Is using telehealth to deliver a phase 2 Chronic Disease Rehabilitation program (education & exercise components) a feasible, appropriate and acceptable model of care?

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"If your actions inspire others to dream more, learn more, do more and become more, you are a leader."

John Quincy Adams

Contents

Abstract

Aim:

To determine if using telehealth to deliver a phase two Chronic Disease Rehabilitation program (CDR program) incorporating education and exercise components is a feasible, appropriate and acceptable model of care in a rural environment.

Method:

This study involved delivering a standard eight week group based CDR program using videoconferencing services between two sites. Patient participants were chosen who had a post code of 2361 (Ashford) and had a chronic disease and had been admitted to hospital in the past 12 months or who had been referred to a CDR program. Participants attended the programs in Ashford (remote site) while exercise instruction and education were provided from the specialist site of Inverell or Bundarra. Observation logs were completed each week by the researcher on the technical feasibility of using telehealth. Baseline data from both patient and staff participants and responses to questionnaires were distributed at weeks one (beginning of program) and weeks eight (end of program).

Results:

Two groups of four participants were held during the pilot program. Although a third program was planned this was cancelled due to lack of appropriate participants. Acceptability of the program was high, with 100% of patient participants either strongly agreeing or agreeing that the group education and exercise sessions were enjoyable, that they could understand the instructions and key messages given, and that they could see the instructor adequately. All patient participants would prefer to see a health care provider via telehealth rather than travel and all would recommend telehealth to family and friends. The majority agreed (63%) that they would not have travelled to Inverell to participate in a program. Hearing was the biggest issue for patients with 50% unsure that they could clearly hear the clinicians during the program sessions.

The majority of staff participants all strongly agreed, or agreed that they were provided with enough training and felt confident in using telehealth equipment. All staff strongly agreed, or agreed, that patients understood the key messages that were delivered and 75% strongly agreed, or agreed, that the audio and visual quality worked well throughout the sessions.

However, based on observation logs technical problems of varying degrees were encountered in 81% of all sessions. These appeared to be related to the mobile, non-dedicated videoconferencing unit used at the sites, especially at the specialist site which required connecting and disconnecting the unit for each weekly session.

Conclusion:

In this small pilot study, a CDR program delivered by telehealth was acceptable, appropriate and feasible for staff and patients in a rural environment. More detailed troubleshooting guides and resolution of identified technical hurdles need further examination if telehealth is to embraced further in the delivery of group based education programs..

Keywords:

Telehealth, Chronic Disease Rehabilitation, Videoconferencing, rural outreach services

Executive summary

Context

Traditionally, CDR programs are based upon exercise and education provision by instructors and specialist staff using a face to face model of care or individual home-based programs.

Inverell is situated in the McIntyre Cluster, (Tablelands Cluster since July 2013) of Hunter New England Local Health District and has four outlying towns; Delungra, Bundarra, Ashford and Tingha (Appendix One). A CDR program is provided in Inverell in the hospital gym on a weekly basis. It had been noted that the attendance by patients referred for CDR programs from outlying areas was low.

With limited staff numbers providing CDR programs, alternative models of care are required to provide a service to outlying areas and increase CDR program uptake.

This study examined the feasibility, acceptability and appropriateness of delivering a phase 2 chronic disease rehabilitation program using telehealth. It does not examine the benefits of CDR programs which are already well documented in the literature (NSW Department of Health 2006).

Approach

Portable videoconferencing units were located at Ashford Community Health and the Inverell Gym. A computer desktop unit with in-built camera suitable for videoconferencing was located at Bundarra Community Health.

For this study patient participants who were residents of Ashford (post code 2361) and discharged from hospital in the past twelve months with a chronic disease, or they were referred to the standard CDR program held in Inverell. Reports from iPM were generated for diagnosis codes Cardiac I05 – I51, Diabetes E10 – E14 and Respiratory J40 – J47 and were cross referenced with Admissions by Postcode report (RH_ADM0021) for separations within the past 12 months.

After participants consented to participate in the research project, an assessment was performed by specialist Registered Nurses along with a six minute walk test (6MWT) undertaken by a fitness instructor.

A CDR program was provided through telehealth from the specialist site (Inverell and Bundarra) to the remote site (Ashford) delivering 30 minutes each of education and exercise each week.

Two eight week programs were held with four participants in each program. Initially it was planned to have three programs but there were insufficient numbers for the third group. The study involved feedback responses from both staff and patient participants and researcher observation logs.

Baseline data was collected from both patients and staff participants, using questionnaires with Likert scaling being completed at the completion of week one and week eight of the CDR program. Observation logs were completed each week by the researcher on the technical and feasible aspects of using telehealth.

Results

All staff and participants that commenced the program completed the program.

Patient participants strongly agreed / agreed that the group education and exercise sessions were enjoyable. They could understand the instructions and key messages given. They could clearly see the instructor. They agreed that they would prefer to see a health care provider via telehealth rather than travel to receive this service. All would recommend telehealth to family and friends. If there was no program in Ashford 63% stated that they would not have travelled to Inverell to participate in a program.

Hearing was the biggest issue for patients with 50% agreeing and 50% being unsure that they could clearly hear the clinician during the program sessions.

At the completion of each program staff participants all strongly agreed / agreed that they were provided with sufficient training, and all felt confident in using telehealth equipment. They strongly agreed / agreed that patients understood the key messages that were delivered. Seventy five percent of staff strongly agreed or agreed that the sound quality and visual quality worked well throughout the sessions.

Technical problems occurred in 50% of the sessions and this was due mainly to the Inverell Gym videoconferencing unit having to be stored away between sessions. Therefore the unit had to be set up and dismantled each week, which caused errors sometimes with inserting plugs into the incorrect slots from the camera to the television and ultimately caused problems with the sound quality.

Implications

The implications for this study for patients include:

- Better access to health care
- Increased resources at outlying health centres
- Development of nurturing relationships and support networks for small rural towns
- A healthier community
- Increased options for exercise and education

The implications for this study for staff included:

- Improved scheduling of rehabilitation programs
- Less travel
- Better staff safety and security
- Change in the way Health Services provide programs for small rural towns

Recommendations

It is important to think beyond the traditional approaches in order to provide services to clients in small rural towns.

Innovative approaches including delivering services using telehealth requires detailed planning and consultation with the relevant expert teams to ensure that the right technology fits the services to be delivered. This not only includes the physical computer/video equipment but the network infrastructure that supports the organisation.

Client (including staff) acceptance of new services can vary, with reluctance to engage for a variety of reasons including a dislike of new technology, fear of change or concerns regarding privacy. It is therefore important for potential clients to have the opportunity to discuss their expectations. These views can then be useful in feedback to design and implement appropriate programs (Sanders, Rogers, et al. 2012).

Offering services in a potential client's place of residence, or changing the way that the Local Health District provides services can lead to increased access for care by clients. The provision of a service that is accessible to clients through telehealth can be delivered from any location including metropolitan areas and can address service delivery issues (Australian Physiotherapy Association 2009).

Recommendations from this study include:

- a larger cohort of patient participants to analyse findings
- solutions for audio problems
- investigation of telehealth needs before commencing CDR programs
- development of standardised resources that can be used by other services.

However a shift in thinking and a willingness to adapt to new approaches by all health care providers as well as community members is needed for the successful integration of telerehabilitation.

Introduction

Chronic Disease Rehabilitation (CDR) is known to improve health (NSW Department of Health 2006). Rural people living in outlying communities experience difficulties in attending CDR programs due to lack of transport options and distances to be travelled (De Angelis, Bunker and Schoo 2008). There is an opportunity to facilitate access to cardiac rehabilitation programs by telehealth for patients living in rural areas (Schwaab 2007).

In Hunter New England Local Health District, Inverell Health Service has a CDR program that is held on a weekly basis with education and exercise components. Clients referred to CDR who live in Ashford, which is 57 kms from Inverell need to drive or find alternative transport to attend CDR in Inverell.

