Rethinking heart failure care and health technologies from early COVID-19 experiences - A narrative review

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Heart Failure (HF), a common chronic disease, requires multidisciplinary care to optimise outcomes. The COVID-19 pandemic, its impact on people's movement and access to health services, introduced severe challenges to chronic disease management. The era that will evolve after this pandemic is likely to provide uncertainty and service model disruptions. HF treatment is based on guidelines derived from randomised clinical trial evidence. Translational shortfalls from trials into practice have been overcome with post-trial service improvement studies like OPTIMIZE-HF where a team using a process of care can translate evidence to the general population. However, gaps remain for vulnerable populations e.g. those with more severe HF, with multiple comorbid conditions, and certain demographic groups and/or residents in remote locations. Health technology has come with great promise, to fill some of these gaps. The COVID-19 pandemic provides an opportunity to observe, from Australian healthcare lens, HF management outside the traditional model of care. This narrative review describes relatively recent events with health technology as a solution to improve on service gaps.

Keywords

Congestive heart failure; Chronic disease management; Heart failure; Self-management; Health hubs; Health technology

1. Introduction

A disruptive force, COVID-19 affecting 185 countries and > 3 million patients (April 2020), will highlight resilience and expose deficiencies in health systems. It rivals the Spanish flu of 1918 as a modern public health epidemic. Predominately respiratory based with pneumonia and respiratory failure, multiorgan involvement including cardiovascular are observed. Heart failure (HF), myocardial injury and arrhythmias are most common cardiac complications; in 339 critical care elderly, 17.4% suffered HF [1–4]. At a population level the effects was sudden, prolonged, where little was known and finally aggravated by limititations to movement and reduced access to health care [5, 6]. From the authors focus on heart failure (HF) care in Australia, we believe:

"The most important goal in this area is summarised in the term 'ambulatory' and delivering a working space at the provider and recipient ends to monitor, diagnose and deliver safe management that complements and reduces cost of entirely centre based care."

When dealing with uncertainty outside a hospital environment, a process of care is important as the foundation, structure and pathway to guide the many elements required to deliver successful chronic disease care. The specifics of HF management are summarised in consensus guidelines [7, 8] and disease management [9], This backbone of disease management complements guideline based recommendations. The HF team must then juggle these resources to provide optimal service for individual clients. COVID-19 has brought some issues to the fore:

1. CHF patients are heterogenous, hence single option models may not deliver uniform outcomes. Where more options are available training and resourcing adds to higher costs;

2. The circumstances for some patients and health services may not be compatible with hosting all management options;

3. In prioritising health resources there will be groups whose services are disproportionately lower compared to their needs [10].

Nonetheless, this universal event provides a unique opportunity for observations and reflection of HF management and health technologies *'ambulatory home health hubs'*. These challenges should provide optimism that what we can learn lesson to close existing gaps and improve care [11]. In this narrative review we explore the chronic HF model including self-management capacities and health technology exposed by COVID-19 pandemic.

2. Chronic care concepts, evidence and translation for congestive heart failure

Barr *et al.* in 2003 presented an expanded chronic care model (CCM) arguing that the language of generic CCM was not *resonating* with health practitioners [12, 13]. The authors argue in this paper that the term 'resonate', a largely qualitative term, has an influence on every CCM every domain. Fig. 1 [1], we have broken down the core pillars in this model. Disease management domains have numerous subdomains that deal with complicated and qualitative areas. When these issues are not resolved adequately, the problem can grow exponentially. Similarly, domains with many subdomains or variables can add stress to service delivery.

In Table 1[1], when we consider integrating health technologies into a heart failure CCM, we must factor this gap. In reality, health innovation involving technology and chronic disease self-management programs (CDSMP), have limited evidence and suffer poor translation. In Australia at the height of the pandemic, a payment code was created to facilitate phone consultation with patients, where evidence is limited. Thus, it will be interesting to observe uncontrolled care models implemented during this pandemic. there are also important limitations that need to be factored when using the CCM [14–19].

a. CCM preconditions for patient's willingness and abilities and health care team capabilities to respond, positively e.g. as demonstrated in diabetic care [16].

b. CCM Flexibility - guideline-directed chronic disease care does not appear consistently in real world disease management programs [17].

c. CCM Integration - cost-effectiveness is better served if strategies for disease management, prevention and promotion utilise similar design principles [9, 17].

d. CCM collaboration or choice - between policy, community resources and broad patient-health system 'resonance' may need to be expanded to account with day-to-day scenarios [17].

e. CCM Links - is required to ensure dialogue with communities in developing strategies particularly health prevention and promotion.

f. CCM Outcomes - clear outcomes must be determined for the program e.g. cost saving and reducing readmissions are important and occasionally under played goal particularly in large trial settings.

