



Physiotherapy in COVID-19

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کووید ۱۹

علائم عمومی : سرفه ، تب ، سردرد و ...

علائم مربوط به سیستمهای عصبی و عضلانی اسکلتی : اختلال حس بویایی، درد عضلانی، ضعف عضلانی، گیلن باره، فلج بل

علائمی نظیر درد و ضعف عضلانی سبب کاهش سطح فعالیتهای روزمره (ADL) بخصوص راه رفتن می گردد.

ادامه

➤ عوارض درازمدت :

➤ آتروفی عضلانی

➤ کاهش دامنه حرکتی مفاصل

➤ کاهش کیفیت زندگی

میزان شیوع

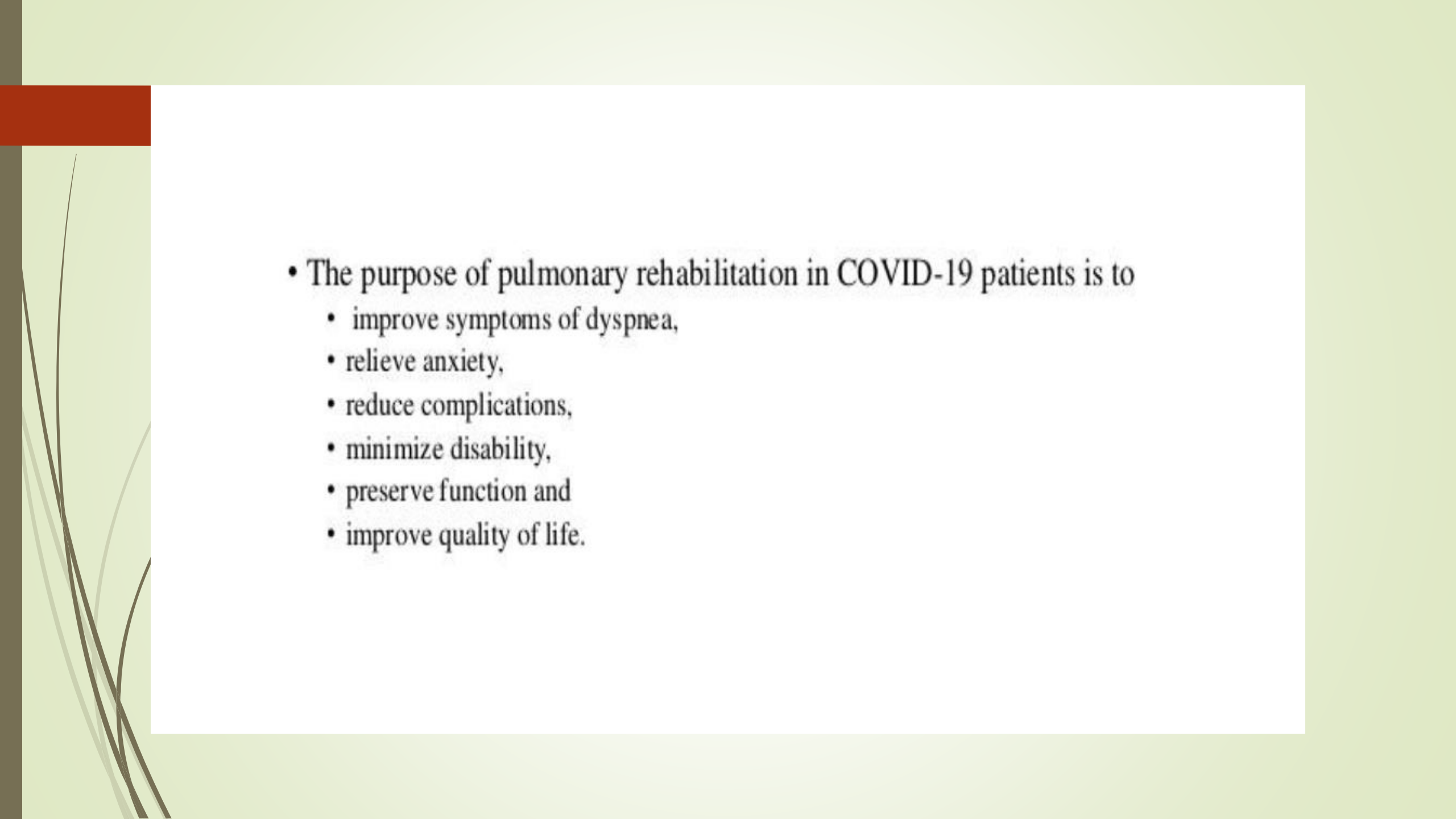
نتایج مقاله مروری سیستماتیک :

- اختلال بویایی: ۳۵ درصد
- اختلال چشایی : ۳۳ درصد
- درد عضلانی : ۱۹ درصد
- سردرد : ۱۲ درصد
- کمردرد : ۱۰ درصد
- مشکلات حاد مغزی عروقی : ۳ درصد
- اختلال سطح هوشیاری : ۲ درصد



Rehabilitation Management

Rehabilitation management is defined as "a multidisciplinary intervention based on personalized evaluation and treatment which includes, but is not limited to, exercise training, education, and behavioral modification designed to improve the physical and psychological condition of people with respiratory disease provided in team approach".

