

PATIENT PROFILE



Sunita Chaudhary is a 78 year-old female admitted for small bowel obstruction which was complicated by a perforated bowel during her inpatient stay. She spent a total of three weeks in the ICU, and was transferred to the surgical ward following her last bowel surgery. Over the course of her stay in the ICU, her upper and lower extremities had atrophied significantly; when asked, Sunita reported that she had rarely left the home prior to admission, and felt “much weaker” than she did about a year ago.

PATIENT PROFILE



Who in the room has had a patient that can relate to this scenario?

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OBJECTIVES

By the end of this presentation you will be able to:

1. Identify the need for resistance exercise prescription in the acute care setting and explain the toolkit development process
2. Describe the benefits of resistance exercise
3. Assess whether a patient is appropriate for REx
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5. Identify strategies to support your client’s sustained participation in the REx program
6. Outline population-specific considerations
7. Develop a plan for implementing REx in your setting





DEFINITION

Resistance exercise is:

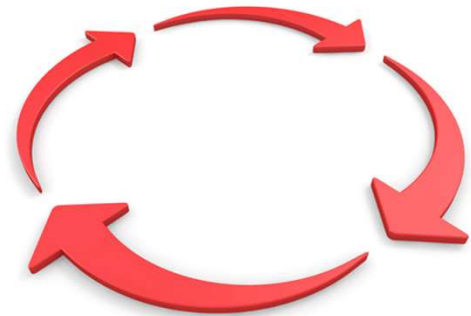
Movement using body weight or external resistance that improves muscular strength, power, or endurance, and may ultimately positively impact mobility, function, and independence.



PROCESS

How RExI came together

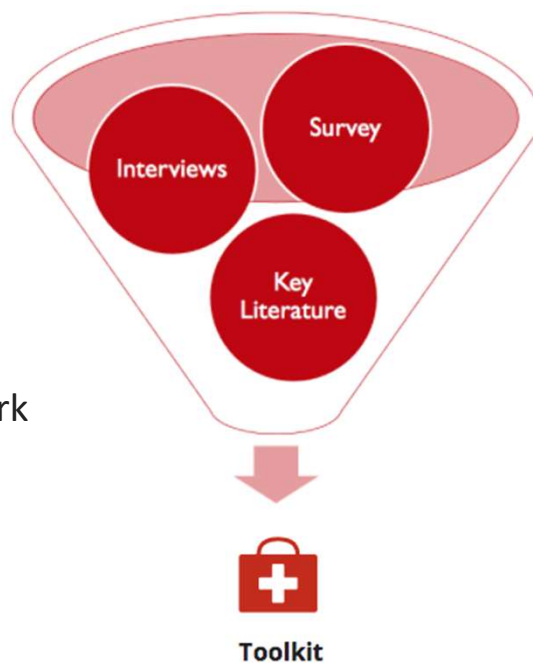
- Call for proposals
- Steering Committee review
- Call for team members
- Identify scope and objectives



PROCESS

How REXI came together - continued

- Survey
- Semi-structured interviews
- Statistical analysis
- Barriers and facilitators mapped to the Theoretical Domains Framework
- Manuscript
- Toolkit development
- Iterative process



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How REXI came together - continued

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Current Practice and Barriers to Physiotherapists' use of Resistance Exercise for Older Adults in Acute Care



Amber Chan, Allison M Hoens, Chiara Singh, Maha Elashi, Kristi Gerevas, Melissa Idle, Janet Lundie, Maylinda Urbina, Angela Pace, Jasmin K Ma

Background: The purpose of this cross-sectional study was to 1) describe the current use of resistance exercise and 2) identify barriers and facilitators for physiotherapists using resistance exercise among older adults in acute care

Methods: An online questionnaire measure guided by the Theoretical Domains Framework was distributed to physiotherapists working with older adults in acute care across British Columbia. Thematic analysis was used to code open text data from the questionnaire.

Results: Of the 105 physiotherapist (male = 23, age 39.9 ± 10.3 years, 12.4 ± 10.3 years of experience) that completed the questionnaire...

Respondents reported frequently...

- Performing function testing (95%) and
- Assessing muscle strength in older adults (70%)




Few respondents reported...

- Prescribing REX to patients (34%)







**Current Practice and Barriers to
Physiotherapists' use of Resistance
Exercise for Older Adults in Acute Care**



Amber Chan, Allison M Hoens, Chiara Singh, Maha Elashi, Kristi Gerevas, Melissa Idle, Janet Lundie, Maylinda Urbina, Angela Pace, Jasmin K Ma

Future Directions: What were the barriers to resistance exercise prescription identified by the physiotherapist data? Recommendations?