In this table we assume a scenario of client, case manager and hospital. All interactions use some form of technology (i.e. no postal or mail). There are seven clinical scenarios. The resourcing model highlights the most likely resources to be aid that scenario. Resources are Health technologies, Personnel, and health information technology.

● **Telemedicine (Structured Telephone Support-STS)** is defined as the direct provision of clinical care, including diagnosing, treating, or consultation, via telecommunications for a patient at a distance. Its primary function is to provide specialist consultation to distant communities, rather than to provide a tool for self-management of chronic disease [22].

● **Telecare (Telemonitoring)** focused on providing care in a home setting with the primary intent of supporting the patient rather than the health professionals [22].

● **Home telemonitoring (TM) (remote monitoring RM)** is used in a more restrictive sense and encompasses the use of audio, video, and other telecommunication technologies to monitor patient status at a distance.

Participants, technology domains, evidence base and translational strategy links are highlighted. For effective models, the right balance between health systems support, patient self-management capabilities and flexible research and implementation strategies must exist. Balancing quantitative and qualitative research is also necessary to deliver broad data.

As medicine will experience many changes in the coming years, this "medicine of the future" will be increasingly proactive, featuring four basic elements: predictive, personalized, preventive, and participatory.
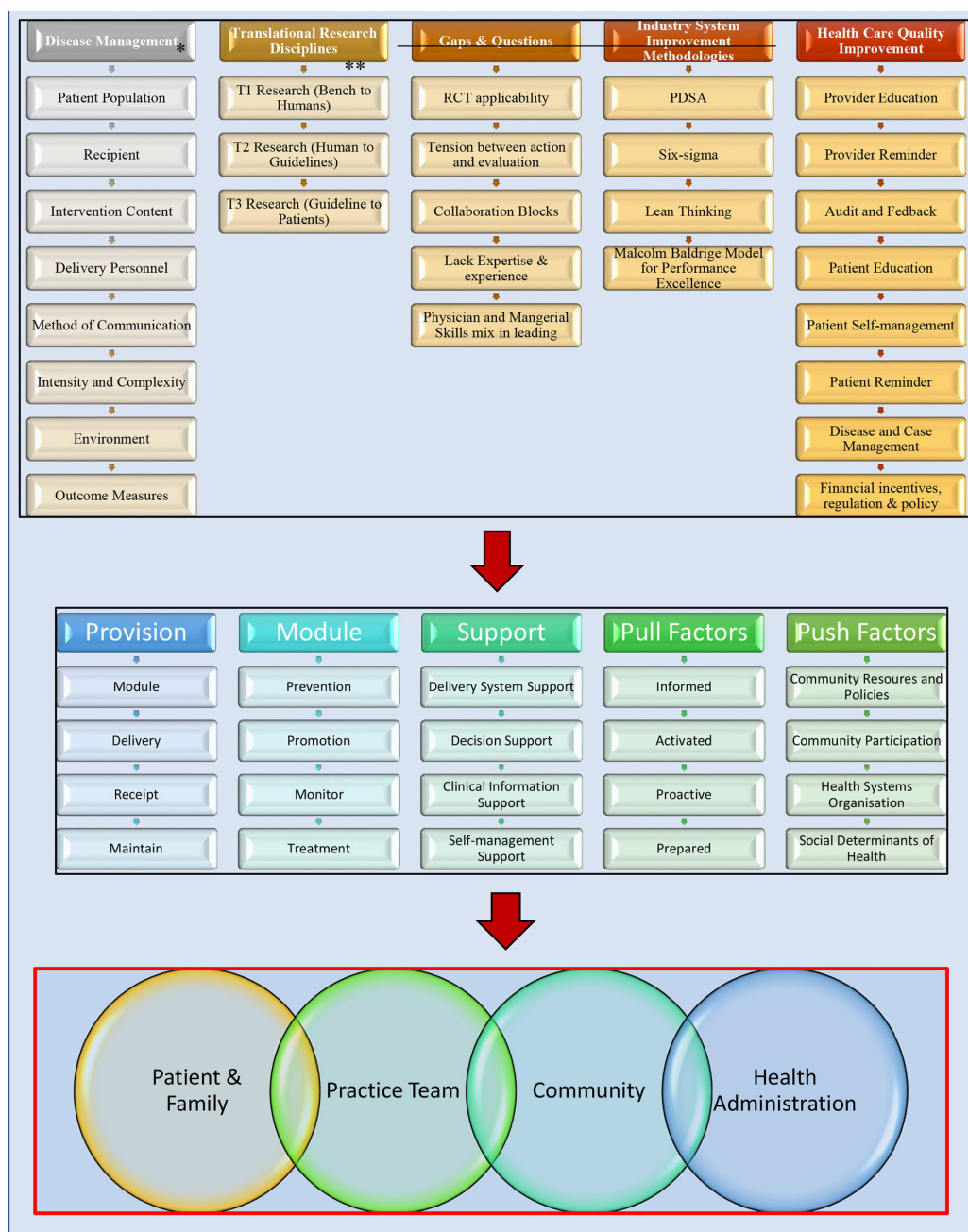
3. Heart failure chronic care model under prolonged forced isolation

