The Clinician's Seating Handbook

A Reference Guide for Clinical Seating Provision

By Martina Tierney
Occupational Therapist

Includes advice on moving & handling, paediatrics, pressure injury staging guidelines & much more.

Edition 6.1

Seating Matters

Contents

"Each day I understand more and more the impact of seating on people's lives. For these people, the quality of their chair determines the quality of their life."

Martina Tierney

Occupational Therapist

About the Author

Martina Tierney qualified as an Occupational Therapist in 1983 and since that time has worked in various settings including rehabilitation, mental health, nursing homes and community care.

Martina specialised in the provision of specialist seating throughout her career and set up the first privately run Occupational Therapy assessment centre in Northern Ireland, providing advice, assessments and equipment to people with disabilities throughout Ireland.

Today, Seating Matters supplies governments and hospital systems throughout the world and has developed partnerships with healthcare facilities to help them reduce cost of care.

We have grown, but we have stayed true to our core value: to improve and enhance the quality of life of patients through clinical excellence.

Martina and Seating Matters

As Clinical Director at Seating Matters, Martina oversees our team working on education and clinical research. We are changing the world through healthcare seating by improving the knowledge available to the healthcare community and by continually pushing the boundaries of seating innovations. We carry out Education Workshops, Lunch & Learns and present our latest research at conferences worldwide to pass this knowledge on to therapists and healthcare staff.

The Seating Matters Series

The Clinician's Seating Handbook is part of a series of publications that will bring the latest research and clinical knowledge to you in manageable, understandable and clear ways. Email us at contact@seatingmatters.com to be added to our email list and be kept up to date with new publications.

Further Training

The Clinician's Seating Handbook will walk you through some of the main things to consider while doing a Seating Assessment. If you are interested in raising your seating IQ, Seating Matters run in-depth Education Workshops around the world. This training programme has been endorsed by the Royal College of Occupational Therapists.

You can visit **www.seatingmatters.com** for further information.

Email us at **contact@seatingmatters.com** to be added to our email list which will keep you up to date with Education Workshops in your region.

Martina Tierney
Occupational Therapist

Introduction

I am passionate about seating, and I am thrilled that you have begun to learn more about this important topic by purchasing The Clinician's Seating Handbook.

Each day I realise more and more the impact of seating on people's lives. There are many factors which affect the seated person - especially someone who is sitting for prolonged periods of time or someone with a disability.

For these people, the quality of their chair determines the quality of their life. Throughout my long career as an Occupational Therapist, I have aspired to transform the way we think about seating. But even today, too many people continue to endure constant pain because of poor posture. Too many people suffer a reduced quality of life from completely avoidable pressure injuries. Too much money is being spent by our health services on reacting to these problems after it is too late. Proper seating can solve each of these problems and save our health services much needed money in the process.

> "Imagine doing a long haul flight every single day of your life. That is what people are going through in their own homes, hospitals or care facilities."

It is sometimes hard for an able-bodied person to understand what it feels like to be sitting for long periods of time and how your life is affected if you are not sitting in the right chair. This is because the able-bodied person can re-adjust and change their position before getting too uncomfortable, which is often an unconscious movement.

To give some understanding of what it feels like, I often use the example of a long-haul flight. Think about how uncomfortable you get when you are flying for three or more hours at a time. You will even get up and walk around as often as possible to reduce the pain and to become more comfortable. This shows that a standard chair is not suitable for everyone for long-term sitting. Now imagine doing a long-haul flight every day. Yes, every single day of your life! That is what some people are going through every day in their own homes, hospitals or care facilities. Many of these people haven't got the ability to change their own position and are not provided with a seating assessment, never mind an appropriate chair.

That is why getting the right chair for the right person is so important. To change the world of healthcare seating, we are increasing the knowledge available to us and sharing it with you. The Clinician's Seating Handbook is one way of doing that by walking you through the basics of posture, pressure management and the correct assessment and provision of seating.

The Clinician's Seating Handbook is part of the Seating Matters Series of publications on the most up to date information made accessible to you.

Our clinical team complete extensive research, studies, trials and literature reviews to find the most relevant information to help change the world through healthcare seating. The publications will help you stay informed, develop best practice and improve patient care.

Martina Tierney

Occupational Therapist

A Note on Terminology

The author uses the term **“pressure injury”** (PI) throughout this publication to reflect the terminology adopted by the National Pressure Ulcer Advisory Panel (NPUAP) and the Pan Pacific Pressure Injury Alliance (PPPIA) to describe what are often referred to as pressure ulcers and sometimes bed sores in different countries around the world.

The term **“pressure injuries”** indicates that a pressure injury is considered to be preventable and recognises that ulcers are only one form of a pressure injury. [1] If you are unfamiliar with this terminology, please refer to official publications from your appropriate local or national body regarding the terminology and staging guidelines adopted in your country.

‘Pressure injury’ replaces previous terms to indicate that a pressure injury is avoidable.

While understanding that the term **“pressure injuries”** is not in use in all regions where this book is in circulation at the time of printing, the author made a conscious decision to use this terminology.

By using this term, the author aims to further create a positive impact on patients and help change the perception and attitudes towards our common goal of improving patient care.

In addition, the author uses the term **“facilities”**, in reference to hospitals, nursing homes and other organisations which care for a large number of patients. Therefore, the practical steps outlined within the guide can apply to any of these organisations and the application of this knowledge will help with significant reductions in these painful, traumatic and costly injuries.

It is understood that spelling differs based on geographical region. Therefore, the author has made a conscious decision to adopt British spelling in most cases.

Why does Seating Matter?

What is Good Sitting Posture?

By approximately ten months of age, a typically developing infant demonstrates good sitting posture. The infant sits with the pelvis and spine in a straight line with the head balanced over the body, with both hands free to interact with the environment. This is an efficient posture, i.e., it requires the least amount of exertion to maintain.

Why is it Important?

The position of the pelvis is the basis for good sitting posture. If it is tilted to the front, back, or side due to a postural deformity or inadequate support, the muscles in the hips, trunk and neck must work harder to keep the person from falling over. If they are unable to maintain a midline position this can lead to poor posture.

Posture can Kill

Improper posture can lead to imbalanced weight distribution which may eventually lead to pressure injuries and other, sometimes fatal complications.

How can Proper Seating Help?

The ability to reposition is often diminished in the very old, the malnourished and those with acute illness. [2, 3] If gravity pulls the person into a poor sitting position over a period of time, it can be difficult for them to bring their body back to midline to correct that posture. Support from the correct chair can reduce poor sitting posture and help with positive repositioning for pressure management.

> “A seating assessment can make a major difference to comfort, positioning and quality of life for years to come.”

Why do a Seating Assessment?

Don’t underestimate the importance of a thorough, clinical seating assessment. The clinician carrying out the assessment should identify the needs of that person and help inform their decision on the type of chair they require to meet their needs, both now and in the future.

Think about that long haul flight. The pain you endure during that flight gives you some idea of the hard work that goes into sitting all day, every day.

For the person being assessed, the time spent doing a Seating Assessment can make a major difference to their comfort, positioning and quality of life for years to come.

Redressing the Balance Between Bed & Chair

In the past, for a person who is at risk of pressure injuries it has been common practice for the focus to be placed solely on the bed and the mattress. For this reason, clinical practice, research and technology has become highly developed in this area and as a result, high risk patients tended to be nursed primarily in highly functional beds and mattresses. These therapeutic surfaces are often of a high quality but are not the entire solution.

Imagine being in bed for a prolonged period of time – hours, days, weeks, perhaps even months or years. This can have a significant cognitive and psychological impact on a person.

Early Mobilisation

Today, there is a shift towards early mobilisation as an important aspect of the rehabilitation process. The prescription of correct seating can enable early mobilisation by supporting the patient to get out of bed earlier. As a result, patients can experience less muscle atrophy, increased strength and conditioning with the effect of reducing their length of stay and improving patient flow.

Evidence indicates that prolonged bed rest may not be the sole form of prevention. [5] When therapeutic seating is used correctly, there is much improvement in a patient's functioning to aid recovery and improve their health. Physiologically, a person is able to swallow, digest and eliminate in a sitting posture with ease, much more so than when they are lying in bed. In addition, improved sitting posture can aid respiration, with oxygen levels recorded as higher in users of therapeutic seating as opposed to those in standard seating. [6] Improved oxygen saturation levels allow tissues to be more oxygenated, therefore reducing the risk of skin breakdown.

Good sitting posture can facilitate a better quality of life. It improves social interaction and self-image, giving significant psychological benefits. Sitting upright will also help improve a person's functional ability for simple tasks such as eating and drinking which aids nutrition, hydration and productivity.

A 24-Hour Package of Care

A lack of therapeutic seating for daytime use could be counterproductive for patients on a pressure management system for supine positioning. The use of clinical, therapeutic seating throughout the day ensures that it is possible for prevention and healing to occur regardless of where the patient is located. This shift towards providing clinical, therapeutic seating through the day should be seen as a compliment to the use of therapeutic mattresses and beds as it allows prevention, treatment and healing to continue while in a seated position.

Building the Evidence-Base

Due to a lack of available evidence on this topic, research and guidance was required on the potential benefits if patients were to be provided with specialist chairs designed with pressure management features and materials. To redress this balance in research and evidence, Martina Tierney and the Ulster University have partnered to complete a KTP research project in order to generate evidence-based practice and guidance, focusing on the effectiveness of specialist chairs in the prevention and reduction of pressure injuries.

For greater detail on this clinical study, you can visit **seatingmatters.com** or attend a certified Seating Matters workshop.

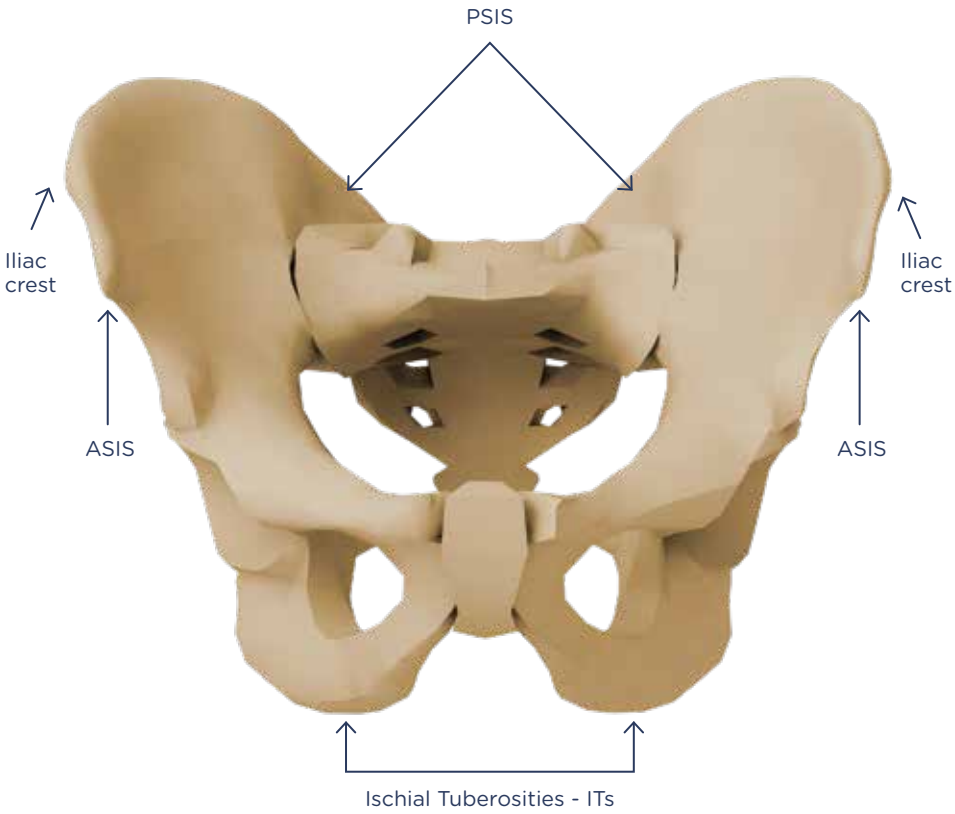
The Pelvis, Postures & Spinal Presentations

The Pelvis

Good posture in terms of seating, and therefore a Seating Assessment, begins with the pelvis. During an assessment, the Anterior Superior Iliac Spine (ASIS) and the Posterior Superior Iliac Spine (PSIS) should be your indicators for the position of the pelvis.

The position of these points in space and in relation to each other is the basis from which you start your seating assessment. It is important to locate these points on the pelvis and record their position at the various stages of the assessment.

The Pelvis



The Pelvis, Postures & Spinal Presentations

Normal & Abnormal Posture

In order to maintain a good seated position, the ASIS and the PSIS must be level, with the pelvis in minimal anterior pelvic tilt. This enables weight to be taken evenly through both Ischial Tuberosities (ITs) with the head and spine balanced and aligned above the hips. This is considered normal posture.

This posture, however, is difficult to maintain due to the force of gravity. Postural control requires an effectively functioning neuromuscular and musculoskeletal system, i.e.

- **Intact Nervous System.**
- **Healthy Muscles.**
- **Flexible Joints.**

Some physical and medical conditions can lead to a deterioration of this posture to an abnormal posture.

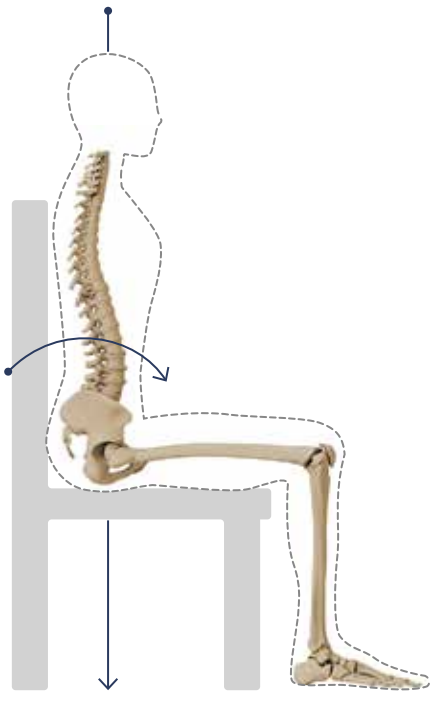
Fixed or Flexible?

An abnormal posture can be either fixed or flexible and it is vital that you establish this during an assessment. If the posture is fixed, you must accommodate this posture using the functions available to you in the chair. This will help to slow down deterioration of this abnormal posture.

If the posture is flexible or partially correctable, you can attempt to correct this posture using the chair. This will bring the person into a better seating position and improve their functional ability while preventing or slowing down deterioration of this posture.

Normal Sitting Posture

ASIS and PSIS level with pelvis in minimum anterior tilt.



Head aligned over hips

The Pelvis, Postures & Spinal Presentations

Posterior Pelvic Tilt

Commonly referred to as “sacral sitting”, this is identified by the PSIS becoming lower than the ASIS.

May cause difficulty in swallowing, communicating and breathing.

Can cause development of a kyphotic posture and sliding from the chair.

Increased loading on the sacrum and less pressure going through the ITs can often lead to sacral pressure injuries.

Pressure injuries can occur on the apex of the spine due to kyphosis and on the heels as a result of the person ‘anchoring’ themselves to reduce sliding.

Clinical Causes

Sliding forward in seat.

Limited hip flexion.

Abnormal tone.

Trunk muscles unable to hold spine upright against gravity.

Obesity.

Tight hamstrings*.

Technical Causes

Seat depth too long.

Inadequate foot loading caused by seat to floor height too high.

Footplate too low.

Back too vertical.

Armrest too low.

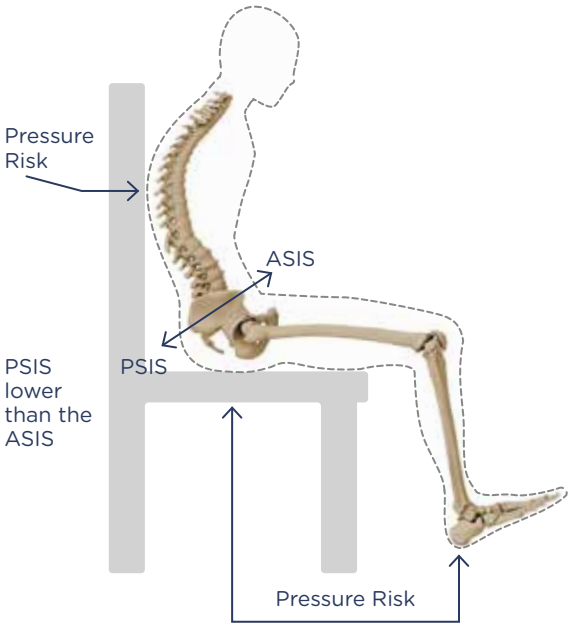
Seat depth too short.

Inadequate femoral thigh loading.

* Impact of Hamstrings on Seating

Posterior Pelvic Tilt

* For more information on the impact on the hamstrings, see page 15.



The Pelvis, Postures & Spinal Presentations

Anterior Pelvic Tilt

A less common posture, this is identified by the PSIS becoming higher than the ASIS.

- This is a common posture while sitting at a desk.
- As the ITs push backwards, the weight is on the pubic region, creating a risk of pressure injuries.
- Can cause bladder issues, spinal muscle fatigue and back pain.

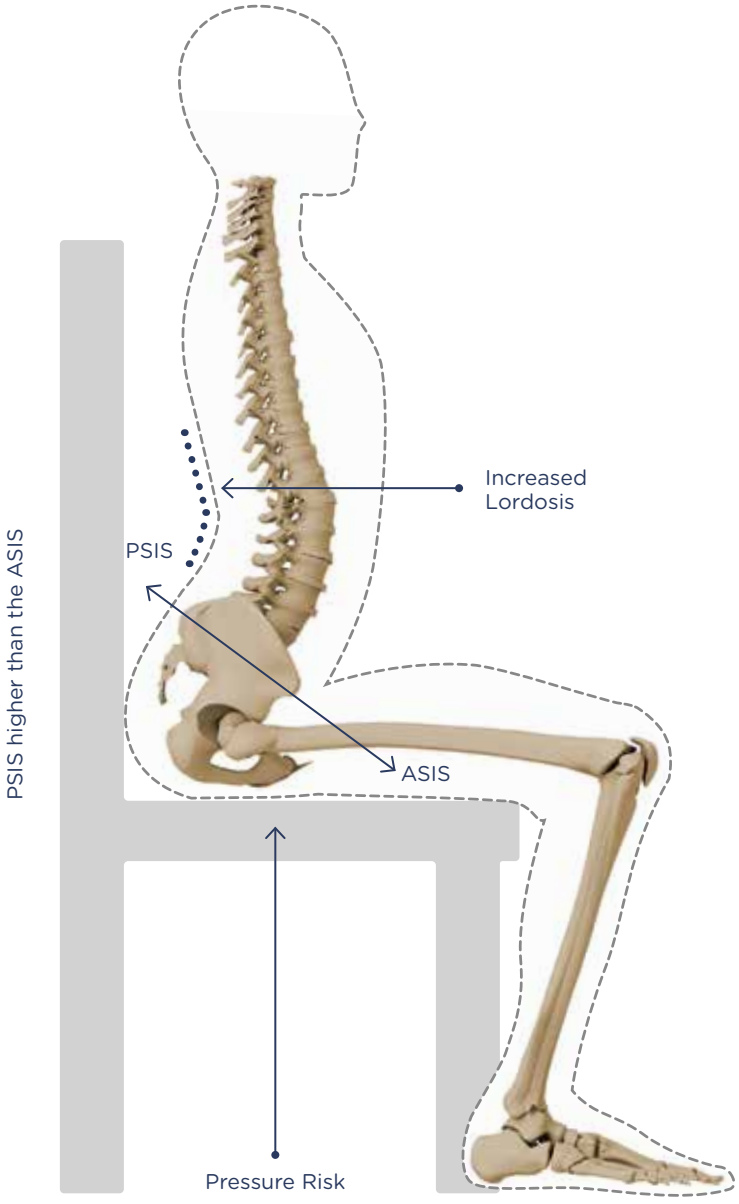
Clinical Causes

- Weakened abdominal muscles.
- Obesity.
- Increased lordosis.
- Tight hip flexors.

Technical Causes

- Anterior slope on seat.
- Back too vertical.
- Excessive lumbar contour.

Anterior Pelvic Tilt



The Pelvis, Postures & Spinal Presentations

Pelvic Obliquity

A pelvic obliquity is characterised by one side of the pelvis being higher than the other.

Weight is taken unevenly through the ITs and can cause associated pressure issues on the lower IT.

Postural issues resulting from this can be scoliosis and issues with the ribcage and organs on the affected side.

Clinical Causes

- Scoliosis.
- Hip dislocation or subluxation.

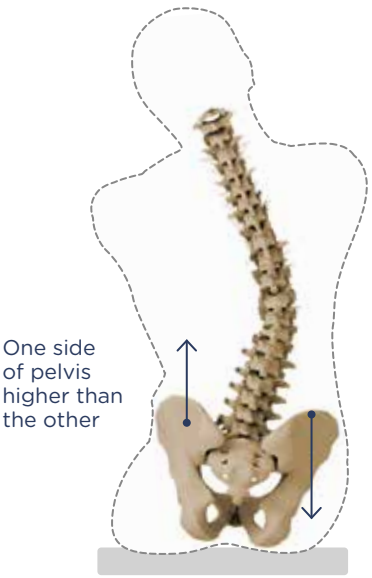
Asymmetry in;

- Muscle strength.
- Bone structures.
- Hip flexion,
- Muscle tone.