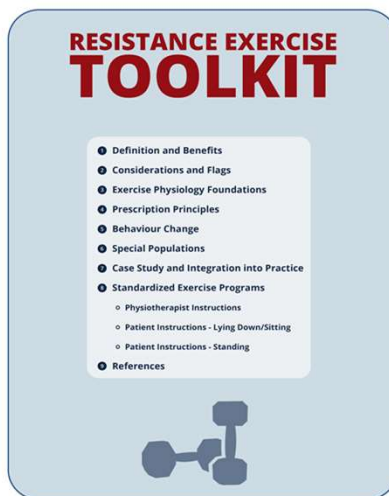
<p>Competing work priorities such as function, mobility, and discharge.</p>		<p>Need to define resistance exercise in a way that highlights the overlap between resistance exercise and rehabilitative goals (function, mobility, and discharge).</p>
<p>A lacking clear definition of resistance exercise.</p>		<p><i>"Movement using body weight or external resistance that improves muscular strength, power, or endurance, and may ultimately positively impact mobility, function, and independence."</i></p>
<p>Lack of time and personnel.</p>		<p>Rehabilitation assistants may be well-suited to provide these supports.</p>
<p>Perceived low patient motivation and ability to perform resistance exercise.</p>		<p>The benefits and safety of resistance exercise for most patients should be clearly communicated to physiotherapists and patients. Perceived low patient motivation may be a product of barriers (e.g., fear of causing pain, experiencing fatigue) and may be important to address to support participation.</p>

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WEBSITE

<https://physicaltherapy.med.ubc.ca/physical-therapy-knowledge-broker/resisted-exercise-initiative-rexi-2/>



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QUESTION 1

How much muscle loss occurs per decade after the age of 30?

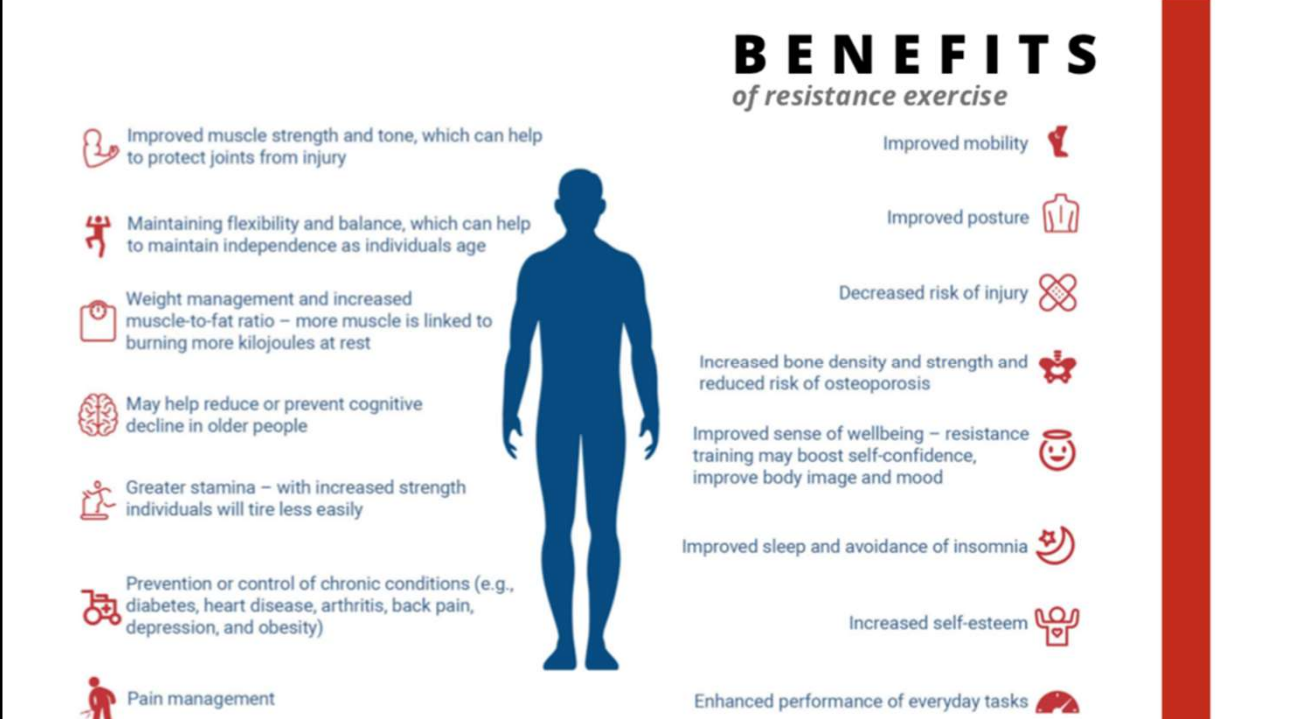
- a. 1-3%
- b. 3-5%
- c. 5-7%
- d. 7-9%

QUESTION 1

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- a. 1-3%
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- d. 7-9%

BENEFITS of resistance exercise



The infographic features a central blue silhouette of a human figure. To the left and right of the silhouette are lists of benefits, each accompanied by a small red icon. A thick red vertical bar is on the far right, and a thick red horizontal bar is at the bottom.

- Improved muscle strength and tone, which can help to protect joints from injury** (Icon: hand holding a muscle)
- Maintaining flexibility and balance, which can help to maintain independence as individuals age** (Icon: person with a cane)
- Weight management and increased muscle-to-fat ratio – more muscle is linked to burning more kilojoules at rest** (Icon: scale)
- May help reduce or prevent cognitive decline in older people** (Icon: brain)
- Greater stamina – with increased strength individuals will tire less easily** (Icon: person running)
- Prevention or control of chronic conditions (e.g., diabetes, heart disease, arthritis, back pain, depression, and obesity)** (Icon: person in a wheelchair)
- Pain management** (Icon: person with a cane)
- Improved mobility** (Icon: hand holding a cane)
- Improved posture** (Icon: hand holding a cane)
- Decreased risk of injury** (Icon: bandage)
- Increased bone density and strength and reduced risk of osteoporosis** (Icon: bone)
- Improved sense of wellbeing – resistance training may boost self-confidence, improve body image and mood** (Icon: smiling face)
- Improved sleep and avoidance of insomnia** (Icon: crescent moon)
- Increased self-esteem** (Icon: person with arms raised)
- Enhanced performance of everyday tasks** (Icon: hand holding a tool)

CASE STUDY

Sunita Chowdhury is a 78 -year-old female, who has undergone abdominal surgery.