The clinical environment in Melbourne, Australia, for a period saw only essential clinical services operating and a fear factor in utilising health services. All health services domains experienced challenges. When using technology, there are some similarities with medical practice early last century where individual practitioners dispense care from observation, or experience, as evidence was limited. Evidenced based medicine (EBM) also created silos in some respects [20–22]. For e.g. the Australian Federal Government in response to self-isolation approved funding for telephone-based consulting, bypassing all the established processes highlighted in Fig. 1. This compares to conventional telemedicine for geographical distance, which is video conferenced, standardised by a list of protocols including patient side supports and haemodynamics. *We must thus also explore technology with primary aim to enhance self-management capacities of patients and as an adjunct to breaking silo's, its secondary goal improve outcomes, while maintaining an acceptable standard of EBM.*

3.1 COVID-19 and heart failure

The mechanism of virus pathophysiology are addressed in these papers [1, 2, 5, 23]. The exact COVID-19 cardiovascular interplay remains unclear, with CV complications reported in many elderly and especially with pre-existing comorbidities. Three pooled reviews with COVID-19 infected patients show: Kunetsor *et al.*, studied 5815 patients in 17 retrospective cohort studies. The average age ranged from

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[1] The points raised in Fig. 1 and Table 1 are established and previously published. However, the focus of each figure represents the stage of thinking in the process of implementing a CCM for heart failure and health technologies There may be overlap between some points in the different figures as they are presented unchanged from the references.

Fig. 1. Components of Disease Management and Steps in Translating and Implementing Heart Failure Models. The chronic care model has many domains and subdomains. Translating evidence is at the heart of evidenced based medical care. Three phases: firstly, process and quality of care standards; secondly creating models on regional needs; and finally, health policy and translation to stakeholders. Some areas are more subjective than others and finding evidence to satisfy the process can be difficult. *Disease Management: 1. Patient Population - Risk Status, Comorbid Condition, Non-clinical features; 2. Recipient - Patient/Caregiver; Case Provider; 3. Intervention Content - Patient/Caregiver Education, Medical Management, Peer Support, Remote Monitoring; 4. Delivery Personnel - Nurse, Physician, Pharmacist, social workers, Dieticians Physical therapists, Psychologists, Case managers, Care coordinators; 5. Method of Communication - Face-to-face individual, Face-to-face group, Telephone in person, Telephone Mechanised, Internet; 6. Intensity and Complexity - Duration, Frequency/Periodicity, Complexity; 7. Environment - Hospital in-patient, Hospital out-patient, Home-based; 8. Outcome Measures - Clinical measures, Process Measures, Quality of life measures, Patient Satisfaction, Provider Satisfaction. **Translational Research Disciplines:** 1. T1 Bench to Human - Basic Science, Molecular Biology, Genetics, Technology Assessment, Animal Research, Phase I & II clinical trials; 2. T2 Human to Guideline Phase 3 clinical trials, observational studies, evidence synthesis and guidelines, clinical epidemiology, comparative effectiveness, policy and ethics; 3. T3 Guideline to Patient - Implementation and Dissemination, systems redesign, communication theory, behavioural and management science, organizational development, patient encounter research (concepts modified from ref [7–16]).