- 
- The purpose of pulmonary rehabilitation in COVID-19 patients is to
 - improve symptoms of dyspnea,
 - relieve anxiety,
 - reduce complications,
 - minimize disability,
 - preserve function and
 - improve quality of life.

Rehabilitation along the continuum of care in COVID-19



Acute

Objectives

- Optimize oxygenation
- Manage secretions
- Prevent complications

Input:

Specialist Respiratory physiotherapist /therapist and/or rehabilitation staff experienced with ICU/HDU setting

Setting: ICU/HDU



Post-acute

Objectives

- Identify and manage impairments for affected functioning domains
- Facilitate safe discharge and onward referral

Input: Multidisciplinary

Setting: Rehabilitation ward/unit, stepdown facility, home



Long-term

Objectives

- Optimize functioning/ minimize impact of impairments on independence and quality of life

Input: Multidisciplinary

Setting: Home, outpatient facility, clinic



Acute Phase

Rehabilitation for severe COVID-19



- Impairments most likely to encounter:
 - Physical deconditioning and muscle weakness, fatigue
 - Impaired lung function
 - Delirium and other cognitive impairments
 - Impaired swallow and communication
 - Mental health disorders and psychosocial support needs.
- Multi-disciplinary team approach is key
- Still many unknowns related to the pathophysiology of COVID-19 and the long-term complications, many organs can be affected

1- Mobilization inside ICU

Mobilization should be used as a primary means for

- Reducing the effects of immobility and bed rest,
- Enhancing oxygen transport,
- Improving ventilation/perfusion (v/Q) matching,
- Increasing lung volumes,
- Reducing the work of breathing,
- Minimizing the work of the heart and
- Enhancing microciliary clearance in patients with
- Acute pulmonary disease, including patients in the ICU





Mobility include :

- Head of bed elevation
- ROM (bed mobility)
- Edge of bed activities
- Continuous lateral rotational therapy (CLRT)
- Tilt training
- Transfers out of bed to a chair
- Chair position
- Ambulation on or off the ventilator



Chest physiotherapy

- Non-productive dry cough should be sedated to avoid fatigue and dyspnea
- Bronchial clearance techniques are indicated in hyper secretive patients with chronic respiratory diseases
- Respiratory muscles training in case of inspiratory muscles weakness

- 
- 
- In the weaned patients , reconditioning interventions in order to improve the **physical status** and to correct the **motor and cognitive effects** of prolonged immobilization in the intensive care area.
 - Reconditioning with specific aids (upper/lower limb devices/cycle-ergometer)
 - Neuromuscular electrical stimulation
 - Balance training especially for patients who were bedridden for long

- 
- 
- In ICU patients , NMES of the quadriceps , in addition to active limb mobilization , enhanced muscle strength and hastened independent transfer from bed to chair



Post Acute



- Breathlessness is a common symptom of covid 19.
- Feeling breathlessness can make you feel panicked/ anxious. This can make it even more worse.
- In early stages you may experience it even when you are doing minimal activity for eg: while getting dressed, walking, showering etc.
- It will be there for certain time after your illness and you may even have lost your strength.
- During this time it is important to slow down and pace yourself.

Managing breathlessness:

- Certain positions will help you ease you from shortness of breath.
- Try and relax in these position, a good way to do is to focus on relaxing muscles in neck and shoulder while doing this:



Sitting leaning forward
Sit leaning forward resting your elbows on your knees or the arms of the chair.



Sitting leaning forward at a table
Sit leaning forward with your elbows resting on a table. You may wish to put some pillows or cushions on the table for comfort.



Standing leaning forward
Lean forwards resting your elbows onto a chair, a wall or a railing. You could use a walking stick or a frame if you use one for walking.



8. Positions to relieve your breathlessness

Any of the following positions will assist relaxation of the upper chest while encouraging use of the lower chest. Breathe at the rate at which you feel comfortable, as quickly as necessary but gently. As control is gained you will be able to slow down the rate of your breathing. Try adopting one of these positions between exercises, to recover. Try to make sure your hands are loose and relaxed.



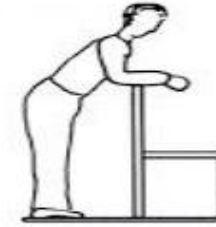
sitting leaning forward



sitting with pillows



standing leaning back



standing leaning forward

Positions to ease breathing



Sitting leaning forward

Sit leaning forward with your elbows resting on your knees. Make your wrists and hands go limp.

Sitting Upright

Sit upright against the back of a firm chair. Rest your arms on the chair arms or on your thighs. Make your wrists and hands go limp.

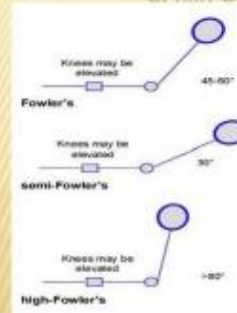


Sitting leaning forward at a table

Sit leaning forward with your elbows resting on a table. You can also put a few pillows or cushions on the table to rest your head on.





