue as required.

The team will keep regular contact (if required) with the person, including checking that care appointments with GPs and other health providers are attended. If a person requires a face-to-face visit or intervention, the VHFS will coordinate this activity by liaising with appropriate community services or requesting priority GP review.

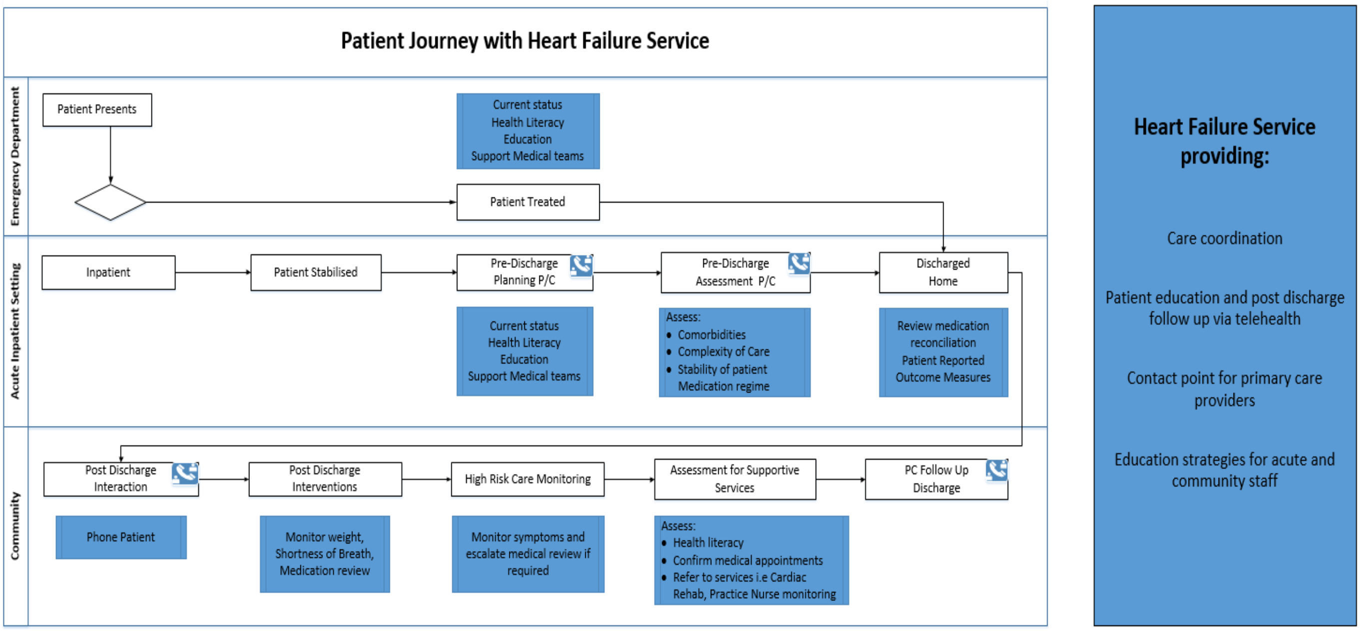
Heart failure clinic

People living with CHF whose symptoms exacerbate and need an acute specialist review may be discussed with the relevant cardiologist for urgent appointment at the outpatient heart failure clinic or private rooms.

Story of a person living with CHF

The journey of a person living with CHF is one of smooth transitioning from acute care in the hospital to primary care at home. The person is an active participant in this process and becomes an active and confident participant in the ongoing management of their condition.

Figure 2: Steps in the patient journey



When people experience a heart failure event and are treated in hospital, they typically understand very little about their condition. When they are discharged, they are still likely to have very limited understanding and therefore the VHFS focuses on building the person’s health literacy.

The person is an active participant in the management of their condition, not a passive recipient of treatment. The VHFS teaches the person how to monitor their condition, the language to use when describing their condition to their GP so that it flags acute concerns, as well as what to expect along their health journey, including end of life.

Quote from a person living with CHF

'The service care coordinator was a really good support, absolutely fantastic! He would give me information about what was happening with my heart, what the medications were doing, what to expect as I got better, when I could expect to feel better. That helped ease my frustration about not feeling better straight away – I knew there was light at the end of the tunnel. I'm feeling about 80% better now, walking regularly and sleeping better.' – David.

Implementation

Using virtual care to have regular contact with people living with CHF

Virtual care is a fundamental component of this service.