47 to 71 years. The prevalence of pre-existing CVD was 14.6% (11.0-18.4; 95% CI 87, 94%; $P < 0.01$); HF overstays 17.6% (14.2-21.2; 95% CI 0, 76%; $P = 0.20$) for HF; myocardial injury, had worse outcomes in older age and with pre-existing comorbidities [2]; Sabatino *et al.* pooled 21 studies with 77317 hospitalized patients, 12.86% had CV comorbidities; 14.09% developed CV complications during hospitalization. Pre-existing cardiovascular comorbidities were significantly associated to CV complications ($P = 0.019$); death ($P = 0.038$) was associated with pre-existing cardiovascular comorbidities ($P < 0.001$), older age ($P < 0.001$), and the development of cardiovascular complications during the hospitalization [4]. Bae *et al.* pooled 51 studies with 48,317 infections where death or severe illness was significantly higher in patients with risk factors for CVD (hypertension: OR 2.50, 95% CI 2.15 to 2.90; diabetes: 2.25, 95% CI 1.89 to 2.69) and CVD (3.11, 95% CI 2.55 to 3.79) [24].

HF patients also experience greater barriers in service access, including the fear of utilising a spectrum of services such as rehabilitation, pharmacotherapies and devices. Novel observations on pathophysiology e.g. on ACE2. This enzyme is highly expressed in the heart, and states that cause excessive activation of the renin-angiotensin system, such as hypertension, HF, and atherosclerosis [1, 5, 23], may counteract the effects of angiotensin II. We anticipate prospective studies to add to this space.

3.2 The heart failure team as a cardiologist led dhronic disease service

The HF team shares features with all chronic disease teams i.e. allied health, primary care and other specialty input. The cardiologist are appropriate leads as CHF pathosphysiology is complex. Specifically, both forms of HF, reduced (HFrEF) or preserved (HFpEF) cardiac function share similar prevalence's, but older age and female sex predominates with HFpEF. Multimorbidity e.g. coronary artery disease, diabetes mellitus, chronic renal impairment, hypertension, are seen in more than half of patients. Patient socioeconomics, demography, geography, and distribution of health services add to the management complexity [19]. Hence a cardiology lead with a good link and dynamic link to other providers is important. Many of the HF program goals can be addressed when patients live within proximity to hospital services; in fact, many other areas of the programs are redundant for achieving optimal care; however as patients gravitate further (either geographical, personal preference, social isolation, etc.) more services will be absorbed by primary health, community specialist, community hospitals, hospital outreach and even by 'good self-managing' patients. However the gold standard is hospital-based model of care, that works well for all patient types and the evidenced tested is also weighted toward this model [16].

The HF Program while utilising the CCM concepts has differences in how its implemented compared to other chronic ailments. Fundamentally the HF team sees the cardiologist addressing disease specific issues; with assistance from a team that includes a nurse, allied health, primary and other medical specialist care on HF and chronic disease issues [7, 8, 11]. While models have explored primary care and allied health leads, one clear observation from COVID-19 is that in reality, the HF team is a '*cardiologist led*' chronic disease team as the latter steers more prognostic issues related to HF. While consolidation of key management areas requires the cardiologist, the sharing of broader care with GP, allied health, is significant for completing the care with planning, information sharing, delivering aspects of care or even handling unforeseen situations. Should patients have comorbidities, differentiation of who leads the team is best mutually agreed based on the primary disease with the greatest burden on quality of life, morbidity, and mortality. In institutions, in-hospital cardiologists or HF subspecialist leads the team. However, in community practice this delineation is less clear. The fundamental difference is access to allied and sub-speciality services. The hospital-based HF specialist can access, refer, prescribe most care, but in the community the general practitioner has greater access to these services. This is an important point as the model of care also various significantly with the type of chronic disease even though many overlapping features are common. There are thus often multiple care models however funding models more likely favour the hospital led concepts.