FOWLER'S POSITION-



SEMI-FOWLERS POSITION



- 
- 
- Low intensity exercise (<3.0 METs)
exercise with gradual load aiming improve subjective symptoms.
 - assessment of exercise capacity, oxygenation response during effort by the 6-min walk test (6MWT) and night-time should be planned
 - For isolated patients, rehabilitation programs can be eventually conducted remotely by telehealth system (educational videos, tele-consultation, webcams etc., with disinfectable tools)

Physical activity	MET
Light Intensity activities	< 3
sleeping	0.9
watching television	1.0
writing, desk work, typing	1.8
walking, 1.7 mph (2.7 km/h), level ground, strolling, very slow	2.3
walking, 2.5 mph (4 km/h)	2.9
Moderate intensity activities	3 to 6
bicycling, stationary, 50 watts, very light effort	3.0
walking 3.0 mph (4.8 km/h)	3.3
calisthenics, home exercise, light or moderate effort, general	3.5
walking 3.4 mph (5.5 km/h)	3.6
bicycling, <10 mph (16 km/h), leisure, to work or for pleasure	4.0
bicycling, stationary, 100 watts, light effort	5.5
Vigorous intensity activities	> 6
jogging, general	7.0
calisthenics (e.g. pushups, situps, pullups, jumping jacks), heavy, vigorous effort	8.0
running jogging, in place	8.0
rope jumping	10.0



Sequence of Exercise Progression

Level 1 : mostly lie down position

Level 2: mostly seated position

Level 3: mostly standing position

Level 1

Deep breathing exercises



Pursed lip breathing exercises



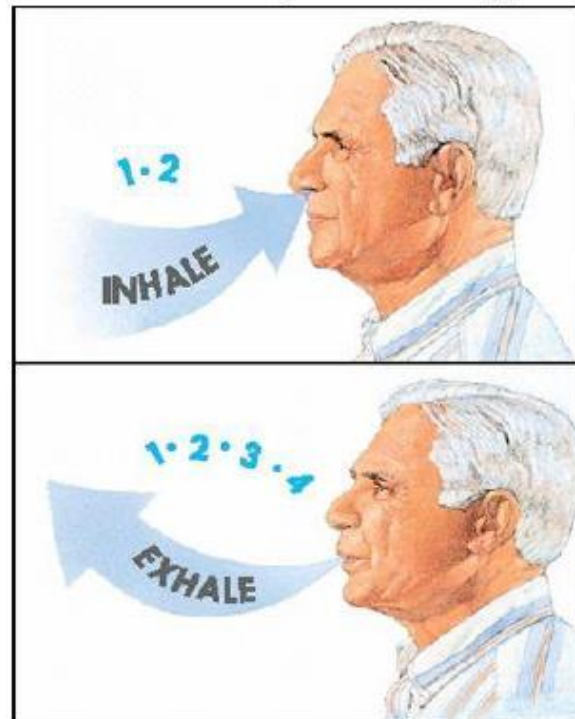
Blowing exercises(Incentive spirometer)



Breathing Techniques



Pursed Lip Breathing



Diaphragmatic Breathing





❖ Pursed lip breathing:

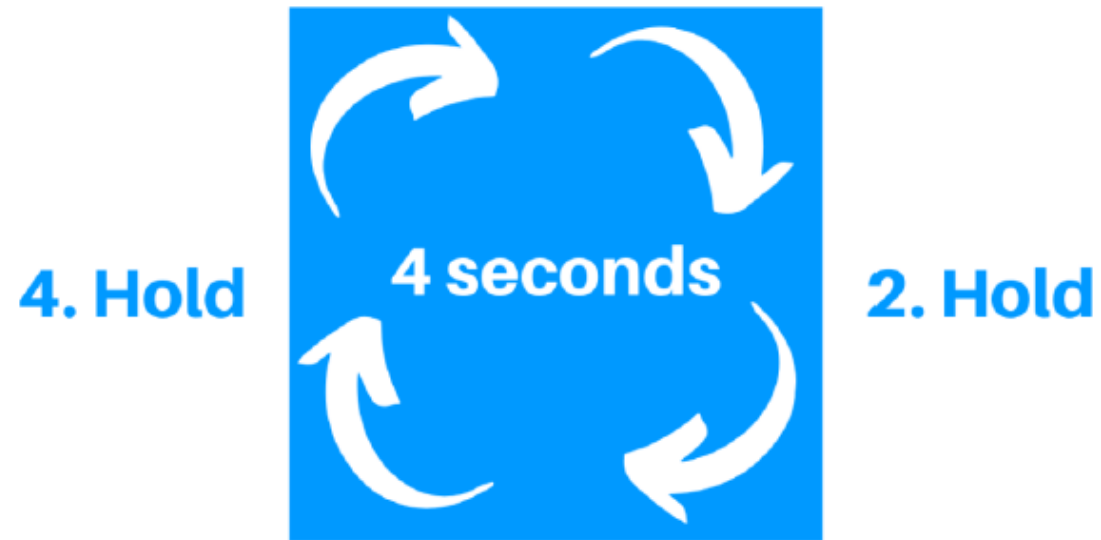
- you may find this helpful if you are very breathless, become anxious or if you find tummy breathing is difficult.
- This type of breathing allows more time for the air to leave your lungs, making it easier to take next breathe in.
- Choose one of the ease positions as told before, relax your shoulders. Breathe in through your nose then breathe in a relaxed fashion through you pursed lip (tightened lip).
- Continue until you feel your breathing is under control.

