1. Purpose and scope

This guideline provides recommendations on ways to adapt and expand ways of offering cardiac, heart failure and pulmonary rehabilitation with a focus on a virtual model of care. Traditional cardiac and pulmonary rehabilitation offers a structured in-person evidence-based exercise and education program to those with chronic lung or cardiac conditions. Exercise training is recommended for most cardiac and pulmonary conditions as it has been shown to improve exercise capacity, reduce symptoms, prevent further decline, improve health-related quality of life, and reduce health care utilisation[1-3].

Telerehabilitation delivers care at a distance via a range of technologies. While further evidence on aspects of telerehabilitation is needed, it is timely to adapt practice as required to facilitate greater participation in rehabilitation.

The aims of the guideline are to assist specialist cardiac or pulmonary rehabilitation clinicians to safely implement telerehabilitation methods to:

1. Select patients that may benefit from telerehabilitation and adapt program to suit individual needs
2. Remotely assess functional capacity and prescribe and progress exercise program
3. Provide education remotely
4. Evaluating the overall outcomes impact of the telerehabilitation program

Recommendations are for Queensland Health clinicians working in cardiac, heart failure or pulmonary rehabilitation within their professional scope of practice.

2. Setting up telerehabilitation

To set up telerehabilitation contact the Telehealth Support Unit Team via telehealth@health.qld.gov.au. To get started it is best to use technology that is freely available and supported by Queensland Health (unless you have your own funding). Your local telehealth team will advise you on the range of available secure technologies including: videoconferencing, e-consults, one-way text messaging, remote monitoring and mobile health applications.

Remote patient monitoring

Remote patient monitoring (RPM) uses technology to monitor patient health when in the community and can signal the need for intervention. Cardiac electronic implantable devices can monitor factors such as heart rhythm and pulmonary pressures.

Videoconferencing

Preparation for education and exercise training via videoconferencing

- Contact your Queensland Health telehealth support office. Let them know if you plan to run group telerehab and they will help with the platform and computer accessories.

- Ensure good sound, vision, and connectivity. See University of Queensland's (https://coh.centre.uq.edu.au/quick-guides-telehealth) A quick start to videoconferencing and A telehealth guide for patients.

- Establishing the connection. See Queensland Health telehealth platform information for patients and families (https://www.health.qld.gov.au/telehealth/patients-and-families).

- Ensure that the patient's digital device is in a stable position so the clinician can view the patient exercising in real time and clearly view exercise techniques.

- Trial the technology with the participant prior to the first clinical session. This could be part of a home visit or initial assessment of the patient

- Provide patient with resources (via mail or online) including questionnaires, rate of perceived exertion (RPE) scales, exercise recording sheet and diary, education manual, safety guidelines, exercise equipment such as TheraBand.

Staffing and ratio considerations

- For a group consider having 2 staff members supervise and a care partner to provide support at home (especially for the first session).

- There is no set ratio, but once experience is gained a ratio of 4:1 (patient to provider) is recommended. With a large screen and an established group, the numbers could be higher.

Safety/back up plans

- Check the address of the patient's location in case you need to call an ambulance and remind the patient to keep a phone nearby.

- Establish options if you determine the clinical need for an in-person review e.g. attending your clinic, home visit, primary care provider, or health facility.

- Check that the patient has a current action plan and ensure that patient has rescue medications on hand (e.g. Ventolin with spacer or anginine)

Communication techniques

- Send appointment reminders via SMS, email, or telephone call to improve attendance.

- See University of Queensland's guide to communicate effectively online (https://coh.centre.uq.edu.au/quick-guides-telehealth).

- Practice video interactions by observing practised clinicians and trialling with peers.

- Initial and discharge assessments should be 1:1 (and in person if possible). If there is time, a telephone review a few weeks into a program is useful for engagement.

3. Group program development and implementation

The evidence base for telerehabilitation is growing. However, adapting in-person groups to virtual groups has limited evidence, and logistical issues. Tables 1 and 2 provides clinical consensus for telerehabilitation program development and implementation.