The **orders** are to follow the Enhanced Recovery After Surgery (ERAS) protocol: mobilize out of bed three times per day, and provide deep breathing exercises.

Past Medical Hx: Bowel cancer, anxiety, osteoarthritis, and right total hip arthroplasty (a year ago).

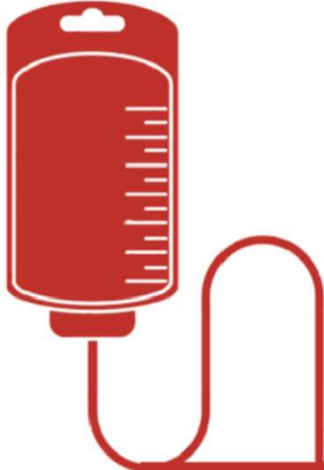
Social Hx: Sunita lives with her partner who cannot provide physical assistance. She received chemotherapy prior to surgery and is scheduled to start radiation therapy 5x/week upon discharge. Her platelets are currently 26,739 μ L.

Functional Goals: Sunita needs to be able to transfer in-and-out of a car and ambulate short distances independently with a four-wheeled walker.



CASE STUDY

Chart review - continued



Strength assessment indicates:

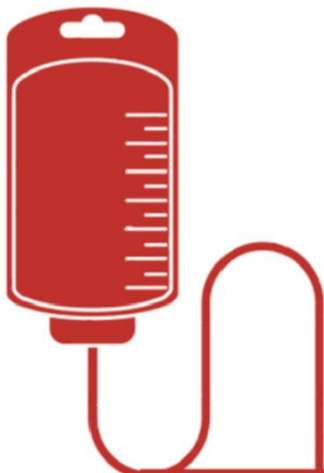
Glutes	3-/5
Quads	3/5
Hip abductors	3/5

Functional mobility assessment indicates:

Lie-to-sit	- 1 min assist
Sit-to-stand	- 1 min assist with 2 wheeled walker
Ambulation	- Standby assist with 2 wheeled walker for 3 meters
Transfers	- 1 min assist with 2 wheeled walker to transfer from bed to bedside chair

CASE STUDY

Consider how each component of the toolkit would apply to this individual:



- Which benefits of REx would you highlight for this individual?
- Which red flags/contraindications would you screen or assess before prescribing REx?
- Develop a sample exercise program.
- How would you support sustained participation in the program?
- Which special population guidelines would you use in this case and what are some of the population-specific considerations?

OBJECTIVES

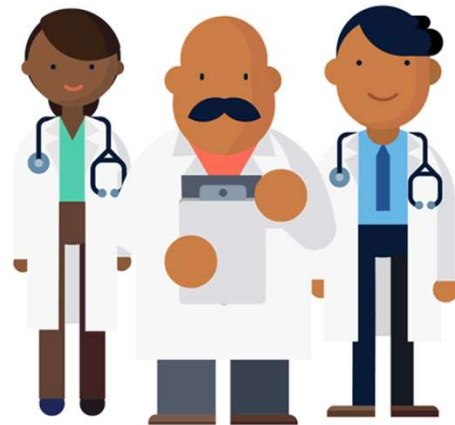
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REx ASSESSMENT

- Equipment considerations
- Screening tools
- Precautions
- Contraindications



REx ASSESSMENT

Equipment Considerations

Equipment Considerations¹

- Lines
- Aids (eyewear, hearing aids, gait aids)
- Body weight as resistance
- External resistance

Patient Considerations¹

- Patient's chart (co-morbidities and medication)
- Activity orders (based on acuity/stability)
- Oxygen saturation/requirements, if applicable
- Need for supervision
- Pain (timing of pain medication)
- Fatigue management (endurance considerations)
- Strength
 - Condition
- Function
 - Barriers
- Ability to learn
 - Mobility assessment

REx ASSESSMENT

Screening Tools

The American College of Sports Medicine (ACSM) Screening Guidelines flow chart

First, use the ACSM or PARQ+ (2020 version) screening guidelines to determine whether REx is an appropriate.

Physical Activity History Tools

Physical Activity Vital Sign (PAVS)

- <https://bit.ly/3vfbS4V>

Rapid Assessment of Physical Activity (RAPA)

- <https://bit.ly/38xSp5R>

Physical Activity Screening for the Elderly

- <https://bit.ly/3cthsbE>

REx ASSESSMENT

Precautions

R

Hematological Considerations

- **Hemoglobin (Hgb):** Withhold mobilization for patients with hemoglobin (Hgb) levels lower than 70 g/L²; monitor the following symptoms and potential adverse effects: chest pain, pallor, leg cramps, dizziness, arrhythmias, shortness of breath, and respiratory distress⁴
- **Blood pressure (BP)**
- **Heart rate (HR)**
- **Oxygen saturation (SpO₂)**
- **Platelets:** please refer to the table in the cancer section under Special Populations for platelet considerations

Appropriate gear and injury prevention are important considerations for avoiding injury⁴

REx ASSESSMENT

Precautions

R

Musculoskeletal Considerations³

- Musculoskeletal limitations
- Joint pain or instability, from arthritis or other causes (these conditions require alternative ways to train the same muscle groups; consider different exercises)