BREATHING EXERCISE TECHNIQUES

DIAPHRAGMATIC BREATHING

- Diaphragm is the primary muscle for breathing (inspiration) diaphragm controls breathing at an involuntary level ,a patient with primary pulmonary disease like COPD can be taught breathing control by optimal use of diaphragm and relaxation of accessory muscles
- Diaphragmatic breathing ex: are also use to mobilize lung secretion in PD

1. Breathe in



2. Hold

3. Breathe out

4. Hold



4-7-8 Breathing



Lay or sit with one hand on your chest and another on your belly.



Take a deep slow breath from your belly, counting to 4 as you breath in.



Hold your breath while mentally counting 1 to 7.



Release your breath completely and slowly, while silently counting from 1 to 8.



Repeat 3 to 7 times or until you feel calm.

NOYZE

Incentive spirometer



INCENTIVE SPIROMETRY



PREPARED BY
HINA VAISH



breathe easy

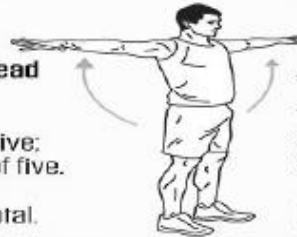
WORKOUT by @ darebee.com



Arms above your head

- 1) Breathe in deep;
- 2) Hold to count of five;
- 3) Exhale to count of five.

Repeat 5 times in total.



Arm Raises

- 1) Breathe in as you raise your arms;
- 2) Exhale on the way down.

Repeat 5 times in total.



Calf Raises

- 1) Breathe in as you rise;
- 2) Hold to count of five;
- 3) Exhale as you drop down.

Repeat 5 times in total.



Shoulder Stretches *arms behind your back*

- 1) Breathe in as you stretch;
- 2) Hold to count of five;
- 3) Exhale as you relax.

Repeat 5 times in total.

Breathing Workout

by DAREBEE © darebee.com



Breathe in slowly, hold to a slow count of ten then exhale slowly. Repeat 3 times.



Take ten rapid breaths. Hold without breathing to the count of twenty.



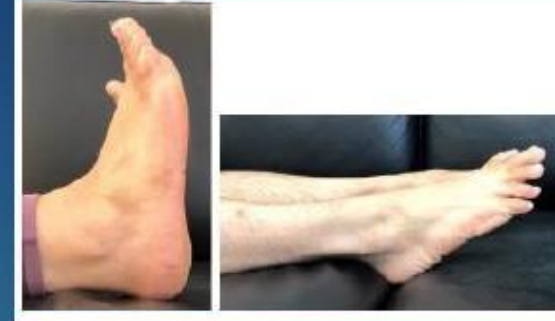
Breathe in and lean back, breathe out and lean forward. Repeat 3 times.



Breathe in fast, breathe out fast. Hold for count of three. Repeat 3 times.



**Ankle
pumps**



**Hip and Knee bends in
bed**



**Crossing your legs in
bed**



**Overhead arm
stretch**



**Touch the back of your
neck**



Touch your mid back



Supported sit to stand



Relaxation

Montefiore example of exercises:

Table 1: Sequence of Exercise Progression

Level 1	<p>These exercises are suitable for a patient who is very weak and has to lie down most of the time.</p> <ul style="list-style-type: none"> Start with the breathing exercises (exercises 1-3) done at least twice a day, and increase to 4-6 times a day Gradually, add the other exercises as tolerated. You can do a few of the different exercises at each session Once you can do all the exercises in one session without any difficulty, repeat them 2-3 times a day
Level 2	<p>Once the patient can complete level 1 exercises with ease, proceed to level 2, which are mainly seated exercises.</p> <ul style="list-style-type: none"> Continue with level 1 exercises Start with a few of the exercises in Level 2 Gradually increase the number of exercises that can be done at each session Increase to repeating the exercises 2-3 times a day
Level 3	<p>Once the patient can complete level 2 exercises with ease, proceed to level 3, which are mainly standing exercises</p> <ul style="list-style-type: none"> Continue with level 1 and 2 exercises Start with a few of the exercises in Level 3 Gradually increase the number of exercises that can be done at each session Increase the numbers of sessions as tolerated. The goal is to do this 2-3 times a day

Table 2: LEVEL 1 EXERCISES

Deep breathing exercises	2 minutes	Aerating the lower parts of the lung
Pursed lip breathing exercises	2 minutes	Exercising the breathing muscles
Blowing exercises	10 times	Exercising the breathing muscles
Ankle pumps	Repeat 2-3 times. Increase gradually to 8 times (1 set)	Improve leg circulation. Prevent ankle contractures
Hip and Knee Bends	Repeat 2-3 times. Increase gradually to 8 times (1 set)	Maintain hip and knee range of motion
Crossing your legs in bed	Repeat 2-3 times. Increase gradually to 8 times(1 set)	Maintain hip external rotation
Overhead arm stretch	Repeat 2-3 times. Increase gradually to 8 times(1 set)	Maintain shoulder abduction and extension
Touching back of neck	Repeat 2-3 times. Increase gradually to 8 times(1 set)	Maintain shoulder external rotation
Touching upper back	Repeat 2-3 times. Increase gradually to 8 times(1 set)	Maintain shoulder internal rotation
Sitting side of the bed	As long as tolerated	Improve sitting balance. Reduce postural dizziness
Sit to Stand	10 times(1set)	Improve ability to get up
Relaxation	10 minutes	

