NHS Education for Scotland

NHS Training for
Physiotherapy Support Workers

Workbook 3

Balance re-education

NHS SCOTLAND

Contents

Workbook 3

Balance re-education

3.1 Aim

The aim of this workbook is to provide the Healthcare Support Worker (HCSW) with the knowledge, understanding and skills to effectively manage a patient with impaired balance.

3.2 Learning outcomes

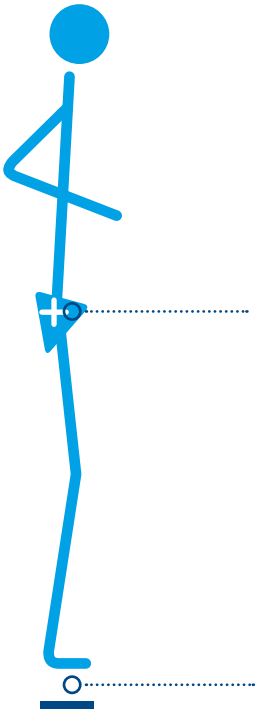
By the end of this workbook you will be able to:

- Explain what is meant by the term base of support, why it is important in relation to balance and the consequences for patients when balance is impaired.
- Apply this knowledge to conduct a balance re-education programme within your scope of practice.
- Recognise and take appropriate action to ensure safety of patients with disordered balance.

3.3 What is balance?

Balance can be described as:

- The ability to control the centre of gravity and keep it within the base of support
- The ability to stabilise some body parts whilst others move
- The ability to adjust to forces that may destabilise the body



Centre of gravity and base of support

To understand the concept of balance in the human body, it is useful to know a little about biomechanics. The centre of gravity of the body is the point through which the force of the weight of the body passes.

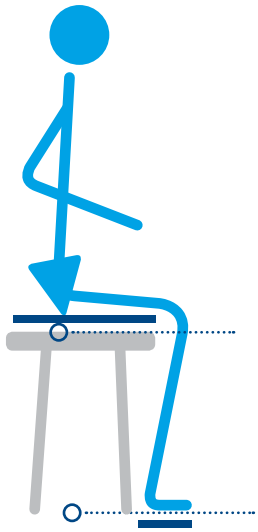
The centre of gravity lies at approximately the level of the second sacral vertebra when the person is the upright position.

Centre of gravity

When an individual is moving around, for example when bending down, reaching or running, they move the centre of gravity around too. The individual remains in an upright position although their balance changes, if they are able to adjust their posture as they move, to keep their centre of gravity within their base of support.

The base of support is the supporting area beneath the body. It includes the parts of the body in direct contact with the ground or supporting surface, but also includes the area enclosed by the contact points.

The smaller the base of support, the larger the balance requirement



In standing the base of support is just the feet. The base of support is therefore small. It is made smaller still, if the person then stands onto tip-toe.

The smaller the base of support, the more the muscles of the body need to adjust and work to keep the centre of gravity within the base of support. This adjustment is necessary to keep the body relatively stable and to stop the person from falling over when balance is threatened.

Sitting on a stool, the base of support is larger, with the bottom, thighs and feet all touching the supporting surface. In this position, less muscle activity is necessary to keep the body relatively stable.

When the individual leans against the back of the chair, the base of support is even larger. Here the centre of gravity is within a large base of support, therefore it takes less effort to sit supported in the chair than unsupported. Here the person is very stable.

Evidence

In your own words, describe what is meant by the term balance:
Describe the effect that a small base of support has on the stability of the body
Describe the effect that a large base of support has on the stability of the body
What prevents us from falling over when our stability is threatened?

3.4 Adapting our base of support for stability

Toddlers and the elderly tend to adopt a wide stance – legs apart and feet turned out, in order to increase their stability when walking. Walking aids, such as frames and sticks, have a similar effect.

Activity

Why do you think that widening your stance and using walking aids increases stability?

What happens when an individual has difficulty keeping the centre of gravity within the base of support?

If an individual has difficulty in adjusting their posture, say with Parkinson's Disease, where muscles are slow to respond, they may have difficulty in resisting gravity to stay upright.

Additionally, because they have quite slow postural adjustments, their centre of gravity may fall towards the edge of the base of support as they try to move.

They may be unable to resist forces that are likely to make them fall such as gravity, or someone bumping them as they walk past.

Because they do not have the ability to work their muscles to make the necessary adjustments of posture to stay upright, they are unable to adjust their posture to keep their centre of gravity within their base of support and may fall over.

