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The ravages of bed rest: rehabilitation after prolonged immobility

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The patient complains of weakness and the relative's and the GP's intuition is that the patient is not the same as before their hospitalisation. Is recovery just a matter of time or will the changes be permanent? Is there something that can be done?

Debility, also called 'deconditioning', is caused by prolonged immobility or bed rest and is the third most common reason for admission of patients to Australian rehabilitation units, after fractured femur and stroke. Nationally, over 5000 patients per year are treated in rehabilitation hospitals for debility;[1] however, far more in the community will be seen by GPs.

This article reviews the physiological effects of bed rest, the approaches of allied health professionals to reconditioning and how GPs can co-ordinate rehabilitation in the community using the 'Team Care Arrangements' in the Medicare Schedule.

Physiological effects of bed rest

A variety of conditions can lead to hospitalisation, bed rest and immobility (Table 1) and physiological changes can start to occur after as little as two days of being in bed. Common patient complaints following a period of hospitalisation are shown in Table 2; these 'side effects' of prolonged immobility occur in up to 40% of elderly hospitalised people.[2]

Long after they have recovered from the original cause of admission, patients can continue to experience symptoms of deconditioning and functional decline. They may never return to their premorbid level of functioning.

IN SUMMARY

- **Deconditioning can start to occur after as little as two days of being in bed, and 'side effects' of prolonged immobility occur in up to 40% of elderly hospitalised people.**
- **Symptoms of deconditioning include fatigue, falls and poor coping with the activities of daily living.**
- **Many patients suffer from silent illnesses such as DVT, infection and osteoporosis during bed rest.**
- **Patients with deconditioning not caused by intercurrent illness will benefit from exercise, activity training and cognitive behavioural therapy.**
- **GPs may co-ordinate rehabilitation in the community by allied health professionals using Medicare's GP Management Plan Provision (GPMP) and Team Care Arrangement (TCA).**
- **The patient's progress should be assessed at a mid-program case conference at four to six weeks and a final case conference at 10 to 12 weeks. Patients should ideally be followed up three to six months later to ensure that they have maintained their achieved goals.**

Table 1. Common causes of prolonged bed rest*

Pulmonary infection
Exacerbation of COPD
Confusion following sepsis
Falls with fracture or soft tissue injury
Arrhythmias
Cellulitis
Urinary tract infection
Cardiac failure
Osteomyelitis
Valvular repair
Abdominal surgery with complications
Urological surgery with complications
ENT surgery with complications
Endoscopic procedures with complications
Skin ulcer and skin grafting
Pulmonary surgery
Kidney failure
Overdose or poisoning

*Associated with hospital stays in excess of five days in patients over the age of 60 years.

Table 2. Common symptoms of deconditioning

Fatigue
Dizziness
Breathlessness
Depression
Confusion
Falling
Not eating
Incontinence
Poor coping with usual lifestyle