3.3 Self-management in heart failure

'Self-management' introduced in the 1960's in paediatric chronic asthma sufferers, has successes in pain management, diabetes and hypertension. The terminology is widely applied in CDSMP as a core component to engaging patients in being actively involved in the day-to-day management of their chronic condition. However, despite significant attention to promoting self-management there has been poor translational success into patients with HF being actively engaged and good self-managers, despite generic HF-CDMP having selective successes. CDSMP is a problem based, approach designed to achieve disease: i) maintenance; ii) management; and iii) efficacy. Such programs create the structures to encourage patient's engagement with the day-to-day and long-term management of their chronic illness. Self-management successes are measured by the levels of self-efficacy and self-tailoring achieved. CDSMP comprise of three key components [25]:

1. Goals - comprising of: i) performance mastery; ii) modelling; iii) interpretation of symptoms; and iv) social persuasion.

2. Tasks - comprising of: i) medical management; ii) role management; and iii) emotional management.

3. Skills - comprising of: i) problem solving; ii) decision making; iii) resource utilization; iv) forming a patient/health care provider partnership; and v) taking action.

Anecdotally, self-management capacities of self-isolating patients would have increased, unfortunately there are no data on its impact on worsening HF. None the less in all the studies and trials to date, for HF, while there have been

positive findings, no health system to date has successfully translated a viable model of CDSMP that impacts on major adverse events, outcomes or cost effectiveness [25–29]. The foundations of managing readmissions in health services around self-management is also proving difficult largely because there is no standardised model that traverses the boundaries of patients' journeys. CDSMP however must link to health technologies for effective models, and there will be lessons to learn from patients' experiences.

4. Ambulatory health technologies in congestive heart failure

4.1 Established technologies

Technology assisted communications in stable situations have been established for decades using telephone, mobile messaging, or emails. Greater scope with video conferencing technologies has also allowed remote teleconsultations. In Australia, during the COVID-19 pandemic and social isolation, Medicare created a funded solution for teleconsultations with patients disregarding previous geographical limitations and video conferencing [30]. This unplanned experiment provides opportunity to study this concept for social isolation and special circumstances to balance mobility and even work commitments in the overall health economic equation. What was however missing between routine teleconsultation and the present was a protocol. There were no standards for consultations and no ability to obtain examination findings to equate to a face-to-face review. Inglis *et al.* followed up a 2010 Cochrane publication reviewing randomised controlled trials (RCTs) of structured telephone support or non-invasive home telemonitoring compared to standard practice for patients with CHF, to evaluate the cumulative efficacy of intervention and usual care. Twenty-five studies with 9332 participants for structured telephone support reduced mortality, HF hospitalisations, quality of life, knowledge of HF and self-care capacity. Age did not alter capacity and ease in learning technology or satisfaction. The quality of evidence did however vary from low to moderate [31]. Other established technologies include centre-based diagnostics, routine clinic-based tools and established ambulatory implanted treatment devices [32], are not a focus of this review.

4.2 Technology in trials and translation

Ambulatory technology for advanced communications including telemonitoring, diagnostics and assisting non-device (programmed) therapies has seen a large number of studies, protocols, and outcomes explored and with mixed results reported [33–35]. Outside trial settings most patients with HF will have non standardised devices to measure or monitor heart rates, blood pressure and weight. Implanted devices have capacity to assess lung parenchymal fluid overload and in conjunction with right heart catheters have been trialled for early detection of rising pulmonary capillary wedge pressures. Pare *et al.* reviewed 65 empirical studies on cardiac and comorbid conditions found that regardless of nationality, socioeconomic status, or age, patients comply with telemonitoring programs the use of technologies for ambulatory care. At this stage in 2007 there were variations in favour of cardio-respiratory conditions without clear supportive cost-benefit evidence. The authors were able to conclude the technologies facilitated accurate and reliable data, empowers, and influences patient attitudes and behaviours, and may even improve health outcomes [36, 37]. Since the early days large costly devices collecting very limited home-based data, stored within cloud systems, remotely accessed by health team has been replaced by sophisticated integrated systems with a range of automated, algorithm or human activation, processing or problem solving has evolved. These led to the foundations of the newer large randomised controlled trials (RCT). These trials then also opened newer and larger issues with technologies included protocol, standards and training, data support, storage, ownership, platform interphase and population level implementation. The call for generic and user-friendly systems is ongoing [38].