3.5 What prompts us to make balance and postural adjustments?

When we move ourselves: internal threats to balance

When we move one part of our body, other parts adjust to counteract this movement to keep us stable and to stop us from falling over.

Activity

Reach across a table to grasp a coffee cup. What happens to your balance when you do?

When you reach, it is obvious that the muscles of your arm work to lift your arm and reach.

What you perhaps are not aware of, is that the muscles of your trunk and legs also work to counterbalance the movement of your arm, and to prevent you from falling over as you reach. The same happens when you reach to the floor to pick up an object, or when you reach to a cupboard above your head.

Try reaching for an object that is just beyond arm's length. As you do so, focus on your body, not the arm that is reaching.

Can you tell where in your trunk and legs the muscles are working?

You may feel the muscles in your back working, and also those that push your foot to the floor, perhaps too the muscles behind your knees.

These muscles are known to work in preparation of you reaching to adjust your posture and to minimise the amount of movement required. The aim is to keep your centre of gravity firmly within your base of support with as little effort as possible!

Activity

Patients need to be able to adjust balance to perform everyday tasks such as reaching for clothing from the wardrobe, getting cups out of an overhead cupboard, placing waste in the bin and picking up objects from the floor.

Sometimes therapists recognise in collaboration with a patient that it is important for the patient to practice this sort of activity as therapy.

Can you think of other activities that individuals that you are involved in treating need to undertake that might require this sort of postural adjustment?

When we need to react to external threats to balance

Not only do we need to maintain our centre of gravity within our base of support, and to stabilise some body parts as we move, we also need to adjust balance in response to factors over which we have no control.

These factors may be generated by others, or by the environment in which we are moving.

- **Postural adjustments prompted by others** Forces generated by others can be seen when walking through a crowded shopping centre. Here we need to adjust our balance to avoid bumping into other shoppers, and to avoid being knocked over by them.
- **Postural adjustments prompted by our environment** To understand forces generated by ourselves, think about the adjustments that we need to make for example when walking on a slippy surface or walking on a slope or on uneven ground. In these situations, we also need to adjust our balance to avoid falling over.

Activity

Think about what activities you might practice to assist patients who need to be able to respond to the destabilising forces that occur in the normal environment of everyday life.

Describe some therapeutic activities that you have observed or assisted with that would help patients deal with these forces.

Why do you think it important for therapy to address balance?

3.6 Consequences for patients when balance is impaired

Patients may develop impaired balance as a consequence of many diseases or disorders.

Muscle weakness as a result of disuse or disease may impair balance and the ability to make appropriate postural adjustments. Neurological diseases such as stroke, head injury and Parkinson's disease are common causes of impaired balance.

Sensory impairments in which patients lose the sense of touch, joint movement or sight, or in which the inner-ear mechanism for balance – the **vestibular apparatus** – is affected may all have consequences that influence balance.

Postural adjustments are critical to any movement, therefore the individual may experience difficulty in:

- standing still
- walking
- stair climbing
- standing up or sitting down
- reaching for an object in sitting or standing
- dealing with external forces – being bumped, or standing up in a moving bus

Activity

Can you think of other ways in which impaired balance might affect an individual?

Patients may compensate for loss of balance

They may use one of several strategies to assist them to feel safer and to ensure that their balance is not threatened.

- An individual may widen his base of support by widening his stance and by turning his feet out.
- The individual may use his hands to hold onto a stable object, such as a table or chair or cling to another person.
- The individual may stiffen the body, to contract more muscle groups than normal. This co-contraction may increase stability, but limits movement.
- Individuals may avoid activities that threaten balance, such as moving their feet to become closer to an object, instead of reaching.

Activity

Describe a patient that you have dealt with who has had difficulty with balance activities.

What did you observe that indicated his balance was poor?

What did the patient do to compensate for poor balance?

Your supervising therapist will verify that you are able to recognise that the balance of an individual is impaired, and to describe how the patient compensates for this.

3.7 Assisting patients in balance re-education activities

Patients should be assisted in appropriate therapeutic balance re-education activities, agreed with the therapist and the patient.

Training

It is possible to retrain patients to adjust their balance to cope with:
- movements that they initiate themselves
- environmental threats

Assessment of balance

You may be involved in assisting the therapist and the patient to assess the patient's balance.