It was noted by community health staff that clients discharged from hospital who live in Ashford were reluctant to commence and complete a CDR program in Inverell. However with advances in clinical telehealth and staff who have had previous experience in using videoconferencing this provided an opportunity to trial this model of care.

This study examined the trial of providing CDR programs through telehealth from Inverell and Bundarra (specialist sites) to Ashford (remote site) and examined patient and staff experiences and satisfaction with telehealth.

Literature Review

It is estimated that Chronic Disease will account for up to 80% of the health care burden by 2020 (NSW Department of Health 2006). People who have a chronic disease would benefit from comprehensive rehabilitation to improve their quality of life through increased functional capacity and an improved understanding of their disease and its management. Having timely access to services, comprehensive assessment, goal setting, individually designed multidisciplinary interventions and continued links to maintenance and support is important for people who have a chronic disease (NSW Department of Health 2006).

Cardiac Rehabilitation programs reduce recurrent events, improve risk factors and enhance quality of life through physical activity and education. However only one third of eligible patients attend rehabilitation and often cardiac rehabilitation programs are limited to particular areas where there are low levels of development and a low population density (Piotrowicz 2013).

Telemedicine studies have traditionally investigated electrocardiogram monitored exercise training at home and used internet based counselling for lifestyle modification on a one on one basis (Piotrowicz 2013). However, if one compares exercise capacity after home-based cardiac rehabilitation and in-hospital rehabilitation, home-based cardiac rehabilitation is effective and comparable to the standard in hospital rehabilitation approach (Scalvini, et al. 2013).

The literature also states that cardiac telerehabilitation is a promising tool to include patients who are not living near a centre based cardiac rehabilitation program or able to attend such a program (Piotrowicz 2013). Access to self-management programs can also be greatly increased with telehealth using single and multi-site groups in rural and remote sites (Jaglal, et al. 2013).

Clark, Conway et al (2013) state there is no need to rely on hospital based strategies alone to deliver effective cardiac rehabilitation programs. In their study a total of 22 databases were searched to identify quantitative studies or reviews of quantitative studies regarding the effectiveness of alternative models of cardiac rehabilitation. Eighty three articles were included, which examined multifactorial individualised telehealth, internet based telehealth focused on exercise, telehealth focused on recovery, community or home-based, and complementary therapies. This review indicated that further research is required to address the effectiveness of alternative models of cardiac rehabilitation in rural, remote and culturally and linguistically diverse populations. The review also stated that local health care systems should strive to integrate alternative models of cardiac rehabilitation in order to ensure there are choices available for patients that best fit their needs, risk factor profile and preferences (Clark, Conway, et al. 2013).

According to Schwaab (2007) there is a lack of controlled data and evaluation regarding risks and benefits of telemedical interventions in cardiac rehabilitation. There is a gap in the literature describing the effectiveness and appropriateness of telehealth group based centre to centre rehabilitation programs. Most literature reviewed, analysed individual home based telehealth rehabilitation or conventional group exercise programs. For example in the Journal of Cardiopulmonary Rehabilitation and Prevention, Winters (2007) researched 36 people with heart failure who participated in a centre based telehealth supported home based exercise program. Telecoaching and telesupport were also provided to participants by means of videoconferencing, as were biweekly telephone calls. Analysis of this program showed the effectiveness of telehealth–based home exercise program for persons with moderate heart failure. The results also showed that exercise adherence was high and improvements in physical quality of life, functional performance and psychological well-being demonstrated. Participant satisfaction was also high.

Similarly in the Canadian Respiratory Journal a study of 147 patients was undertaken. Patients completed an eight week rural rehabilitation program delivered by telehealth. However, only the education sessions were delivered by telehealth with the exercise component delivered under direct supervision at the satellite site. This was compared to 262 patients who attended a standard pulmonary rehabilitation program. The research concluded that telehealth was an effective tool for increasing Chronic Obstructive Pulmonary Disease (COPD) pulmonary rehabilitation services (Stickland 2011).

In determining acceptability of telehealth services a study by López et el in 2010 found. Eighty percent of participants were very satisfied with teleconsultation and 63% would use telemedicine again. Sixty five percent thought that telemedicine improved their medical care. More than 50% believed that telemedicine had a positive effect in terms of medical care improvement, time and cost savings.

Similarly, in a study by Loane et al, in 1998, (Patient satisfaction with the technical aspects of teledermatology in Northern Ireland) patients reported universal satisfaction with the technical aspects of teledermatology. The quality of both audio and the display was highly acceptable to patients. Personal experiences of the teledermatology consultation were also favourable, and 85% felt comfortable using the video link. Patients also found teledermatology to be as acceptable as the conventional dermatology consultation.

A study by Brewster et al (2000 – 2012) looked at factors affecting front line staff's acceptance of telehealth technologies. This study found that data about staff was collected as part of wider studies, rather than being the focus of data collection, meaning that data about staff acceptance has been limited. (Brewster, et al. 2013)

This project is not about evaluating the benefits of CDR Programs or improved health outcomes from attending rehabilitation programs. This research examines whether CDR programs (group based) can be delivered effectively using videoconferencing techniques from one centre to another in small rural towns and captures the perceptions of both patients and staff.

Methodology

The aims of this project were:

- To determine if telehealth is capable of delivering exercise and education from one health site to another (feasibility)
- To investigate if telehealth delivered CDR programs are suitable for people who have Chronic Diseases (appropriateness)
- To determine if clients are satisfied with using this of model of care (acceptability).

This telehealth CDR program is based on the same format as the standardised eight week CDR program that is held in Inverell on a weekly basis and three programs were planned to be delivered in this pilot project.

The weekly program was of one hour's duration with 30 minutes each of exercise instruction and education. Each exercise session was facilitated by an Instructor (Physiotherapist) in Inverell (specialist Site); with the health education sessions delivered from either Inverell or Bundarra health sites. A registered nurse was present at the remote site of Ashford, with a maximum of four clients in each session.

Education consisted of different topics each week as can be seen by table 1.

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Cardiac Education	Nutrition - Eat Smart Healthy Heart	Relaxation and stress less	COPD	Exercise and its benefits	Energy maximisation	Nutrition - Swap It, Don't Stop It	Advanced Care Planning
Community Health Nurse from Bundarra	Community Health Nurse from Bundarra	Mental Health Service from Inverell	Respiratory Nurse from Inverell	Physiotherapist from Inverell	Occupational Therapist from Inverell	Community Health Nurse from Bundarra	Dementia Support Worker from Inverell

Table 1: Education program topics for 8 weeks

As per NSW Health Cardiac Rehabilitation Guidelines all participants were screened with a risk assessment and six minute walk test at the pre assessment clinic held prior to the commencement of the group programs.

Staff Participants

Introductory letters, information sheets and consent forms were given to the five staff members

- Cardiac Rehabilitation Co-ordinator
- Respiratory Nurse Educator
- Physiotherapist
- Ashford Community Health Nurse
- Bundarra Community Health Nurse

After consent was obtained a baseline questionnaire was completed on their previous experiences with or using telehealth.

Roles and Responsibilities for staff involved in this project:

- Physiotherapist provided 30 minutes of exercise instruction every week for eight weeks for two groups and exercise education
- Respiratory Nurse provided education on COPD
- Bundarra Nurse provided sessions on cardiac and pulmonary education, *Eat Smart, Healthy Heart* modules on nutrition and *Swap it, Don't Stop It* from dietician's resources.
- Ashford Community Health Nurse in attendance at all the sessions at the remote site providing support and assistance for participants.
- Inverell based Cardiac Rehabilitation Co-ordinator filled in for nursing staff at both sites.

Other staff were co-opted in to provide community education modules, including Advanced Care Planning, Relaxation and Stress less, Energy Conservation and Work Simplification.

Recruitment of Participants

The selection criteria for participants included:

- residents of Ashford or having a postcode of 2361
  and
- Current referrals to the Chronic Disease Rehabilitation program held in Inverell.
  or
- discharged from Inverell District Hospital with a diagnosis of a Chronic Disease within the past 12 months.