Technical causes

- No solid base of support i.e., unstable cushion or no baseboard.
- The person leans to one side to gain.
- Contact with the chair because their body has not been loaded / supported by the chair, ie;
  - Chair too wide.
  - Arm supports too low or too high.
  - Femurs & feet unsupported.

Pelvic Obliquity with Resultant Scoliosis



Pressure Risk

Pelvic Rotation

A pelvic rotation is characterised by one ASIS being in front of the other. The ASIS is named from the patient's perspective (see diagram) and a pelvic rotation is named according to the direction of rotation. Think of it as the direction of movement of a car in relation to the steering wheel - if the right ASIS is forward, it is a left pelvic rotation and vice versa.

- It is often present in those with a pelvic obliquity.
- Can lead to a windswept deformity.

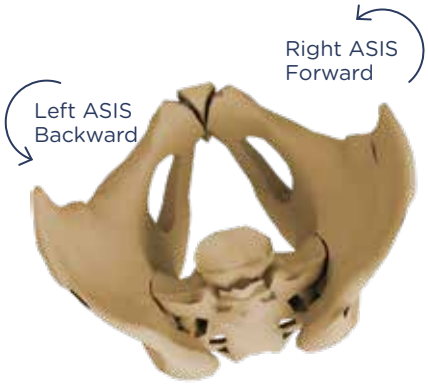
Clinical Causes

- Leg length discrepancy.
- Hip dislocation or subluxation.
- Asymmetrical hip flexion.
- Person is a unilateral foot propeller.
- Asymmetrical hip adduction.

Technical Causes

- Trunk not supported.
- Back rest does not support the posterior pelvis.
- Seat too wide.

Left Pelvic Rotation Right ASIS forward

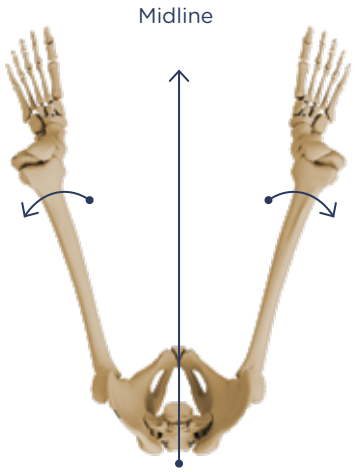


The Pelvis, Postures & Spinal Presentations

Abduction

Abduction is the movement of a limb away from its midpoint on the body.

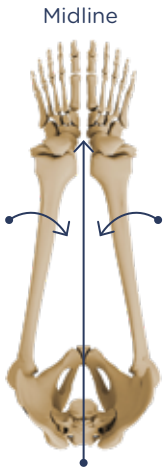
Tip - For clarity when verbally communicating this posture it is often useful to say “A-B-duction.”



Adduction

Adduction is the movement of a limb towards its midpoint on the body.

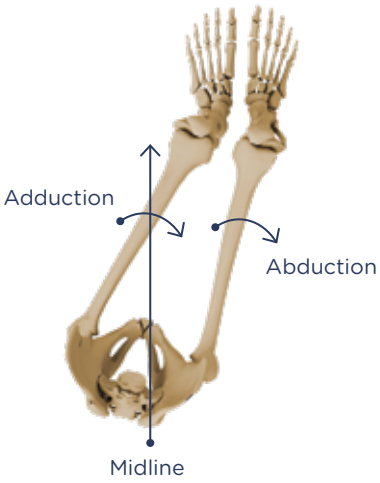
Tip - For clarity when verbally communicating this posture it is often useful to say “A-D-duction.”



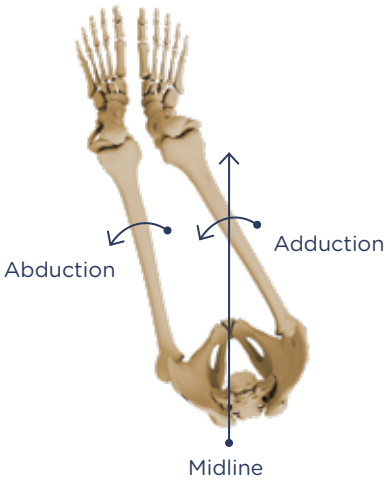
Windswept Hip Deformity

A windswept deformity is identified by the abduction and external rotation of one hip with the adduction and internal rotation of the other. It is named according to which side of the body the legs are windsweeping. May occur in association with; **hip dislocation, scoliosis, pelvic rotation.**

Right Windswept Deformity



Left Windswept Deformity



The Pelvis, Postures & Spinal Presentations

Lumbar Lordosis

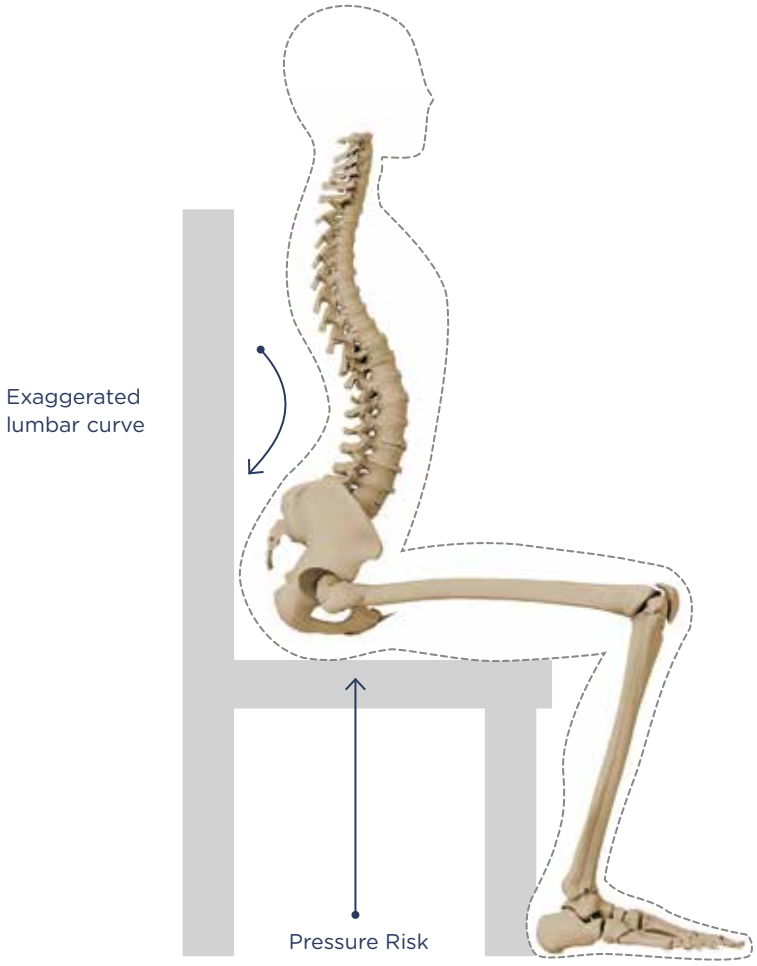
Lordosis is identified by an increased lumbar curve. It can be associated with;

- Anterior pelvic tilt.
- Increased tone in hip flexors.
- Weakened abdominals relative to extensors.

Spinal Presentations

There are three main spinal deformities in terms of sitting posture:

Lordosis of the Spine



The Pelvis, Postures & Spinal Presentations

Scoliosis

A scoliosis is identified by the “C” or “S” shaped spine and can be associated with;

- **Pelvic obliquity.**
- **Osteoporosis.**
- **Pelvic rotation.**

With a severe scoliosis there can be issues with the ribcage and with compression of internal organs.

Kyphosis

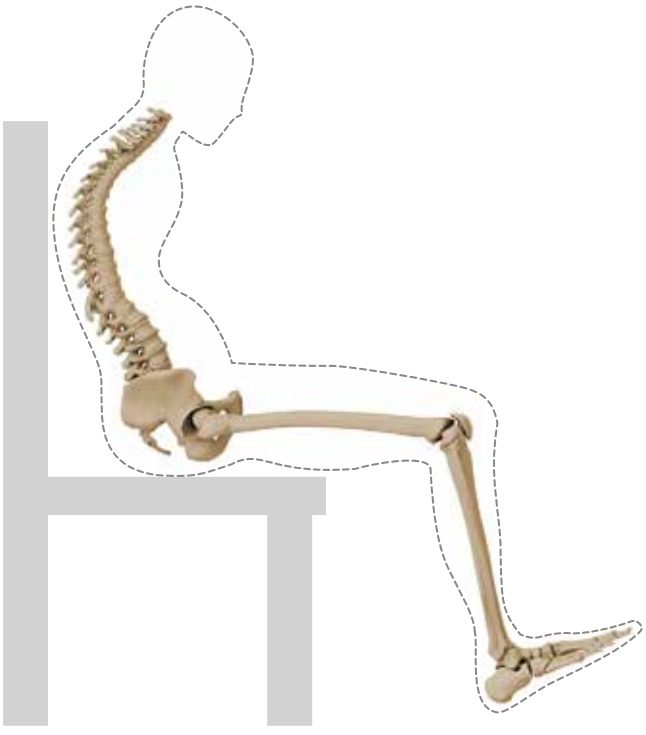
A kyphosis is identified by a marked curvature in the thoracic and/or cervical spine and can greatly reduce physiological functioning. It is associated with;

- **Posterior Pelvic Tilt.**
- **Osteoporosis.**

Pressure injuries can occur on the apex of the spine and on the heels if the person ‘anchors’ themselves to reduce sliding out of their chair.

Scoliotic Spine

Kyphotic Spine



The Impact of Seating on Hamstrings

The hamstring pulls over two joints: the hip and the knee, and they deserve special attention when it comes to seating.

In many patients, contracted, or tight hamstrings, can have a profound impact on the seated person. Although this is a common issue, it is often overlooked.

Limited Range of Movement

If, when testing the range of movement, you find that this is limited, or that the lower limb is in a fixed position, you must be careful of the position of the chair's leg rest mechanism.

If the leg rest is elevated beyond the limited range of movement of the lower limb, this can cause the person to be pulled into a posterior pelvic tilt position.

This greatly increases the risk of pressure injuries on the sacrum, the heels and even the back of the head. It can also encourage development of a kyphotic posture.

Accommodating Tight Hamstrings

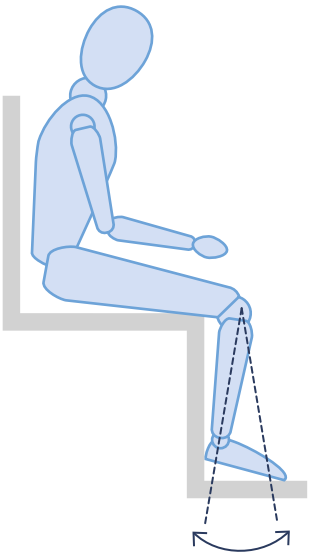
If the person has tight hamstrings, the contracted leg has to be accommodated. The leg rest must not be elevated beyond their range of movement.

In addition, there may need to be additional space underneath the seat cushion to allow the heels to come right back behind the knee.

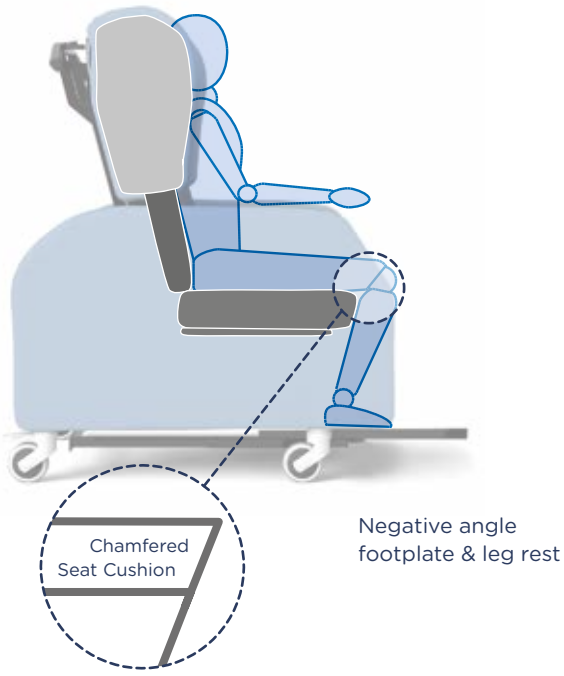
Remember

- Test for tight hamstrings.
- Do not elevate the leg rest if hamstrings are in a fixed position.
- Look for negative angle settings on chairs with leg rests or for space underneath the seat.

Limited Range of Movement



Chair with Negative Angle Footplate & Leg Rest



Seating Bariatric Patients

A Holistic Approach is Key

Seating bariatric patients can often present several challenges to both the patient and caregivers and this issue is much more complex than simply providing a wider chair.

The weight and size of the patient, limitations in mobility and independence combined with a lack of proper equipment could increase the risk of manual handling injuries, pressure damage and increased hospital stays. In terms of seating, postural support, pressure management and increased independence are important requirements that unfortunately are not available in many chairs for this patient group.

There are many details that need to be taken into consideration such as the weight of the client, the body proportions, physical dimensions, range of movement, mobility and transfers. The needs of the caregiver should also be incorporated into the selection of the chair.

Accommodating the Gluteal Shelf

The presence of a gluteal shelf, or bulbous gluteal region in some bariatric patients can make it more difficult to give patients the full back support that they need. The extra tissue in the posterior lumbar region often forces patients to sit forward in the chair, without proper support given to their legs and upper back. This position can be dangerous, causing long-term postural complications.

It can lead to instability in sitting and increased risk during sit-to-stand movements. It is important to seat bariatric patients in a chair which can accommodate the gluteal shelf while also giving upper body support. A chair with a removable cushion at the lumbar level to accommodate the gluteal shelf allows the patient to sit back into the chair, with their legs and back supported.
(See case study on Page 90).

A Suitable Seat Depth

A correct seat depth can give full support to the patient's legs and in some cases their abdomen. A proper seat depth increases their surface area contact with the chair, thereby reducing interface pressure. It can also reduce the effect of gravity pulling the body forward and thus decreasing the strain on the back musculature and spine that are constantly working to keep the patient upright.

Accommodating the Calves

A leg rest that retracts underneath the chair can accommodate larger calves and allow the patient to maintain a typical 90° knee flexion posture with their weight distributed evenly through the feet. In sitting, this reduces the risk of the patient having to rest their weight on his or her heels or toes, decreasing the risk of pressure injuries over the bonier areas in the feet.

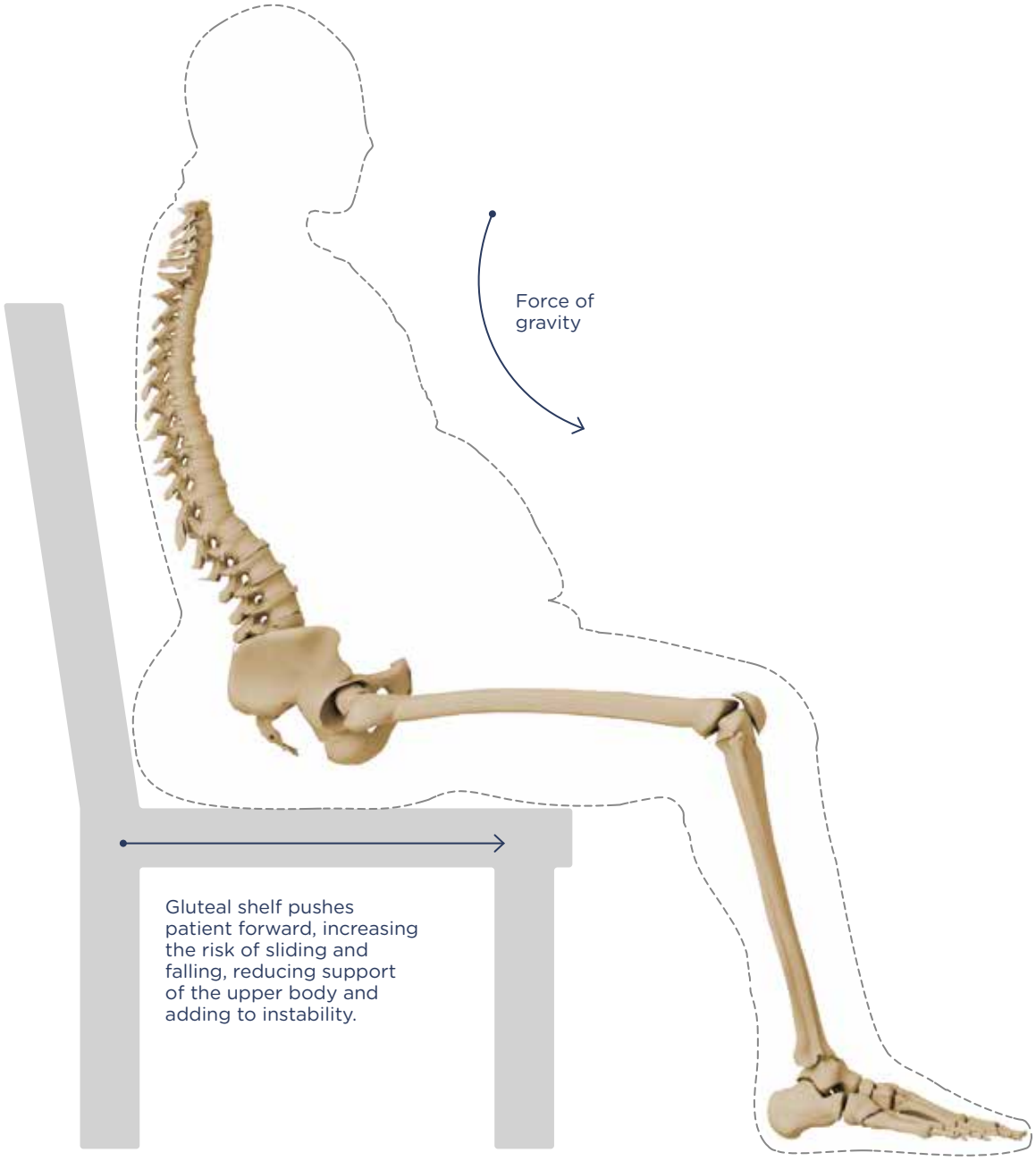
Assisting with Transfers

In sit to stand transfers, anterior tilt empowers the patient to be more independent and reduces the need for caregiver assistance and/or the use of patient lifts (hoist). By giving the patient more independence for safe transfers, he or she may feel better about the ability they have to care for themselves and may not be embarrassed about relying on others for help.

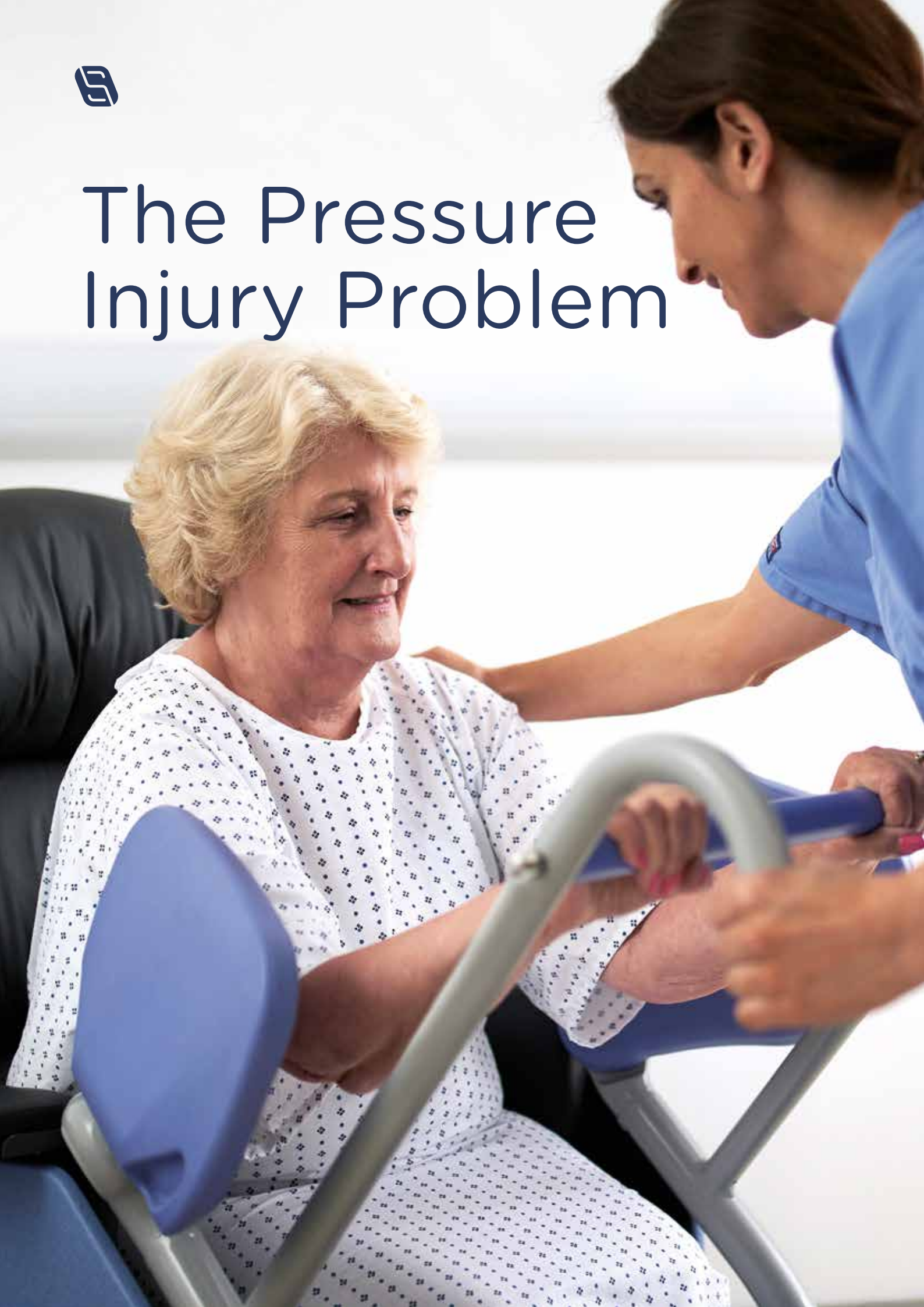
A chair which has removable arms will also help with transfers by giving caregivers more space to put a sling in place. If a patient is able to side-transfer, removing the arms will be an important feature to assist with this function.