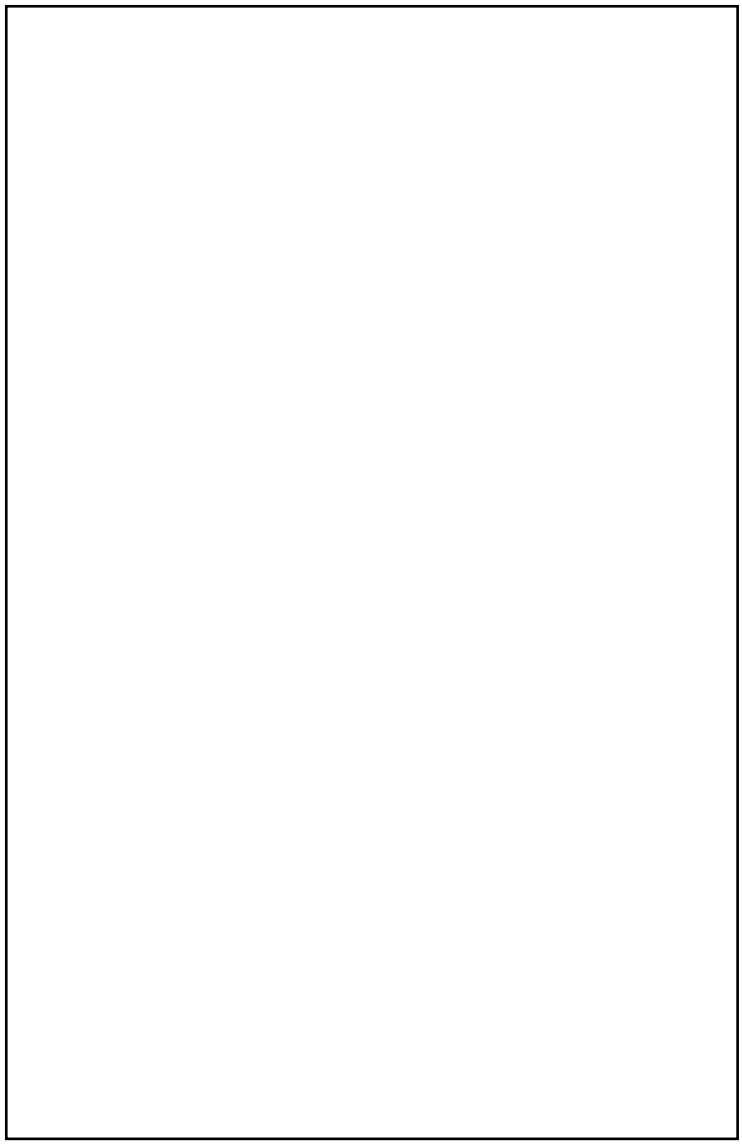

Figure. Fear of falling is common in patients affected by deconditioning and is associated with depressed mood. Graduated exposure and cognitive therapy can address anxiety and depression.

Musculoskeletal effects

Muscle wasting

With complete bed rest, up to 1.5% of muscle strength is lost per day. After one week of bed rest, up to 20% of strength is lost. This loss is greatest during the first week and peaks at 40% with prolonged bed rest. The loss of strength is associated with wasting of the muscles. Weight-bearing muscles of the legs are particularly affected.

It can take up to three times as long to regain strength as it took to lose it.

Contractures

During periods of bed rest, contractures can develop in the joints and limit their motion. During immobility, the number of collagen cross links increases in the connective tissue around joints and the muscles shorten. This process can start to occur after a week and is eventually irreversible. Typically, joint flexion contractures occur at the hip, knee and shoulder, and affect walking and activities of daily living.

Osteoporosis

Bed rest and the absence of weight-bearing increases the risk of osteoporosis and fracture. After 12 weeks of bed rest, bone density is reduced by up to 45%.[3] Bisphosphonates are the drugs of choice to both prevent and treat this condition.

Cardiovascular effects

Postural hypotension

Postural hypotension can occur within three days of bed rest and can lead to falls. On standing from a lying position, blood pools in the legs. Normally this is compensated for by vasoconstriction and a rise in heart rate and in systolic blood pressure, but following bed rest, these compensations are lost.

Tachycardia

With immobility the patient's resting heart rate increases by about one beat per minute every two days for up to four weeks. Resting stroke volume declines, mainly due to a reduction in blood volume caused by bed rest. With submaximal exercise following bed rest, the heart rate response is increased, and the cardiac output and maximum oxygen uptake are reduced. This results in poorer aerobic fitness and the patient fatigues more easily with exertion.

DVT and PE

With bed rest, the patient's plasma volume decreases and there is a relative increase in haematocrit and blood viscosity. As such, the bedridden person is at risk of deep vein thrombosis (DVT) and pulmonary embolism (PE). The use of fractionated heparin (Heparin Injection BP, Heparin Sodium Injection), compression stockings and bed exercises are the mainstay of prevention for DVT and PE.

Respiratory effects

There is also an increased risk of pneumonia and atelectasis. Lying flat, it is harder to expand the lungs because of the mechanical disadvantage, so further blood pools in the thorax, leading to decreased lung volume. Cough is impaired due to weak abdominal muscles, so secretions pool in the back part of the lungs and the front segments become relatively dry. This results in ineffective mucociliary clearing mechanisms.

Dermatological effects

Immobility leads to an increase in capillary pressure over bony prominences like the heels, sacrum, occiput and greater trochanters. This leads to a risk of decubitus ulcers and subcutaneous bursitis. This risk is even greater when combined with intrinsic factors like sensory impairment, confusion, malnutrition, incontinence and being underweight. Immobility also leads to dependent oedema, with an increased risk of cellulitis.

Metabolic and endocrine effects

While the patient's overall weight may remain static, immobility causes a relative reduction in lean mass and a relative increase in body fat. Urinary nitrogen and calcium loss occurs and parallels muscle and bone loss; while potassium, chloride and zinc loss also occur.[3] Sodium loss is associated with a diuresis, especially in the elderly, which can contribute to incontinence.