Reports were generated from the patient information system (iPM) and run for diagnosis codes Cardiac I05 – I51, Diabetes E10 – E14 and Respiratory J40 – J47 and were cross referenced with Admissions by Postcode report, (RH_ADM0021) for separations within the past 12 months.

Exclusion criteria was similar to other chronic disease rehabilitation programs. For this study people aged 18 years and under as well as people with profound hearing and vision disabilities were excluded.

Introductory letters and an information sheet were given to the Ashford Community Nurse who visited potential candidates to provide information on the study. Involvement in the study was on a voluntary basis. Those who declined to be involved in the study were still offered the face to face CDR Program delivered in Inverell.

Participants attended a pre assessment clinic at Ashford Community Health Centre and were provided with further information on the research project, a consent form, rights and responsibilities, privacy information, compliments and complaints documentation.

The assessment included all participants undertaking a 6MWT. After completion of the assessment and 6MWT, approval was sought from each participant's General Practitioner to participant in the program. Once approval was gained the participants were invited by phone call to commence the rehabilitation program.

The Intervention

Venue

The Inverell hospital gym was used to deliver all the exercise components and ten of the 16 education sessions. Before this research project commenced videoconferencing was not available in this gym area.

A small room at the end of a larger room at the Ashford Community Health centre was available to set up the gym equipment and the videoconferencing equipment. The floor had linoleum coverings and there were windows behind the exercise equipment. The blinds had to be drawn as the light potentially made it hard to see on the television screen.

Six of the sixteen education sessions were provided from the nurse's station at Bundarra Community Health Centre.

The telehealth set up for the exercise and education component at both Inverell and Ashford sites used a portable non-permanent telehealth unit (figure 1, 2, 3, 4). When an education session was provided by the staff member in Bundarra a computer desktop unit with in built camera was used. PowerPoint presentations were used for the majority of the education presentations, and were broadcast to the Ashford site form either Inverell or Bundarra.

Figure 1: Inverell Gym and telehealth setup

Figure 2: Showing where audio lead (White) needs to be inserted.

Figure 3: Showing leads staff were required to plug in each week.

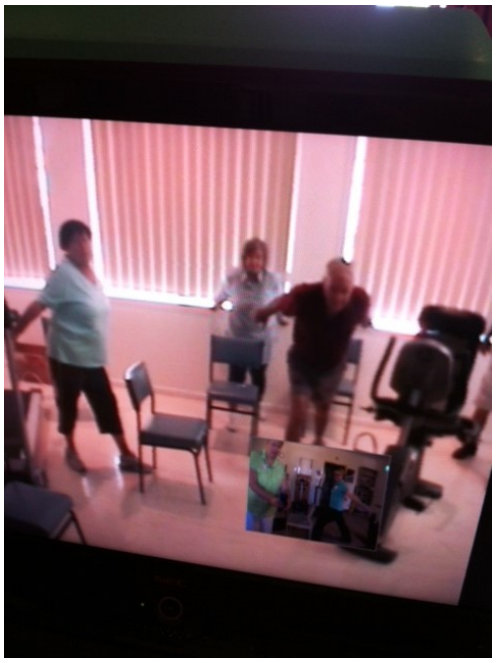


Figure 4: Showing size of room at Ashford with exercise equipment

Exercise Equipment

The equipment used included a treadmill, recumbent bike, weights, therabands and an aerobic step and was duplicated at both sites at Inverell and Ashford (see Figure 1).

Data Collection

Demographic data was collected and baseline questionnaires were used to determine previous experiences with using telehealth from both staff and participants. Baseline data was collected from both staff and participants when consent was obtained. Data items collected from patient participants were: age, occupation, Aboriginal Status, gender and previous experience with telehealth. Data items for staff included: previous experience with telehealth and if this was positive or a negative experience.

Quantitative analysis using written questionnaires were given to staff and participants after their first CDR session (week one) and repeated at the end of the program (week eight) (appendix 2 and 3). Participants were asked to record anonymously whether they agreed or disagreed to a number of statements using a Likert scale. Responses from both rehabilitation programs were collated and trends identified in telehealth being an acceptable and appropriate model of delivery for CDR programs.

Researcher Observation logs were used to collect video and audio quality information during the exercise component of each session to determine the technical quality of the videoconferencing transmission.

Ethics Approval

Ethics approval was given on 29th May 2012 by Hunter New England Human Research Ethics Committee as a Low and Negligible Risk Research.

HNEHREC reference number: 12/05/16/5.08
NSWHREC reference number: LNR/12/HNE/157
SSA reference number: LNRSSA/12/HNE/218

Funding

Funding was obtained through NSW Health Education and Training Institute, Rural Directorate.

Results

Two eight week education and exercise CDR programs were delivered via telehealth from Inverell (Specialist site) to Ashford (Remote site). Due to a small sample size detailed statistical analysis was unable to be performed.

Potential participants were identified after reviewing the results from the iPM report output. Invitations to participate in the research study were sent to 16 potential candidates via the Community Health Nurse at Ashford. Of these four declined to participate, the remaining 12 agreed to participate in the research project and undergo the pre-assessment review. One person withdrew for medical reasons.

Four people were enrolled in the first eight week CDR program, four in the second and unfortunately all three people enrolled in the third group withdrew while waiting for this to commence.

In total eight participants enrolled in the project, all of whom had history of cardiac disease with three also having diabetes and one having COPD.

The first group was held in the afternoon from 3–4pm from October till December. The second group was held in the morning from 8.30–9.30am from February till April. As there is no air-conditioning at Ashford Community Health Centre or in the Inverell Gymnasium this was to avoid the hotter weather in February.

Patient Participant Results

Demographics:

Patient participants were aged between 59 and 79 years with the majority (n=6) in their seventies. The only patient who was formally referred for CDR was also the youngest (aged 59 years). All patients recruited were of non-Aboriginal descent. Participants included five men and three women. The majority (75%) were retired with only two participants currently employed.

Baseline Data:

All eight participants advised that their main reason for participating in the CDR program was due to the program being run in their home town. One participant advised that they felt unwell and wanted to feel better and another participant advised that their family encouraged them to attend.

Five of the eight (62%) participants indicated that they would not have participated in a rehabilitation program if it was not available in Ashford and only one would definitely have travelled to Inverell (Table 2).

Question	Yes	No	Maybe
If Chronic Disease Rehabilitation was not available in Ashford would you have travelled to Inverell to participate?	1 13%	5 62%	2 25%

Table 2: Percentage of people who would not have travelled to Inverell to participate (n=8)

At the Pre assessment clinic all of the participants advised that they had had no previous experience using videoconferencing equipment or receiving care via telehealth.

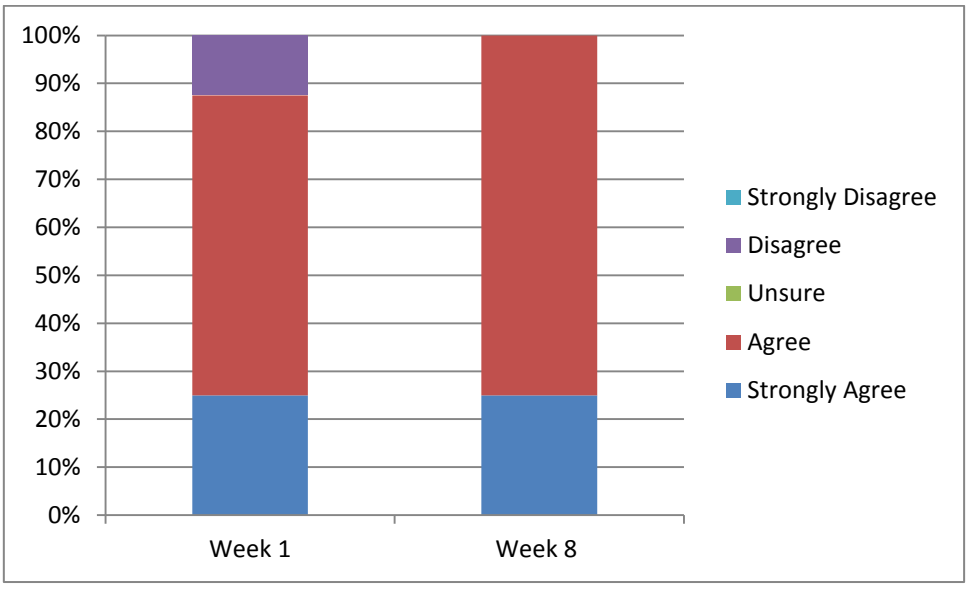
The following are comments from participants are about their expectations and goals for participating in the CDR program.