By ensuring the chair's leg rest accommodates larger calves, the patient should be able to get their legs back to give a safer, stable sit-to-stand position. This position is sometimes called "Nose Over Toes".

Example of Poor Seating for a Bariatric Patient



The Pressure Injury Problem



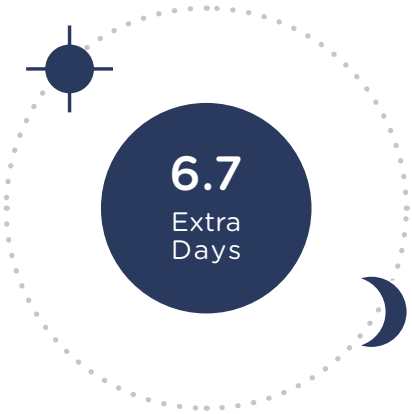
Pressure Injuries

What are the Risks?

Pressure injuries remain a common problem throughout healthcare systems. Prevalence among inpatients in hospital is 3% - 14%, although it can be as high as 70% in elderly inpatients with orthopaedic problems. In long term healthcare facilities 1.5% - 25% of patients develop pressure injuries. [7]

The experience of having a pressure injury can have a significant cognitive and psychological impact on the patient.

The ability to do even minor tasks like reading, writing, eating and drinking can be affected as well as decreased motivation, which can have an impact on the patient's rate of recovery.



Pressure Injuries Kill!

We often take for granted the huge impact that pressure injuries have on patients. In order to fully address this problem we must realise the seriousness of pressure injuries to the health and life of our patients.

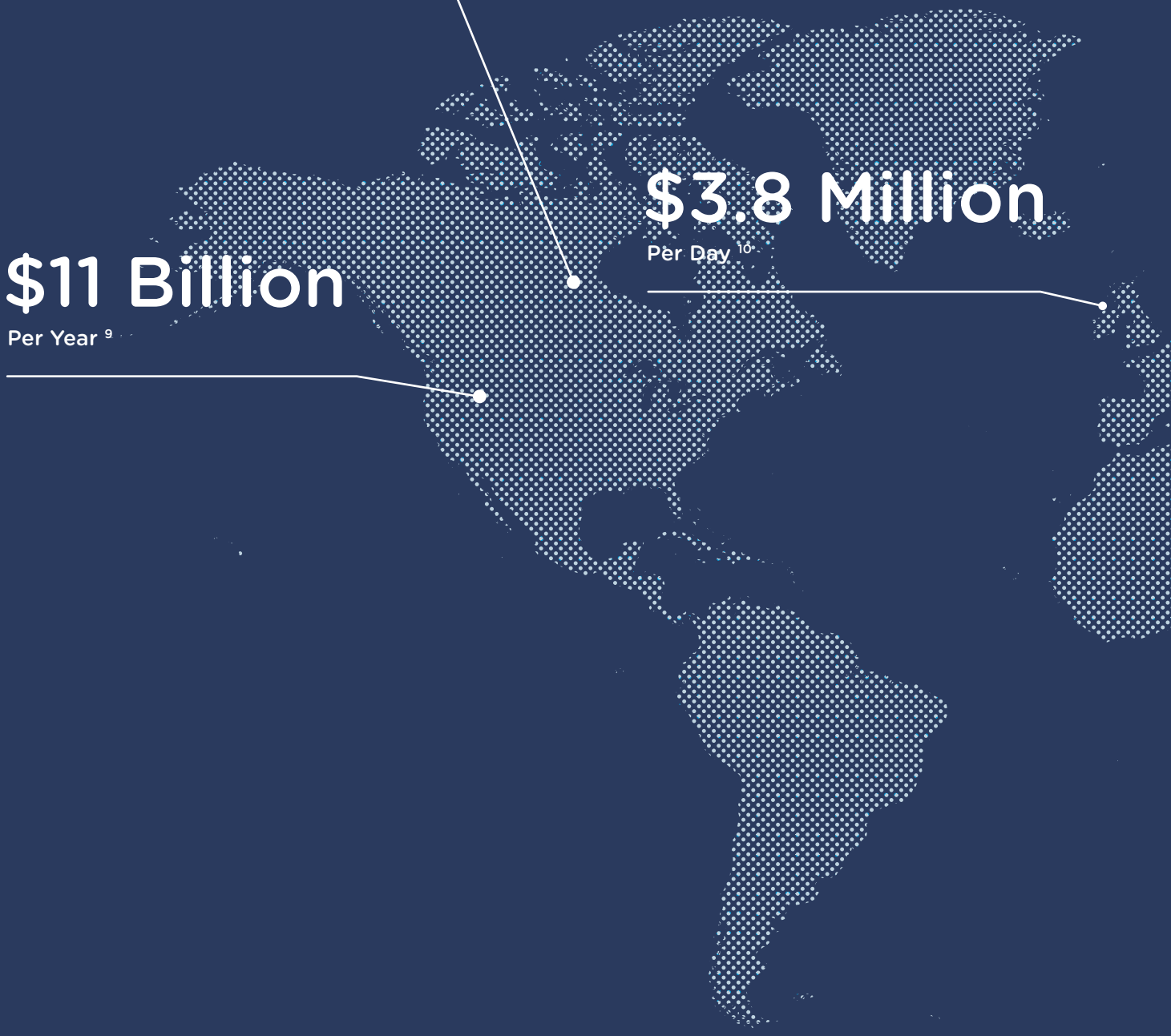
Pressue ulceration in elderly patients is associated with a fivefold increase in mortality, and in-hospital mortality in this group is between 25%-33%. [7]

Cost of Treating Pressure Injuries around the World

$44–90,000
Per Pressure Injury [8]

$11 Billion
Per Year [9]

$3.8 Million
Per Day [10]



Pressure injuries cause pain, discomfort and reduced quality of life to patients and represent a monumental cost to health and social care systems.

18.1%

Incidence of Pressure Injuries [11]

$2 Billion

Per Year [12]

The Cost of Pressure Injuries

The Human Cost

The suffering and pain associated with pressure injuries is often overlooked. Apart from the decreased quality of life that an individual suffers, both physiologically and psychologically, there are significant ongoing impacts to the person.

Pain, anxiety, an increased risk of infection and an increased likelihood of hospital admission are all outcomes that the patient must deal with following a pressure injury.

The Financial Cost

The total cost of treating pressure injuries can be up to 4% of a health system's total budget, costing billions annually. [13] Most of the costs incurred are a direct result of the additional nursing and care time, which includes dressing changes, patient repositioning and assessments. Also included are dressings, antibiotics, diagnostic tests, support surfaces and the increased length of stay and delayed discharge as a result of complications.

The Organisational Cost

This increased length of stay has significant impacts on the finances of the hospital system. Hospitals with high levels of pressure injuries will often experience;

1. **Increased length of stay -** The length of stay for a patient who gets a pressure injury in hospital is 7-10 days longer. [14, 15] This automatically increases the cost of care, the human impact on the patient and the availability of beds for other patients.

2. **Delayed discharges -** If complex equipment and a more involved package of care is now required to care for the patient in their home environment, this can take time to get established. If this is the reason for the increased length of stay while the patient is Medically Fit For Discharge, this can cause "Delayed Discharges" which can reflect poorly on the hospital's performance.

3. **Increased readmission rates -** If a patient were to acquire a pressure injury during their hospital stay, this can have an effect on their mobility and overall health which could lead to another medical episode such as an infection. Readmissions in such scenarios can reflect poorly on the quality metrics of the organisation.

4. **Penalties for the facility -** In some countries, insurance companies will not reimburse the facility for the cost of readmissions in relation to pressure injuries, meaning that the entire length of subsequent admissions are completely covered by the facility itself.

Medical Malpractice

Reported pressure injury rates likely underestimate the true scope of the pressure injury pandemic, as many cases are underreported due to concern that a pressure injury may be interpreted as negligent care. [16]

Medical Malpractice

The number of legal cases for medical malpractice are increasing. Such cases associated with the development of pressure injuries average $250,000 per settlement. [17] Where care facilities followed proper procedures, the settlement amounts were greatly reduced.

Factors that come under scrutiny in such legal cases are;

- The availability of modern equipment that is supported by clinical evidence to prove its effectiveness.
- Proper training and education of staff in prevention of pressure injuries.
- Record keeping and reporting of how equipment is being used and how staff are being trained.

Educating your clinical team with correct guidelines and reinforcing the importance of proper procedures will help to reduce the incidence of pressure injuries for your patients. This combined with proper assessment and the provision of a 24-hour package of care which includes both a mattress and a clinical, therapeutic chair, will serve to improve patient outcomes and reduce the cost of care.

If Pressure Injuries were Apples[18]

Stage 1 - Pressure Injury

Definition

Non-blanchable erythema of intact skin.

Think of the normal state of a delicious red apple. The red colour is something that will not go away. We can't "touch" a red apple and make the colour be less vibrant or make the colour go away. Just like a Stage 1 pressure injury, we can't take away the redness simply by touching it. It will not blanch because there are already signs of capillary compromise within the layers of the skin.

Stage 2 - Pressure Injury

Definition

Partial-thickness skin loss with exposed dermis.

The key here is that there is not a lot of depth to these wounds and that it is right at the layer of the dermis, the inner most layer of skin. Think of an apple being peeled. Just the layer of outside "skin" is being removed or impacted when we carefully peel an apple. The same superficial layer has been removed or compromised in a Stage 2 pressure injury. These wounds will not have slough, and they will be superficial in nature.

Stage 3 - Pressure Injury

Definition

Full-thickness loss of skin, in which adipose (fat) is visible in the injury and granulation tissue and epibole (rolled wound edges) are often present.

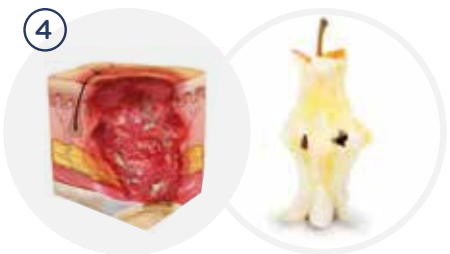
Think of what your apple looks like when you take a nice healthy bite out of it. The skin is gone, you are into the juicy "meat" of the apple. A Stage 3 pressure injury is similar. It's migrated into the subcutaneous tissue and there is usually depth to these wounds.

Stage 4 - Pressure Injury

Definition

Full-thickness skin and tissue loss with exposed or directly palpable fascia, muscle, tendon, ligament, cartilage or bone in the injury.

If you were to bite too far into your apple, you would get to the core, to the inner structure of that apple. This is what happens in a Stage 4 pressure injury. You are down to the inner structure under that subcutaneous layer.



Deep Tissue - Pressure Injury

Definition

Persistent non-blanchable deep red, maroon or purple discoloration.

What if your apple had a purple or dark spot on it? You wouldn't know just how "bad" that apple was underneath that spot. The skin looks intact, but you know that part of that apple is bad and is not good to eat. That's what happens with a suspected deep tissue injury. Just like an apple with a soft discoloured spot, a deep tissue injury presents with skin intact, but with a top layer of maroon or purple localised discoloration, letting you know that there is tissue damage underneath even though the skin is intact.

Unstageable - Pressure Injury

Definition

Obscured full-thickness skin and tissue loss. The base of the injury is covered by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed.

Think of a caramel-covered apple. That thick, tannish brown caramel completely coats the apple. Because of that caramel, we don't really know the state of the apple underneath. Just like an unstageable pressure injury, because of the slough or eschar obstructing the base of the wound, we don't know how deep it is, and therefore, we cannot stage it, and we consider it unstageable.

Medical Device Related - Pressure Injury

Definition

This describes an etiology i.e. resulting from the use of diagnostic or therapeutic devices. These should be staged using the staging system.

Mucosal Membrane - Pressure Injury

Definition

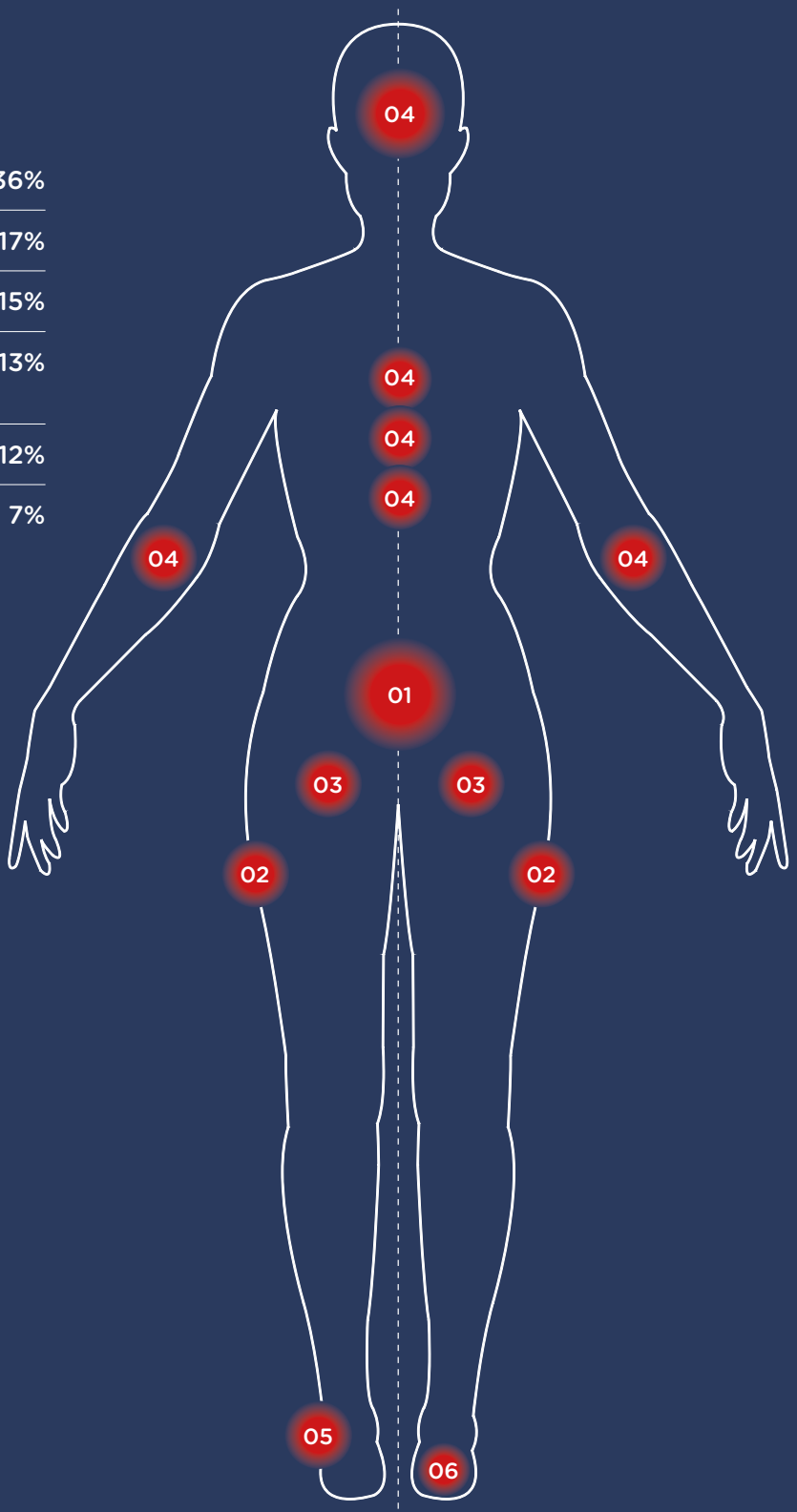
Found on mucous membranes with a history of medical device in use at the location of the injury. Due to the anatomy of the tissue these injuries cannot be staged.

Where do Pressure Injuries Occur?

Where do pressure injuries occur?

Below illustrates the most common locales and percentile risks of pressure injuries. [19]

01	Sacrum or Coccyx	**36%**
02	Trochanters	**17%**
03	Ischial Tuberosites	**15%**
04	Other (Back of Head, Elbows & Apex of Spine).	**13%**
05	Ankles	**12%**
06	Heels	**7%**



How are Pressure Injuries Formed?

How are they Formed?

It does not take a long period of time for a pressure injury to occur. Findings from studies done in the lying position indicate that pressure injuries under bony prominences very likely occur between the first hour and 4 to 6 hours after sustained loading. [20]

With poor posture or the incorrect chair, the risk can be greater in sitting. This publication and the other publications from Seating Matters will assist you in the correct provision of clinical, therapeutic seating to manage pressure and posture. The Seating Matters chairs are specifically designed by our clinical team to help meet these needs.

Pressure

In normal upright sitting, our weight is exerted as shown:

75%	through the buttocks & thighs.
19%	through the feet.
4%	through the back.
2%	through the arms. [21]

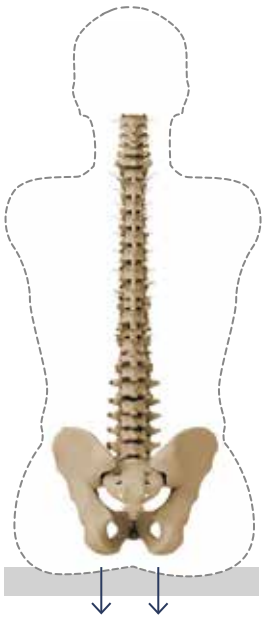
Weight distribution through the Ischial Tuberosities (ITs) should be equal. Even then, 75% of body weight is supported on only 8% of our body area. [22]

It is important to have the correct chair to provide pressure management and help to maintain good posture in sitting.

Pressure & Abnormal Posture

Posture and pressure injuries are inextricably linked. When a person sits in an abnormal posture, their weight may not be taken equally through the ITs. In a person with a pelvic obliquity for example, a greater percentage of their weight is channeled through the lower IT. This leads to higher interface pressure on this side, therefore increasing the possibility of a pressure injury occurring.

Normal Posture



Balanced weight Distribution through ITs

Abnormal Posture

Unbalanced weight Distribution through ITs

Friction, Shear, Moisture and Heat

Friction

Some friction is needed to prevent a person from sliding off the seat surface. However, too much friction can result in external tissue damage due to the skin sliding against the support surface. This is often a burn-like abrasion from rubbing against bed sheets or a seat cushion.

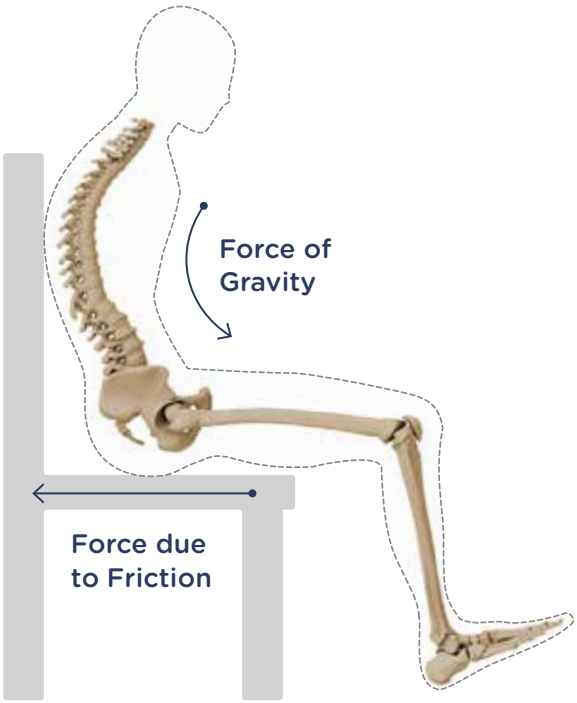
Shear

Shear occurs when friction holds the skin on a support surface while the skeleton moves over it. This stretches, thins and kinks blood vessels to occlude or reduce flow.

The movement can be caused by gravitational forces pulling the person towards the ground.

Moist and wet skin is more susceptible to shearing. [23]

Effects of Shear



Friction, Shear and Abnormal Posture

The problems with shear and friction increase with abnormal posture.

For example, for those with a posterior pelvic tilt, gravity will often pull the pelvis forward in the seat. If a non-slip seat surface is used or for other reasons, the skin cannot move with the pelvis, the person will experience shear.

The Effect of Moisture and Heat on the Skin

Managing the temperature and moisture levels of the skin is critical for maintaining skin integrity and preventing breakdown. EPUAP suggest that protecting the skin from exposure to excessive moisture with a barrier product will reduce the risk of pressure damage. [9]

The relative humidity of the area in and around the skin and support surface also has a great impact on the epidermis, the outermost layer of skin. As the humidity and temperature between the skin and the surface increase, the metabolic demands to maintain the skin integrity increase but the strength [24] and durability of the skin decreases quicker than the demands can be met. [25]

Other Factors

Other factors you need to look at when identifying the risk for pressure injuries include moisture, heat, disease, poor nutrition and circulation problems.

The Impact of Fabric Selection on Pressure Injury

How can a Fabric Help?