R

Cardiovascular Considerations¹

- Major risk factors for Coronary Artery Disease
- Uncontrolled hypertension (systolic blood pressure 160 mm Hg and/or diastolic blood pressure >100 mm Hg)
- Individuals who have implanted pacemakers or defibrillators

R

Other Considerations¹

- Diabetes in any age

REx ASSESSMENT

Contraindications

A

Cardiovascular Changes³

- **Cardiac conditions:** unstable coronary heart disease (CHD); decompensated heart failure; acute myocarditis, endocarditis, or pericarditis
- **HR:** uncontrolled arrhythmias
- **BP:** uncontrolled hypertension (>180/110 mm Hg); severe pulmonary hypertension (mean pulmonary arterial pressure >55 mm Hg)
- **Aortic dissection:** genetic conditions associated with thoracic aortic aneurysm and/or dissection include: Marfan syndrome, vascular Ehlers-Danlos syndrome, Loeys-Dietz aneurysm syndrome, bicuspid aortic valve, Turner syndrome, and familial TAA/D syndrome. Prior cardiac surgery (particularly aortic valve replacement and aortic manipulation, including angiography and stenting), is also a risk factor for aortic dissection³
- **Blood flow:** severe and symptomatic aortic stenosis, untreated deep vein thrombi (DVTs), and untreated pulmonary emboli (PE)

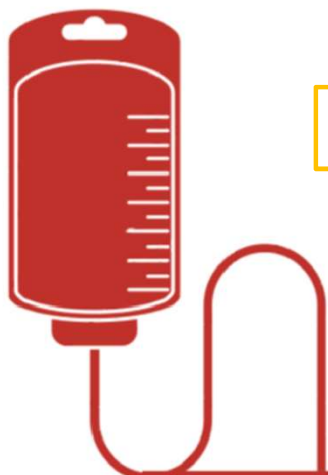
A

Other Considerations³

- High-intensity resistance training (80–100% of 1RM) in patients with active proliferative retinopathy, or moderate or worsening non-proliferative diabetic retinopathy

CASE STUDY

Consider how each component of the toolkit would apply to this individual:



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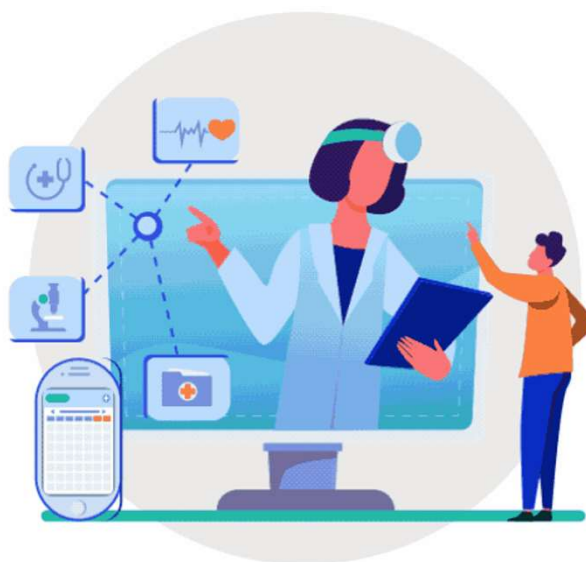
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REx PRESCRIPTION

- FITT principle
- Appropriate intensity
- Monitoring and progression



QUESTION 2

What intensity level (based on 1 repetition maximum) is recommended when prescribing resistance exercises for an older adult?

- a. 45-60% 1RM
- b. 50-65% 1RM
- c. 70-85% 1RM
- d. 85-100% 1RM

QUESTION 2

What intensity level (based on 1 repetition maximum) is recommended when prescribing resistance exercises for an older adult?

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REx PRESCRIPTION

Prescription (FIT)		
<p>i Goal is to work towards 2-3 sets of 1-2 multi-joint exercises per major muscle group (6-12 reps), 70-85% 1RM, 2-3 times/week (non-consecutive days).¹ You can start at one set for beginners or older adults with frailty.^{1,2}</p>		
Program Variable	Recommendation	Details
Sets	1-3 sets per exercise/muscle group	1 set for beginners and older adults with frailty and progress to multiple sets.
Repetitions	6-12 or 10-15	6-12 for healthy older adults, 10-15 at a lower relative resistance for beginners.
Intensity	70-85% of 1RM	Begin at a resistance that is tolerated and progress to 70-85% of 1RM. Lighter loads are recommended for beginners, or adults with frailty or special considerations such as cardiovascular disease and osteoporosis.
Exercise Selection	8-10 different exercises	Include major muscle groups targeted through multi-joint movements.
Modality	Free weight or machine or theraband based	Beginners, frail older adults, those with functional limitations benefit from machine or band based training. High functioning older adults gain added benefits from free-weight training.
Frequency	2-3 days/week per muscle group	Training on non-consecutive days may allow favorable adaptation, improvement or maintenance.
Power/Explosive Training	40-60% of 1RM	Include high velocity movements in the concentric phase to promote muscular power, strength, size and functional tasks.
Functional Movement	Exercises to mimic tasks of daily living	Include exercises that simulate daily activities like sit to stand to optimize functional capacity.

Table adapted from Table 1 (Fragala et al. 2019)¹

REx PRESCRIPTION

Doing true 1RM testing⁴ (<https://exercise.treeducation.org/assessment/muscle-strength-assessment/>) is likely not appropriate in acute settings but it is very important to provide an adequate ('challenging') dose/intensity as this is often underestimated in the acute setting.