"Would like to maintain my fitness"	*"Feel better"*	*"More healthy"*

Patient Participant Responses after Week 1 and Week 8:

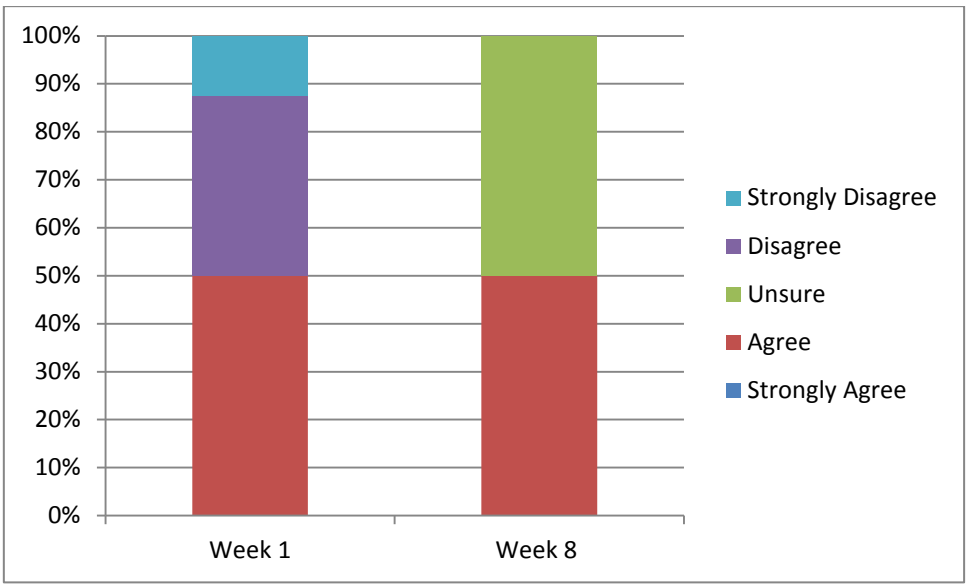
Patient participants recorded their responses to questionnaires anonymously. Below are the main findings from the week one and week eight surveys.

At week one and week eight, patient participants were asked if they **could clearly see the clinician** at the other end, two participants (25%) strongly agreed for both weeks and six participants (75%) in week eight agreed compared to five participants (63%) in week one (Graph 1).



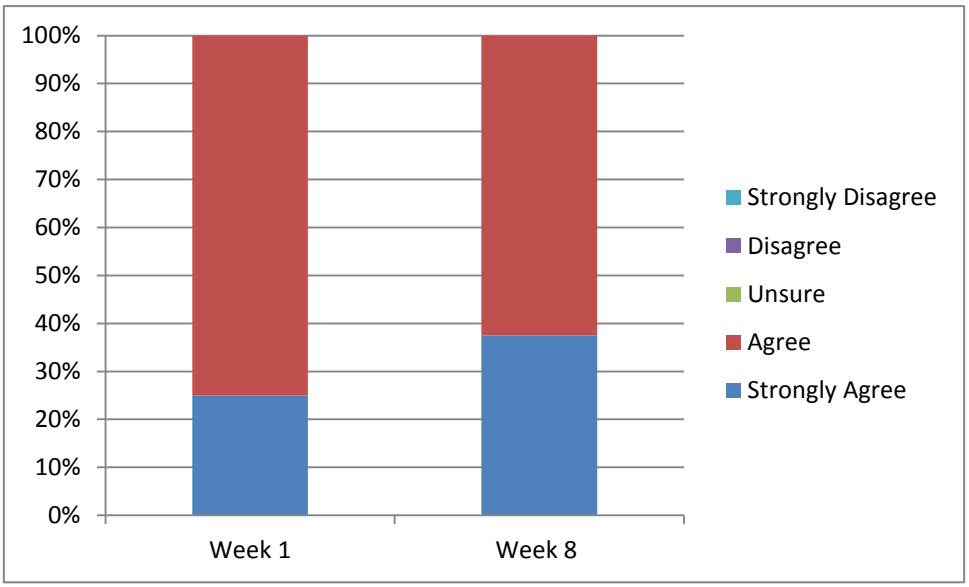
Graph 1: Patient responses: I could clearly see the clinician at the other end

At week one, four participants (50%) agreed and three (38%) disagreed and one participant (13%) strongly disagreed as to whether they could **clearly hear the clinician** compared to four participants (50%) who agreed in week eight and four participants (50%) who were unsure (Graph 2).



Graph 2: Patient responses: I could clearly hear the clinician at the other end

In both weeks one and eight, all participants strongly agreed or agreed that they **clearly understood the key information, instructions and feedback provided by the clinician** with a shift by one extra participant into the strongly agreed category by week eight (Graph 3).



Graph 3: Patient responses: understanding the key information, instruction and feedback provided by the clinician

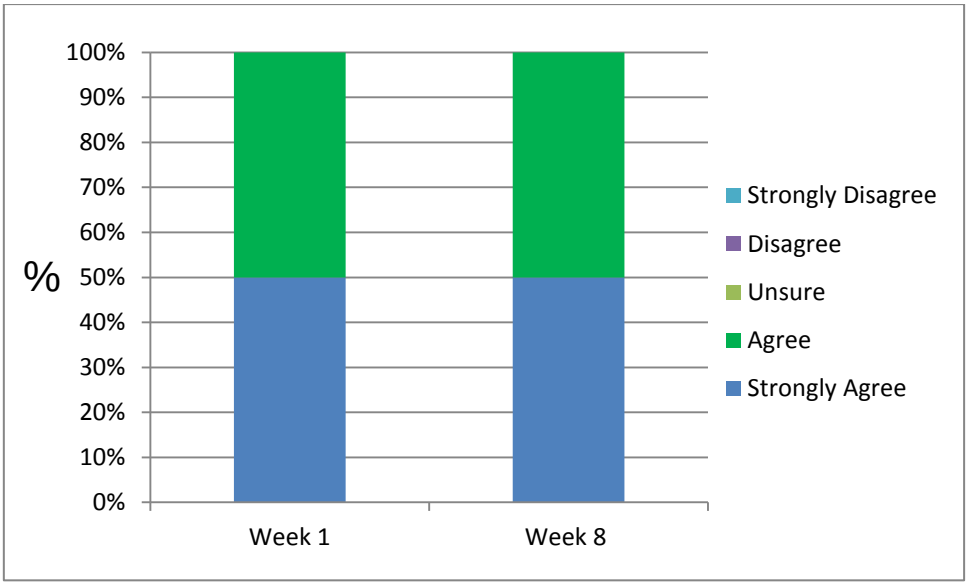
Receiving instructions via a television monitor was not a barrier to receiving rehabilitation education and this view was strengthened over time as more participants had strongly agreed by the week eight survey. In week one, three patients strongly agreed and five agreed compared to week eight when five patients strongly agreed and three agreed.

All patients felt **comfortable talking, listening and looking at the videoconferencing equipment**. Again this view strengthened between the first and final surveys with one more participant strongly agreeing to the statement by week eight. In week one, three (38%) strongly agreed and five (62%) agreed, week eight four (50%) strongly agreed and four (50%) agreed.

Participants **did not feel that computer and technical problems occurred** on a regular basis. In week one, five (63%) disagreed, one (13%) was unsure, one (13%) strongly agreed and one (13 %) agreed. At week eight, all (100%) participants agreed with the statement that technical problems did not occur on a regular basis. Observation logs also showed that in week eight for both groups no technical or computer problems occurred (Table 3). In fact comments from participants for this week include:

"Best yet as no echo"	*"Really good session"*

When participants were asked if they would **prefer to see a healthcare provider via telehealth compared to travelling** to see them in person, in both weeks one and eight, four (50%) participants strongly agreed and four (50%) participants agreed (Graph 4).