Diabetes may become apparent in the immobile person. Impaired glucose tolerance occurs with bed rest due to reduced insulin sensitivity in peripheral muscle.[2]

Genitourinary effects

Urinary stasis, which leads to infection, occurs with bed rest because it is harder to fully empty the bladder when lying flat. Further, increased excretion of urinary calcium increases the risk of bladder and renal calculi.

Incontinence due to bed rest is also common, particularly in the elderly hospitalised patient. The incontinence is often multifactorial as disorientation, confusion and decreased mobility can all contribute.

Gastrointestinal effects

Constipation is often seen in bedridden patients. This is due to a combination of factors including decreased mobility, decreased fluid intake, decreased peristalsis and incomplete bowel evacuation as a result of being in bed.

Neurological effects

Pressure neuropathies, particularly of the ulnar and peroneal nerve, can occur with bed rest, as can critical illness polyneuromyopathy (CINM). CINM is a symmetrical axonal sensorimotor neuropathy that is painless and may be caused by immobility or some medications, including steroids and aminoglycosides.[4] It may be difficult to differentiate CINM from the generalised weakness that occurs with bed rest.[5]

Psychiatric effects

Bed rest in combination with the stress of illness can lead to anxiety, depression, irritability, apathy, sleep disturbance and reduced attention.

The role of allied health professionals

Physiotherapists

There is a significant relation between falls at home and a loss of strength in the quadriceps[6] and in the dorsiflexors.[7] The risk of falls increases with asymmetrical lower limb weakness, which is common in hospitalised patients due to paresis, trauma or surgery.

Physiotherapists can assess if reduced strength, loss of joint range, poor endurance, vestibular disturbances or sensory deficits are affecting a person's loss of balance and function. They can then provide an individualised exercise plan to address these impairments.

The physiotherapist will need to design a home exercise program and monitor its progress. In some areas, exercise physiologists under the guidance of physiotherapists or doctors can carry out supervised exercise programs.

Weight-bearing and functional exercises, such as sit to stand practice, have a greater impact on return of quadriceps strength than do nonfunctional or open chain exercises (i.e. where the leg is free to move and not fixed, for example by standing on the ground).[8] But an approach that combines these two exercise regimens is usually prescribed. The exercise prescription should combine both resisted (e.g. weight lifting) and aerobic exercises to build strength, endurance and agility. This allows patients to improve their equilibrium and postural reactions during activities of daily living and mobility.

The 'laying on of hands' (massage, passive stretching and assistance with walking) has an enormous impact on patients through both the placebo response and an increase in their confidence. However, physiotherapists will often caution that overuse of the 'hands-on' approach may encourage dependence on passive therapies and discourage exercise, which is the mainstay of treatment for postimmobility reconditioning.

Occupational therapists

The occupational therapist (OT) focuses on functional return and will teach safe transfers from bed to chair, chair to chair and toilet, and in and out of a car seat. Repetition of activities of daily living are the mainstay of therapy and OTs will also undertake a home visit to identify whether the installation of rails and other home modifications can make the home safer and more accessible and minimise falls.

The OT will also often accompany patients to assess whether they are safe to take public transport, go shopping or cook for themselves. This is often important for those with cognitive impairment who live in less than ideal settings (e.g. cluttered homes, caravans, homes in disrepair) or who have had difficulties in leaving the home. OTs can also advise carers on safe manual handling techniques; for example, for transfers or showering.

If a patient has an upper limb injury or reduced dexterity of the hands, OTs can design exercise programs for the hand and also offer assistive devices (e.g. tap turners, modified cutlery and kitchen implements) which can allow the patient to be independent in many activities of daily living.

The interaction between the physiotherapist and the OT can make a significant difference to the efficacy of both therapies. Co-ordination is the key to successful rehabilitation.

Psychologists

Cognitive behavioural therapy as undertaken by a trained psychologist (with a Masters Degree in Clinical Psychology) can have a significant impact in minimising falls and treating depression and anxiety. Also, collaboration with the physiotherapists can assist patients who have become fearful of exercising.

Fear of falling

Since most falls leading to fracture occur outdoors, it is understandable that people who fear falling may avoid outdoor activity. Fear of falling limits functional recovery after surgery for hip fracture perhaps more than pain or depression. It is a predictor of falls themselves[9] and is associated with lower life satisfaction and depressed mood.

Education about falls risk may not be sufficient to reduce anxiety and the rate of falls. Psychological treatment should emphasise the value of a realistic and adaptive approach to activities of daily living and community participation.[10] Graduated exposure covering a broad domain of activities, supported by cognitive behavioural therapy, will address anxiety and depression. Low levels of optimism and perceived control contribute to the fear of falls, and focusing on these feelings may be helpful.