Partnerships and primary care capability building

Building partnerships and primary care capability to manage CHF is critical to the success and operation of the VHFS. The VHFS gives primary care providers managing heart failure a central point for heart failure specialist support, as well as regular heart failure education and outreach to both GP practices and staff at residential aged care facilities.

The person living with CHF and their family and carers are central partners in the VHFS. A fundamental focus of the service is to educate and empower people and their carers to have an increasingly informed and active role in the monitoring and management of their condition.

The team also requires a comprehensive list of services across localities that can be leveraged to contribute to heart failure care.

A passionate team with heart failure expertise based in acute care

The VHFS is a new approach to delivering heart failure care to the person's home within the Hunter New England Local Health District. As care monitoring and management is devolved to the person living with CHF and their GP, it is important that the team coordinating care retain their base in acute care with heart failure expertise. This allows the team to swiftly activate heart failure acute care if required. The team must be passionate about the possibilities and opportunities afforded by telephone-delivered coordinated care.

Support from a heart failure cardiologist

This is considered an essential component of the VHFS.

Executive sponsorship

Executive sponsorship greatly assists the service which has a tier 2 local health district executive champion.

Project support to set up the program

In the initial pilot phase, a broader project team supported the service to develop standardised processes and systems to embed the model of care across other existing heart failure service areas in the Hunter New England Local Health District. The project team includes cardiac stream sponsorship, Leading Better Value Care project officer support to facilitate clinical system processes and broader support from the district clinical network manager and the chronic disease network manager.

Evidence of success

Data collection and monitoring

The VHFS collects local (Newcastle, Cessnock and Maitland) data for people living with CHF in relation to:

- referrals to the service
- 28-day readmission rates
- bed days (average length of stay)

VHFS activity data shows an increase in contact with people living with CHF in the Hunter New England Local Health District since the inception of the service.

Table 2: Appointment attendance at Greater Newcastle heart failure service – John Hunter and Belmont Hospitals, Feb 2019 - Nov 2020

TIME AND SERVICE	NUMBER OF ATTENDED INITIAL APPOINTMENTS (NEW REFERRALS TO SERVICE)	NUMBER OF ATTENDED APPOINTMENTS
Jan 2018-Dec 2018 Home visit service	200	Unable to extract
Feb 2019-Dec 2019 VHFS	361	1082
Jan 2020-Nov 2020 VHFS	365	1264

Table 3: Appointment attendance at Lower Hunter heart failure service†

TIME AND SERVICE	NUMBER OF ATTENDED INITIAL APPOINTMENTS (NEW REFERRALS TO SERVICE)	NUMBER OF ATTENDED APPOINTMENTS
July 2019-Nov 2019 Home visit service	22	78

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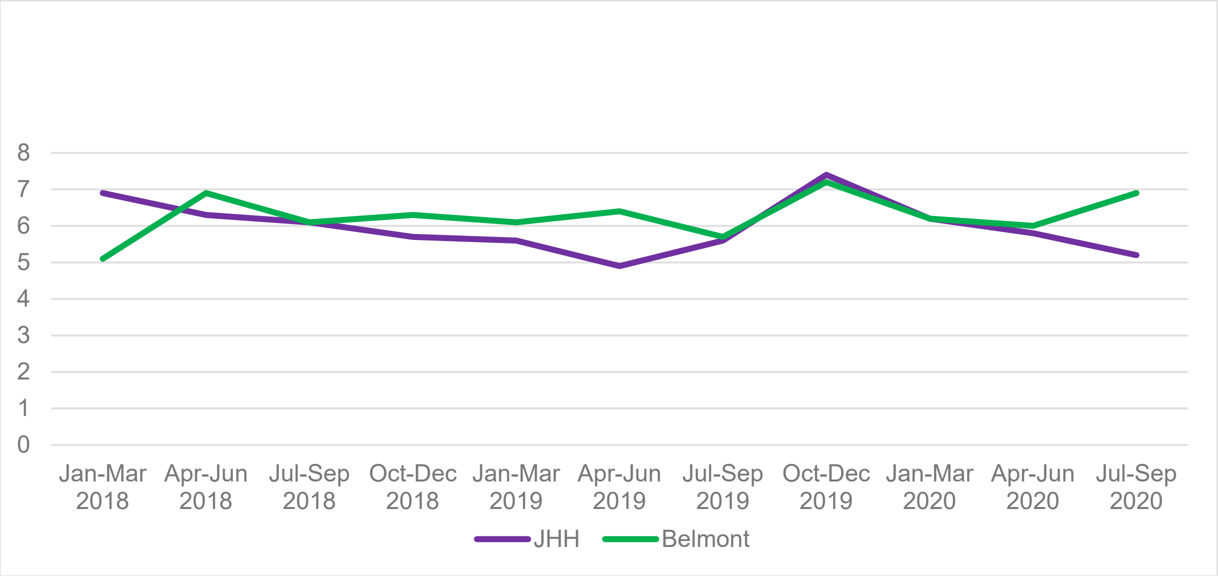
† Lower Hunter Heart Failure moved to the VHFS model in July 2020.