Table 1: Developing telerehabilitation groups program

Adapted from Practice considerations for adapting in-person groups to telerehabilitation[4]

Steps	In-person group process	Adaptations for group telerehabilitation	Reason for adaptations
Identify eligibility criteria	Ensure patients can perform activities with minimal supervision.	Consider non-clinical factors including access to needed technology and patient or caregiver capability of managing it, and environmental factors.	Patient or care partner need ability to connect to virtual sessions and have access to a device, internet connection, and a safe physical space to perform rehabilitation activities.
Establish emergency protocols	Follow intra-facility emergency policies and procedures.	Verify physical location, emergency contact, and if additional individuals are present.	Provider may need to call for emergency assistance on behalf of the patient.
Identify outcome measures	Evaluate measure constructs and psychometric properties to finalise outcome measures.	Evaluate measures that can be assessed virtually.	Non validated measures virtual administration requires consideration of advantages/disadvantages, and reproducibility.
Identify maximum group size and ratios	Ratio of 5-10 patients:1-2 provider	6-8 patients (max of 4:1 ratio of patients to providers). Maximum number may be higher for established program.	For novel group curricula, fewer patients overall and/or a lower patient to provider ratio.
Provide Staff Training	Testing/measures are validated for in-person delivery. No technology limitations.	Train on virtual selection, administration, and testing. Train assistants to help with check-in, safety checks and technology.	Virtual format is new to providers and assistants. Assistants help provider to see more patients.

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Table 2: Implementing a telerehabilitation group

Adapted from Practice considerations for adapting in-person groups to telerehabilitation[4]

	In-person group processes	Adaptations for group telerehabilitation	Reason for adaptation
Measure patient response to program	Assess outcome measures in-person.	Assess outcome measures virtually.	Virtual evaluation relies more on patient-report surveys and measures that are reproducible in the virtual setting (e.g. 30-second sit to stand instead of manual muscle testing).
Conduct pre-program orientation	Group orientation and a tour and outline of group expectations.	Orientation to include conduct expectations during virtual group, use of signals during the session, troubleshooting technical issues, and use of tech support.	Patients variation in technological experience and capabilities. Patients need awareness of conduct in a virtual setting to ensure safety and privacy for all members of the group.
Prepare for the session	Sessions are not limited by technical issues	Provide information prior to first session and check-in patients.	Build in extra time for technical issues and safety verification.
Conduct the session	Providers can individually observe patients and offer hands-on cueing.	Providers demonstrate activities, repeat tasks with verbal cues. If, two personnel present outline roles/responsibilities.	Accommodates differences in function, visibility of patient on the screen and lack of hands-on cueing. Helper for technology, and monitoring chat.
Establish procedures for patient communication	Providers can elicit individual conversations. Peer- to-peer discussion may also occur.	Build in time to discuss challenges and opportunities as a group to create more lines of communication. Develop a process for fielding individual questions.	Promotes a positive group dynamic and a space for patients to get peer and provider feedback/support.
Anticipate problems with ongoing engagement	Providers can elicit individual conversations during the session to address attendance and home program adherence.	- Individual phone/video at initial and final assessments and a check-in call early on. - Provide extra phone call to patients who are missing sessions or struggling with technology -Promote use of chat functions	Individual phone or video contacts as well as creative use of technologies to foster group and individual communication with providers, along with built-in group support promotes progress and accountability towards functional goals.

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4. Patient screening for telerehabilitation

See table below for factors to consider when screening a patient for telerehabilitation.