Graph 4: Patient responses: indicating preference to see a healthcare provider via telehealth compared to travelling to see them in person

In response to the statement, "If I didn't attend this program, I would not have accessed a rehabilitation service anywhere else", in week one, five (62%) patient participants strongly agreed, three (37.5%) agreed, compared to week eight when two (25%) patient participants strongly agreed, five (62.5%) agreed and one (12.5%) was unsure. However, four (50%) patient participants strongly agreed and four (50%) patients agreed that they would recommend using telehealth to family and friends.

In group one the attendance rate was 90% and 78% for group two. The overall attendance rate for both groups was 84%. The reasons given for non-attendance included having a

previous appointment or illness and not dissatisfaction with the program or the delivery mode.

Patient responses at the end of the program:

"There were times when the voices were echoing"
"I enjoyed my time here" *"Could not suggest on improving at all"*

Staff Participants Results

Four staff commenced the initial program in October 2012 and there was one staff member who was co-opted to participate during the project due to staff leave.

Four out of five staff were provided with two intensive training sessions, one week apart and included linking Inverell directly with Bundarra and Ashford via video conferencing. All staff participated in dialling another site. Telehealth resources from Hunter New England Local Health District Telehealth Unit were used and provided staff with a Roles and Responsibilities document, a troubleshooting guide and telehealth etiquette information. The relieving staff member was provided with individual basic training on the day of the program and was supported by another staff member.

Staff Baseline Data:

All five staff completed the baseline data and indicated that they had had previous experience using videoconferencing equipment. Four out of five (80%) staff indicated that this was a positive experience. One staff member indicated that their experience was negative.

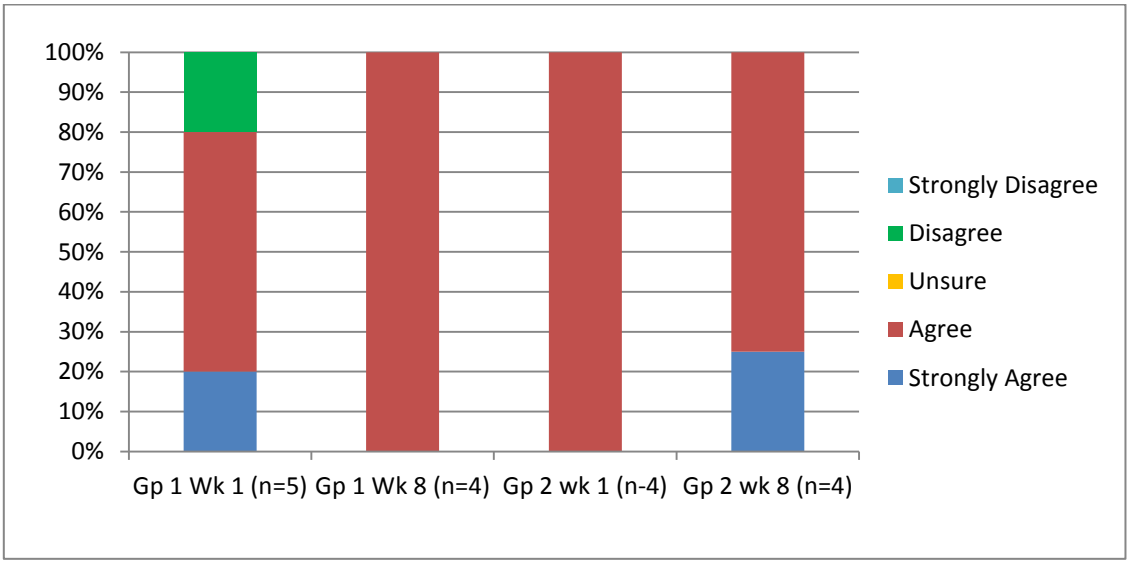
Expectations for staff participating in this program included:

- Gaining skills with technology and learning how to interact with clients via telehealth.
- Being part of a healthcare team to improve the health of clients with Chronic Diseases
- Socialisation for clients and improvement of their health and self-esteem and encouraging clients to see for themselves the benefits of telehealth.
- Being able to deliver health care to remote areas where access to quality health care is difficult.

In preferring to see people face to face, two staff indicated that they would rather see clients face to face. One of the staff advised that it is "*easier to see facial expressions and body language to interpret patient's behaviour*". Two staff indicated that they would prefer not to see people face to face. One staff advised, *"if videoconferencing was well presented there is no need for face to face"*. The remaining staff provided no response.

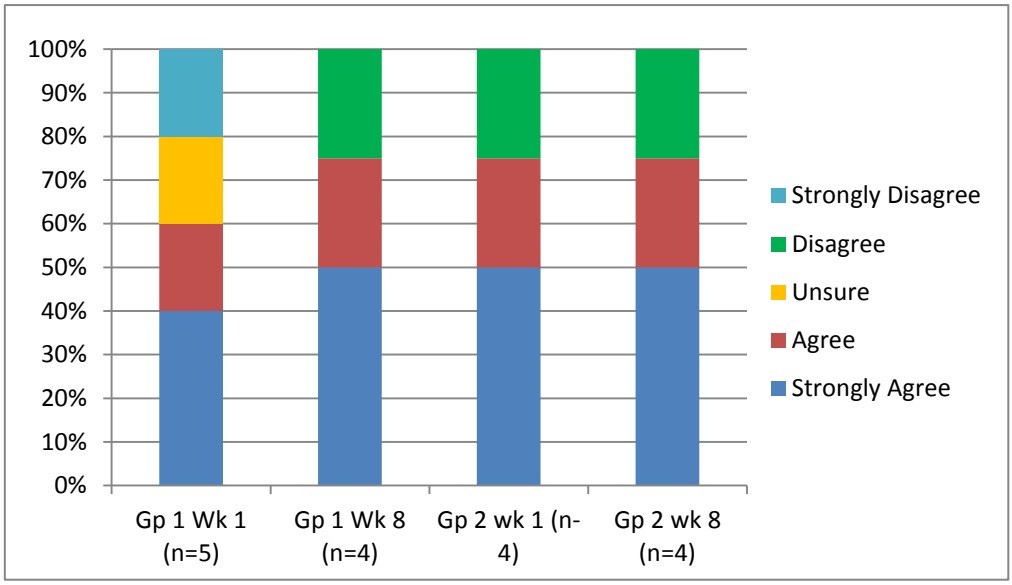
Staff Participant Responses after Week 1 and Week 8:

In the beginning staff were not confident in using the videoconferencing equipment but after longer exposure they became more confident in using this equipment. There was also a shift of one staff member from “agree” in Group two week eight to “strongly agree” (Graph 5).



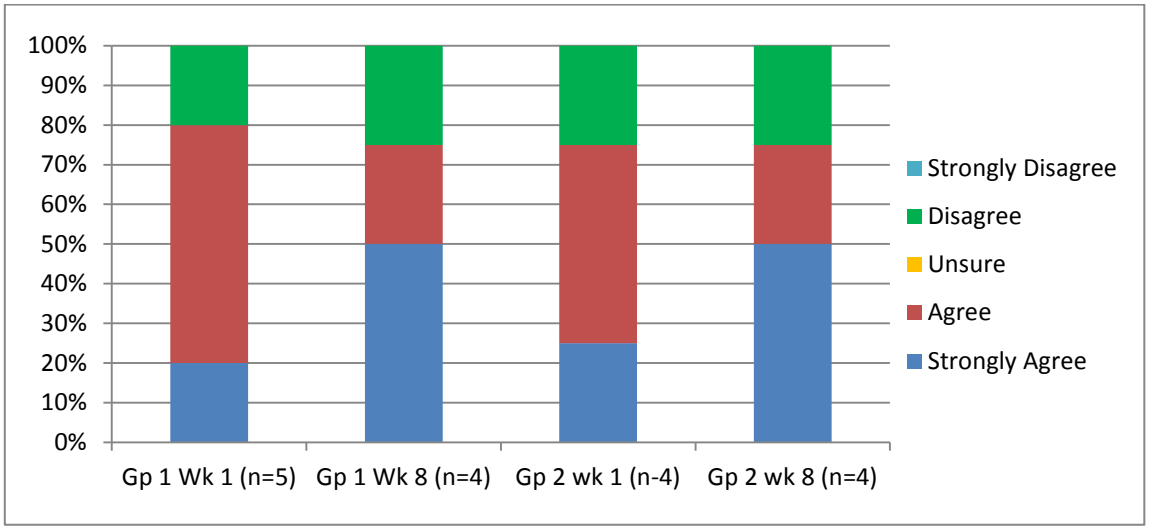
Graph 5: Staff responses: Confidence in using videoconferencing equipment

At the commencement of the program staff were uncomfortable with setting up the equipment. This was shown across all answers and could be due to the effort required to set up and dismantle the equipment each session. At the end of Group two, week eight, no one strongly disagreed with the statement (Graph 6).