► Suggested alternatives to determine 70-85% of 1RM in the acute setting include:

- 1 Using a **basic scale of 0-10** (0=no effort, 10=hardest effort you can give) suggested by ACSM. The last rep should feel hard to complete and you should progress the weight lifted over time so that it feels like 8/10 difficulty.⁵
- 2 **Rate of Perceived Exertion (RPE) via the original or modified Borg.** Start with 'Somewhat Hard' on the scale and progress to 'Hard/Very hard'.^{6,7}
<https://www.healthlinkbc.ca/physical-activity/borg-rating-perceived-exertion-scale>
- 3 An article referenced by APTA suggests: "**A physical therapist can carry out a high-intensity strength program by simply providing a patient with enough resistance to cause muscle fatigue to the point of failure at 8 to 12 repetitions, with form deterioration over the last 2 repetitions.**"⁵
- 4 **Determine 10 RM** (the max weight that a patient can lift for 10 reps with good form). 10RM is approximately equivalent to 75% of 1RM.

REx PRESCRIPTION

Monitoring and Progression

- ▶ Progression should follow general exercise principles of individualization, periodization and progression.¹
- ▶ For progression of intensity, continue to use the method utilized for your initial strength testing prescription.

Progression

The following summarizes different methods of progression:

Simple Progression Recommendations

Volume: Manipulate sets, reps, weight

Equipment: Body weight, bands, machine, free weight

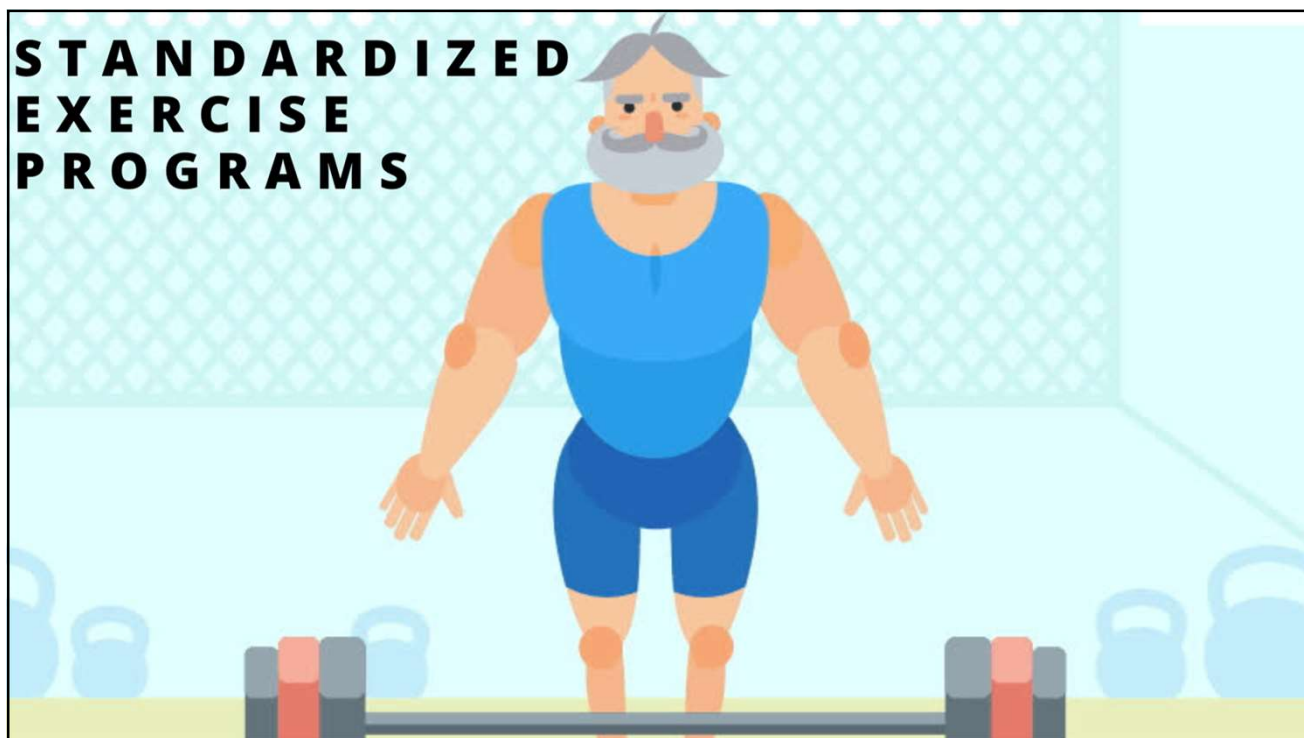
Stability: Lying, seated, kneeling, standing both feet on flat surface, standing single leg on flat surface, standing both legs on unstable surface, standing single leg on unstable surface

Complexity: Single joint + single exercise, multi-joint + single exercise, combined exercises

- ▶ It is important to explain to patients that, with resistance training, they should expect some delayed onset muscle soreness.¹⁰
- ▶ For patients with medical issues, continue to monitor as per clinical judgement (For example, SpO₂ with patients with COPD, Borg for patients who are short of breath, heart rate for patients with a cardiac condition or blood sugar for patients with diabetes).