Telemonitoring for treatments requires a greater understanding of terminology and medical physiology and experience to action findings. Telemedicine and remote monitoring represent more than the remote system-patient communication of health data, several reviews explore this in greater detail [33, 39, 40]. Essentially the ability to provide prevention, treatment and promotion requires a sophistication and accuracy in technology, and simplicity to increase uptake, before even exploring hard health outcomes measures like readmissions, morbidity, and mortality. With this frame of thinking we can then understand the variable outcomes seen in larger randomised trials ($>$ 250 patients) the CHAT, TIM-HF, TEN-HMS and BEAT-HF, Tele-HF, INH, WISH, TEHAF studies [41–58]. Interpreting the success are interesting when we explore this early study by Gattis *et al.*, by introducing a clinical pharmacist into the heart failure team improves CHF outcomes [58]. Clearly defining the HF team as multidisciplinary we can add positive assets that lead to outcomes. However, among the non-invasive studies only TIM-HF2, with 1571 participants and the most comprehensive parameters measured, web-based remote monitoring on daily weight, BP, pulse, ECG, peripheral capillary oxygen saturation, a self-related health status, showed reduction in HF admissions or death (HR 0.80; 95% CI 0.65-1.00). All the other trials had patients with different characteristics, different protocols, tools, endpoints and mechanism of follow-up making it difficult to standardise the findings. However, when we break down performance measures daily weight and voice calls have high value [44, 45].

The most novel are mobile phone and devices. Cajita *et al.* looked at 10 articles utilized mobile health technology as part of a HF monitoring system, including blood pressure measuring device, weighing scale, and an ECG recorder found inconsistent outcomes between studies from sample-size, study design, older technologies [44, 58]. Inglis *et al.* has submitted a Cochrane protocol and we await that finding [31]. Implanted Device platforms and invasive monitoring as trialled

Table 1. Executing CCM using technology for HF.

| Resourcing Model	Clinical Scenario	Options/Notes	Priority Research Directions
a. Health Technology delivered: • HT_C - communication; • HT_{HIS} - Health Information Systems; • HT_M - Monitoring; • HT_{PP} - Prevention & Promotion; • HT_T - Treatment.	*Chronic Stable*	All resourcing models are relevant in this scenario.	Integrating a, b, c
	Acute Unwell	Readmission prevention key goal. Delivery therapies such as diuretics vital.	a (HT_C, HT_M) b (P_a, P_{cm}) c (IT_{eH}, IT_{SEMR})
	Ambulance	Access to health records and monitoring improves time and helps acute decision making.	a (HT_C, HT_M) b (P_a, P_{cm}) c (IT_{eh}, IT_{SEMR})
b. Personnel Resourcing: • P_a - Automated (Decision Support); • P_{cm} - Personnel Case Manager; • P_{ehl} - Personnel electronic health literature.	*Emergency*	Shared electronic medical records, creating early discharge plans and follow-up support.	a b c
c. Information Technology: • IT_{DM} - data mining/ artificial intelligence (AI); • IT_{eH} - eHealth; • IT_{SEMR} - Shared Electronic Medical Records.	*Discharge*	Reactivation of all aspects of Health Technology delivery. P_{cm} engagement and judicious use of P_{ehl} are relevant.	a b c
	Prevention	An area that could benefit greatly from technology.	a (HT_{pp}) b (P_{ehl})
	Promotion	An area that could benefit greatly from technology.	a (HT_c, HT_{pp}) b (P_{ehl})
	Research	IT_{DM} and AI will become increasingly relevant Home Health Hubs.	a b c

in DOT-HF, REM-HF, MORE-CARE, OptiLink HF, EF-FECT, IN-TIME, MultiSENSE, COMPASS-HF, LAPTOP-HF, CHAMPION is an evolving field. The risks of infection and chronically implanted foreign objects add to the non-invasive translation issues. The results have been mixed, however it worth mentioning as it highlights increasing the remote data to equate high level hospital care alone is not sufficient to reproduce institutional outcomes in the ambulatory setting [45]. Health promotion and prevention stems from secondary prevention clinics. This is usually a part of cardiac rehabilitation, general practice, and specialist consultation. Dedicating time for this is part of the heart failure program. However, to achieve parity with other chronic diseases, motivational interviewing, and cognitive behavioural therapies to improve quality of life and change negative behaviours is required. In Australia very limited programs are capable of offering this and outside public systems such models are not remunerated.