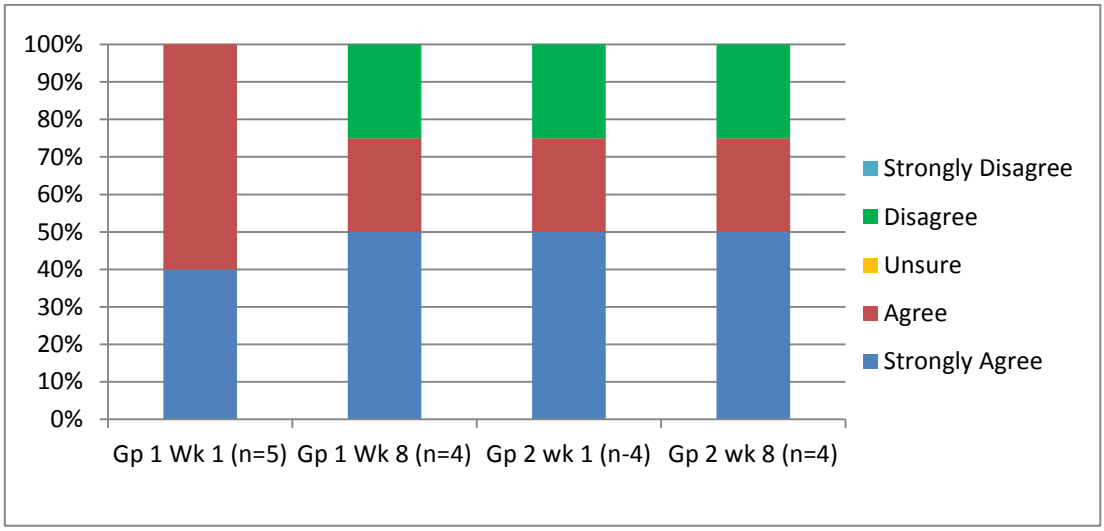
Graph 6: Staff responses to ease of equipment to set up

At the completion of both groups there was an increase by one staff participant who strongly agreed that the sound quality worked well throughout the program sessions (Graph 7).



Graph 7: Staff responses to the sound quality.

Two staff participants across all groups strongly agreed that the visual quality of the videoconferencing worked well (Graph 8).



Graph 8: Staff responses to the visual quality of the videoconferencing

After week one of group one there was an increase in the number of staff who said the videoconferencing worked well during the clinic. By the end of week eight in both groups the videoconferencing worked better as staff became more proficient in using the videoconferencing equipment.

Staff comments at end of week 1:

"I think telehealth has its place. I find that because of the way the microphone cuts in it doesn't encourage questions and talk during the presentation."

"Problems with connection and IP address, connected to a different point and rebooted, session commenced late."

"Poor visual view of Inverell Room. It was difficult to see myself and adjust angle as TV and camera not in same spot."

"Too small area for exercise group. Until audio problems resolved - a test run prior to session. Appropriate location. Warm during exercise group."

"Still need to move TV - manual handling risk associated with this and set up each time."

"Clients participating often comment to me that are enjoying attending and seeing the telescreen working and delivering effective exercise and education."

"I think the session went very well. I was unable to see the participants for the first part of the session but that was my fault, I then realised what I had not done."

Staff Comments at the end of Week 8:

"Need for unit on trolley that does not have to be dismantled and moved after each session. Also camera on same angle as TV unit."

"The screen on the video conference is large and therefore easy to see. The slides and information are very informative and easy to read."

"When the group members were talking, it was sometimes difficult to get them to refocus."

"Sound and Picture quality not ideal. Difficult to see facial expressions and clients not always able to hear clearly."

"Good vision (picture), sound and quality. Presentation via telehealth of PPT ran smoothly."

"The setting and exercises were very hot in summer when run at 3pm. Changing to 8.30am was much cooler."

"The setting up and running is very good. The delay (slight) in sound is something to get used to."

Staff participant comments: 3 positive aspects of telehealth

Clients seems to really enjoy the experience	*Bridges distances*
Available in smaller sites	*Being able to do it from your centre*
Fairly easy to operate i.e. dial in	*Decreased travel and cost*
Access to service for clients	*Able to give education to a wider community*
Upskilling staff in delivering care via telehealth	*Connects people and places.*

Staff participant comments: Improvement suggestions

Improved set up for Inverell, equipment on a trolley to be moved for each session
Trolley for TV unit, more data points in Rehab Gym so cable can be shorter
Just a little improvement, altering of sound is required at times
Overcome inability to play discs with sound
Trolley for TV, port in room for network cable and better sound
A trolley for v/c equipment I think it runs well

Researcher Observer Log Results:

Observer logs were completed each week by the researcher for the exercise component only and looked at the technical and feasibility side of providing CDR via telehealth (Table 3).

Group	Week	Clear broadcast	Audible broadcast	Delays in transmission	Dropouts	Unforseen events	Commenced on time
1	1	✓	✓	✓	✓	x	x
	2	✓	x	x	✓	x	x
	3	✓	x	x	✓	✓	✓
	4	✓	✓	✓	✓	x	x
	5	✓	✓	✓	✓	x	✓
	6	✓	✓	✓	✓	✓	✓
	7	✓	✓	x	✓	x	✓
	8	✓	✓	✓	✓	✓	✓
2	1	✓	✓	x	✓	x	x
	2	✓	✓	✓	✓	✓	x
	3	✓	✓	x	x	✓	x
	4	✓	✓	x	✓	✓	x
	5	✓	✓	x	✓	✓	✓
	6	✓	✓	✓	✓	x	✓
	7	✓	✓	x	✓	x	x
	8	✓	✓	✓	✓	✓	✓

Table 3: Weekly observation log results

Legend: ✓ = met criteria × = does not meet criteria

Overall technical issues were identified in thirteen of the sixteen sessions (81%).
All sessions were determined as having a clear broadcast, only one session was terminated unexpectedly and all but two had no problems with sound. Delays in transmissions, unforseen events and commencing on time occurred in 50% of the sessions.

Discussion

The aim of the project was to determine the acceptability, appropriateness and feasibility of delivering CDR via telehealth. There is a gap in the literature describing the effectiveness and appropriateness of delivering group-based rehabilitation programs via telehealth. Most literature reviewed, analysed individual home-based telehealth rehabilitation or conventional group exercise and education rehabilitation programs.

From this small research study the results appear to demonstrate that CDR via telehealth is an acceptable, appropriate and feasible mode of delivery.

Acceptability:

All patient participants enjoyed the group education and exercise sessions. They would recommend using telehealth to family and friends and that they felt comfortable talking, listening and looking at the presenters via the videoconferencing equipment. Participants also stated that they would prefer to see a healthcare provider via telehealth for their health care needs compared to travelling to see them in person which is similar to the findings by Loane et al in 1998 and Lopez et al in 2010.