REx PRESCRIPTION PRACTICE

Level - Strength/ Hypertrophy/ Endurance					
Block	Exercises	Reps/Time	Sets	Recover	Additional cues/Notes
	Warm-up routine:				
A					
B					
C					
D					



STANDARDIZED EXERCISE PROGRAMS

Two sets of programs:

- Lying down/seated
- Standing

Physiotherapist instructions:

- Progressions
- Modifications

Patient instructions:

- Photos
- Instructions
- Fill-in-the blanks for sets and repetitions

STANDARDIZED EXERCISE PROGRAMS

Continued - Example

Hip Abduction Sidelying (Band)

Sets: ____ | Reps: ____ | Frequency: 2 x/week

Preparation:

- Lay straight as an arrow, band around knees or just above your knees
- Keep pelvis still (you can lie with your back against the wall)
- Support your head with your hand or on a pillow



On side, both legs straight



Raise top leg

Execution:

- Lift top leg 1-2 inches against resistance

Progression:

- Hold your leg up for 3 seconds

STANDARDIZED EXERCISE PROGRAMS

Continued - Example

Knee Extension (Band)

Sets: ____ | Reps: ____ | Hold: 3 seconds | Frequency: 2 x/week

Preparation:

- Loop band around your ankle and the leg of the chair as shown
- Sit tall with good posture



Sit in a chair with good posture







Straighten knee against resistance

Execution:

- Straighten knee against resistance

STANDARDIZED EXERCISE PROGRAMS

Continued - Example

Partial Squat (Dumbbells)	Sets: _____	Reps: _____	Frequency: 2 x/week
<p>Preparation:</p> <ul style="list-style-type: none"> Stand with good posture, feet shoulder-width apart Hold dumbbells as shown 			
<p>Execution:</p> <ul style="list-style-type: none"> Initiate squat by bending at the hips and sticking your bottom out (like you are going to sit in a chair) Squat part way down Rise up at the hips 			
<p>Progression:</p> <ul style="list-style-type: none"> Hold squat position for 3 seconds 			
 <p>Front view</p>		 <p>Partial Squat - Knees aligned over toes</p>	
 <p>Side view</p>		 <p>Partial Squat</p>	

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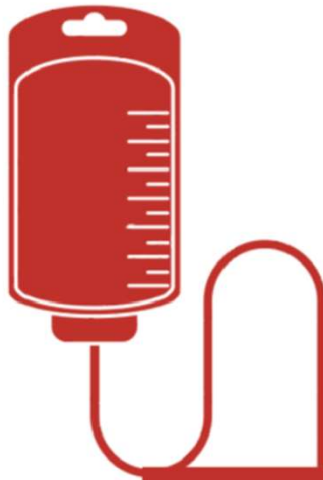


BEHAVIOUR CHANGE

<p>Assess</p> <ul style="list-style-type: none"> Physical activity level Physical abilities Beliefs and knowledge 	<p>Individual</p> <p>"How much exercise do you currently get each day?"</p> <p>"What kinds of things make it hard to exercise?"</p>
<p>Advise</p> <ul style="list-style-type: none"> Health risks Benefits of change Appropriate "dose" of physical activity 	<p>Health Policy</p> <p>"The national guidelines recommend at least 150 minutes of moderate activity each week. I strongly recommend that you begin to move around more regularly. We always recommend starting from where you are and building up slowly."</p>
<p>Agree</p> <ul style="list-style-type: none"> Co-develop personalized action plan Set specific physical activity goals based on interests and confidence level 	<p>Social Support</p> <p>"I understand that you have busy work and family schedule. How do you feel about starting with 20-minute walks for 3 days next week? Maybe you could also use that time to spend with your daughter?"</p>
<p>Assist</p> <ul style="list-style-type: none"> Identify barriers and create strategies to address them Identify resources for physical activity and social support 	<p>Community Resources</p> <p>"Do you have a gym, park, trail system, or other safe place to be active near your home or workplace?"</p>
<p>Arrange</p> <ul style="list-style-type: none"> Specify plan for follow-up (e.g., visits, phone calls, text messages) Check on progress / maintenance of physical activity change 	<p>Provider/Team</p> <p>"We would like to hear about how the walking is going for you. The nurse will call you in one week to check in and see if you have any questions or concerns."</p>