The surface and material a person is sitting on is incredibly important in reducing the risk of pressure injury. Some fabrics are designed specifically for pressure care settings and are widely used in healthcare environments. One company which produces many of the fabrics used in pressure care settings is Dartex Coatings Ltd, part of Trelleborg Engineered Coated Fabrics, but in the clinical sphere, there is inadequate knowledge of which specific product types from this company are the most effective for pressure injury prevention.

Building the Evidence Base

To establish the efficacy of the various cushion coverings as a method to reduce moisture and heat at the surface of the skin, Seating Matters worked with Dartex Coatings on a study titled "The Impact of Dartex Fabric choice measuring Humidity of Microclimate Fabric v Performance Fabric in Clinical Seating". [26]

This study looked at two product types within the Dartex range: Dartex Microclimate (MIC200) and the Dartex Performance (PER200). Both are used as breathable, waterproof covers for seat cushions. For the purposes of the study, relative absolute humidity and temperature were measured on various parts of the body to analyse the level of moisture from the two materials at the interface between a patient and the seat cushion, and inside the seat cushion.

Humidity is the amount of water vapour present in gas. Absolute humidity is the mass of water vapour that a given volume of gas can carry as a set temperature. [26] By measuring relative humidity and temperature, one can calculate the absolute humidity. The study investigated the role that different seating fabrics can have in influencing humidity levels in clinical seating, therefore reducing moisture levels. The fabric was tested using participants who sat in Seating Matters clinical, therapeutic seating.

Result

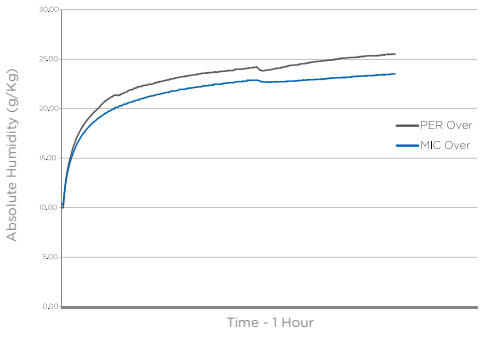
In several cases, the highly moisture vapour permeable fabric, MIC200 was shown to reduce the humidity measured between the patient and the seat cushion to a greater degree than the PER200 fabric. The humidity was also reduced when a patient changed posture.

Impact on Patient Care

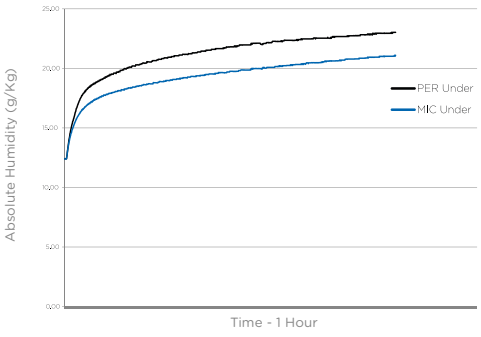
Ensure patients have the opportunity to reposition and change posture as frequently as possible. This could be achieved by a weight shift within the chair, transferring out of the seat or through the use of tilt in space.

In the instance that 'Dartex' is cited as the material covering, ascertain which particular type of Dartex is used. This study has demonstrated MIC200 as a better option for a person with an increased risk of pressure injury.

Absolute Humidity Average - Over



Absolute Humidity Average - Under



Why do Patients still have Pressure Injuries?

Prevalence rates of pressure injuries continue to be a problem in all healthcare sectors. In acute settings 3 - 14% patients are at risk of developing a pressure injury with this increasing to as high as 70% in elderly patients with orthopaedic problems. In long term healthcare facilites 1.5 - 25% of patients develop pressure injuries. [7]

Unfortunately, we have become so accustomed to treating pressure injuries in clinical settings that they are seen as inevitable and unavoidable.

> "Pressure injuries can occur in under two hours."

Lack of Understanding

A pressure injury is certainly a complex issue. Some of the factors affecting pressure injuries include increased moisture and heat, nutrition and mobility issues, diminished sensation in some patients and even the clothing that the person is wearing.

Pressure injuries can occur over a very short time period, in some cases in under two hours [27] and identifying the location of the patient and the time of occurrence does not always happen. This together with continued confusion around the pressure injury staging, adds to the complexity and lack of understanding as to causation and therefore possible steps towards prevention of pressure injuries.

Over-Reliance on Bed and Mattress

Another major factor in pressure injury occurrence is the over-reliance on the bed and the mattress, also known as a 'therapeutic surface'.

The current emphasis on the reduction or prevention of pressure injuries is synonymous with providing high-tech mattresses and cushions with little thought given to the chair the person sits on all day.

In the past, there have been significant investments in bed and mattress technology. This has resulted in huge leaps forward in this technology and the research surrounding it. In many facilities patients are provided with a highly functional mattress with excellent pressure management features.

However, the mattress is only part of the solution. It can be very appropriate for restorative sleep during the night but imagine being in bed for a prolonged period of time – hours, days, weeks, perhaps even months or years. For the patient, this can have a significant cognitive and psychological impact.

The ability to do even minor tasks is diminished – reading, writing and eating food becomes more challenging. Physically, complications can include contractures, muscle atrophy, urinary tract infections, pneumonia, anorexia, constipation, and bowel impaction.

> "After 3-5 weeks of bedrest, almost half the normal strength of muscle is lost."

A study by Norton and Sibbald (2004) showed that cognitive and psychosocial complications of bed rest can include depression, learned helplessness, perceptual changes, and fatigue. [5] Moreover, the literature does not contain evidence supporting the use of bed rest to facilitate healing of pressure injuries.

In addition, this can lead to muscle atrophy "and a loss of muscle strength at a rate of around 12% a week" and "after 3-5 weeks of bedrest, almost half the normal strength of muscle is lost." [28]

Unproven, Untested Seating

Standard chairs used in most hospitals and care facilities were never intended to be used for lengthy periods of time or for those with or at risk of pressure injuries.

Many patients sit out for 6, 8 or 10 hours per day and some spend more time in a chair than in bed. Therefore, a singular focus on the mattress and bed to prevent or reduce pressure injuries only serves to address part of the problem.

If patients continue to sit in chairs that are inappropriate, not supportive and provide no therapeutic or clinical benefit, they could actually contribute to an increase in pressure injuries and may be counterintuitive to pressure management that has been achieved by the bed and mattress.

The Four Principles of Effective, Clinical Seating™

When carrying out a seating assessment, there are several key points which must be addressed to help manage pressure or reduce the risk of pressure injury development.

When considering pressure management in seating, it is common to think only about the cushion on the chair. It is the most predominant element and often the first and only step used to address pressure management in seating.

To achieve effective pressure management in seating, The Four Principles of Effective, Clinical Seating™ should be incorporated.

These are;

1. **Load the body.**
2. **Provide postural support.**
3. **Allow effective repositioning.**
4. **Use a proper cushion.**

1 Loading the Body

When you increase an individual's surface area contact with their chair, you reduce the pressure exerted through any point. It is imperative that the chair is measured and adjusted to the size and shape of the patient and adjusted to load their body properly. By maximising the amount of contact the patient can have with the chair through the feet, legs, femurs, arms and back, you are ensuring that pressure is being evenly distributed, thus reducing the amount of pressure through any given part of the body. For example, when loaded properly, the feet take 19% [21] of the body's weight in seating. If there is no footplate on your chair, or the feet are incorrectly loaded, this 19% of weight will be going through the buttocks and thighs instead, therefore increasing weight, pressure and risk in this area.

2 Providing Postural Support

Martina Tierney often says, "pressure and posture are inextricably linked" and it has been shown that better posture has a direct link to improved pressure management. For example, a person with a scoliosis and leaning to the left over their chair will have greater weight going through one side of their pelvis. Due to this unbalanced weight distribution, they will have an increased risk of skin breakdown under that side of their body.

Proper support on the left side will help to stabilise the patient in a midline posture and equalise the distribution of pressure through the body, rather than it being focused on a smaller area. To this end, the correct use of lateral and head supports will ensure improved posture, balanced loading and therefore reduced risk of pressure injury.

③ Effective Repositioning

The International Guidelines recommend to reposition all individuals with or at risk of pressure injuries on an individualised schedule, unless contraindicated. [52]

Repositioning can be accomplished by a change in the seated position, lifting the body off the weight bearing area or by standing. This can take a lot of energy, work and time, and in some cases, this leads to a patient not getting adequate or regular weight shifts.

Research shows that 45° tilt "maximises the potential for significant blood flow increases and pressure reduction" by allowing the patient to completely off-load their pelvis and allow re-oxygenation of the tissue. [29] With caregiver or user-operated 45° tilt in a chair, it is much easier to reposition the patient periodically and thus facilitate effective weight shifts. If 45° of tilt is not appropriate or suitable for a patient based on an assessment, 30° of tilt will also give a degree of repositioning.

④ The Cushion

There are ranges of cushions on the market to provide different levels of support, postural alignment and for pressure management. In seating, it is important to be able to select different cushions to meet the individual needs of that person.

As standard, all Seating Matters chairs come with a visco-memory foam cushion. It is made up of two layers of foam – the top layer allowing immersion and envelopment of bony prominences like the pelvis, and the bottom layer giving a stable base of support. This cushion performs very well for many patients but in many cases, a secondary cushion is prescribed by a wound care clinician. In these cases, it is important that your chair has the ability to have a removeable cushion and a solid base board to hold the new cushion in place.

Cushion coverings should be made from multi-directional stretch fabrics to prevent hammocking. These fabrics should be breathable to prevent excessive moisture on the skin.

See page 29 for more information on specific fabric coverings.

Falls Prevention and Restraint

Many patients who use clinical, therapeutic seating are also those who are in high-risk categories for falls. Falls which cause injury most commonly occur in those aged over 65 with two-thirds of falls being among those aged 80 years and above. [30]

Conditions Making You More Likely to Fall:

- Lower body weakness.
- Difficulty with ambulation.
- Poor balance or vestibular issues.
- Visual impairments.
- Polypharmacy and certain medicines.
- Environmental factors.
- Vitamin D deficiency.
- Previous history of falls.

One out of every five falls cause a broken bone or head injury [31, 32] with the wrist and hip being particularly vulnerable. In fact, 95% of hip fractures, which are all-too frequent among older adults, are caused by falls. [33] Falls are also the most common cause of traumatic brain injury. [34]

3 Million
ED admissions per year related to falls [35]

50 Billion
Per year total medical costs related to falls. 75% covered by Medicare and Medicaid [36]

255 Thousand
Fall related admissions in ED per year

435 Million
Yearly cost to the NHS

240 Thousand
Falls reported in acute and mental health facilities due to safety issues [30]

Falls Prevention Through Seating

For those at risk for falls, proper seating can greatly improve their quality of life and potentially decrease the chances of falling. For those with conditions related to falls, such as broken wrist or hip where mobility is an issue, proper seating can provide a safe place to recuperate without the added risk of acquiring a pressure injury.

Hip Contractures

Some patients will slide and fall from their chair because of an incorrect back angle on the seat. If a patient has a fixed angle at the hips which is not accommodated by the back angle of the chair, they may have a tendency to slide down the seat. If, however, the chair has an adjustable back angle recline, which can be altered and locked to the correct position, this will reduce the likelihood of the patient sliding and falling.

Transfers

For mobile patients with decreased lower extremity strength or for those with balance or vestibular issues, care should be taken in assessing the optimal transfer method to reduce falls. Specialist therapists and clinicians can provide individual assessments to determine what is safe for a patient. For those with whom it is safe to stand transfer from their chair, an anterior tilt function can assist them in safely performing the sit to stand transfer. Anterior tilt can help get the feet closer to the floor and provide a degree of forward momentum to get into a standing position. Use two or more people when appropriate to reduce the risk of falling.

Postural Support

Some falls happen as a result of a persons reduced postural control. If a patient has poor sitting balance and head control, they can lean and fall to the side of their chair. Having a chair with appropriate, or adjustable, armrests can help to mitigate this risk. In addition, lateral, shoulder and head supports can be used to maintain an upright sitting balance.

Fear of Falling

Many people who have experienced a fall, even if they are not injured, become afraid of falling which in turn can lead to inactivity which will again increase their risk of falling. This person becomes weaker and deconditioned through their lack of activity. When they do attempt to mobilise, they are then less able to move and adapt to their environment and are more likely to fall again. It becomes a never-ending cycle, causing an overall decline in strength and balance reactions and eventually a fall that causes significant harm.[37]

Restraint

The issue of restraint as a solution to patient falls is a contentious one. Often, regulations and guidelines have changed and will continue to change, based on local experiences, new research or shifting attitudes towards this issue. The decision to use belts, harnesses, trays and other forms of restraint is typically made through balancing two noble ideals. One is to maximise the liberty of the individual and the other is to ensure the safety of the patient and caregiver.

If it is deemed to be appropriate to use a restraint by those with a responsibility of care and in line with local and national guidelines, certain items can increase the safety of specific patients. Lap belts can reduce the risk of falling or sliding from a chair during transport. Pelvic belts and harnesses or 4-point chest belts can reduce the risk of a patient thrusting themselves from a chair if they experience, for example, vigorous involuntary movements.

Another feature that can be employed is the use of a deep-seated position. Often this is preferred as it can be used without a physical belt to hold a patient in position. The deep seat of an **Atlanta**™ chair for example, allows a person to sit in a safe, padded position during a period of agitation, but then be brought up to a comfortable position where they can interact with their surrounds during other periods of the day.

Early Mobilisation

Early mobilisation as soon as medically safe during a recovery from critical illness has been shown to improve long term outcomes for the patient, decrease repositioning needs, expedite discharge and reduce re-admissions.

The prescription of correct seating as part of the treatment package often enables early mobilisation by supporting the patient to get out of bed earlier and therefore positively impacts their clinical outcome.

Reducing Healthcare Costs

If a person remains in bed, their mobilisation can be delayed. This can lead to many secondary complications including pressure injuries and an increased length of stay.

Considering the daily average cost for a hospital stay is £941/$2,742 per day. [38, 39] The financial impact of a delayed discharge or increased hospital stay can be detrimental for a facility, but primarily we need to focus on the impact on a patient's health and quality of life. In fact, mortality rates in hospitals, in the elderly with a presuure injury are between 25-33% and pressureulceration is associated with a fivefold increase in mortality in this group. [7]

To expedite your patients' rehabilitation and recovery you should aim to introduce seating at the earliest stage possible to aid their treatment. With improved mobility and reduced dependency, patients can then be transferred from an Intensive Care Unit (ICU) to a High Dependency Unit (HDU) or Step Down Unit (SDU).

By providing care in these lower dependency units, the cost of care is drastically decreased.

Muscle Breakdown

Bed rest results in a loss of lean muscle mass (sarcopenia) as individual muscle groups atrophy. This is accompanied by a decline in skeletal muscle strength at a rate of around 12% a week. [28]

Therefore, encouraging the patient to sit in a chair as early as possible into their treatment can be a key factor in order to preserve muscle strength.

The effect of systematic early mobilisation in mechanically ventilated adult ICU patients has shown benefits vs late mobilisation in terms of muscle strength and physical function. [50]

Increased Independence & Improved Health

When a patient is confined to a bed, their ability to do minor tasks is inhibited and can result in cognitive, psychological and physiological complications.

Early mobilisation has also shown trends towards improved patient outcomes in terms of duration of mechanical ventilation, ICU length of stay and hospital length of stay. [51]

If the chair is accurately prescribed it can contribute to the prevention of the patient sliding or falling and reduce manual handling for staff. As a result, the patient can hopefully restore their previous level of independence and ability to complete functional tasks such as reaching for a drink, feeding themselves or reading the newspaper.

Physiologically, a patient's digestion, elimination and respiration will also be positively impacted, which has numerous health benefits.

Psychological Wellbeing & Speed of Recovery

Spending the majority of your time in bed can understandably lead to a decrease in motivation and have a dramatic impact on recovery.

Providing a patient with the ability to sit out of bed can have overwhelming benefits on the patient's psychological wellbeing, their dignity and confidence. As a result, they will start to feel better mentally and be more motivated to interact with staff members, family and other patients. The impact on speed of recovery can be life changing.

Some Key Benefits of Early Mobilisation

- **Quicker discharge from ICU or High Dependency Units to Step Down Units, reducing healthcare costs.**
- **Positive impact on overall health and wellbeing.**
- **Increased functional ability and increased independence.**
- **Improved approach to pressure management, reducing risk of pressure injuries.**
- **Maintenance of muscle mass and strength.**
- **Improved social interaction, communication, inclusion and increased motivation. In addition, family members are often happier to see their loved one out of bed and sitting comfortably.**

Using Chairs to Encourage Early Mobilisation:

Thorough Seating Assessments and the correct use of clinical, therapeutic seating can help keep patients safe and secure, reducing the need for time spent in bed. This can help with reducing pressure injuries, providing comfort and overall aiding a quicker recovery, a better quality of care and improve patient outcomes.

The use of tilt in space can allow for semi-sitting to be achieved. This refers to a position midway between bed rest and upright sitting. If the patient does not have adequate core strength to maintain an upright position in a standard chair, tilt in space can improve their sitting balance and help in the rehabilitation process.

Seating Matters chairs are designed to support transfers using hoists, patient lifts, stand aids, side transfers and standing transfers. This can be beneficial to the patients as they begin their rehabilitation process and can support continued use of therapeutic seating as they improve and regain their functional independence.

It is also important for clinical, therapeutic seating to be used in the initial stages of rehabilitation to support the use of and to be compatible with devices such as oxygen tanks, feeding tubes, IV poles etc.

The option of a removable cushion facilitates continued use of a support surface which is appropriate for the patient, for example the use of an air alternating cushion, while continuing to achieve early mobilisation and seating goals. Should the patients' risk of pressure injury change as they progress through their intervention, the support surface can be altered accordingly.

Safe Patient Handling & Transfers

It is important to know different techniques that will assist in safe patient transfers. The techniques you use can reduce the risk of injury and ensure that you are applying the best clinical practices. It is important to assess the client's abilities and choose the most appropriate hoist/patient lifter that is suitable for their needs and compatible with their seating. Training is essential
before you attempt to transfer a patient. *

There is a range of standing and lifting equipment available to patients which can;

- Aid a standing transfer with minimal caregiver assistance;
- Provide higher-level support for those who can weight bear through their feet, or;
- Totally encapsulate the person in a lifting sling to mechanically lift them from their seat using a hoist, patient lift of sling lifter.

Levels of Physical Assistance:

- **Independent:** Patient does not require any assistance with transfers.
- **Supervision:** Patient requires a therapist to observe throughout the completion of the transfer.
- **Contact guard:** Patient requires the therapist to remain in close contact with the patient to complete the task.
- **Minimal assist:** Patient requires 25% assistance from the therapist to complete the task.
- **Moderate assist:** Patient requires 50% assistance from the therapist(s) to complete the task.
- **Maximal assist:** Patient requires 75% of assistance from the therapist(s) to complete the task.
- **Dependent:** Patient is unable to complete the task in any way and requires the therapist(s) to do all of the work.

Transfer Guidelines

- Evaluate the patient's level of cognition and mobility. If necessary, get another therapist to assist.
- Obtain all equipment prior to starting the transfer.
- Demonstrate and verbally describe the steps of the transfer. If necessary, break it down into steps.
- Position yourself correctly around the patient and maintain proper body mechanics and a wide base of support throughout the transfer.
- Use manual contact to guide the patient through his or her own participation in the transfer.

Note: In some areas, this includes using a safety belt. Please follow local protocol guidelines with the use of a safety belt. *

Types of Transfers:

Dependent
- Hoist.
- Two- or three-person dependent lift.
- Squat pivot transfer.

Assisted transfers
- Stand aid.
- Sliding board.
- Stand Pivot/Stand Step.

Note that these are not universal transfers. Be sure to follow local guidelines when performing. *

How Seating Helps with Transfers:

An adjustable chair with removable arms facilitates an efficient and safe transfer where appropriate. It allows sideways transfers for a quicker transition time with less obstacles to manoeuvre around for the therapist and the patient with both dependent and assisted transfers. A side transfer can assist the therapist in achieving optimal positioning of the patient, particularly of the hips and pelvis, and maximise loading of the body.

Removable and adjustable arms are useful to make the chair wider, perhaps if a patient has gained weight and it was a tight fit to get the sling on.

Anterior tilt can aid patients with limited mobility in working on improving strength as well as assist with transfers to a stand aid.

Safe Standing of Bariatric Patients

Often bariatric patients struggle with transfers due to inappropriate seating. Chairs don't always accommodate the size and shape of bariatric clients so it is necessary for chairs for bariatric patients to accommodate a gluteal shelf, larger calves and provide assistance with safe, independent standing.

A chair for a bariatric patient should have a removable portion at the base of the back to accommodate a gluteal shelf at the lumbar spine. This will give the patient even support through the body without putting unnecessary stress on the back due to poor seated posture.

Leg rests that are angled back underneath the chair facilitate 90 degrees of knee flexion in order to properly distribute weight through the legs and feet, thus decreasing the risk of pressure injuries on the calves, heels and/or toes.

Anterior tilt in a chair for a bariatric patient can help the patient to self-transfer. It reduces the amount of strength needed to stand up as the decreased height and forward angle of the seat help propel the patient safely up and out of the chair. It can decrease the need for caregiver assistance and empower the patient to be independent.

When is it Used?

For patients with increased body mass and decreased strength.

With patients who are capable of independent or minimal assistance transfers or for those who use stand aids.

The **Bariatric Sorrento**™ provides all of the above accommodations and can be easily cleaned, adjusted and fixed to be used on multiple patients if it is needed in a rehabilitation setting.