It is interesting to note that of the eight patient participants that commenced the program 100% completed the CDR Program. Six of the eight participants were married to other participants and this may account for the same numbers commencing and completing the program. Patient participant feedback suggested that they found the program acceptable:

> "*I enjoyed my time here and could not suggest on improving anything at all."*

Staff participants overall indicated that as they had more exposure to CDR programs via telehealth they became more confident using the equipment and delivering presentations for the sessions. Staff participants also indicated that telehealth bridges distances and allows availability of services at smaller sites and provides better accessibility to services that patients would not normally have had access to.

The results show some negative responses from staff in regards to equipment setup confidence and sound quality. Due to the anonymity of the survey design it is unclear if these responses came from the same individual staff member or specific allocated roles for these telehealth sessions where staff may have felt unsure of their actions. That is, were negative comments more likely in those staff members where increased technical skills were required to ensure optimal set up was achieved. As identified by Brewster et al between 2000–2012 investigation of staff acceptance of telehealth has been limited and requires more in depth analysis of staff views.

It is also interesting to note that one staff member who participated in this study has now implemented a fracture plaster cast review clinic via telehealth. Thus because of their exposure to telehealth, staff have been more open to further enhancements of their service and ability to expand their practice delivery options to incorporate new technology. Therefore, telehealth can be seen to be an acceptable method of delivering improved services.

Appropriateness:

All patient participants said they achieved their intended goals and felt that they benefitted from participating in the telehealth CDR Program. They also indicated that having an instructor via a television monitor was not a barrier to receiving education.

Staff participants indicated that the patient participants understood the key messages that were delivered during the sessions. Staff also indicated that they were able to provide 'education to a wider community' when using telehealth and were able to provide this from their place of work. One staff member commented that telehealth 'connects people and places.' On one occasion technical issues were encountered with the sound of embedded videos within one of the PowerPoint presentations being unable to be heard. This was due to technical issues with the videoconferencing equipment at Bundarra and was overcome by the presenter stepping the group through the main messages of the video.

It is interesting to note that there were no standardised guidelines or resources available for use across the District for providing CDR education sessions. PowerPoint presentations were accessed from a number of different sites across HNELHD to form the education modules of the program. These resources have since been compiled for use in Inverell's CDR education program. This demonstrates that the same resource package can be effectively used for both face to face or telehealth delivered CDR programs.

All staff and all patients that commenced the program completed the program. When a patient was absent from the program it was due to another appointment or they were unwell and not because they did not want to participate in this education program.

Feasibility:

Although during the planning phase for this project a detailed technical needs assessment was undertaken technical problems were the major factor that impacted on the success of this program. This was mainly due to not having dedicated and mounted videoconferencing equipment in the clinical areas used and no network connectivity available in the Inverell Gym. This resulted in the mobile telehealth unit requiring to be set up and dismantled each week as there was no storage space in the gym. As there was no trolley for this mobile equipment sit on, the camera and monitor unit had to be disconnected from each other due to size and weight and carried to/from the storage area (Figure 1).

There were also no active network ports available in the gym which required a 30 metre network cable to access the nearest network port. This required the cable to be taped down every week to reduce the safety risk as it crossed a major walkway. This also impacted on other staff using the office space attached to the Gym as the network port was used for a dedicated printer and was unable to be used during the sessions. On two occasions there was no sound at the remote end as a plug was not inserted into the correct slot (Figure 2). As displayed in figure three, staff were required to insert cords to set up the telehealth equipment every week. Other technical issues identified included the video freezing for a few seconds on and off throughout the program as well as a slight echo when the instructor was talking. Based on information received by IT this was due to erratic traffic load on the network.

The telehealth unit at Ashford was set up on a trolley and was easy to manoeuvre into place and was stored in the same room as the exercise equipment. At Ashford a 10 metre network

cable was needed as there were no ports in the area being used as a gym. The existing computer desktop unit at Bundarra is in the treatment room was able to be used for this research but had to be moved each week to the nurses' station as the treatment room was being used by a visiting doctor.

Consideration needs to be given to the room size required at the remote site to deliver group based programs especially those requiring bulky equipment such as a treadmill; recumbent bike, theraband, balls and weights. There were four participants in each session at the remote site. It became apparent with four participants and equipment that it was difficult to observe all patients at all times. Three participants would have been adequate for the size of the room (figure 4). The camera width was just wide enough to capture the room and equipment.

The results from the participants showed that hearing was an issue with participants at times unable to hear the exercise instructor. This could have been due to the background music used during the exercise component playing at the remote site. As is the case in conventional CDR programs music is played and managed by the instructor but after the first telehealth session the music needed to be run from the remote site to improve the audio quality heard by all parties (remote and specialist sites). The music may have influenced how well the patient participants could hear the instructor. Further investigations into audio problems are needed for provision of CDR programs through videoconferencing. Solutions could include use of wireless headsets for staff and patient participants to lessen the background interference noise.

Staff results indicated that there were some problems with the sound during the sessions. Comments from staff include: 'When the group were talking it was sometimes difficult to get them back' and 'clients were not always able to hear clearly'.

Researcher observation logs indicated that the broadcast was audible in 88% of all sessions but as mentioned above the quality required to understand instructions may need to be a higher level than first thought. The comments describing the reasons for this included:

Ashford could hear Inverell site, however Inverell could not hear anything from Ashford site. There was a slight echo. There was music at the Ashford end and the Ashford nurse had to repeat questions.

There were delays in transmission during eight of the 16 sessions (50%) and reasons for these delays include:

"No sound from Ashford, phoned Telehealth support unit, unable to fix short term, was a problem previously"

"voice volume turned down at both sites"

"hearing microphone not plugged into TV and the screen kept freezing intermittently."

Fifty percent of the time the sessions did not commence on time due to problems connecting the telehealth unit, troubleshooting with sound issues, waiting for participants to attend and on one occasion the presenter was absent expectantly.

The instructor could clearly see the participants 94% of the time and the participants could clearly see the instructor 100% of the time. The telehealth equipment was available for use 100% of the time.

There were eight unforseen events occurred during the 16 sessions. Five of these events were directly related to having to set up and dismantle the equipment at the specialist site each week.

Unforseen events included:

- no IP address visible, on the television screen
- invited presenter was unavailable
- problems with the audio,
- blank screen at remote site,
- IP address changed without notice at dial in site
- theft of extension cord and network cable.

Benefits to Staff and Patients

All four staff learnt new skills. One staff member has taken on another telehealth project, six other staff members from Inverell Community Health asked for and have received training in using telehealth equipment and staff have also learnt how to use PowerPoint through telehealth.

There has been an ongoing impact whereby all eight participants wanted to continue with exercising and a total of two have gone on to participate in a local exercise group. A staff member from the remote site advised that, "*Participants enjoyed the exercise and information and would continue to attend if it was longer into the future".*

Comments from participants included: "*I enjoyed my time here*" and "*Could not suggest improving on anything at all".*

Conclusion

Ultimately the delivery of this rehabilitation program to eight community members was found to be appropriate, acceptable and feasible. Seven of the participants would not have attended Inverell's face to face program. All participants wanted to continue the program, until completion. This study has shown that a telehealth CDR program, delivered between two centres is acceptable and appropriate to both patient and staff participants, as is shown in the literature. However, from a feasibility point of view further work on solving the minor technical issues needs to occur.

For telehealth clinical services to be successfully delivered detailed accurate scoping for the requirements of such a service are required so that the appropriate information technology infrastructure including videoconferencing equipment and network availability is determined in order that for future clinical telehealth services are successful.

The format for a conventional CDR program can be used for a telehealth-delivered program with minor modifications including how to deliver background music used in the exercise component so that both participants and staff can easily hear the education, instructions and participant feedback.

Recommendations

A number of recommendations are suggested to further advance the implementation of telehealth services into rural and remote communities to improve access to health services. These include:

1) further pilots to increase the number of participant responses analysed.
2) investigate solutions that address audio problems identified when delivering group-based programs that use music as background during exercise instruction.
3) Incorporate thorough scoping of Information technology needs prior to delivering a CDR program via telehealth.
4) development of a set of standardised resources that can be utilised by other telehealth delivered rehabilitation programs.