Level 2

Chin Up & Down



Head Turns



Shoulder Rolls



Finger stretch



Calf stretches in bed



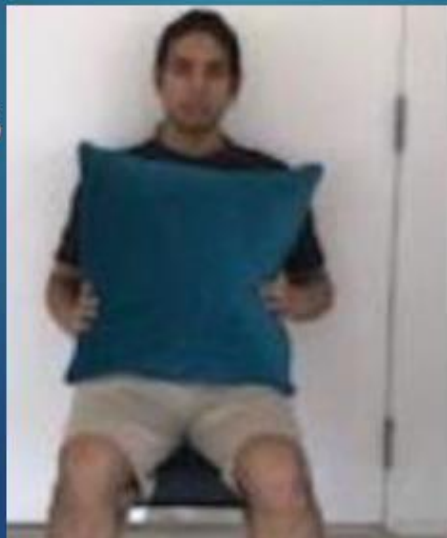
**Wrist curls with
light weights**



Biceps Curls



Tummy twists



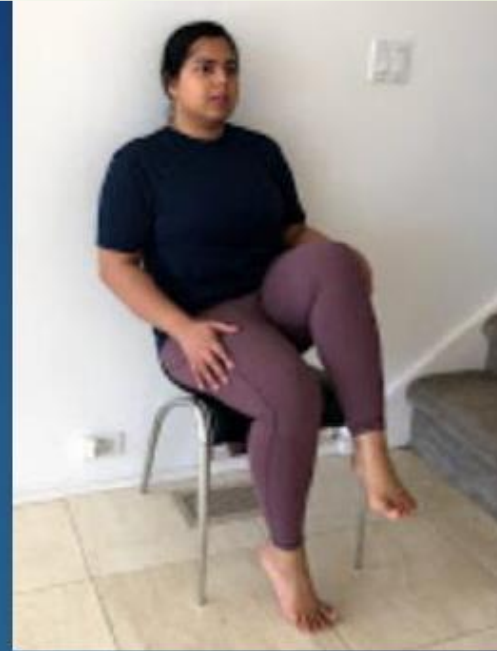
Seated Overhead weights



Shoulder Abductions



Seated knee lift



Knee Extensions



Relaxation

Level 2

Start with 1-2 repetitions, gradually increase to 8 repetitions. This is 1 set. Once you can easily complete all the exercises, increase the frequency to twice a day

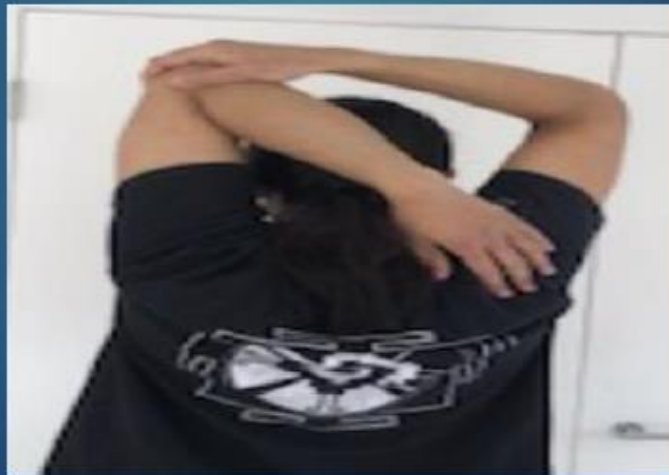
Deep breathing exercises	2 minutes	Aerating the lower parts of the lung
Pursed lip breathing exercises	2 minutes	Exercising the breathing muscles
Blowing exercises	10 times	Exercising the breathing muscles
Chin Up and Down	1-2 times, increasing to 8 reps	Neck range of motion. Vestibular exercises
Head Turns	1-2 times, increasing to 8 reps	Neck range of motion Vestibular exercises
Shoulder Rolls	8 times forwards, 8 times backwards	Shoulder range of motion
Finger Stretch	Hold for a count of 8	Wrist and finger stretch
Calf Stretch	Hold for a count of 8	Hamstring Stretches
Wrist Curls		Hand and wrist muscle strengthening
Biceps Curls	1-2 times, increasing to 8 reps	Forearm strengthening
Seated Overhead Extension	1-2 times, increasing to 8 reps	Shoulder muscle strengthening
Seated Shoulder Abductions	1-2 times, increasing to 8 reps	Shoulder muscle strengthening
Tummy Twists	1-2 times, increasing to 8 reps	Core strengthening
Seated Knee Lifts	Start 2-3 times. Increase to 8 times	Hip flexor stretches and strengthening
Seated Knee Extensions	Start 2-3 times. Increase to 8 times	Hamstring stretches Quad strengthening
Relaxation		