Treatment for depression

The rate of depression among older people who have recently experienced significant illness requiring hospitalisation is about 38%, and the depression can persist for a significant period. Effective psychological treatments can include reversing depressive thinking habits, improving coping skills, reintroducing rewarding activities and improving relationships.[11]

Social workers

Following hospitalisation some patients may require permanent support with aspects of their personal care, domestic duties or managing their medication. There are frequently financial, emotional and social concerns that social workers are trained to address with families.

It is important to note that social workers are as yet not eligible for Medicare rebates through the allied health provisions of the Medicare Schedule. Social work services are currently only accessible through social work departments at public hospitals or community health centres.

Services for carers

Carers run the risk of exhausting themselves by attempting to provide care without adequate assistance. The government is committed to assisting older people to stay in their own homes and currently fund programs such as Home Care and Community Aged Care Packages (CACP), and services such as Meals on Wheels. These services can relieve some of the pressure on carers.

Home Care services may be provided in the person's house up to three times a week to assist with a variety of tasks including daily chores, personal care, meal preparation, laundry and/or domestic assistance.

Community Aged Care Packages offer a planned and managed package of services that are designed to meet the individual needs of the person. Community Aged Care Packages are co-ordinated by a specialist and provide assistance with physiotherapy, occupational therapy and nursing, as well as personal and domestic care.

Respite care offers the opportunity for the carer and the person being cared for to have a break. This may be for a few hours, a day or a few weeks. Day care respite is often provided at day care centres, community centres and some residential aged care homes.

In some cases a Transition Care Program is organised by the hospital on discharge to provide rehabilitation in the patient's home. The program usually lasts for 12 weeks, but may be able to be extended for a further six weeks in some cases. To be eligible, patients must be over 65 years of age, an inpatient of a hospital and have an assessment by an Aged Care Assessment Team.

Social isolation

Socially isolated patients, unlike other patients, do not have family members or many social supports on which to rely. They may need to be connected to transport services, such as community transport and/or day care centres, which may promote social activities. The culture and background of a person is important to keep in mind and many ethnic communities offer support services for isolated members.

The GP's role

Patients affected by deconditioning after a period of bed rest may present with a relative, a carer or alone, complaining of fatigue, falls, pain or simply a loss of independence. 'I can't do as much as I used to', 'I won't drive yet' and 'I haven't been able to leave the house since I left hospital' are common complaints from patients. The carer or relative might say that the patient needs to do more for him or herself or that the patient is sleeping excessively, is not his or her old self or has become fearful of being alone.

As a GP, you are in a position to rule out any intercurrent illnesses, including depression and anxiety, which of course will require a full history, examination and appropriate tests. It is important to note that many patients suffer silent illnesses during bed rest, such as stroke, heart disease and infection.

However, in cases where you do not find any obvious cause for the symptoms, you may want to put patients through a rehabilitation program in the community. In this way you will be able to treat their deconditioning and monitor their progress, clinically and through regular review by therapists and/or in your rooms.

Co-ordinating rehabilitation in the community

Rehabilitation is a co-ordinated multidisciplinary treatment program that is goal oriented. This means that you need to make a plan with the patient and your local allied health professionals about what you want to achieve (Table 3) and in what time frame.

It is important that patients agree to participate, the allied health professionals agree the goals are realistic and the carers understand that they will be doing less for the patients as they attempt to do more for themselves.

GP Management Plan and Team Care Arrangement

While the GP may have access to a rehabilitation physician or geriatrician for inpatient or outpatient rehabilitation, many may chose to undertake the rehabilitation in the community using both the GP Management Plan (GPMP) and Team Care Arrangement (TCA) provisions of the Medicare Schedule (item numbers 721 to 731). These items are part of the Enhanced Primary Care Program, which provides a Medicare rebate for five allied health visits per year. If anxiety or depression is the major component of the patient's presentation, GPs may decide to add in a Mental Health Care Plan to provide up to 12 episodes of psychological treatment over and above the original five that could be funded by the Enhanced Primary Care Program.