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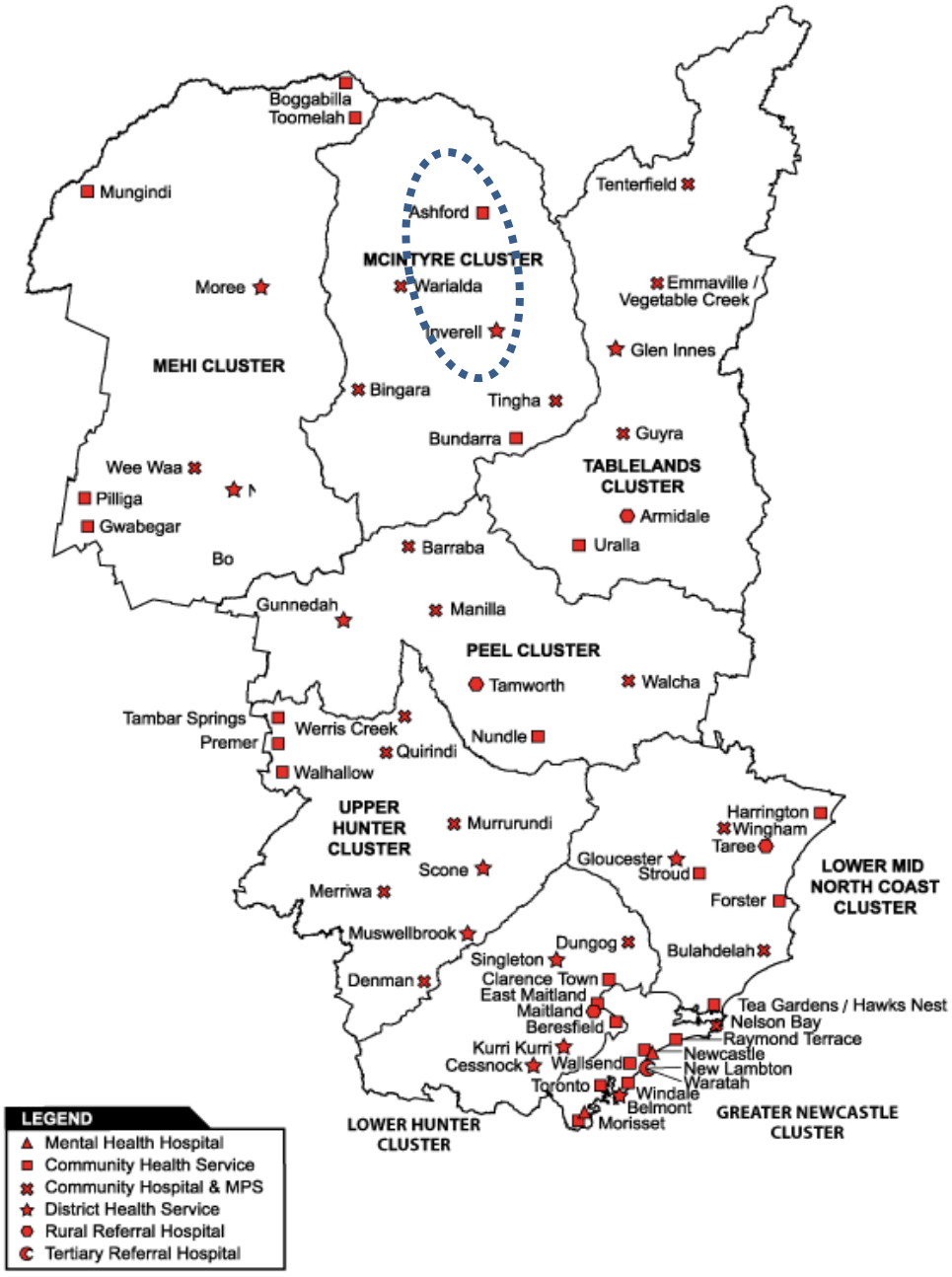
Appendix one: Map of Hunter New England Health District



Appendix Two: Patient Satisfaction Questionnaire

Chronic Disease Rehabilitation by Telehealth

Patient Satisfaction Questionnaire - Complete at end of **Week 1**

Recently you participated in a Chronic Disease Rehabilitation Program using videoconferencing at Ashford Community Health. It would be appreciated if you could answer the following questions about your recent telehealth experience. If you have any queries concerning this survey please contact Belinda Robinson on 67219600.

Participant Information (please circle appropriate answer):

Gender Male / Female **Age (yrs)** _____

Aboriginal Status: Aboriginal / Torres Strait Islander / Aboriginal & Torres Strait Islander / Neither

Occupation_____

Please **circle** the most correct answer:

1. It was clearly explained to me what would happen in the telehealth Chronic Disease Rehabilitation Program	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
2. I was informed the telehealth session was voluntary and could be stopped at any time at my request	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
3. I was made aware I could have a family member or friend present with me during the session/s	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
4. I was introduced to all participants and staff and informed of their role	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
5. The day and or time of the program was suitable	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
6. I enjoyed the group education and exercise sessions	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
7. I had no difficulty with transport to attend the program.	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
8. I felt confident that my privacy and confidentiality was maintained during the telehealth session	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
9. Having a clinician in the room with me during my telehealth clinic made me feel comfortable	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
10. I could clearly see the clinician at the other end	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
11. I could clearly hear the clinician at the other end	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree

12. I clearly understood the key information, instructions and feedback provided by clinician	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
13. I felt I benefited from participating in the telehealth rehabilitation program	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
14. Having an instructor via a television monitor was not a barrier to receiving the rehabilitation education	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
15. I felt comfortable talking, listening and looking at the videoconferencing equipment during my telehealth session	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
16. Computer and technical problems did not occur during the session	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
17. I would prefer to see a healthcare provider via telehealth compared to travelling to see them in person	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
18. If I didn't attend this program, I would not have accessed a rehabilitation service anywhere else.	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
19. I would recommend using telehealth to family and friends	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
Additional suggestions to improve our telehealth clinics:					

Thank you for taking the time to provide us with feedback.

Appendix three: Staff satisfaction Questionnaire

For completion at end of week 1 - Chronic Disease Rehabilitation Staff Satisfaction Questionnaire

Recently you participated in a Chronic Disease Rehabilitation Telehealth clinic. Would you take a few moments to answer the following questions about your experience/s?
Please **circle** the most correct response.

Establishment & Training					
I was provided with enough training to feel confident conducting Telehealth clinics	**Strongly agree**	**Agree**	**Unsure**	**Disagree**	**Strongly Disagree**
I feel confident using the videoconferencing equipment	**Strongly agree**	**Agree**	**Unsure**	**Disagree**	**Strongly Disagree**
Telehealth Session					
The video conferencing equipment was easy to set up prior to the session	**Strongly agree**	**Agree**	**Unsure**	**Disagree**	**Strongly Disagree**
The videoconferencing technology worked well during the session	**Strongly agree**	**Agree**	**Unsure**	**Disagree**	**Strongly Disagree**
The sound quality of the videoconferencing worked well throughout the session, ie it was easy to hear and understand all participants	**Strongly agree**	**Agree**	**Unsure**	**Disagree**	**Strongly Disagree**
The visual quality of the videoconferencing worked well throughout the session, ie it was easy to see all participants	**Strongly agree**	**Agree**	**Unsure**	**Disagree**	**Strongly Disagree**
The duration of the Telehealth session was appropriate.	**Strongly agree**	**Agree**	**Unsure**	**Disagree**	**Strongly Disagree**
I feel confident in contacting the Telehealth support unit to assist with any issues during the telehealth sessions	**Strongly agree**	**Agree**	**Unsure**	**Disagree**	**Strongly Disagree**
The client/s understood the key messages delivered during the session	**Strongly agree**	**Agree**	**Unsure**	**Disagree**	**Strongly Disagree**
Value and Work Satisfaction					
Please comment on the setting and running of the telehealth clinic eg quality _____ _____					
List the three positive aspects about the Telehealth session/s from your point of view **1.** _____ **2.** _____ **3.** _____					
Do you have any suggestions to improve the sessions? _____ _____					

Thank you for your time