Level 3

Overhead Stretch



Triceps stretch



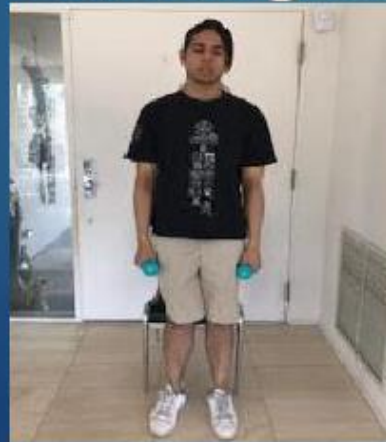
Side Stretch



Standing Shoulder flexion Upright Front Row



Standing arm abduction



Biceps curls



Core exercises



Leg abduction



Supported lateral lunge



Hamstring curls



Supported squats



Wall push ups



Walking Relaxation

Level 3

Deep breathing exercises	2 minutes	Aerating the lower parts of the lung
Pursed lip breathing exercises	2 minutes	Exercising the breathing muscles
Blowing exercises	10 times	Exercising the breathing muscles
Overhead stretch	Count of 8	Full body stretch
Side Stretch	Count of 8, Rpt 2-4 times	Full body stretch
Triceps stretch	Hold 15-30 s. Rpt 2-4 times	Arm stretch
Quadriceps stretch	Hold 15-30 s. Rpt 2-4 times	Thigh muscle stretch
Groin Stretch	Hold 15-30 s. Rpt 2-4 times	Hip muscle stretches
Calf Stretch	Hold 15-30 s. Rpt 2-4 times	Hamstring stretch
Standing shoulder flexion	Start 2-3 times and increase to 8 times	Shoulder stretch
Standing shoulder abduction	Start 2-3 times and increase to 8 times	Shoulder stretch
Upright front row	Repeat 8 times	Shoulder strengthening exercise
Biceps curls	Repeat 2-3 times on each side and increase gradually to 8 reps.	Arm strengthening exercise
Core exercises	Start with 1-2 reps and slowly increase to 8 reps	Core strengthening exercise
Leg abduction	Hold for count of 8 Start with 2-3 reps and increase to 8 reps	Hip strengthening exercise
Hamstring curls	Hold for count of 8 Start with 2-3 reps and increase to 8 reps	Leg strengthening exercise
Supported lateral lunge	Hold for count of 8 Start with 2-3 reps and increase to 8 reps	Leg strengthening exercise
Supported squats	Hold for count of 8 Start with 2-3 reps and increase to 8 reps	Leg strengthening exercise
Wall push ups	Hold for count of 8 Start with 2-3 reps and increase to 8 reps	Chest strengthening exercise
Walking	10 minutes Increase to 3 times a day	Cardiovascular fitness
Relaxation	10 minutes	



Long Term



Introduction

- ◆ With a wide range of disease expression and a broad scope of clinical severity, COVID-19 presents a different challenge for each patient returning to activity.
- ◆ Our goal is to provide an introduction to the considerations for return to activity in people after recovering from COVID-19.



Considerations

- ◆ **A one-size-fits-all** plan for return to sport would not work well for those who had COVID-19!
- ◆ Patients with Hypertension, Diabetes, Cerebrovascular, or Cardiovascular disease, more likely to require hospitalization, ICU level care, and die from the infection.

Take the Pre-Exercise Screening Questionnaire (PESQ)

Being physically active is very safe for most people. Some people, however, should consult their doctors before starting physical exercise, especially if they experience symptoms of fever for many days.

Answer **Yes** or **No** to the Following Questions

- 1) Do you feel a sore throat?
- 2) Do you feel cough and sputum production?
- 3) Do you feel fatigue?
- 4) Do you feel short of breath or difficulty breathing?
- 5) Do you feel fever $>37.8^{\circ}\text{C}$?
- 6) Have you had fever for more than three days $>37.8^{\circ}\text{C}$?
- 7) Have you had any contact with anyone who has been diagnosed or suspected of the new coronavirus?

If You Answered Yes

If you answered yes to question number seven (Q-6) and/or number nine (Q-7), You should ask for a medical clearance along with information about specific for starting exercise.

If You Answered No

If you answered no to all the PESQ questions, you can be reasonably sure that you can exercise safely and have a low risk of having any medical complications from exercise.



• ورزش با شدت متوسط در افراد بدون علامت سودمند است.
فعالیت ورزشی باید در محیط اختصاصی، محیط روباز، منزل و حتما دور از جمعیت،
با اجتناب از تماس با سطوح (وسایل ورزشی بوستان ها، صندلی پارک ها و...) و
رعایت فاصله ۱-۲ متر از دیگران انجام شود.
این برنامه ورزشی باید شامل ترکیب ورزش هوازی، قدرتی، کششی و تعادلی باشد.



- ✓ باند الاستیک را به تکیه گاهی در سطح مچ پا محکم متصل کنید.
- ✓ انتهای کش را به سمت عقب بدن مطابق شکل بکشید.
- ✓ در سرتاسر طول تمرین زانویتان را صاف نگه دارید و از چرخش کمر خود جلوگیری کنید.
- ✓ به آرامی به حالت اول برگردید و تکرار کنید



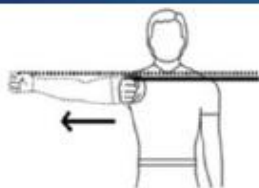
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- ✓ انتهای کش را به سمت جلو بدن مطابق شکل بکشید.
- ✓ در سرتاسر طول تمرین زانویتان را صاف نگه دارید و از چرخش کمر خود جلوگیری کنید.
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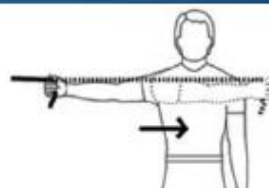
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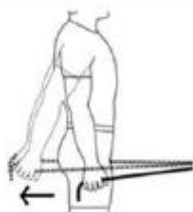
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- ✓ به آرامی به حالت اول برگردید و تکرار کنید



- ✓ باند الاستیک را به تکیه گاهی در ارتفاع شانه محکم متصل کنید.
- ✓ انتهای کش را به سمت خارج بدن مطابق شکل بکشید.
- ✓ در سرتاسر طول تمرین بازویشان را صاف نگه دارید و از چرخش کمر خود جلوگیری کنید.
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- ✓ باند الاستیک را به تکیه گاهی در ارتفاع محل کمر بند محکم متصل کنید.
- ✓ انتهای کش را به سمت عقب مطابق شکل بکشید.
- ✓ در سرتاسر طول تمرین بازویشان را صاف نگه دارید و از چرخش کمر خود جلوگیری کنید.
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- ✓ به آرامی به حالت اول برگردید و تکرار کنید.