Table 3: Outline of patient eligibility screen and needs assessment for group telerehabilitation

Adapted from Practice considerations for adapting in-person groups to telerehabilitation[4]

Construct	Measure Yes or No	Criteria for Inclusion	Adaptations to Address
Technology equipment	☐ Access to a digital device ☐ Reliable internet ☐ Monitoring equipment (if needed)	*Yes* to all	Provide options to purchase vitals monitoring equipment (BP, HR, Oxygen saturation); provide education on vitals monitoring.
Physical Space and Privacy for patient	☐ Enough space for exercise interventions ☐ Patient can communicate privately	*Yes* to all	Identify modifications needed (e.g., moving furniture). If privacy is an issue, explore alternative locations.
Patient impairment	☐ Visual Impairment ☐ Auditory Impairment ☐ Mobility Impairments (e.g., use of mobility aid)	*Yes* to one or more: adaptations needed	Visual: assistive technology (e.g., screen reader); and provider wears clothes that contract against a plain backdrop with good lighting. Auditory: hearing aids, headphones, quiet room; assistive technology (e.g., closed captioning); provider uses a headset to enhance audio. Mobility: use of an assistive devices and/or care partner to assist.
Cognition	Cognitive test by phone or video (e.g., Montreal Cognitive Assessment-Blind)	Case by case basis	Carer to be present during sessions Simple cueing and use of visual aids and compensate as indicated (e.g., alarms, notes).
Technology Capability	• Technology skills • Access to an email account.	Case by case basis	Tailor training based on patient needs. Establish email account. Request and train care partner who can assist with technology.

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5. Assessment

Functional capacity (exercise) testing

Ideally, exercise testing should occur in-person at a health facility where exercise testing is validated, and it is easier to standardise conditions so that methods can be followed accurately, and results replicated. While there is limited evidence regarding accuracy of virtual assessment of exercise capacity, clinical consensus suggests that there is potential to adapt some in-person assessments for telerehabilitation, especially in circumstances that prevent in-person attendance.

Screening for a virtual exercise capacity test

Conduct standard safety and technology checks and ensure that the patient is willing to participate and able to provide informed consent. Exclude patients with significant cognitive impairment, unstable medical conditions, or poor balance with risk of falling. Some patients may require continuous monitoring or close supervision during exercise tests such as those with postural hypotension, fatigue, and breathlessness with less than ordinary physical activity (See table 3).

Virtual tour/home set up

Get the patient to give you a virtual tour of the home (if they have a mobile device with camera). Select the most appropriate chair, availability of steps or home exercise equipment, address safety factors and mitigate risks such as rugs, clutter, and pets.

History

Undertake standard history taking, subjective interviews and goal setting.

Equipment and tools for patient to use at home

Give the patient a rating of perceived exertion (RPE) scale (e.g. modified Borg) to rate their symptoms (or alternatively show a scale on the screen). Consider the need for home monitoring equipment during the assessment to assess oxygen saturation, blood pressure and heart rate. If so, check if patient has any equipment or if there is capacity to loan equipment. Note that home pulse oximeters cannot be calibrated so the accuracy cannot be established, therefore they should be used to monitor trends rather than acting on an individual reading [5].

Conducting an exercise capacity assessment virtually

When conducting a virtual exercise assessment, the exercise clinician should:

- Practice administering an exercise tests virtually with colleagues and observe experienced clinicians (if possible).
- Document exactly where the test is conducted and the position of the furniture so that retesting can be performed in the same conditions.
- Be prepared to repeat a test if there are reception lags and the patient is not too tired.
- Question the patient and involve a care partner during the assessment to assist in determining if there are clinically reasons for stopping a test that may be more difficult to see than when conducting a test in-person, such as signs of poor perfusion or severe fatigue.

Standardised assessments

If you cannot conduct an in-person assessment, select physical capacity assessments with information gained from the virtual tour that can be repeated at the completion of the program using the same methods and modality.

Walking tests are generally not recommended as they are difficult to conduct virtually, and results are unreliable. Compared to centre-based testing, the 6 minutes walking distance can be similar when performed outdoors (supervised by trained clinicians) but shorter when performed at home.[6]

Sit to stand tests (STS)

- 5 x sit-to-stand (5 STS) gives an insight into functional quadricep strength.
- 1-minute sit-to-stand (1 min STS) can give insight into aerobic capacity and cardio-respiratory exercise tolerance. One small study of COPD suggests change on the test correlates with 6-minute walk test (6MWT) but gives different information as patients are less likely to desaturate compared to 6MWT [7].