July 2020-Nov 2020 VHFS	123	432

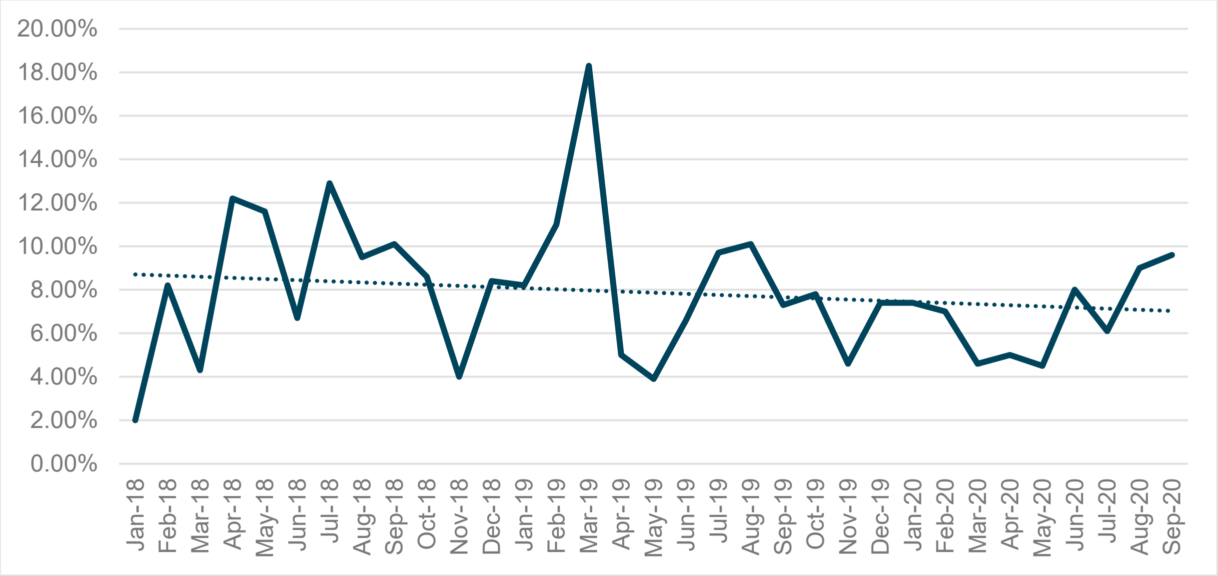
In the Greater Newcastle area, there has been an overall reduction in mean length of stay at John Hunter Hospital.

Figure 3: Mean length of stay for heart failure patients at John Hunter and Belmont Hospitals Jan 2018 - Sep 2020