Note: The guidance here is not to be applied universally. Be sure to check your local and national guidelines on moving and handling, as techniques often vary from region to region. *

***Please refer to the terminology and disclaimer on Page 4.**

Paediatrics

"Chairs that grow with the child will provide the best possible support and continuity of care."

Martina Tierney

Occupational Therapist

Seating Matters

Paediatrics

Overview:

Children who require specialised seating are typically patients with neurological disorders who are unable to adapt their sitting posture continuously. Specialised seating and adaptive equipment help to improve their quality of life by stabilising their pelvis and trunk. [40]

The most important feature a paediatric chair can have is adjustability. Chairs that grow with the child will provide the best possible support and continuity of care, eliminating wait times for new equipment and reducing the cost to the family as the child grows or their ability changes.

Children can be categorised as two types of 'sitters': Active or Passive.

Active: **able to adjust position of trunk and pelvis on their own.**

Passive: **sitting only by the use of seating aids, i.e., unable to maintain trunk and pelvis position actively.**

Knowing the type of sitter the child currently is (and what they will likely be in the future) will help determine what type of chair and adaptations are best suited for the child to provide continuous care with little to no changes to the equipment needed.

Paediatrics:
A Closer Look at Muscular Dystrophy [41]

Muscular dystrophy is a genetic disorder that causes changes in the muscle fibres that lead to an inability to function properly. There are different forms of muscular dystrophy affecting both genders but the most common and typically most severe is Duchenne Muscular Dystrophy (DMD) which is found only in boys.

Background:

DMD is characterised by progressive muscle degeneration and weakness. Symptoms usually start to be noticed around 3 years old with muscles of the hips, pelvis, thighs and shoulders being affected first.

Presentation:

The child will often experience difficulties in;

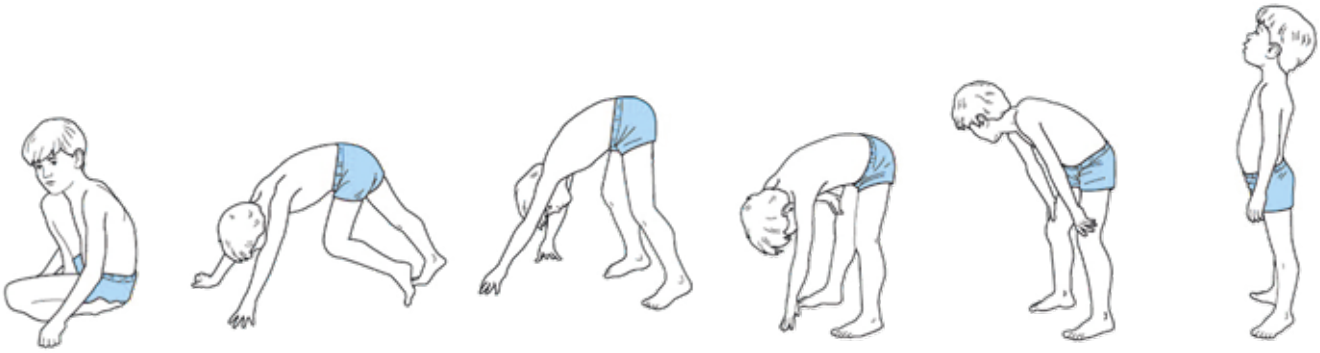
- **Rising from the floor (You will often see Gower's sign, which means the child uses their hands to push off the floor and their legs to get the trunk to an upright position).**
- **Climbing stairs.**
- **Maintaining balance.**
- **Raising the arms or maintaining them overhead.**

By the teenage years, the disease has spread to the heart and respiratory muscles causing breathing difficulties, increased risk of infection and other symptoms.

Muscular Dystrophy and Seating:

Proper seating is essential for these children, especially in the teenage years when mobility has significantly declined due to muscle weakness and the effects DMD has had on the cardiovascular and respiratory systems. Because DMD is a progressive disease, a chair that can adapt to growth as well as declining ability is essential to provide continuous high-quality care.

Gower's Sign:



Paediatrics:
A Closer Look at Cerebral Palsy

Background:

Cerebral Palsy (CP) is a neuromuscular disorder of the central nervous system that varies based on the area of the brain that is affected. There are different levels of disability, and they are classified by the distribution of the disability.[41] Some commonly used terms to describe CP are;

CP with:

- Quadriplegia (all four limbs are affected);
- Hemiplegia (one side of the body is affected) or;
- Diplegia (both arms or both legs are affected).

Or by the type of muscle tone the child displays;

- Spastic (increased muscle tone that causes movement to be stiff and jerky);
- Dyskinetic (involuntary movements, often noticeable when the child is intentionally trying to move);
- Ataxic (tremors, inaccurate movement and lack of coordination) and;
- Mixed (a combination of the above).

CP also presents with a variety of behavioural and cognitive abilities as well as possible seizures and sensory impairments.[41]

Presentation:[42]

The most widely used system is the Gross Motor Function Classification System (GMFCS) which categorises children up to age 18 into 5 levels based on their motor ability.

- Level I: Walks without Limitation.
- Level II: Walks with Limitations.
- Level III: Walks Using a Hand-Held Mobility Device.
- Level IV: Self Mobility with Limitations: May Use Power Mobility.
- Level V: Transported in Manual Wheelchair.

CP and Seating

Levels III-V are children who need varying degrees of assistance from their seat, ranging from a modified seatbelt to assist with pelvic alignment and balance to the use of full adaptive seating for trunk and pelvic control, balance and assistance with transfers.
Some areas to think about are;

- Head support.
- Tilt in space.
- Feeding – aspiration.
- Safety & falls prevention.

Paediatrics: A Closer Look at Scoliosis

Background:

Scoliosis affects 2-3% of children worldwide. Paediatric scoliosis is classified by the age of onset and the cause of the condition. Based on age of onset, scoliosis is described as infantile (0-3), juvenile (4-9) and adolescent (10-17).

Causes:

Neurological conditions such as cerebral palsy or muscular dystrophy.

Congenital scoliosis resulting from abnormal formation of the spine during foetal development.

Idiopathic scoliosis, where the origin is unknown, is the most common.

Presentation:

Visually, for the most pronounced scoliosis you will see extremely uneven shoulder blades, uneven waist and hips and/or leaning to one side.

Diagnosis of less severe scoliosis is done by x-ray where a lateral spine curvature of 10°or greater by the Cobb method. [43]

Based on the severity of the scoliosis, treatment ranges from simple observation to bracing, postural support through positioning devices, casting and/or surgery. [44]

Scoliosis and Seating

When seating paediatric patients who have scoliosis, it is often advisable that measurements should be taken with and without any adaptive bracing being worn so that the chair can accommodate the child in both scenarios. Features such as lateral supports may also play an important role in achieving upright posture, especially for those who required surgery to correct the scoliosis who are recovering, or those who have scoliosis in addition to other complex needs that are unable to use the trunk and pelvis to actively adjust position.

Scoliotic Spine

Selecting the Right Chair

"It is important for you to identify the main goals from each different perspective and prioritise them to the top 3 goals to be achieved from a particular chair."

Selecting the Right Chair

Using the information you have gathered together with your clinical experience, select the chair that would meet the person's needs. The information on pages 60 to 73 will give some guidance here.

Arrange a Trial

You should then arrange for a chair to be brought to the person for them to try and to be left for a suitable period on trial. This is an important part of the seating assessment as the person using the chair should get the opportunity to experience it at various stages of the day. If the chair is trialled for just a short period of time, you may not get an accurate picture of the effect the chair has had on meeting the goals identified.

During the trial period, get feedback from all of the parties involved with the chair to build up a clear picture of how it has performed from each of their perspectives.

Get feedback from all of the parties involved with the chair.

The Fitting Process

Some adjustments, such as the seat depth, width and footplate height can be adjusted to the person's size before they sit in the chair by taking measurements and setting the chair up accordingly. This will reduce the number of transfers the person will have to perform. It is important that you have ample assistance to ensure that the chair is set up correctly and safely for the person during the fitting process.

Use the available features of the chair you have selected to provide the necessary support and to meet the goals identified at the start of the assessment.

The Transfer

Ensure the hips are to the back of the chair when the person transfers.

The chair should accommodate stand, frontal, side or hoist transfers.

The angle of the back must accommodate the hip angle.

The Seat Surface

Ensure the seat depth matches the person's leg length correctly.

Are the hips level?

Ensure the seat or footplate height is set for correct loading of the legs and feet.

Check the seat cushion to ensure it is giving maximum support and pressure management.

Regularly check the skin for redness or signs of a change in condition.

Support

Use the features of the chair to give support, to accommodate or correct posture and enhance function.

Comfort of the person sitting in the chair is crucial. Postural correction and meeting the goals of seating can take time. The person is more likely to experience a successful outcome if they are comfortable and so you should consider making incremental improvements in the posture over a longer period of time.

Make sure to maximise the body contact with the chair.

Identifying Seating Goals During an Assessment

The goals of seating can be divided into three main areas;

- **Activity Related Functions.**
- **Psychological Functions.**
- **Physiological Functions.**

In order to achieve these goals, your assessment must aim to provide a chair which will;

- **Support the user's body.**
- **Manage their skin and pressure needs.**
- **Provide comfort.**
- **Ensure safety.**

Often, the parties concerned with provision of the chair will have different views as to what are the main goals to be achieved from seating.

The therapist may be concerned with function, the main issue for the user may be comfort and the caregiver may want a chair which is:

- **Easy to adjust and set up.**
- **Easily adapted to changing pressure needs.**
- **Easily cleaned.**
- **Easily transported.**
- **Easily maintained.**

It is important for you to identify the main goals from each different perspective and prioritise them to the top 3 goals to be achieved from a particular chair.

"After our seating assessment it was the first time in 15 awful months that we could see a future for our mum that would allow her to leave her bed."

Debbie Jenner & Kellie Driscoll, UK.

Assessment Process

A proper assessment involves testing the range of motion at the person's joints, identifying fixed and flexible components and assessing how they present from a postural perspective in their current chair or bed.

You must remember to look for the source of the problem instead of just treating the symptom and in a person who has an abnormal posture, the earlier an assessment is carried out the greater the chance of preventing further deterioration.

If possible and with consent, it is a good idea to take before and after photos.

This will help to jog your memory when looking over a case and note any significant changes.

> "Look for the source of the problem instead of just treating the symptom."

Use these templates as a supplement to your current documentation and in accordance with your facility or local regulations.

Template I
Goals

Patient Name:

Write down problems with existing seat or surface:

Write down what the client, carer and assessor need to achieve from the new seat:

Prioritise the Goals

Goal 01:

Justification:

Goal 02:

Justification:

Goal 03:

Justification:

Any other risks or desirable outcomes to note:

Assessment Process

Critical Measurements

When the chair is set to meet the person's postural needs, it is important to record their corrected position.

Tips

Keep the measuring tape straight so as not to curve around the client.

You could use a firm surface like wood, or a book as a guide for the actual dimensions such as seat width.

Ask for assistance from another person.

① Seat Width

The widest part of the person is not always at the hips. You must consider trochanter width, ischial width and the trunk width.

Windsweeping must also be considered.

② Seat Depth

The person's leg length is measured as the back of the buttock to popliteal fossa. The seat depth should be approximately 1 inch shorter than this. Measure left and right sides separately in case of a leg length discrepancy.

③ Seat to Floor Height, or Seat to Footplate Height

This is measured as the distance from the popliteal fossa to the heel.

④ Footrest Angle and Footrest Width

Record how the feet should be supported according to plantar/dorsiflexion or inversion/eversion.

⑤ Back Height and Angle

Back height is measured from the seat of the chair to the desired height of the back of the chair, according to the level and type of support needed.

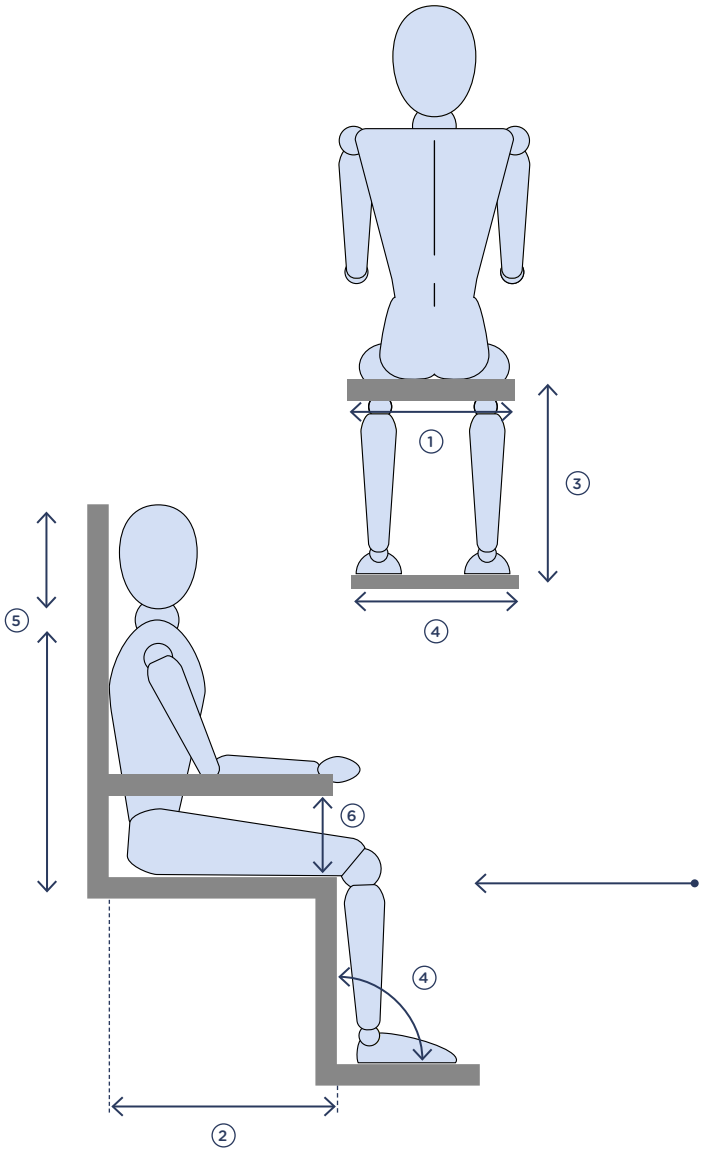
Record the optimum back angle and note if this is to be fixed or can be adjusted.

⑥ Armrest Height

This is crucial in supporting and maintaining good posture.

Measure the arm height for each arm.

At the end of the assessment it is important to document your results and the outcome.



Template II
Decisions & Recommendations

Document your decision on the final product.
I have decided to recommend the following chair and options;

Justification
Document how seating goals were achieved by this selection.

Document any un-met goals and why your selection didn't meet these needs.

Document current or future risks that are addressed by this selection.

Current Postural Presentation

Current Postural Presentation

At the start of the assessment it is important to document how the client presents in their current chair or bed.

To do this, you have to test the range of movement (ROM) at several points and establish if the person's posture is fixed or flexible. This will enable you to determine if their posture must be accommodated or if it can be corrected using the chair.

Use the following structured order to assess posture and record your findings:

Visit our website and download our assessment forms: www.seatingmatters.com

Test and record range of movement of the following:

① ASIS & PSIS and the Pelvis

Look for:

- Pelvic obliquity.
- Pelvic rotation.
- Anterior pelvic tilt.
- Posterior pelvic tilt.

② Trunk

Look for:

- Scoliosis and possible secondary scoliosis.
- Kyphosis.
- Lordosis.
- Trunk rotation.
- Anterior pelvic tilt.
- Posterior pelvic tilt.

③ Lower Limbs

(i) Hips - Test:

- Flexion.
- Extension.
- Abduction.
- Adduction.
- Internal and External Rotation.

(ii) Knees - Test:

- Flexion & Extension.

(iii) Feet - Test:

- Plantarflexion/Dorsiflexion.
- Foot inversion & eversion.

④ Upper Limbs

(i) Shoulders Test:

- Flexion/Extension.
- Protraction/Retraction.
- Adduction/Abduction.
- External/Internal rotation.
- Are the shoulders level and symmetrical?

(ii) Elbow & Forearm

(iii) Wrist & Hand

⑤ Head and Neck

From a side & front view test:

(i) Cervical curve - Look for:

- Flexion.
- Extension.
- Hyperextension.

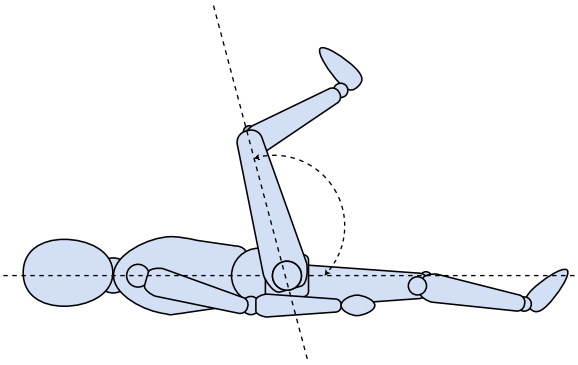
(ii) Neck Position - Look for:

- Lateral flexion.
- Rotation.

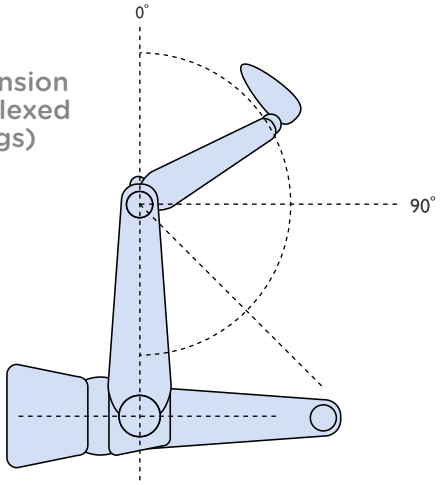
(iii) Head Control - Look for:

- Restricted ROM.
- Restricted or absent control.

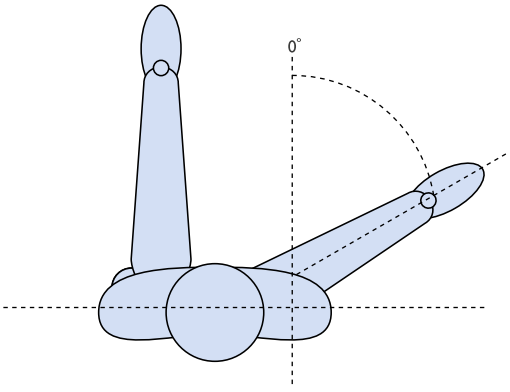
Hip Flexion



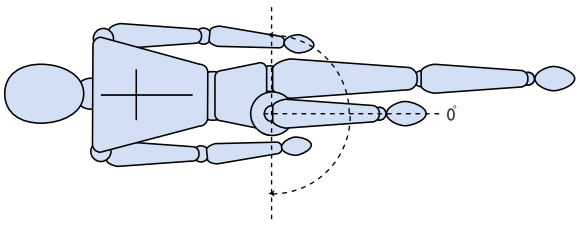
Knee Extension with Hip Flexed (Hamstrings)



Hip Adduction and Abduction



Hip Internal and External Rotation



Pressure Management Risk Assessment

Template III

You can use this template upon a patient's admission to your care facility, on initial visit or after a change in health status. Remember to reassess periodically and document and record the results.

Use this Risk Assessment as a supplement to current Risk Assessment procedures in accordance with facility or local regulations regarding pressure management.

Template III
Identifying the Level of Risk

Identifying the Level of Risk

High Risk Factors

Does the client have a history of skin trauma?

- [ ] **Yes**
- [ ] No

Do they have a presence of skin trauma?

- [ ] **Yes**
- [ ] No

Can the client do an independent weight shift?

- [ ] **Yes**
- [ ] No

Is the shift effective?

- [ ] **Yes**
- [ ] No

Do they have the ability to repeat the shift effectively and regularly?

- [ ] **Yes**
- [ ] No

If any of the **bold text items** are ticked the person is at High Risk.

Moderate Risk Factors

Is the client very bony and active on the sitting surface?

- [ ] **Yes**
- [ ] No

Does the client have atrophied muscle and are they active on the sitting surface?

- [ ] **Yes**
- [ ] No

Do they have impaired or absent sensation on the sitting surface?

- [ ] **Yes**
- [ ] No

If any of the **bold text items** are ticked the person is at Moderate Risk (Unless already classified as High Risk in section 01).

Signature: _____

Date: _____

Time: _____

Stating Your Case

If you are recommending a change in care, it must be passed along and addressed by relevant parties. If you are suggesting the person receives equipment, you should build your case and justify your recommendation clearly and robustly.

In your application for funding or suggestion for equipment provision, it is not enough to pass a product type and cost to the funding authority. You should include the details of the person's medical history and the problems and risks they are experiencing with their current equipment.

> "Justify your recommendations clearly and robustly."

Copies of your assessment notes should be included.

Be objective and explain your opinions with facts and evidence.

Your application should include:

- The patient's medical history.
- Their clinical problems in relation to seating.
- Risks in current equipment.
- Factors that might increase risk or cause problems in future.
- Likely changes in the person's condition.
- Your recommendations.
- Why you have made these recommendations.

Evidence to back this up from:

- Your assessment.
- Current research.
- Your clinical experience.

In terms of the chairs suggested and their features, use the evidence in the section on 'Selecting the right chair' (Page 47) to back up your recommendations. Each feature of the chair and its cost should be listed and justified as demonstrated in your application for funding.

> "If equipment is not provided, you should clearly record the reasons why and evidence this in your notes."