Table 3. Common goals for rehabilitation after deconditioning

- Independent mobility and stair climbing
- Independence in activities of daily living (e.g. toileting, dressing, showering, cooking, cleaning, driving, shopping, gardening)
- Improvements in fatigue (using a visual analogue scale)
- Improvements in mood, fear and avoidance behaviour and anxiety*
- Decreased dependence on home services or carers
- Improved levels of participation (being able to leave the home regularly and engage in community or family activities)
- Decreased falls risk
- Minimised carer stress

* Using the Depression Anxiety and Stress Scale (DASS) of Lovibond et al. Available online: www2.psy.unsw.edu.au/groups/dass

Case conference

Once you have decided to start a community based rehabilitation program via a Team Care Arrangement, a case conference is needed (Medicare item numbers 740 to 765). This can be via a phone link up with or without the patient in the room. At the case conference the patient's goals and treatment will be discussed (see the box on page 43 for a documentation template) and the number and type of funded sessions will be decided upon. (For veterans there is separate and more generous funding for allied health services.) This community case conference forms the beginning of the Team Care Arrangement.

In most cases three sessions with a physiotherapist, one with an OT and one with a psychologist will be necessary. However, if the psychologist feels the patient needs cognitive behavioural therapy for anxiety or depression, or fall

Team Care Arrangement documentation

The goals selected for the patient should be recorded at the first case conference, and the patient's progress should be recorded at the mid-program and final case conferences.

Patient's name _____ Date of birth _____

Therapist's goal	Apply goal? (Y/N)	Outcome measure	Progress (achieved, ongoing or abandoned)	
			Mid-program case conference	Final case conference
Physiotherapist				
Independent walking		Timed up and go		
Improved lower limb strength		Walking speed		
Improved balance		Berg balance score		
Improved cardiovascular endurance		Six-minute walk test		
Home exercise program developed		Program developed		
Other				
Occupational therapist				
Independent transfers*		Independent transfers		
Decrease environmental hazards for falls		Home visit and assessment		
Independent shopping and use of public transport		Shopping/transport trial		
Safety in domestic activities		Cooking trial		
Improve upper limb strength		Upper limb resistance exercise		
Improve dexterity		Nine-hole peg test		
Other				
Social worker				
Support services arranged		Carer and patient assessment		
Improved access to community		Community links and activities established		
Decrease social isolation**		Geriatric Depression, Anxiety and Stress Score		
Other				
Psychologist				
Improve major depression/anxiety		Psychological assessment		
Mental Health Care Plan developed		Plan developed		
Dietitian				
Improve nutrition		Dietitian review		

* May also be undertaken by a physiotherapist. ** May also be undertaken by a psychologist.

anxiety, a Mental Health Care Plan may need to be activated.

Mid-program review

It is wise to review the patient in your rooms about four to six weeks into the program to assess whether the goals are being met and if the patient is being compliant. This community case conference can occur again through a phone link up, with or without the patient in the room.

In some cases the patient may not be responding due to a hitherto concealed or indolent disease. In this case the patient will need to be re-examined and investigated. However, in most cases the patient will have been progressing well and therapists are able to offer rich and detailed information on progress and assessment. It is at this stage that a Mental Health Care Plan may need to be activated. Documentation needs to be reviewed and in some cases the intensity of therapy may need to be increased. If significant problems arise, such as the patient fails to attend, therapy assessment reveals hidden problems (e.g. a home visit may reveal dangerous living conditions, squalor or significant cognitive impairment) or therapists feel the patient cannot manage at home and is unlikely to respond to the treatment, inpatient treatment may be required in a rehabilitation unit.

Mostly, however, the patient is responding, the therapists are optimistic and the goals look achievable but might need to be fine tuned. For example, independent mobility as a goal may need to be changed to independent mobility with a walking stick.

Final review

In the final case conference, held at 10 to 12 weeks, the same phone link up occurs and the goals are reviewed. Hopefully they have all been achieved and the patient is set up to continue exercises in the home or is linked up with ongoing community services. In some instances the patient will wish to continue the therapy beyond this time; however, the only way this can be undertaken is by self-funding or referral to public outpatient programs through the local geriatric or rehabilitation service.

In any case, patients who have undertaken a rehabilitation program in the community should ideally be followed up three to six months later to ensure that they have maintained their achieved goals. It is at this stage that the Team Care Arrangement and GP Management Plan can be reviewed (Medicare items 725 and 727).

Conclusion

The future of hospital care is in flux, over the next 10 years there are likely to be an assortment of programs to minimise bed rest and hospital length of stay and almost all of these programs will include an element of rehabilitation in the community. GPs are poised to be at the helm of these innovations. Medicare support is in place, hospitals are groaning with the current demand and certainly evidence points to the facts that patients are safer being treated at home by well supported care teams. MT

Teach us to live that we may dread,
Unnecessary time in bed.
Get people up and we may save,
Our patients from an early grave.
Dr Richard Asher 1965.

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