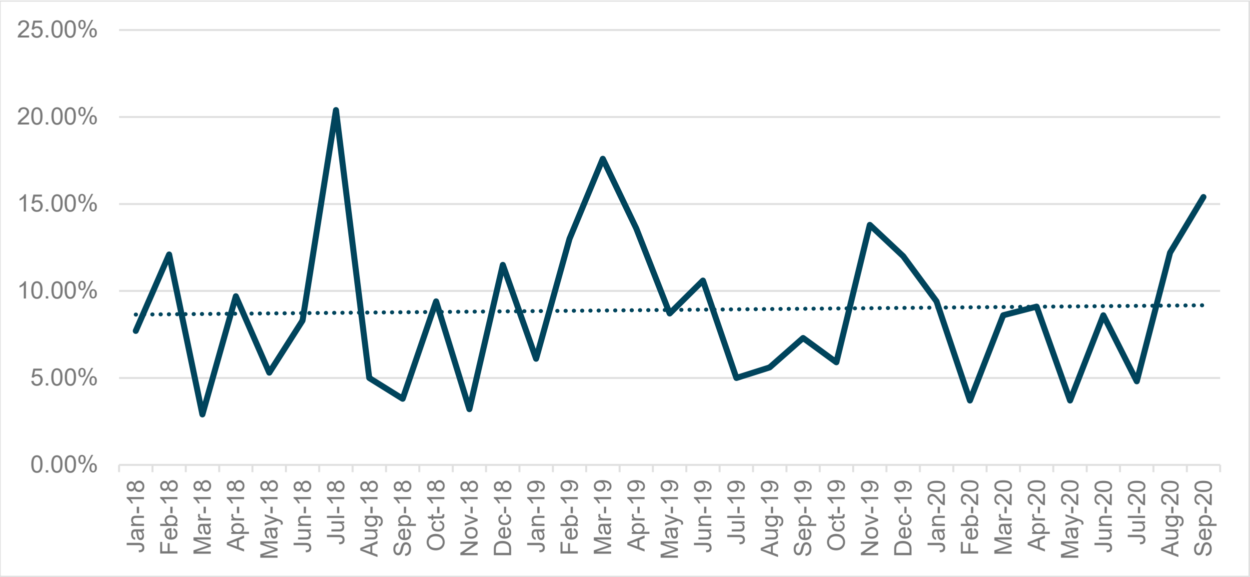
There has been a downward trend in the readmission rates for heart failure patients at John Hunter Hospital.

Figure 4: Heart failure readmissions, John Hunter Hospital Jan 2018 - Sep 2020



Belmont Hospital, which has an older and multi-comorbid patient population, has not seen readmission rates decrease.

Figure 5: Heart failure readmission rates, Belmont Hospital, Jan 2018-Sep 2020



Lower Hunter data is not yet available as the VHFS model only commenced in July 2020.

The VHFS also collects patient-reported experience measures using the Patient-Reported Outcomes Measurement Information System (PROMIS-29) and collects patient-reported outcome measures using the Kansas City Cardiomyopathy Questionnaire (KCCQ-12).

Opportunities to explore innovative solutions

Providing health equity to communities outside large metropolitan areas

The VHFS model provides opportunities to deliver heart failure interventions to communities by empowering people living with CHF and helping GPs build their expertise in managing heart failure. This also saves resources. Being a virtual service allows more people living with CHF to be monitored and managed at home. Expanding the services does not rely on establishing out-posted specialist teams. It is about growing relationships with existing health providers in various locations and upskilling them so they can support people living with CHF locally. If a person is assessed as requiring an acute service, that option is still available.

Using specialist staff to coordinate the delivery of heart failure care, rather than to directly deliver it

One of the biggest challenges for the VHFS was convincing stakeholders that better health outcomes would be achieved by specialists coordinating heart failure care to be delivered by others, rather than the heart failure specialist delivering it in situ. The evaluation of the implemented model of care will potentially deliver ground-breaking evidence.

Being confident to move from face-to-face delivery to the patient into a virtual realm

Letting go of the face-to-face contact is one of the biggest challenges.

‘People living with CHF really like the model, compared to my previous experience … (in a major city) … I notice people are more engaged and their medication titration happens better in the community because the VHFS chases up the GP and it gets done faster. People also come into the clinic earlier, in my previous hospital, I’d see them when they came into the ED and it was too late.’ – Heart failure cardiologist

Glossary

ABF	activity based funding
ACI	NSW Agency for Clinical Innovation
AGREE	Appraisal of Guidelines for Research and Evaluation
AHFS	Austin Heart Failure Service
COPD	chronic obstructive pulmonary disease
CHF	chronic heart failure
CNS	clinical nurse specialist
ED	emergency department
FEV1	forced expiratory volume in 1 second
FTE	full-time equivalent
GCRT	Goulburn Cardiorespiratory Team
GOLD	Global Initiative for Chronic Obstructive Lung Disease
GP	general practitioner
HFN	heart failure nurse
HIP	health independence program
HNELHD	Hunter New England Local Health District
HRQoL	health-related quality of life
LHD	local health district
LBVC	Leading Better Value Care
NP	nurse practitioner
PR	pulmonary rehabilitation
PRP	Pulmonary Rehabilitation Program
QoL	quality of life
RACF	residential aged care facility
RCCP	Respiratory Chronic Care Program
RCT	randomised controlled trial
RPAH	Royal Prince Alfred Hospital
VHFS	Virtual Heart Failure Service

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