All too often, decisions for refusing equipment can be based on cost and a lack of supporting information. Outlining these details will help to justify the costs and highlight the importance of providing your recommended equipment to the patient.

You must balance the costs of the equipment today with the subsequent reduction in the risk of pain, pressure injuries, cost of care and litigation in the future.

If your recommendations are not acted upon, you should follow this up to ensure the clinical needs of your client are not being compromised. If equipment is not provided, you should clearly record the reasons why and evidence this in your notes.

Duty for Continuous Professional Development

You are also duty-bound to have the necessary knowledge of care and related physiology including the use of up to date evidence-based knowledge. The Seating Matters Series and The Clinician's Seating Handbook are designed to help you with this aspect of your responsibilities. These publications are readily available to improve your level of knowledge and to ultimately improve patient care.

Choose Your Chair

Documentation

You are professionally accountable for everything you write and do not write, and you are required to create an appropriate standard of documentation for your activities. This is not just for protection from litigation but 'good documentation is integral to good nursing'. [45]

The templates included in The Clinician's Seating Handbook will help in the documentation of your work as a clinician.

Remember to:

- Write legibly in black ink.
- Create your records at the time of the assessment.
- Sequence events in the correct order.
- Line through, sign and date any alterations to your records.
- Keep abbreviations and jargon to a minimum.
- Do not use correcting fluid.
- Date, time and sign all entries.

Recommended Chair Features

1. To help you meet the goals you have identified for your patient, you must select chairs with the correct features to maximise the person's functional ability, physiological and psychological goals as well as managing their pressure care needs.

2. When deciding on what chair brand to use for your patient or facility, you must ensure that vital clinical features are considered.

3. The Seating Matters™ chairs have been designed by the Seating Matters™ clinical team and engineers applying the evidence in the previous pages.

Tilt in Space

15-30°

What is Tilt in Space?

Tilt in Space is when the entire chair shifts its position on its frame as one unit, while maintaining the angles of the hips, knees and ankles. Tilt in Space is used to improve posture, including head and trunk control and assists positive or corrective positioning for those with a kyphotic posture. Tilt in Space can prevent a person from sliding out of the chair and help with pressure management.

15° - 30° tilt

When is it Used?

Tilt in Space between 15° and 30° can be useful for improved positioning, including reducing sliding, and improved functional ability in many cases.

The Evidence

In a study conducted, backward tilt of a) 15°, and b) 30° showed more consistent:

Head positioning, and;

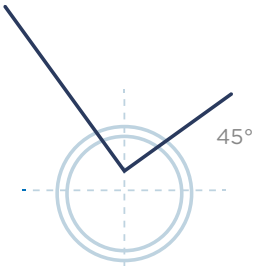
Trunk and head control as the person in the chair tired. [46]

Remember

It is important to remember that Tilt in Space should be accompanied by back recline for the person with a fixed hip angle to prevent shearing from occurring.

Which Chairs Meet These Criteria?

The Seating Matters **Phoenix**™, **Sorrento**™ and **Milano**™ are Tilt in Space chairs with back recline adjustment. They will adjust from 0° to 30° and can be locked in position at the optimum angle between these degrees of tilt.



Tilt in Space

Phoenix™

45° Tilt

45°

When is 45° Tilt Used?

Larger degrees of tilt are needed for those at risk of pressure injuries. Evidence shows that the optimum angle for an effective weight shift and therefore pressure management is between 30° and 45°.

Remember

In some cases, a person's functional ability can be limited by these larger degrees of tilt. You must therefore use your clinical experience of the individual in question before recommending Tilt in Space.

The Evidence

Backward tilt of an angle from 20° up to a maximum of 45° has been shown to decrease pressure under the ITs by approximately 24mmHg. [47]

Aissaoui, Lacoste et al (2001) reported a maximum of 40.2% of weight shift was found when combining system tilt angle of 45° to a seat-to-back angle of 120°. [48]

Sonenblum and Sprigle (2011) established that although biomechanical responses to tilt can vary, pressure reduction at the ITs occurred with tilt angles to 30° and greater. [49]

Results indicate that tilting as far as the seating system permits maximises the potential for significant blood flow increase and pressure reduction. [6]

Which Chairs Meet These Criteria?

Based on this research, the Seating Matters **Sorrento**™ and **Phoenix**™ chairs have the option of increased Tilt in Space to a maximum of 45° with built-in back recline adjustment.

Phoenix™

Forward Tilt

What is Forward Tilt?

Forward, or anterior tilt, occurs when the front of the seat drops down below the horizontal position.

When is it Used?

The ability to transfer weight from a seated position to one of standing is a common activity of daily living. Rising is a precursor to gait but many older and/or disabled people have difficulty rising from a chair.

Anterior tilt will facilitate this activity and allow more independent stand transfers.

Remember

- Use proper armrests to assist rising.
- Ensure seat height is suitable.
- Ensure the feet can be positioned slightly behind the knees for a stable base before standing.
- Move any footplates out of the way before attempting a stand transfer.

Which chairs meet these criteria?

The Seating Matters **Phoenix™**, **Sorrento™**, **Milano™** and **Bariatric Sorrento™** have forward tilt with the added feature of negative angle leg rests. This ensures there is ample space to achieve a stable base for standing. The **Monaco™** chair has an adjustable seat angle to facilitate standing.

Phoenix™

Back Recline

What is Back Recline?

Back recline is the adjustment in angle of the back of the chair. It is measured as the angle of the back from the seat surface.

When is it Used?

Recline can be used for comfort and relaxation. It is a crucial element of seating for the support and positioning of those with certain abnormal postures. Repositioning can be assisted by reclining a chair in tandem with Tilt in Space. Aissaoui, Lacoste et al (2001) reported a maximum of 40.2% of weight shift was found when combining system tilt angle of 45° to a seat-to-back angle of 120°. [48]

Remember

Recline has to be used in the correct way as it can sometimes induce shear.

Too much recline will encourage a person to slide down the chair with the help of gravity.

The back being too upright can also encourage a person to slide as they move forward in the seat to achieve a more comfortable position.

In the case of a person with a fixed hip angle, the back recline needs to adjust and lock at the optimum angle for their hips. This will limit improper adjustment and ensure the user continues to have a safe position in the chair with a reduced risk of sliding.

Which Chairs Meet These Criteria?

The Seating Matters **Phoenix**™, **Sorrento**™, **Bariatric Sorrento**™, **Monaco**™ and **Milano**™ chairs have back recline adjustment. This can be easily locked at any point to limit improper adjustment and re-engaged to adjust at another time to meet different needs.

Sorrento™

Pressure Management

What is Pressure Management in a Chair?

As outlined in The Four Principles of Effective, Clinical Seating™ section (page 32), proper pressure management in a chair includes the following main categories:

Loading the body: This requires adjustment in seat depth, seat width, footplate height and arm height.

Provide postural support: This can require the use of laterals, head, shoulder, arm and other supports.

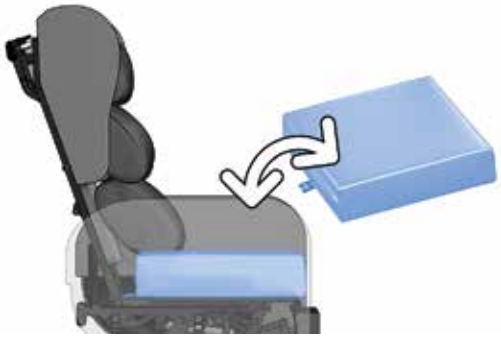
Allow effective repositioning: The International Guidelines recommend to reposition all individuals with or at risk of pressure injuries on an individualized schedule, unless contraindicated. [52] A chair that can facilitate adequate repositioning without requiring the patient to transfer out of the chair into bed or another surface is both easy for the caregiver and patient.

Use an appropriate surface: The cushion should meet the individual needs of the patient. It is therefore important to find a cushion that fits the dimensions of the chair as well as meeting the patient's requirements. The cushion should be removable so that if the patient's needs change over time, a new cushion can be used to accommodate the new requirements of the patient.

Remember

- Ensure a proper assessment of the skin is performed.
- Ensure the chair and the cushion are being used in the correct way.
- Ensure cushions are removable as cushions deteriorate over time and will need to be replaced in order to remain effective.
- Ensure Dartex or superior fabric is used on at-risk areas to avoid hammocking and to promote immersion and envelopment.

Removable Seat Cushion



Which Chairs Meet These Criteria?

Each of the Seating Matters chairs – the **Phoenix**™, **Sorrento**™, **Bariatric Sorrento**™, **Atlanta**™, **Monaco**™ and **Milano**™ have employed these features for enhancing pressure management.

Atlanta™

Monaco™

60 Second Fixed Adjustment

What is a 60 Second Fixed adjustment?

A chair which can be easily adjusted:

- **On-site.**
- **Without tools.**
- **Within 60 seconds.**
- **And fixed to limit improper adjustment.**

When is it Used?

As a therapist you need to source a chair to suit a person's size and support needs for pressure management and postural support. It is crucial to do this correctly as the responsibility for making sure the chair is set up properly lies with you. Having a chair which can be readily adjusted without tools or complex instructions will ensure that the person has the support and comfort they need.
Even in the most basic chairs, there should be seat depth and seat width adjustment and a removable seat cushion as standard. This will allow you to meet even the most basic support and pressure management needs.

Remember

After the chair has been set up for the individual, there is always a risk of it being improperly adjusted by other people in that environment. You should look for a chair which meets the person's support needs and can be easily locked into position to limit improper adjustment.

Which Chairs Meet These Criteria?

Each of the Seating Matters chairs – the **Phoenix™**, **Sorrento™**, **Bariatric Sorrento™**, **Atlanta™**, **Monaco™** and **Milano™** have 60 second fixed adjustment.

Adjustable Leg Rest and Footplate

Adjustable Footplates

These are necessary to adequately load the feet while sitting. In normal sitting the feet should take 19% of the body weight. [21]

Insufficient foot loading will increase the risk of pressure injuries in other areas. A plantar/dorsiflexion abnormality must also be supported by adjustable footplates.

What is Plantarflexion/Dorsiflexion?

Plantarflexion is the angle of the sole of the foot in relation to the calf being greater than 90° and is sometimes called 'dropped foot'. Dorsiflexion is when this angle is less than 90°. These can be fixed or flexible positions and each foot can be at a different angle in the same person.

When is Such Support Needed?

With a fixed plantar/dorsiflexion, the foot needs to be accommodated. This will serve to reduce pressure through the seat as the feet are loaded. If it is a flexible deformity, correct loading of the feet will slow down deterioration of this posture.

Remember

Needs can change: If the person's foot position changes over time, ensure that the chair you provide can be adjusted to suit their new position and support needs.

Which Chairs Meet These Criteria?

The Seating Matters **Phoenix**™, **Sorrento**™ and B**ariatric Sorrento**™ have height and angle adjustable footplates. The **Atlanta**™ and **Monaco**™ and **Milano**™ have adjustments for plantar/dorsiflexion as an adaptation.

Adjustable Footplate

Accommodation of Tight Hamstrings

Hamstring tightness affects the mobility of the knee joint in the sitting position. Because the hamstrings pull over two joints, they affect both the hip and knee joints. Limitations in length of this large and powerful muscle group occur quickly with decreased ambulation.

What is A Negative Angle Leg Rest?

A negative angle leg rest will accommodate the contracted leg, allowing the legs to be fully supported and reducing the risk of the person being pulled out of the chair. The footplate will also support the feet in this position.

If there is a space underneath the seat to accommodate the contracted leg but no leg rests or footplate, you are not loading the body sufficiently.

When is a Negative Angle Leg Rest Used?

This can be used to accommodate tight hamstrings. It can also be helpful for stand transfers in conjunction with anterior tilt as the person can get their heels behind their knee and therefore achieve a stable position to stand.

Remember

Contracted legs have to be accommodated.

Leg rests must not be elevated if the person has tight hamstrings.

Support the feet.

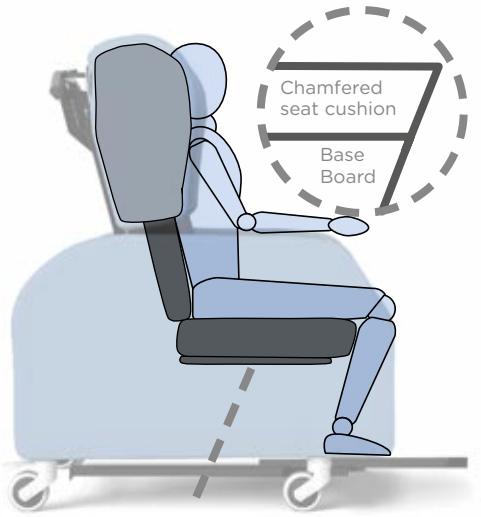
Accommodate the shorter leg by having a split cushion.

The edge of the cushion must have a chamfer to reduce pressure behind the knee.

Which Chairs Meet These Criteria?

The Seating Matters **Phoenix**™, Sorrento™, **Milano**™ and **Bariatric Sorrento**™ have negative angle leg rests as standard. The **Atlanta**™, **Milano**™ and **Monaco**™ have space underneath the seats and the footplates can be built up to support the person's feet. In addition, the **Sorrento**™ and **Phoenix**™ chairs will allow for elevation of one leg while supporting the other contracted leg.

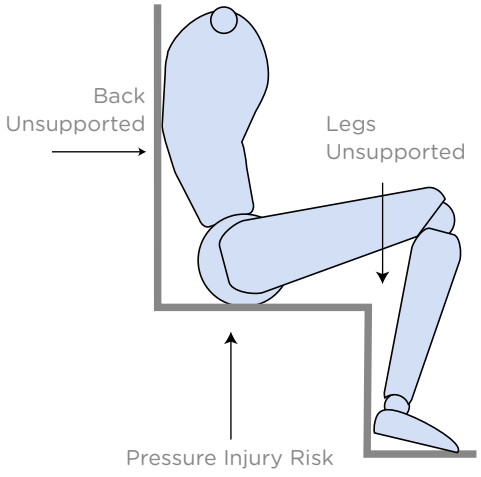
Chair with Negative Angle Footplate



Accommodation of Hamstrings

This chair does not accommodate hamstrings.

When the hamstrings become contracted, they can pull the person into a posterior pelvic tilt and increase pressure injury risk.



Mobility

What is Good Mobility in a Chair?

Depending on the goals for a particular person, mobility may be;

- Independent
- Caregiver assisted
- Indoor
- Outdoor

You should use a chair which can give a variety of options such as various sizes of wheels for different terrain, directional lock castors and a sturdy metal push handle to help caregiver movement of the chair. For a person transferring from the chair independently, features such as forward tilt and the ability to use Tilt in Space without the need for caregiver assistance are critical.

When is it Used?

For people dependent on a patient lift (hoist), the ease of getting slings on and off is important and removable arms will assist with this action. The chair should then have directional lock castors if the person is being moved down a corridor to help with steering for the caregiver.

For a person who can perform a stand transfer, the chair should have the function of a forward tilt. This anterior tilt will help them to stand from the chair and should be a powered movement if they stand independently.

Remember

Anterior tilt can sometimes affect the person's positioning. You must therefore use your clinical experience of the individual in question before recommending this.

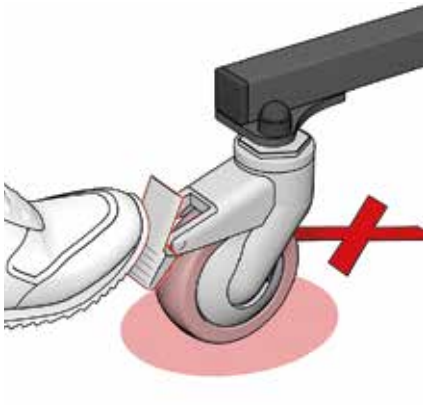
- **Ensure that the footplate is removed to avoid trip hazards during a stand transfer.**
- **The leg rest and footplate should be at a negative angle to facilitate safe positioning of the feet.**

Which Chairs Meet These Criteria?

Each of the Seating Matters chairs – the **Phoenix™**, **Sorrento™**, **Bariatric Sorrento™**, **Atlanta™**, **Milano™** and **Monaco™** have push handles and can have various castor options for mobility.

The **Phoenix™**, **Sorrento™**, **Milano™** and **Bariatric Sorrento™** have forward tilt to assist with stand transfers.

Push Handle



Braking Castors

Falls Prevention Features

What is a Safe Chair?

A safe chair will reduce risk of injury to the person sitting in it or to those in their environment. This could be safety in terms of pressure management, reducing oedema and swelling or a number of other factors.

Safety in terms of the person's physical movements is another area for consideration. In this case it is important to get a chair that will balance ensuring safety and avoiding restraint. Such a chair will usually be prescribed to solve some of the issues identified in a risk assessment and your clinical judgement will play an important role in this decision.

You must document any risks identified before using the chair you recommend and the subsequent reduction in this risk by using the correct chair.

When is it Needed?

People with Huntington's Disease, Alzheimer's and those with vigorous involuntary movement or chorea are often identified as at risk of injury due to their movements. Some of the risks are;

- **Risk of falling out of the chair.**
- **Risk of climbing out of the chair.**
- **Risk of hurting themselves on the frame of their chair when hitting or kicking with the arms and legs.**
- **Risk of injury to others in the environment.**

You should promote maximum function with the chair while ensuring safety.

Remember

A lap belt is one of many options used to ensure a person's safety in seating. The use of Tilt in Space, a deep seat and a padded surface will often accommodate involuntary movement but reduce risk. In some cases, a person's movements can be due to sensory impairment or other external factors. It is important to provide support in the chair and also to look at the person's complete environment in this case.

Which Chairs Meet These Criteria?

Each of the Seating Matters chairs; the **Phoenix™**, **Sorrento™**, **Bariatric Sorrento™**, **Atlanta™**, **Milano™** and **Monaco™** can be used with a range of people at risk of injury. The **Atlanta™** in particular has been designed for those with involuntary movements such as those experienced by people with Huntington's.

Atlanta™

Adaptability

As detailed in the The Four Principles of Effective, Clinical Seating™ (page 32) and 'The Pelvis, Postures & Spinal Presentations (page 7) sections,
there are many postures that we need to be able to support and accommodate, many of which can only be achieved when a chair can be adjusted. Seating Matters chairs can be adjusted on site without the use of tools in a minute or less to accommodate position changes for a specific user or for multiple patients using the chair as part of their rehabilitation.

There is no such thing as a standard sized person, so in addition to on-site adjustability, you should use chairs which have the option of being customised to the person's needs.

When is it Used?

When the support needs of the person have gone outside the standard capability of the chair, you need to be able to create additional solutions to meet these needs. If you can provide a chair which has the option of adding and removing bespoke adaptations at a later date,
it will reduce the;

- **Number of visits to the client.**
- **Time frame for specifying their chair.**
- **Risk of chair being improperly designed.**
- **Overall cost of the chair.**

Remember

If the client's needs change, you need to be able to remove the bespoke adaptations and add different adjustments in order to use the chair in its basic form. This will allow fast re-issue of the chair, ensure the client has their chair quickly and reduce the cost of providing this equipment.

Which Chairs Meet These Criteria?

Each of the Seating Matters chairs; the **Phoenix**™, **Sorrento**™, **Bariatric Sorrento**™, **Atlanta**™, **Milano**™ and **Monaco**™ have the ability to be made bespoke to the user. Adaptations can be removed at a later stage to allow the chair to be used for different needs.

Leg Laterals

Tray

Infection Prevention and Control

What is Infection Control Approved?

Infection Control Approved is a standard by which products are designed to be easily cleaned and repaired to maintain a high standard of hygiene and reduce the risk of infection in a particular environment.

In seating, this involves the use of fabrics that can be cleaned by standard cleaning agents in healthcare environments. It is often useful to have removable arm and seat covers made from these same healthcare approved fabrics so they can be easily taken off for cleaning where there is infection or incontinence. The frame of the chair should also be easy to strip down to its component parts for repairs, maintenance and thorough cleaning on site.

Where is it Used?

In environments with several users of one chair; i.e., multiple residents in a home, a flow of patients in and out of hospital.

Where there are a high number of staff and visitors and chairs are likely to get damaged.

Where there is incontinence and a risk of infection.

Removable Arm Covers

Remember

Chairs that are difficult to adjust are often difficult to clean. Cleaning is something that should be done often and thoroughly, especially where the person using the chair is at risk of infection and disease. The chair you recommend should be easily cleaned and maintained.

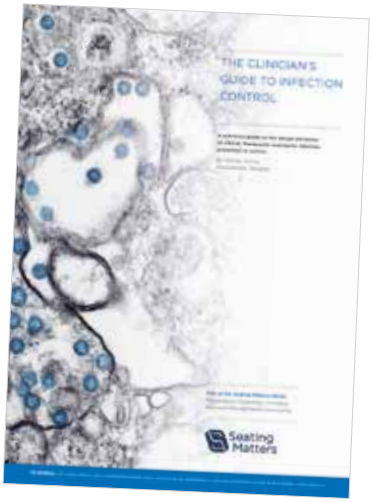
Which Chairs Meet These Criteria?

Each of the Seating Matters chairs; the **Phoenix™**, **Sorrento™**, **Bariatric Sorrento™**, **Atlanta™**, **Milano™** and **Monaco™** are Infection Control Approved. With healthcare-specific fabrics and 60 second fixed adjustment they can be easily cleaned and maintained. All Seating Matters chairs can be easily disassembled on site for replacement of parts and cleaning.

Would You Like Further Information on Infection Control?

Request a copy of the newest publication in the Seating Matters series,

'The Clinician's Guide to Infection Control'.