Risk assessment

Clearly, since patients with balance impairment may be at risk of falling, it is important to undertake risk assessment before getting the patient up to perform activities

Assessing balance

Balance is normally assessed by:

- Watching the patient as he performs movements such as reaching in different directions and to the floor, turning to look behind and during walking.
- Walking backwards, sideways or over different surfaces which will indicate to the therapist and the patient what difficulties exist and how best to address them in therapy.

Evidence

Describe your role in assisting with balance assessment of a patient.

What did you do and why?
What went well?
Anything you would do differently next time?
How did you ensure safety of the patient?
What observations were you able to contribute to the assessment?

3.8 Training of balance in standing and reaching

Patients need to be able to adjust balance to perform everyday tasks such as reaching for clothing from the wardrobe, getting cups out of an overhead cupboard, placing waste in the bin and picking up objects from the floor.

Sometimes therapists recognise in collaboration with a patient that it is important for the patient to practice this sort of activity as therapy.

For most patients therefore, balance training can be addressed through training of activities of everyday life, such as standing up, sitting down, reaching to pick up objects and walking.

Activities may need to be modified to start with. For example, to train reaching, an object can be placed just at arm's length to start, and can then be moved further and further away, so that the person is reaching towards and controlling his balance as he reaches the edge of his base of support.

Other activities might include:

- looking up at the ceiling
- turning to look behind without moving the feet
- reaching forwards to take an object
- reaching sideways
- reaching backwards
- reaching down to the floor or to a stool

These activities can be progressed by:

- changing to walk-standing or by bringing the feet closer together to provide a smaller base of support
- increasing the object's distance from the body
- increasing the weight of the object
- increasing the size of the object so two hands must be used
- increasing the speed at which the patient performs the activity
- requiring a quick response, such as catching a ball

Evidence

Provide an example from a patient with whom you and the therapist have agreed that re-education of standing or sitting balance is important.

Describe your involvement in re-education of these tasks.

What safety precautions did you take?
What activities did you assist the patient to undertake?
What were the outcomes of the activities?
Anything you would do differently next time?

Training of balance during walking

The therapist will indicate which activities are appropriate for balance training during walking, but these may include:

- walking on different surfaces
- change of direction in response to a command
- walking backwards, sideways
- walking in a crowded hallway
- Negotiating obstacles

Whilst ensuring that the patient is undertaking the activities effectively, you must be able to ensure that the patient is safe.

Evidence

Provide details of your treatment of a patient with whom you and the therapist have agreed that re-education of balance during walking is important. Describe your involvement in re-education of balance in walking.

Describe the patient
What safety precautions did you take?
What activities did you assist the patient to undertake?
What were the outcomes of the activities
Anything you would do differently next time?

Progression of balance activities

Balance activities may be progressed when the patient is able to easily perform initial activities.

Standing activities can be progressed by:

- changing to walk-standing or by bringing the feet closer together to provide a smaller base of support
- increasing the object's distance from the body
- increasing the weight of the object
- increasing the size of the object so two hands must be used
- increasing the speed at which the patient performs the activity
- requiring a quick response, such as catching a ball

Walking activities can be progressed by:

- increasing speed
- introducing more rapid directional changes
- taking the patient outside to uneven surfaces
- walking on tip-toe, or one foot directly in front of another
- removing walking aids, provided it is safe to do so
- providing a less supportive walking aid

Evidence

Provide an example from a patient whom you have assisted to progress their balance activities.

How did you recognise that it was appropriate to consider progressing the activities?
Describe how you, the patient and the therapist decided on the appropriate activities for progression, including safety considerations.
What action did you take and what was the outcome?
Anything you would do differently next time?

Acknowledgements
NHS Tayside

3.9 Balance re-education workbook completion

Your supervising physiotherapist will sign your portfolio to indicate that you have completed this workbook successfully

Objective	Physiotherapist's signature	Date
Describe what is meant by the term balance		
Demonstrate your ability to recognise when a patient's balance is impaired and describe how they compensate for this		
Contribute to the assessment of balance of an individual		
Safely assist a patient to undertake re-education of standing or sitting balance		
Safely assist a patient to undertake balance re-education in walking		
Successfully and safely carry out progressive balance re-education activities		

Support worker (name)
Support worker's signature
Physiotherapist (name)
Physiotherapist's signature
Date

3.10 Balance re-education reflection

Suggested KSF Dimensions: C3, HWB2, HWB7
This form should be placed in the appropriate section of your portfolio.

What did you learn from this module?
How has this influenced your work?
Date module completed

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