Kacrowski *et al.* randomised 39 communities to Cardiovascular Health Awareness Program (CHAP), using a limited number of ambulatory technologies. The CHAP communities, volunteer run (adults > 65 years) cardiovascular risk assessment and education sessions in community pharmacies over 10 weeks; automated blood pressure, self-reported risk factor were collected and shared with participants, physicians and pharmacists. This collaborative, community based health promotion and prevention programme reduce cardiovascular morbidity and hospital admission (including CHF) with a 9% relative reduction in composite end point (rate ratio 0.91, 95% confidence interval 0.86 to 0.97; $P = 0.002$) or 3.02 fewer annual hospital admissions for cardiovascular disease per 1000 people aged 65 and over [59]. In the TERVA study at 12 months of individualised health telephone coaching intervention in HF and other chronic diseases, 1221 participants, did not deliver the majority of disease management clinical measures. The authors concluded to provide substantial benefits, interventions may need to be more intensive, target specific sub-groups, and/or to be fully integrated into local health care [60]. In another home-based telephone coaching study among the 660 HF participants mortality between IG and CG campaign was (OR = 0.44; $P = 0.001$) [61]. Titration of HF medication that is nurse lead achieves target dose in shorter intervals and improves readmission and mortality outcomes [62]. In nurse-run, cardiologist or nurse practitioner-supervised clinic, HF medication via telephone can be achieved in up to 97% with improvement in left ventricular ejection fraction [63]. Automated telemedicine systems using algorithms have been successful in home up titration of beta-blockers.

4.3 The necessity of health innovation and integration

Health innovation is a broad term, often used to imply technology. For health innovation 'a hub' or a 'Precinct' is vital as a drawcard, whether it be for geographical, social or other forms of isolation requiring to be connected through other means (Fig. 2). Adding machine learning and data management is vital, but beyond the scope of this review [64]. Technology works in daily life; it is working during these crises; thus, the question is why not in health systems?
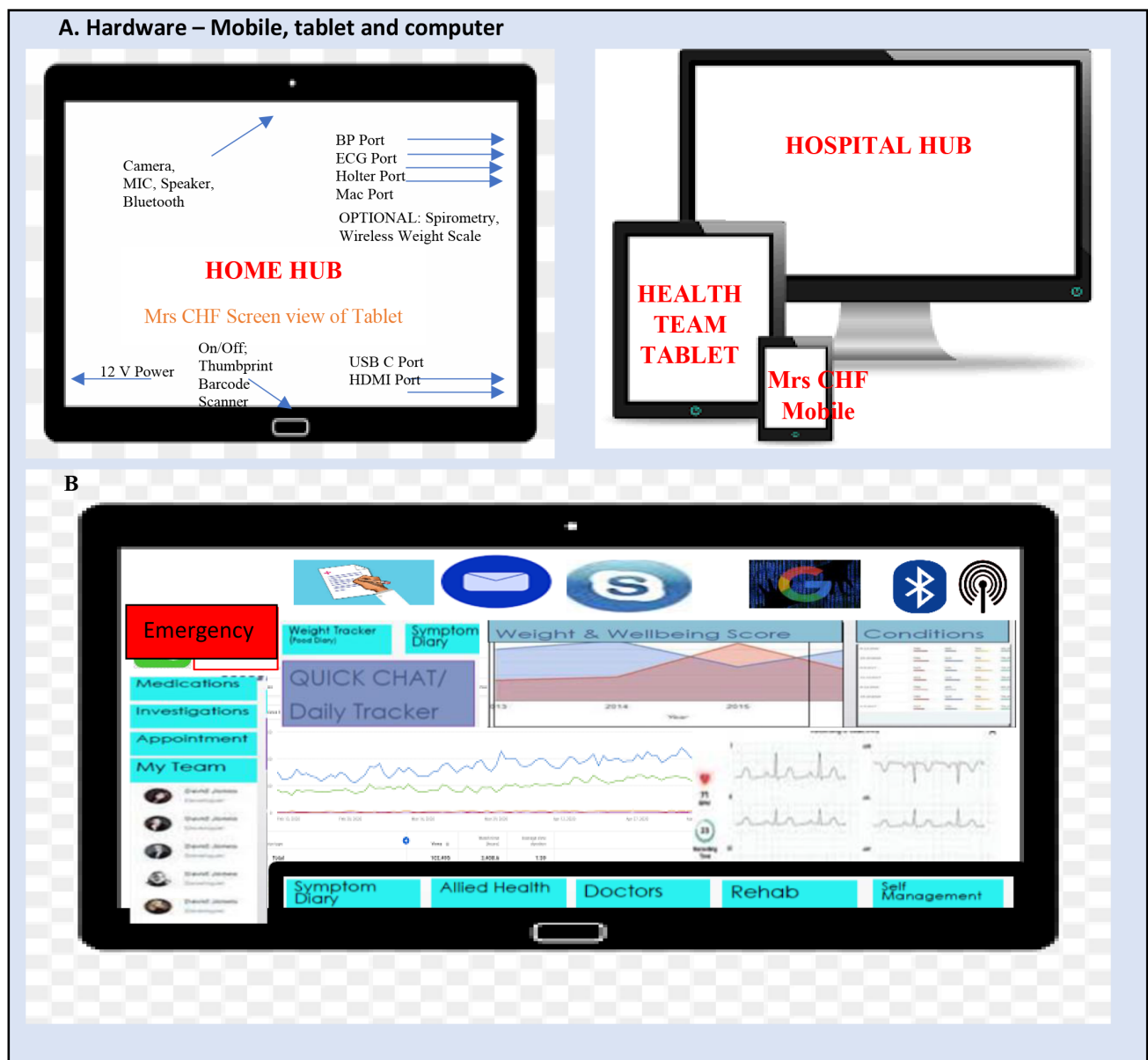
Fig. 2. Concepts for Integrated Health Hub. Both images are a theoretical concept of an Integrated Technology solution or '*Home Health Hub*'. As highlighted, there are many domains for which technology can be used. We also discussed the need to reduce the number of variables in subdomains. (A) In this concept the hardware (above image) are limited to a home tablet. This is modified to house features for communication, monitoring and treatment. For portability, a mobile phone platform also interphases with the home system. The final interphase is located with the health care team; (B) This image shows the patients heath page. A range of information is displayed. A few actions are possible. This 'app' will be the command centre for patients and health care team. Again, it is important to minimise the variables while ensuring there is sufficient sophistication for the client's health needs. Alternatively, several versions tailored for greater self-management capabilities could be considerations.