Help the patient to find a suitable chair in their location for the videoconference. Ideally, the chair should have a straight-back, hard or slightly padded seat, and no arms. The patient should be able to have their feet flat on the floor when they come forward in the chair. Stabilise the chair by placing it beside a wall or solid structure (such as kitchen bench) in case the patient needs to steady or support themselves. Use the same chair for assessment and re-assessment and follow the same standardised methods that you use in person.

6. Exercise prescription and progression

Effectively prescribing and progressing exercise without in-person patient contact can be challenging, and there is limited evidence to guide clinical practice. Despite the limitations, telerehabilitation is still preferable to no program (or an unsupervised home exercise program with no follow up) due to the known health risks of being sedentary.

Adaptions for virtual exercise progression

- The safety of virtual exercise training needs to be judged on an individual basis. As per standard practice, it is important to assess fitness to exercise by conducting observations (SpO2, BP, HR, RPE scale) and questioning about symptoms and injuries. This could be done in a virtual waiting room or phone call with patient reporting their observations.
- Clear prescription and progression of an individualised home exercise program alongside the group telehealth sessions will support successful outcomes.
- Monitoring during real time exercise will rely on use of RPE scales and on visual observations and signs for normal / abnormal responses to exercise.
- Remote monitoring, text messaging, and apps can be used to support supervised and unsupervised programs.
- Although the clinician may not be able to prescribe a specific intensity of training for a patient from an exercise test, such as the 6 minute walk test, progress of exercise can be based on

increasing duration of activity and monitoring of symptoms on a RPE scale such as the modified Borg 0-10 (dyspnoea scale 3-4 'moderate' to 'somewhat severe').

7. Education

There are alternatives to face to face education and many cardiac, heart failure, and pulmonary rehabilitation programs already offer patients a variety of online and paper-based education materials to suit different learning styles and help patients to retain information. Educational text messaging and mobile health applications are gradually evolving but are less commonly available.

Hybrid education models (where some patients attend an in-person group while others link in using videoconferencing) is useful when numbers in a room are limited by restrictions of space (e.g. during a pandemic or epidemic) or where patients find travel to a health facility difficult.

Education via indirect methods (such as videos, booklets, text messaging) can be tailored to suit different learning styles and help patients to retain information. Indirect methods may benefit from being supplemented with telephone coaching to maintain motivation and help patients understand concepts. If education is carried out by non-interactive methods patients understanding of information should be checked.

8. Program evaluation

Evaluation of the telerehabilitation model of care is important to support business cases and quality improvement activities for increased funding, staff, space etc. at a local level with the view of sustainability and maintenance of the model of care.

The evaluation methods should ideally be established prior to commencing a virtual model of care. To facilitate ease of data collection, use local administrative data that are routinely collected. If you are based in a hospital, ensure that all telerehab service events are coded in outpatient systems so that activity is captured as well as the funds attracted to the organisation via weighted activity units (WAU). Your business manager or outpatient coordinator should be able to support you.

Recording the activity, uptake, and incidence will indicate the reach of the program. It is important to measure outcomes from a patient's perspective. Quality of life questionnaires currently used for your usual rehabilitation programs are a good source of Patient Reported Outcome Measures (PROMS). To inform the development of telerehabilitation consider introducing a Patient Reported Experience Measures (PREM) with questions related to the overall telerehabilitation experience. Contact your local consumer engagement office in your Hospital and Health for support on developing questions and online survey platforms that are compliant with Queensland Health privacy restrictions.

For help on developing clinical indicators and other aspects of program evaluation contact the relevant statewide coordinators below.

Cardiac rehabilitation QueenslandCardiacRehabilitationProgram@health.qld.gov.au

Heart failure: qldheartfailure@health.qld.gov.au

Pulmonary rehabilitation: Statewide_Respiratory_Network@health.qld.gov.au

9.   Document approval details

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