CASE STUDY

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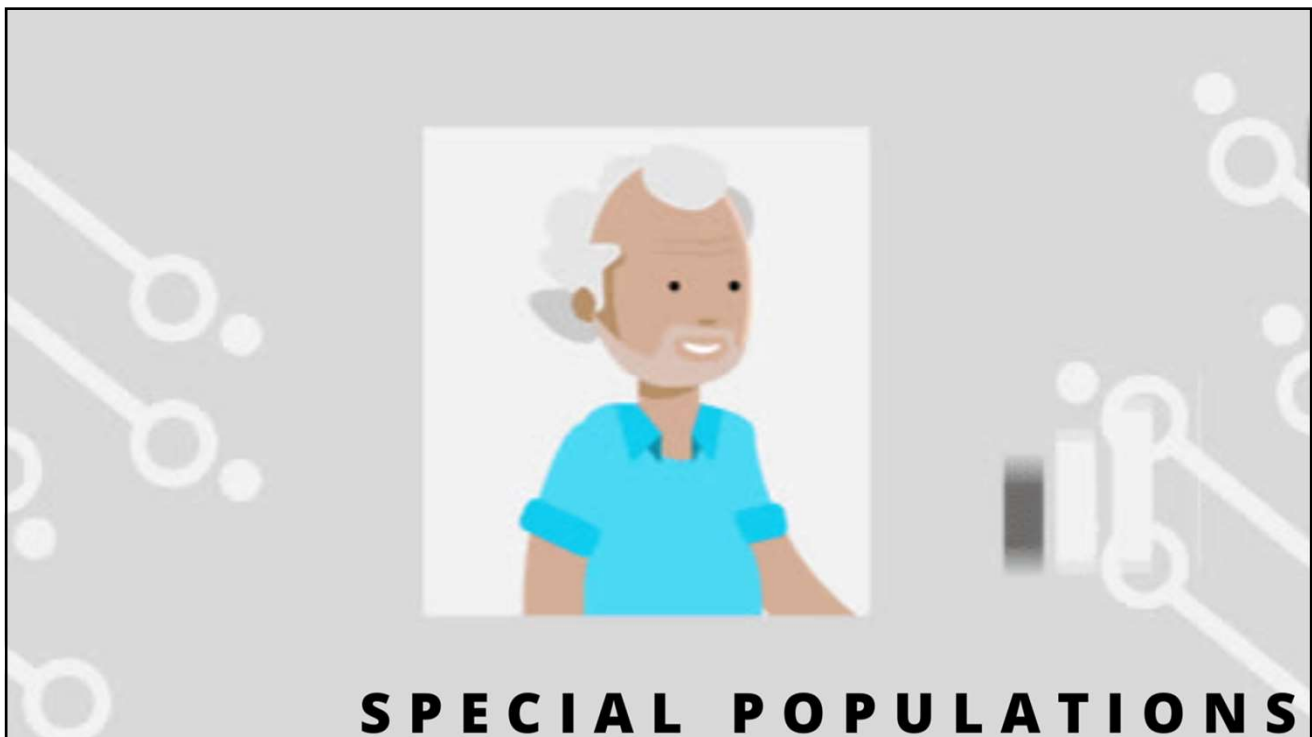
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What's one component of the 5A's that you could feasibly implement?

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QUESTION 3

Which resistance exercise should be avoided if you have osteoporosis?

- a. Squats
- b. Bridges
- c. Lunges
- d. Sit Ups

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SPECIAL POPULATIONS

- COPD
- Cardiac
- Stroke
- Parkinson's Disease
- Multiple Sclerosis
- Spinal Cord Injury
- **Arthritis** (OA and RA)
- Chronic Pain
- Osteoporosis
- Diabetes
- **Cancer**
- Frailty
- Poor vision
- Poor Balance
- Back Pain

SPECIAL POPULATIONS

7 Arthritis

A Osteoarthritis

Key Points:

- Combining exercise to increase strength, flexibility and aerobic capacity is likely to be the most effective in the management of lower limb osteoarthritis.⁵
- Proper technique/alignment during joint loading is very important for patients with OA.

B Rheumatoid Arthritis

Key Points:

- Schedule exercise each day when pain is lowest and pain medication is most effective.⁶
- Continue being physically active during a flare or periods of inflammation, but modify to avoid vigorous, highly repetitive activities, or stressing the affected joint(s). Prescribe gentle stretching to help increase ROM— especially if joints are unstable.⁶
- Instruct patient to avoid over stretching.³
- If the patient has been inactive for a long time, start with shorter sessions (10 to 15 minutes) at a lower intensity. Add 5 minutes to each session, increasing every 2-4 weeks. Over time, build up to at least 30 minutes a day on most days of the week.⁶
- The patient should expect some discomfort (not pain) after the workouts. If pain is greater 2 hours after exercise than it was before, reduce the length and intensity of the next session.⁵
- Total exercise time is more important than intensity. If the patient exercises at too high an intensity, he/she may not be able to exercise very long thus potentially increasing risk of injury.⁵
- Avoid overuse or repetitive stress injuries by alternating types of exercise over consecutive days.⁶
- Drink plenty of fluids before, during and after exercise.⁶

Resources for A:

- <https://gladcanada.ca/>
- <http://boneandjointcanada.com/>

Resources for B:

- <https://exercise.trekeeducation.org/populations/comorbidities>
- https://www.exerciseismedicine.org/assets/page_documents/YPH_All.pdf

SPECIAL POPULATIONS

11 Cancer

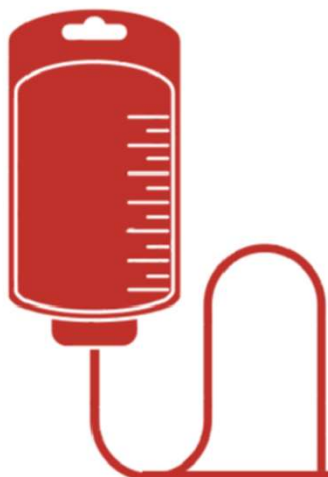
Key Points:

- Start with short periods of exercise (5-10 minute sessions) and rest after each session. Gradually build up to 20-30 minutes of continuous activity.⁸
- Encourage the patient to be active when they have energy as this may change from day-to-day.⁸
- Instruct the patient to listen to their body. Take breaks or change activities as needed.
- Patients may prefer to be active every second day to have time to recover.⁸
- Patients with significant nerve damage may have reduced ability to use the affected limbs because of weakness or loss of balance.⁸
- Instruct patients with compromised immune function to avoid public gyms and pools until white blood cell levels return to safe levels. Survivors who completed a bone marrow transplant are advised to avoid such exposures for one year after transplantation.⁸
- Instruct patients with an indwelling catheter or feeding tube to be careful of dislodging lines during resistance training.⁸
- Patients with severe anemia should delay exercise until the anemia has improved.⁸

Platelets	Recommendations ¹¹
<10,000/ μ L	Limit activity. Patient may receive a transfusion of platelets. Use caution to avoid injury and bleeding due to falls. Gentle range of motion (ROM) can be done in supine or sitting.
<10,000/ μ L- 20,000/ μ L	Perform gentle exercises without resistance or strain to avoid bleeding from high exertional blood pressure. Standing exercises and ambulation is recommended only if patient is steady on feet and exhibit no signs of bleeding.
<20,000/ μ L- 40,000/ μ L	May use light resistance (e.g. elastic tubing, Thera Band) if patient exhibits no signs of bleeding without strain.