شدت ورزش

Breathlessness scale

	0	Not at all
	0.5	Very, very slight (just noticeable)
	1	Very slight
	2	Slight
When you are doing physical activity, it is ok to feel moderately breathless →	3	Moderate
	4	Somewhat
	5	Severe
	6	
	7	Very severe
	8	
	9	Very, very severe (almost maximal)
	10	Maximal

شدت ورزش

- اگر می توانید یک جمله را کامل بدون توقف یا احساس تنگی نفس بگویید در این صورت می توانید بیشتر ورزش کنید.
- اگر اصلا نمی توانید صحبت کنید و یا هر دفعه فقط می توانید یک کلمه بگویید و تنگی نفس شدید دارید در این صورت ورزشی که می کنید برای شما شدید است
- اگر می توانید یک جمله بگویید برای گرفتن نفس یک یا دو بار توقف می کنید و در حالتی بین تنگی نفس متوسط تا تقریباً شدید هستید، در این صورت سطح ورزش شما مناسب است.
- به خاطر داشته باشید که احساس تنگی نفس در هنگام ورزش کردن طبیعی است و خطرناک و یا مضر نیست. رسیدن تدریجی به تناسب اندام می تواند به شما کمک کند، کمتر دچار تنگی نفس شوید. برای بهبود تناسب اندام باید در زمان ورزش کردن دچار احساس کمبود نفس متوسط تا تقریباً شدید شوید.
- اگر آن قدر دچار تنگی نفس شده اید، که نمی توانید صحبت کنید باید روند حرکات را کند کنید و یا توقف کرده و کمی استراحت کنید تا نفس شما بیشتر تحت کنترل قرار گیرد. وضعیت های ارائه شده در صفحه ۳ برای تسکین تنگی نفس می تواند کمک کننده باشد.



Exercise training

Components of exercise training:

- Lower extremity exercises
- Arm exercises
- Ventilatory muscle training

Types of exercise:

- Endurance or aerobic
- Strength or resistance

Lower extremity exercise

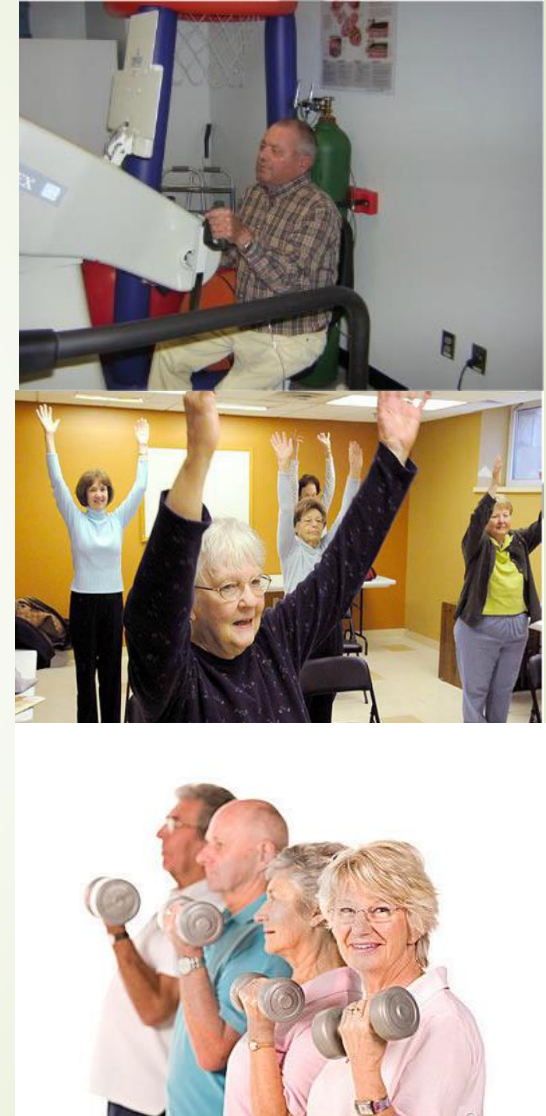


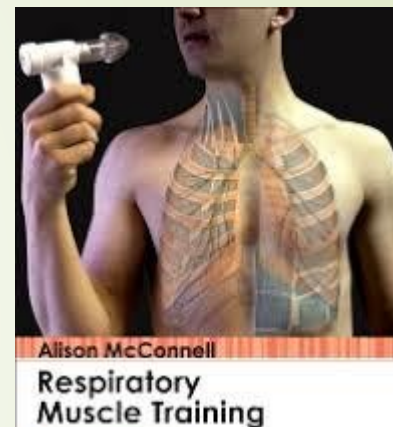
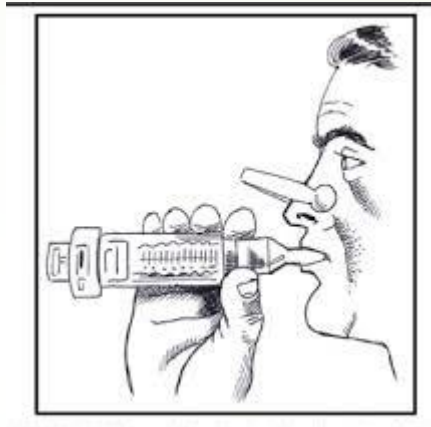
Arm exercise training