Case Studies

All case studies are
real patient scenarios.

All case study illustration images have been created from real photographs taken with permission. They are real people in real situations, but illustrations have been used in order to protect their identity.

1. Rachel
2. Valerie
3. Margaret
4. Ben
5. Sarah
6. Alan

1 Rachel

Background

- 94-year-old participant.
- Arthritis in her left knee.
- History of falls.
- Mobilised with a walking frame.
- Assistance of one for transfers.

Problems with Old Chair

- The chair was not made to fit her size, nor specially adjusted to suit her small frame and stature.
- The long seat depth and high seat height were causing her to slide from the chair.
- She was in a near horizontal position for long periods of the day.
- There was high pressure underneath small, bony load bearing areas like her heels, sacrum, shoulders and the back of her head.
- This was very uncomfortable position.
- It was a non-functional and limiting position for Rachel who would have been an independent lady and able to complete most activities of daily living with little assistance.

Caregiver Issues

The caregiver's main frustrations were that no matter how well they tried to position Rachel she would always slide into the posture shown in the Before image, 'bracing' herself in the chair with this extended position. It then became very hard to assist Rachel to stand as she could not position her feet behind her knees in a 'ready stand' position or use the armrests for a propulsion and support.

Before

Rachel sitting in a Monaco™

After

1 Rachel

Postural Issues

On assessment it was found that Rachel had a normal range of motion at her joints. She had no postural difficulties that would cause her to slide from the chair as she did. It was purely due to oversized seating that could not be adjusted to suit her needs.

Compensating

Rachel often assumed an extended position and anchored her heels to the floor.

She could also be seen bracing herself in the chair with her hands by holding onto the cushion.

This significantly affected her function and her ability to reach out for objects as she adopted this protective position.

It was very difficult for Rachel to eat or drink from this position as her throat and neck were compressed and flexed and not in the optimum position for consumption.

Intervention

In the assessment stage it was identified that Rachel had few postural difficulties or complaints. Her joints were flexible and would be easily accommodated in a sitting position. She needed customised seating which would accommodate her small physique, while safely facilitating stand transfers and participation in other activities of daily living.

It was decided that she should use a Seating Matters **Monaco™** chair.

Adaptation: The seat depth was adjusted to match her femoral thigh length and a 2" foam pad was secured to the sliding footrest to ensure her feet were loaded properly, concentrating her weight throughout the soles of her feet and not purely on her heels as before.

Qualitative Client Feedback

Rachel felt that the chair was very comfortable and she became happy that she could enjoy a scone and cup of tea easily without fear of spilling it on herself or choking.

> "She looks like a new woman!"

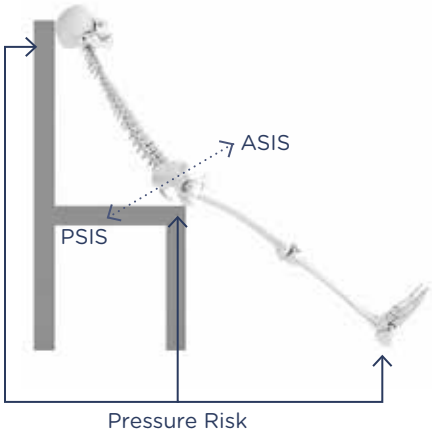
Postural Changes

Rachel no longer slid in a near-horizontal position.

She was able to easily maintain her upright posture and recruit flexion at her knees and hips.

This is a natural sitting position and exerted much less strain on her lower limbs and back muscles.

Her pelvis was supported in a neutral position, which prevented any secondary complications or abnormal positioning of the spine or lower limbs.



1 Rachel

Caregiver, Family Feedback

Rachel's caregivers were delighted when she sat in her new chair. They felt that it was a 'perfect fit' and were happy to see Rachel in a much more comfortable position. Prior to the provision of the **Monaco™** chair, two caregivers were needed to assist her to a standing position. By using the **Monaco™** which improved her posture, this was reduced to one caregiver.

Functional Changes

Hand function

Rachel was able to maintain an upright and functional position from which she could easily eat, drink and participate in many other activities.

She no longer needed to brace herself in the chair and had regained free hand and arm function.

The arm supports of the **Monaco™** chair were also set at a height that suited her and as is evident from the After image, she was able to use these for support and stability.

Rachel no longer slid from the chair

Transfers

With the adjustable angle seat and with the help of correct positioning, Rachel was able to safely transfer to a standing position with minimal assistance of one caregiver.

This was completed with a lot less strain on both Rachel and her caregivers and facilitated safe moving and handling techniques.

Impact on Skin

As a result of her almost horizontal position in the previous chair, Rachel was concentrating the majority of her weight in sitting over a smaller surface area and underneath bony prominences, such as the heels and sacrum. Since using the **Monaco™** chair, which was made and adjusted according to her size, the risk of developing pressure injuries was significantly reduced as Rachel was spreading her weight over a larger surface area. Her feet were also loaded entirely through the footplate, which was made with the same pressure management materials as the seat.

2 Valerie

Background

- 86-year-old resident in a care facility.
- Dementia.
- Limited mobility.
- Previously unable to reach out and feed herself or take a drink independently.
- Valerie would no longer carry out this task.
- Spent much of her day with her arms crossed.

Before

Problems with Old Chair

Valerie previously sat in a standard wooden frame chair that is used in many nursing homes and used this chair for approximately 8 hours per day. Some of the problems noted were;

- The chair was too wide.
- The back height was too high.
- Armrests as they were too high and too far away from her body.
- She tended to slump forward when she was sitting for long periods.
- She would spend much of her day with her head slumped forward.
- Significantly limited her communication, social interaction and visual field.

Valerie sitting in a Sorrento™

After

2 Valerie

Caregiver Issues

Valerie did not communicate much throughout the day and due to the protective position of her hands and arms, she had difficulty completing small tasks such as drinking or eating. Valerie required assistance for these tasks, but it proved very difficult due the position of her head and her caregivers often felt worried that she would choke and her motivation for feeding was quite poor. The caregivers also noted that when assisting Valerie to transfer from the chair she would be quite stiff and her range of motion, particularly of her upper limbs, was restricted.

> Valerie did not communicate much throughout the day and had difficulty completing small tasks.

Postural Issues

- Leaning to the right side was causing an imbalance in her weight distribution.
- More weight was being taken through the right side of her pelvis, increasing the risk of a pressure injury in that area.
- This could cause or attribute to a scoliotic deformation of the spine.
- Valerie may have been experiencing difficulties breathing or digesting food.

Intervention

After assessing Valerie's needs, it was deemed appropriate for her to trial a Seating Matters **Sorrento**™ chair.

Postural Changes

Immediately a difference to Valerie's postural alignment was recorded. As a result of using tilt in space and changing the position of the centre of gravity, Valerie was able to:

- Maintain an upright head position with little exertion or strain.
- Use the armrests for support and positioning, which helped her to maintain a midline position of her trunk and head.
- Evenly distribute her weight through both sides of her pelvis.

Caregiver, Family Feedback

- Valerie had become more communicative.
- She was more alert and responsive throughout the day, particularly when feeding.
- She was at much less risk of choking or aspirating.

2 Valerie

Functional Changes

Over time and as she felt more secure, Valerie began to use the armrests and as a result of feeling much more secure and stabilised in her correctly adjusted chair, she no longer crossed or 'fixed' her arms and was able to reach out to drink a cup of tea and eat independently.

> Valerie is more stabilised and can now eat and drink independently.

Impact on Skin

The position of Valerie's pelvis was improved and there was a more even weight distribution throughout.

She no longer leaned heavily to one side.

The risk of pain and developing a pressure injury was significantly reduced.

The tilt in space feature was used in this case, not only to improve comfort and posture but also to distribute pressure evenly throughout all contact areas. By tilting the chair, as seen in the image below, weight was redistributed from underneath Valerie's sacrum and ischial tuberosities (ITs) and spread throughout her back and other load bearing areas.

Social Interaction

She was able to attend social events taking place in the nursing home such as bingo, arts and crafts and music classes as the chair could be wheeled from room to room.

Being able to hold her head upright and look around the room without difficulty or strain had made a difference to her motivation and she became more interactive with caregivers and other residents throughout the home.

It was also gratifying for those that looked after and cared for Valerie to be able to see her face when seated whereas before they would often only able to see the top of her head, she has regained her social and personal identity.

Sorrento™

3 Margaret

Background

- 81-year-old lady.
- Cerebrovascular accident (CVA) (left sided weakness).
- History of pneumonia.
- High risk of pressure injuries.
- Developed a red area on her left heel for which she wore a pressure management boot.

Problems with Old Chair

- Margaret used her original chair for approximately 6 hours per day.
- She was choosing to stay in bed over sitting in her chair as she reported the chair to be unbearably uncomfortable.
- She would request paracetamol at night due to her pain and discomfort.

This was a conflicting situation as Margaret was a very sociable person and enjoyed sitting up and spending time in different environments throughout the home. However, due to the challenges associated with sitting, she often missed out on those activities which she enjoyed.

The Seating Matters Atlanta™ was designed to reduce swelling in the lower limbs.

Caregiver Issues

The caregivers found it very hard to position Margaret in the chair. Despite various attempts, they could not get her in a comfortable position and would often be aware of how much pain she felt within the chair.

The caregivers would often feel frustrated that they could not alleviate her pain. They would use pillows and rolls for positioning and comfort and would regularly correct her posture as a result.

Before

Margaret Sitting in an Atlanta™

After

3 Margaret

Postural Issues

Margaret was sitting in a right-sided pelvic obliquity and rotating to the right.

Her feet were not loaded on the footplate and her legs were in a non-elevated position, encouraging oedema in both lower legs.

Limited hip flexion on her affected left side which made her assume a near lying position in the chair and contributed to the deviations in her pelvis.

Intervention

After a thorough assessment it was deemed suitable that Margaret would trial the Seating Matters **Atlanta**™ chair. This chair was designed specifically for her needs with the provision of a leg rest to be used to reduce swelling on both lower limbs.

Qualitative Client Feedback

Immediately Margaret expressed her satisfaction at how comfortable the chair was and that it made a huge difference to her life. She was excited to show the staff and other residents her new chair and delighted in telling them she was now comfortable.

Postural Changes

The leg rest was used to reduce and manage oedema in both lower legs.

Her ischial tuberosities and pelvis were secured in a more comfortable and sustainable position.

She was able to maintain a midline position of her trunk.

A concave head support was used when needed to support her head in a midline position, which eliminated the need for additional pillows.

Because of the breathable properties of the Dartex covering on this head support, Margaret was able to use the pillow without sweating and becoming hot, as she had done previously using towels and bed pillows.

Functional Changes

A tray table was also provided with Margaret's chair. This encouraged bilateral hand function as she was able to use both hands or rest her left on the table, preventing weakness in her left side.

Margaret had not required medication for pain and discomfort whilst sitting in her new chair.

Impact on Skin

Margaret was now maximising her body contact with the support surface and distributing her weight throughout the seat, back and leg rest, all of which were made with integral pressure management materials.

This significantly reduced any localised or concentrated pressure areas and reduced the risk of skin breakdown and pressure damage.

The level of pressure management included in the leg rest, combined with an elevated position, ensured that the risk of breakdown on her heels was minimised.

Social Interaction

One of the most pivotal advantages of her new chair was that for the first time since her admission, Margaret was able to attend a religious service that was being held in the nursing home. This was owing to the fact that the Atlanta™ chair could be wheeled from room to room easily. Also, Margaret was now able to sit comfortably for extended periods. In previous years she could not tolerate sitting long enough to attend this service, which was undoubtedly very important to her.

4 Ben

Background

- 87 years old.
- CVA.
- Osteoarthritis.
- History of pressure injuries.
- Hoisted for all transfers.
- Spent approximately 14 hours each day in his chair.

Problems with Old Chair

- Little head support.
- No tilt in space or gravity-assisted positioning.
- This contributed to the fixed kyphotic curve which Ben had developed at his cervical spine and neck.
- This made it difficult and painful for him to lift his head or extend his neck.
- His visual field was compromised and restricted.
- His safety when eating, drinking or respiring was impaired and the risk of aspiration was high.

Ben would often slide down the chair and was continually developing red areas on his sacrum for which he was nursed in bed to alleviate the pressure and shearing forces experienced when seating.

Before

Ben Sitting in a Phoenix™

After

4 Ben

Caregiver Issues

The caregivers reported that Ben;

- Was difficult to position in his chair in the morning.
- Would regularly slide down the chair throughout the day. This was strenuous for the caregivers and also Ben. This increased the shear forces as he would 'slide and return' many times per day.
- Was very difficult to move throughout the home as there was no push handle on the chair.

Postural Issues

Marked Spinal Kyphosis

- Made activities such as eating and drinking difficult.
- Also limiting his visual field and interaction.

Sliding Forward in the Seat

The curved position of his spine combined with the inadequate seat depth was encouraging him to slide forward in chair. This provided insufficient femoral thigh support.

Pelvic Obliquity

- Ben's pelvis was uneven as the right side was lower than the left.
- This caused an imbalance in weight and pressure distribution.

Pelvic Rotation

- Ben's pelvis was observably rotated to the right.
- Evident from the position of his lower limbs.
- Ben had a leg length discrepancy.

Intervention

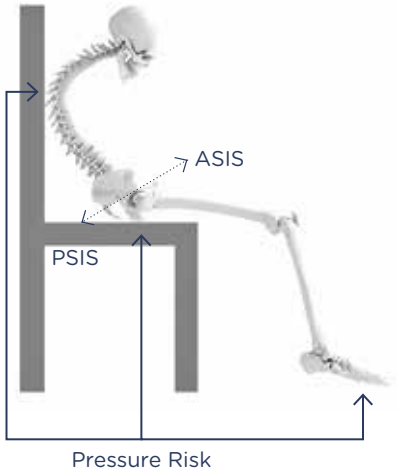
It was suggested that a tilt in space chair would be beneficial to Ben and would improve his postural alignment and reduce or prevent further kyphotic deterioration.

A Seating Matters **Phoenix**™ chair was chosen due to the extensive upper body and head support.

> Ben's kyphosis limited his visual field and interaction.

Qualitative Client Feedback

Ben expressed that he was more comfortable in the new chair and was able to interact and communicate with others in the room.



4 Ben

Postural Changes

The curved position of Ben's head and spine was supported and accommodated using the adjustable later, head and shoulder supports.

The strain on bens shoulder muscles was lessened due to the arms being adjusted to suit Ben's arm height.

Tilt and space was used to change the position of the centre of gravity.

His visual field was improved and was in a much safer position for drinking, feeding and respiring as his head and neck were supported in a more extended and functional position.

Pelvic obliquity and rotation were eliminated by providing a supportive seating surface that was adjusted to Ben's physical measurements.

The Phoenix™ ensured the curved position of Ben's head and spine was supported and accommodated.

Caregiver, Family Feedback

After assessment and in light of Ben's difficulty weight bearing, it was recommended that the carers use a full hoist in order to effectively position Ben in the chair each morning. After educating the caregivers and staff as to how to position Ben, they felt more involved with Ben's care and postural management and were motivated and enthused to take part in this every day.

Functional Changes

Ben's chair could be easily moved throughout the home. With the ease of manoeuvrability, he could spend time in different environments without having to compromise his posture or positioning by transferring to an unsupportive wheelchair. This was particularly evident at mealtimes when Ben could be transported to the dining room in his clinical therapeutic chair.

Impact on Skin

Correct positioning and the use of tilt in space have significantly reduced the risk of pressure injury development.

Ben's contact between his body and the supporting surface was maximised.

This helped to evenly distribute pressure and prevent high interface pressures under any bony prominences.

Tilt in space redistributed the weight distribution and pressure from his sacrum and buttocks to his back.

The same level of pressure management materials is included in the back and headrest of the Phoenix™ as standard to protect this area too.

Social Interaction

The caregivers reported that Ben's improved position and the manoeuvrability of the chair facilitated better communication and interaction with others. He was now able to move throughout different rooms within the home and spend time with more residents and staff.

The improved head position facilitated better voice projection and respiration, meaning his communication and speech was more audible and clearer. In addition, Ben did not fatigue as easily in this activity and could participate for longer periods of time without becoming tired and strained.

5 Sarah

Background

- 91-year-old.
- Cerebral Palsy, spastic type.
- Scoliosis.
- Hiatal hernia with resulting reflux and other GI problems.
- Non-ambulatory.
- Living at home independently.

Problems with Old Chair

- Standard wheelchair meant for mobility with no tilt or recline options.
- Back was not fully supported against the back of the chair.
- Scoliosis was not supported with adaptations.
- Leg rest could not support her mild knee flexion contracture.
- Suffered high levels of pain in her lower back.
- Would have to go to bed after using wheelchair, thus limiting her interaction with friends and family.
- Other option for seating was a couch which she was unable to get up from on her own, limiting her ability to participate in normal activities.

Before

Sarah Sitting in a Milano™

After

5 Sarah

Caregiver Issues

Sarah's friends and family were unable to adjust her current chair which would support her to stay upright and independent all day. Instead, they would have to assist with transfers to the couch or bed which reduced Sarah's ability to actively participate in activities. Sarah and her caregivers were also limited in the amount of time they could spend outside of the home because her sitting tolerance in her current chair was so low that they needed to be able to get home quickly in case her pain was too great.

Postural Issues

Sarah had spasticity that resulted in flexion in her elbows, wrist and fingers, however she was able to achieve almost full extension in her elbows.

She demonstrated flexed hips, adducted thighs and flexed knees that were unable to fully extend or to bend more than 100°.

This would cause her to slide forward in her chair and assume a position of anterior pelvis tilt due to lack of foot support.

Leaning to the left due to curvature in her spine as the day went on and she became more fatigued.

Compensating

Due to the spasticity in her legs, Sarah was unable to bend her knees far enough to rest her feet completely on the footrest. This meant her legs were pulling her hips and pelvis into a posterior pelvic tilt. There was very little back support in the chair.

Sarah relieved the pressure in her back by leaning from side to side. This was difficult due to spasticity of the muscles.

Because she was not fully supported in the chair, Sarah was at risk of falling out of the chair and this was making it hard for family members to leave her alone.

Intervention

During the assessment, it was determined that Sarah needed a chair that could accommodate the curvature of her spine and her lower limb spasticity in order to take pressure off her lower back. She also needed customised seating that would accommodate her shorter physique and safely facilitate position changes, stand transfers and participation in activities of daily living. It was decided that she would use a Seating Matters **Milano**™ chair with a horseshoe pillow and lateral supports.

> "I've never been in a chair that can recline more than the Milano – right when I sat in it I knew it was my chair"
>
> *- Sarah*

Qualitative Client Feedback

Sarah was pleased that the Milano looked like a piece of furniture, not a piece of medical equipment. The wheels meant that she could be transported to other rooms in the house without having to use her standard wheelchair. She was able to utilise the recline and 45° tilt function to redistribute the pressure in her lower back thus increasing comfort and reducing the risk of skin breakdown. She suffers less from acid reflex because the Milano put her in a more upright position than her old chair. Most importantly, her pain would decrease all the way down to a 0/10 after sitting in it.

Postural Changes

Sarah sat upright with normal pelvic posture and sliding from the chair was eliminated.

Lateral supports helped to accommodate the curvature of Sarah's spine and prevented her from leaning sideways over the side of the chair.

This natural sitting position allowed her to sit out for longer periods and socialize without confining her to her bed or one room.

Comfort was significantly increased.

Caregiver, family feedback:

5 Sarah

Sarah's daughter was delighted with the new **Milano**™ chair. She no longer had to worry that her mother would fall at home and could leave Sarah alone during the day. The family and Sarah appreciated that the chair looked more like a piece of furniture than medical equipment. Sarah looked more at home and natural in the chair and most importantly, had little to no pain during the day.

Functional Changes

Sarah was able to be left at home independently while her family went to run errands. She was able to be upright during the day with no pain and the tilt in space and recline features of the **Milano**™ allowed her to change positions to help with her symptoms from reflux as well as provide adequate pressure redistribution.

Social Interaction

Sarah no longer had to limit her time out of the house because she had a supportive and comfortable chair that met her positional needs. She was able to be out in the common areas with her family when she got fatigued because the tilt in space and recline allowed her to change position but still be able to interact with family and friends.

Before

Impact on Skin

The position of Sarah's pelvis was improved and her feet were fully supported so there was a more even weight distribution throughout her body.

She no longer leaned heavily to one side.

The risk of pain and developing a pressure injury was significantly reduced.

Sarah Sitting In A Milano™

After

6 Alan

Background

- 41-year-old.
- 650 pounds/294 kg/46.5 stone.
- Bariatric.
- Unable to sit unaided.
- Low blood oxygen saturation.
- Respiratory infections.

Problems with Old Chair

Alan did not have a chair that met his seating and postural needs and accommodated his weight.

Caregiver Issues

Alan's caregivers reported that Alan spent most of his day in bed because he was too weak to transfer and there was a high risk to staff and patients both during transfers as no suitable chairs were available.

When Alan sat in a more upright position in bed, he fatigued easily due to lack of postural support and couldn't tolerate this position for very long. Due to his minimal position changes from day to day, he was developing red areas on his skin. He repeatedly showed low blood oxygen saturation.

Alan had also contacted multiple respiratory infections due to his inactivity and inability to sit upright for prolonged periods of time.

Postural Issues

- Alan fatigued easily and couldn't tolerate an upright position for very long.
- The reclined position in bed caused recurrent chest infections and contractures of the lower limbs were beginning to emerge.