CASE STUDY

Consider how each component of the toolkit would apply to this individual:



- Which benefits of REx would you highlight for this individual?
- Which red flags/contraindications would you screen or assess before prescribing REx?
- Develop a sample exercise program.
- How would you support sustained participation in the program?
- Which special population guidelines would you use in this case and what are some of the population-specific considerations?

OBJECTIVES

By the end of this presentation you will be able to:

1. Identify the need for resistance exercise prescription in the acute care setting and explain the toolkit development process
2. Describe the benefits of resistance exercise
3. Assess whether a patient is appropriate for REx
4. Practice prescribing REx using the REx toolkit
5. Identify strategies to support your client's sustained participation in the REx program
6. Outline population-specific considerations
7. Develop a plan for implementing REx in your setting



IMPLEMENTATION

1. What can you incorporate in your practice tomorrow?
2. What can get in the way?
3. Create an action plan for steps that you could take at your site
4. How can you monitor this plan?

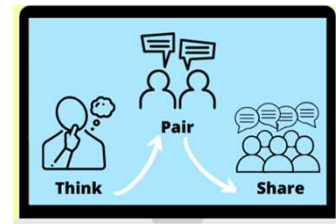
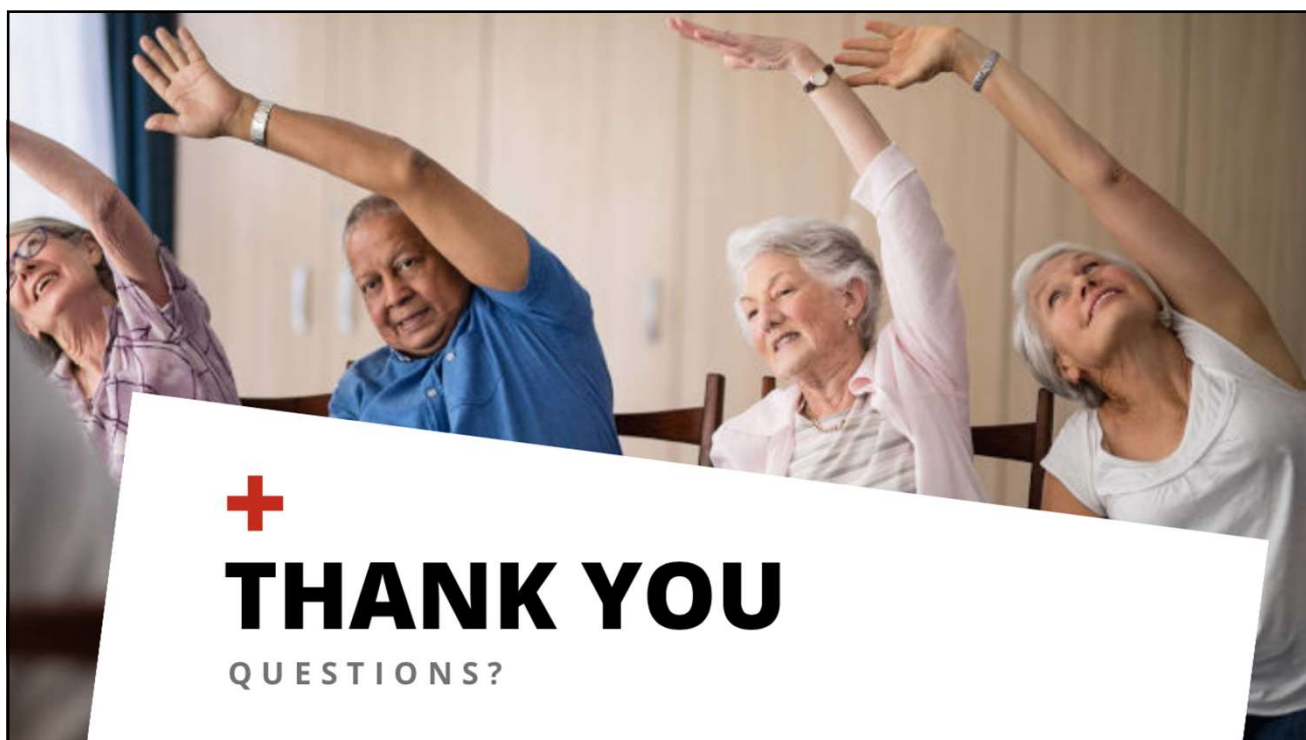


Image: <https://k-12talk.com/2020/05/14/sharing-the-task-of-learning-using-think-pair-shares-in-a-digital-world/>

Conclusion

1. The toolkit is grounded in evidence and was co-developed with PTs across BC
2. All of the information in the presentation is included in the toolkit and more



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