- Arm cycle ergometer
- Unsupported arm lifting
- Lifting weights

Strength exercise

When strength exercise was added to standard exercise protocol; led to greater increase in muscle strength and muscle mass







Inspiratory Muscle Training

- ▶ Inspiratory muscle training (IMT) is indicated for patients who exhibit signs and symptoms of decreased strength or endurance of the diaphragm and intercostal muscles.
- ▶ The goal of IMT is to increase the ventilatory capacity and decrease dyspnea.
- ▶ The patient inhales through the device at a level that does not cause adverse effects, such as dyspnea or a drop in oxygen saturation, in a special level. When this level is comfortable for the patient, then the resistance is gradually increased.

Strengthening of respiratory muscle

- Patients with COVID-19 might have suspected respiratory muscle weakness caused by prolonged mechanical ventilation during ICU stay.
- After transfer to the COVID ward, respiratory muscle strengthening can be continued for patients recovering from critical illness.
- Training protocols typically use resistive loads ranging *between 30% and 80% of MIP*. However, the use of noninvasive handheld manometers is not recommended in patients hospitalized with COVID-19 due to the increased risk of virus transmission.
- Training can be started pragmatically (ie, without respiratory testing results) using *a threshold training device with low resistance (< 10 cmH₂O)*, and can be increased based on clinical presence, experienced dyspnea and BORG score for perceived exhaustion.
- One of the unique advantages of respiratory muscle training is that it can be implemented in shorter intervals (30 breaths, 2 times/day).
- Training effects from respiratory muscle training have been observed for multiple protocols lasting only 4 weeks.
- A telehealth or mobile appbased model would allow for the opportunity for real-time remote monitoring of compliance and assessment. Telehealth and home-based models for respiratory muscle training have been studied with similar effects.

Taking walking as an example how to progress should be somewhat like this, which again will vary from individual to individual:



Week 1:

5-10-minute walks daily

Week 2:

10-15-minute walks daily

Week 3:


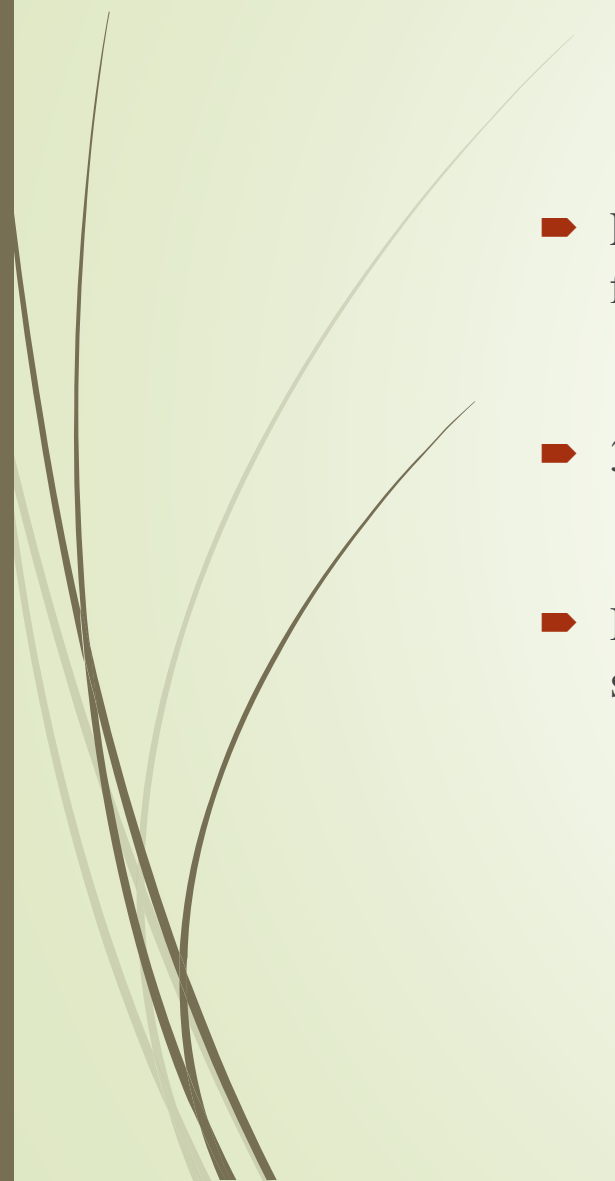
15-20-minute walks daily

Week 4:

20-25-minute walks daily

Weeks 5-6:

25-30-minute walks daily

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- Low resistance multiple repetitions of resistive muscle training can improve muscle mass , force generation and oxidative enzyme in patients
 - 3 sets of 8-10 repetitions at 50 – 70% of 1 repetition max RM
 - In patients unable to perform voluntary muscle contractions , neuromuscular electrical stimulation (NMES) has been used to prevent disuse muscle atrophy