There is an invisible wall regards social and political will to address medicolegal consequences and governance needed to push the boundaries. In CHF and CDSMP health innovation is needed in two key areas: firstly, finding a suitable model (like the hospital model) to administer, fund and remunerate, and then to risk stratify and tailor CDSMP's particularly on patients abilities from poor to good self-managers; secondly to find integrated technological platform as a hub to house patients side information in a user friendly manner and health system side in its natural complexity. This capacity requires data storage, patient monitoring and communication. This set-up must factor the patient's illness journey. In HF there are stable periods, chronic deterioration or acute decompensation. The CDSMP and technology supported model must support clinical deterioration to keep patient's ambulatory and at home [36, 37]. Readmission reduction must be seen as a priority. Research framework must portray the real world picture of the question, and maintain stringent research methodology, and subsequent translation by health services [16, 17]. Finally, health Integration (Fig. 1)

of health innovation (Fig. 2) will be difficult area. We highlight 5 points for consideration.

1. Resonate - ie fit-for-purpose for clients and health services.

2. Understand - new terminologies and protocols.

3. Integrate - e.g. end bulky heavy systems are difficult to use.

4. Informed and activated - prepared, proactive clients and healthcare teams.

5. Standardise Program & Performance Measure - know what to deliver and measure.

5. Summary

The COVID-19 has impacted health services and its significant impact on CHF care are coming to light. CHF being a chronic disease sees an acute hospital and stable community phases. On the ambulatory aspects traditional models of care built around face-to-face interactions, multidisciplinary input and multimodality treatments, makes this aspect quite complex. Aging, isolated, associated comorbidities and further challenges to traditional service models. The COVID-19 environment including self-isolation and access to services has tested self-management capacities and health technologies. However, from observations, paradigms could emerge. For e.g. if only to observe the technology uptake in all aspects of lives, it is clear, technology is here to stay. In medicine we see technology daily in the workplace. What has been most difficult is the ambulatory (home) and clinical workplace connect. We have seen patches of success. Very clearly technology will player a greater role. It is this important to put a structure in lay terms on approaching this. Undoubtedly this link between improved patient self-management, technology assistance and framing the right models around COVID-19 experiences, could add to improved chronic disease management.

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