Before

Alan Sitting In A Bariatric Sorrento™

After

Bariatric Sorrento™

6 Alan

Intervention

During the assessment, it was decided that Alan would trial the **Bariatric Sorrento™**. The removable arms made it possible to complete a safe transfer with Alan, after which the chair was adjusted to a tilted position. The initial position was familiar as it was close to the position Alan maintained in bed.

The Sorrento™ chair has a waterfall back with three back cushions. The third lumbar cushion on the **Bariatric Sorrento™** was removed to allow Alan to sit right back into the chair and gain support for his upper back. This was a challenge before due to a pronounced gluteal shelf.

Qualitative Client Feedback

Alan was pleased to be able to sit out securely. The special features of the **Bariatric Sorrento™** meant that his back, feet and legs were properly supported increasing Alan's comfort and security in the chair.

Sitting out improved Alan's breathing and he felt his quality of life and his mood improved when he was able to get out of bed and interact with others from a seated position. The motorised feature of the chair gave Alan some control over his own position. This was very important to him.

Postural Changes

Alan sat more erect but had the ability using the handset to readjust his position to increase his comfort as his posture was accommodated.

The special feature of removing the third lumbar cushion meant Alan's back was fully supported and this increased his comfort and ability to sit out for extended periods of time.

Alan's feet were securely loaded on the footplate reducing the risk of sliding into a Posterior Pelvic Tilt.

Caregiver, Family Feedback

Caregivers were pleased with his progress and were happy with the reduction in moving and handling risk with transferring Alan each day. Alan's posture, core strength and mobility began to steadily improve.

Functional Changes

After a few weeks, the caregivers attempted standing transfers. This was significantly aided by the negative angle leg rest, helping him to get his feet into a position that would give him a safe, stable base when he reached the standing position. The caregivers were then able to use the anterior tilt to assist Alan to standing.

After progression, Alan was then able to perform a standing transfer when returning to bed with the assistance of caregivers. However, significantly reduced assistance to prior to using the **Bariatric Sorrento™**.

Impact on Skin

The redness on Alan's skin disappeared due to better redistribution of pressure and frequent changes in position using the tilt in space feature on the chair.

Social Interaction

Alan reported feeling stronger as he was able to for up to 7 or 8 hours per day comfortably in conjunction with regular position changes and weight shifts. Due to being able to sit out he was able to join in any common areas.

How to Improve Clinical Outcomes in Your Facility

In order to help you reduce pressure injuries, increase in quality of life and generate a reduction in staff labour, here are some initiatives which you can put into practice in your facility;

1. Carry out audits of seating needs

It is important to audit the seating in your facility to get an understanding of the quality of chairs in your facility and to assess its suitability in meeting your patients' needs.

Assess the current seating against The Four Principles of Effective, Clinical Seating™ and record which chairs meet all four criteria and those that don't. If a chair is missing one or more of these vital puzzle pieces, it may not be appropriate for seating your patients.

Following this audit, you should rebalance the mix of seating available to your patients and provide chairs such as Seating Matters which meet The Four Principles of Effective, Clinical Seating™. (page 32)

> Preventing pressure injuries reduces unnecessary pain, suffering and costs.

2. Raise the quality of standard chairs

Case studies performed in real life facilities with a variety of patients have shown that chairs that are not designed in accordance with The Four Principles of Effective, Clinical Seating™, can increase the risk of pressure injury. As outlined in the book, reducing the risk of pressure injury will improve overall quality of life for the patients and save healthcare facilities substantial amounts of money.

If an audit has determined that your chairs do not contain The Four Principles of Pressure Management in Seating™ to facilitate a reduction in pressure injuries, these chairs could be replaced by equipment that does.

3. Prevention as well as cure

Following the guidelines outlined in The Clinician's Seating Handbook and applying The Four Principles of Effective, Clinical Seating™ can reduce the risk of new pressure injuries for those who are more susceptible to skin breakdown and reduce the incidence for those with existing wounds.

4. The cooperation of families, nursing staff and patients

The family, staff and patients need to feel they are a part of the process of creating change and their inclusion is vital for success.

You can provide information and meet with these groups of people in turn to explain how implementation of these findings can reduce pressure injuries and be of benefit to the patients.

If these parties are informed of your objectives and are aware of the contribution they can make, you will have a much greater chance of success.

5. Individualised assessment

Therapeutic seating is sometimes taken from storage and reused without a proper assessment of the patient need. Thorough assessment is a vital starting point so that the specific needs of each patient are identified and the top goals for seating prioritised.

Not every goal can be achieved all of the time, but by meeting the top clinical goals you can make marked improvements in patient care by selecting a suitable chair and ensuring its correct use.

It is important to use your knowledge of the patient and clinical judgment together with evidence from research to make these decisions. By following this process, improved clinical outcomes could be gained in all healthcare environments. The important thing to note is that poor assessment leads to poor outcomes. Training is essential to ensure the assessment of patients with very complex needs is carried out appropriately.

To ensure high skill levels in seating assessments, Seating Matters have developed detailed training in the assessment process, and run frequent training days to improve the quality of assessments. You can learn more about this training and download free assessment forms at www.seatingmatters.com.

Investing time in a seating assessment is essential.

6. Training of caregivers

As the people who have the main contact with patients on a daily basis, it is important for caregivers to be trained in the correct use of the chairs their patients are using.

For example, educating caregivers and staff on the importance of using 45° tilt as an effective weight shift which should be performed regularly will ensure compliance and active participation in this practice.

While an Occupational Therapist may play a role during the assessment of the client and after provision of the chair, it is often down to the caregiver to monitor the patient's on-going progress. Caregivers awareness of postural changes and how to adjust the chair to accommodate them is important to the overall success of your intervention with a specialist chair.

As education plays an important role, Seating Matters have developed training tools to help with the training of all the staff concerned with patient care. These materials include training videos at **www.seatingmatters.com**, easy-to-read operation manuals for adjusting the chair in one minute or less and full-day, accredited training for an in-depth look into the clinical aspects of seating.

In addition, you can;

1. **Invite Seating Matters to your facility for a 'Lunch & Learn'. This will give an overview of the features of the chairs and how best to use them with your patients.**

2. **Discover more about the 'Injury Prevention Program™'; a program partner designed by Seating Matters for falls and pressure injury prevention.**

Further clinical education materials available at www.seatingmatters.com.

Lunch & Learn

Putting the Evidence into Action

Research outcomes which are not translated to clinical practice will serve little purpose to the patient experience.

The goal of this clinical publication is to actually save lives, reduce pressure injuries and to create lasting improvements in the healthcare system.

However, it can be a challenge to enact large-scale change in some organisations. The need to follow historical procedures, cost implications, ingrained practices and staff constraints are some of the reasons why good quality research and practical actions are not acted upon even when they can have substantial benefits.

To help organisations actually enact the recommendations contained in this book, Seating Matters have created a program that overcomes these barriers. This Injury Prevention Program™ ensures that this research can start to make changes and improve patient lives in healthcare organisations around the world.

To help organisations enact the recommendations contained in this book, Seating Matters have created the **Injury Prevention Program™.**

This Program addresses the various seating needs for patients and educates staff on learning outcomes to ensure that a change of culture takes place in the organisation towards radical improvements in pressure injury management and prevention.

We work with your facility to implement a long term change towards the correct use of therapeutic seating, in addition to the other technologies you employ, to reduce pressure injury incidence and increase patients' quality of life.

This is done by providing you with an education, training and maintenance program designed to meet the needs of your facility, including equipping you with therapeutic seating supported by clinical evidence.

The Aim of the Injury Prevention Program™

The Program aims to instil a change of culture in an organisation to help achieve improved patient outcomes. We take the learning outcomes from the project and work with your organisation to aim for a reduction in pressure injuries as well as:

- **Lower risk of staff injury.**
- **Reduction in staff manual handling.**
- **Reduction in patient falls.**
- **Absence of maintenance costs.**
- **Reduced litigation.**

Seating Matters

Injury Prevention Program™

How it Works in Your Facility

The Injury Prevention Program™ facilitates the use of Seating Matters therapeutic chairs for high-risk patients for a small cost per day. The Seating Matters chairs and the Injury Prevention Program™ are designed to facilitate a 24-hour solution to pressure management and to reduce the incidence of pressure injuries through the application of research and evidence based practice.

Your care facility will benefit from the following areas to help improve the care of the patients:

Evidence supported therapeutic clinical seating.

Staff training and education.

Comprehensive analysis of improvement of record keeping.

For more information about the Injury Prevention Program™ and how it can improve patient care within your facility, visit **www.seatingmatters.com**.

Injury Prevention Program™ is designed to facilitate a 24-hour solution to pressure management.

More About Seating Matters

Seating Matters chairs are changing the world through healthcare seating.

Seating Matters Therapeutic Chairs

Having struggled to find the correct chair to seat her patients, Martina Tierney OT, author, worldwide educator and Clinical Director of Seating Matters wanted to provide a range of seating for patients and caregivers to help prevent injury, increase comfort and reduce the cost of care. Together, Martina and a team of clinicians, engineers and designers have designed a range of clinical, therapeutic seating.

Much of past research and practice has focused on the use of bed rest to treat pressure injuries, not in conjunction with a specialist chair. Martina knew that the Seating Matters chairs were improving patient care but gaining clinical evidence was vital to support their use.

Today, Seating Matters manufacture a range of adult, children's and bariatric therapeutic clinical seating to make life more comfortable for those in need across the globe.

Sydney GoFlat™

Sorrento 2™

Phoenix 2™

MIlano™

Bariatric Sorrento™

Atlanta™

Monaco™

Kids Range

Kids Sorrento™

Kids Phoenix™

“I found it a real struggle to get chairs to suit my clients. As a therapist for many years, I wanted chairs that would give pressure management, postural support and comfort – not just mobility.

So we researched and created a solution that would meet all of these needs in a simple to use, easily adjusted chair.”

Martina Tierney OT

Try Seating Matters for Yourself

We work alongside a team of clinically trained Seating Specialists who can deliver a wide range of educational services tailored to suit the needs of you and your colleagues.

To find our more and request: Scan this QR code using your smartphone.

Seating Assessment	Educational Workshop	Clinical Seating Training	Demonstrations

The Clinical Questions Hotline

Sometimes it's nice to have a second opinion.

If it's a quick question on a postural issue, a suggestion on a specific patients' needs or a tip or hint on a particular seating situation, our Clinical Team will be happy to help.

Get in touch today by phone or email. You can find your regional office's email and phone number on the back of this handbook.

Phoenix™

Further Reading

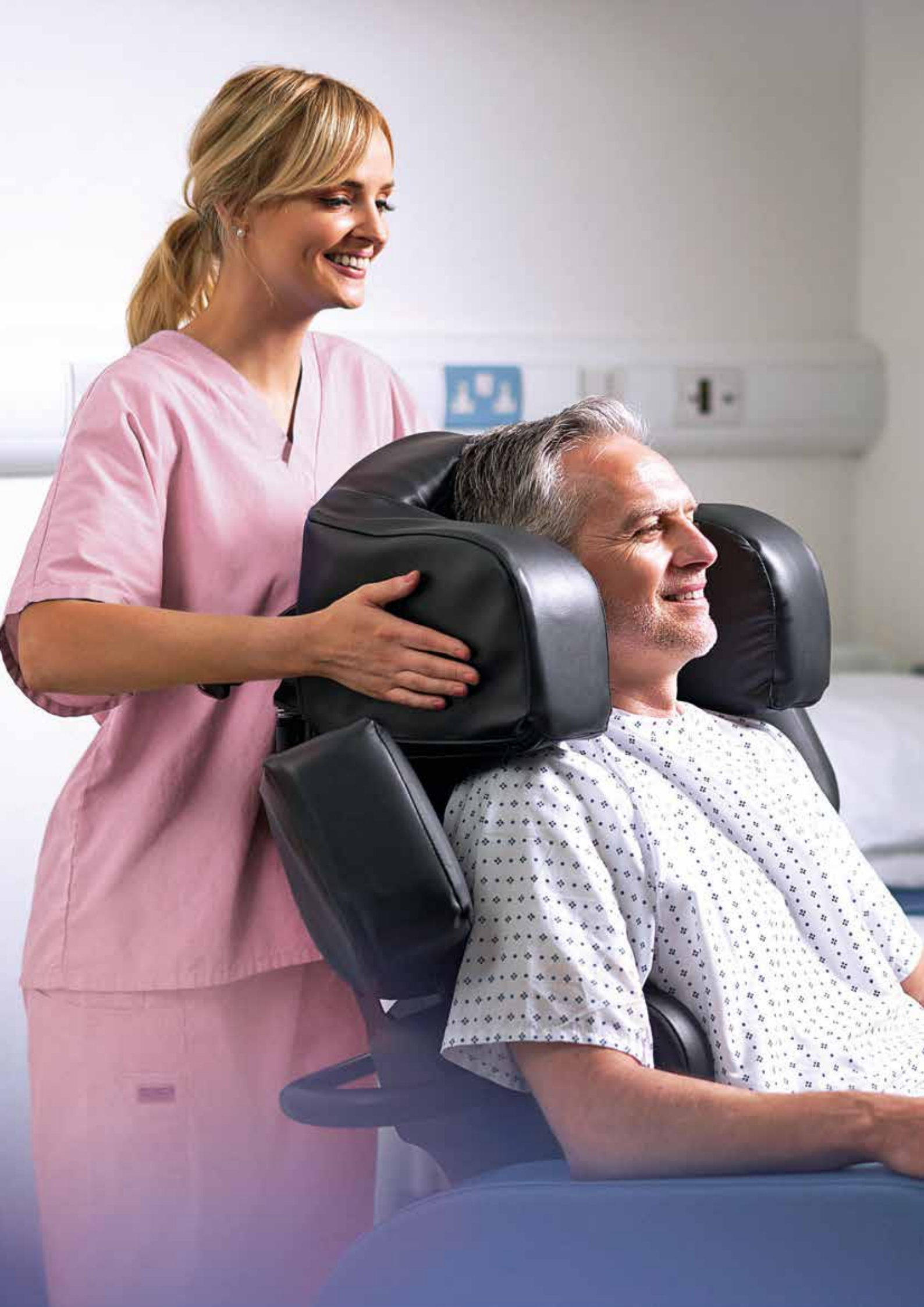
The Clinician's Guide to Infection Control by Seating Matters™

A reference guide on the design attributes of clinical, therapeutic seating for infection prevention & control..

This guide has been written to answer common questions on infection prevention & control.

Author Martina Tierney says, “In the post COVID-19 world, there will rightly be a new emphasis placed on design for infection prevention & control. I wanted to publish this book to get up to date information into the hands of clinicians who are fighting this pandemic across the world”.

To request, scan this QR code using your smartphone and enter details.



References

1. Australian Commission on Safety and Quality in Health Care (ACSQHC) (September 2011), National Safety and Quality Health Service Standards, ACSQHC, Sydney.
2. Fisher, A. R., Wells, G., & Harrison, M. B. (2004). Factors Associated with Pressure Ulcers in Adults in Acute Care Hospitals. Holistic Nursing Practice, 18(5), 242-253.
3. Lindgren, M., Unosson, M., Fredrikson, M., & Ek, A. (2004). Immobility - a major risk factor for development of pressure ulcers among adult hospitalized patients: A prospective study. Scandinavian Journal of Caring Sciences, 18(1), 57-64.
4. Downie, F. & Sandoz, Heidi & Gilroy, P. & Royall, Dawn & Davies, S. & Brett, D. & Bates, J.. (2014). Avoidable pressure ulcer rates in six acute UK Trusts. Wounds UK. 10. 48-53. .
5. Norton, L., & Sibbald, G. (2004). Is bedrest an effective treatment modality for pressure ulcers? Ostomy Wound Management, 50(10), 40-51.
6. Casey, J., & Gittins, L. (2013). Use of tilt-in-space in seating systems for adults with physical disabilities. Physical Therapy Reviews, 18(4), 285-299.
7. Grey, J.E., Harding, K.G., Enoch, S. (2006). Pressure ulcers. BMJ 2006;332:472.
8. Chan, B., Ieraci, L., Mitsakakis, N., Pham, B., & Krahn, M. (2013). Net costs of hospital-acquired and pre-admission PUs among older people hospitalised in Ontario. Journal of Wound Care, 22(7), 341-346.
9. National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and Treatment of Pressure Ulcers: Quick Reference Guide. Emily Haesler (Ed.).
10. NHS Improvement. (2018). Pressure Ulcers: Revised definition and measurement. Ruth May (Ed.). Wellington House: Cambridge, UK; 2018.
11. Vanderwee, K., Clark, M., Dealey, C., Gunningberg, L., & Defloor, T. (2007). Pressure ulcer prevalence in Europe: A pilot study. Journal of Evaluation in Clinical Practice, 13(2), 227-235.
12. Graves, N., & Zheng, G. (2014). Modeling the direct healthcare costs of chronic wounds in Australia. Journal of the Australian Wound Management Association, 22(1), 22-33.
13. Bennett, G. (2004). The cost of pressure ulcers in the UK. Age and Ageing, 33(3), 230-235.
14. Bauer, K., Rock, K., Nazzal, M., Jones, O., & Qu, W. (Nov 2016). Pressure Ulcers in the United States' Inpatient Population From 2008 to 2012: Results of a Retrospective Nationwide Study. Ostomy Wound Management, 62(11), 30-38.
15. Theisen, S., Drabik, A., & Stock, S. (2012). Pressure ulcers in older hospitalised patients and its impact on length of stay: A retrospective observational study. Journal of Clinical Nursing, 21(3-4), 380-387. doi: 10.1111/j.1365-2702.2011.03915.x
16. Meehan, M. (2000). Beyond the pressure ulcer blame game: reflections for the future. Ostomy Wound Management, 46(5), 46-52.
17. Bennett, R. G., Osullivan, J., Devito, E. M., & Remsburg, R. (2000). The Increasing Medical Malpractice Risk Related to Pressure Ulcers in the United States. Journal of the American Geriatrics Society, 48(1), 73-81.
18. NPIAP. (n.d.) Retrieved May 7, 2022. Pressure Injury Staging Illustrations. https://npiap.com/page/PressureInjuryStages
19. Smith, D.M. (1995). Pressure ulcers in the nursing home. Annals of Internal Medicine, 123(6), 433-442.
20. Gefen, A. (Oct 2008). How much time does it take to get a pressure ulcer? Integrated evidence from human, animal, and in vitro studies. Ostomy Wound Management, 54(10), 26-35.
21. Staas, W.E., Cioschi, H.M. (1991). Pressure sores: a multifaceted approach to prevention and treatment. Western Journal of Medicine, 154, 539-544.
22. Trumble, H.C. (1930). The skin tolerance for pressure and pressure sores. Medical Journal of Australia; 2: 724-726.
23. Sprigle, S. (2000). Effects of Forces and the Selection of Support Surfaces. Topics in Geriatric Rehabilitation, 16(2), 47-62.

References

24. Fisher, S. V., Szymke, T. E., Apte, S. Y., & Kosiak, M. (1978). Wheelchair cushion effect on skin temperature. Archives of Physical Medicine and Rehabilitation, 59(2), 68-72.

25. Brienza, D. M., & Geyer, M. J. (2005). Using Support Surfaces to Manage Tissue Integrity. Advances in Skin & Wound Care, 18(3), 151-157.

26. Trelleborg. (2019). Retrieved May 7, 2022. Are You Sitting Comfortably. https://www.trelleborg.com/engineered-coated-fabrics/-/media/engineered-fabrics/dartex/dartex-pdfs/2019-are-you-sitting-comfortably-ecf-dartex.pdf

27. Kosiak, M., Kubicek, W.G., Olson, M., Danz, J. N., & Kottke, F. J. (1958). Evaluation of pressure as a factor in the production of ischial ulcers. Archives of Physical Medicine and Rehabilitation, 39, 623-629.

28. Jiricka, M. (2009). Activity Tolerance and Fatigue. In C. Porth (Author), Pathophysiology: Concepts of Altered Health States(8th ed., pp. 231-249). Philadelphia: Lippincott Williams & Wilkins.

29. Hibbs P (1998). The past politics of pressure sores. J Tissue Viability 8(4): 14–5.

30. NHS. (2022). Retrieved May 7, 2022. Falls: Applying All Our Health. https://www.gov.uk/government/publications/falls-applying-all-our-health/falls-applying-all-our-health

31. Alexander, B. H., Rivara, F. P., & Wolf, M. E. (1992). The cost and frequency of hospitalization for fall-related injuries in older adults. American Journal of Public Health, 82(7), 1020-1023.

32. Sterling, D. A., O'Connor, J. A., & Bonadies, J. (2001). Geriatric Falls: Injury severity is high and disproportionate to mechanism. The Journal of Trauma: Injury, Infection, and Critical Care, 50(1), 116-119.

33. Hayes, W. C., Myers, E. R., Morris, J. N., Gerhart, T. N., Yett, H. S., & Lipsitz, L. A. (1993). Impact near the hip dominates fracture risk in elderly nursing home residents who fall. Calcified Tissue International, 52(3), 192-198.

34. Jager, T. E., Weiss, H. B., Coben, J. H., & Pepe, P. E. (2000). Traumatic Brain Injuries Evaluated in U.S. Emergency Departments, 1992-1994. Academic Emergency Medicine, 7(2), 134-140.

35. Centers for Disease Control and Prevention. (2020). Retrieved May 7, 2022. Cost of Older Adult Falls. https://www.cdc.gov/falls/data/fall-cost.html?msclkid=a1d5c034d06111ec9dccb0e8efc21b2c

36. Florence, C. S., Bergen, G., Atherly, A., Burns, E., Stevens, J., & Drake, C. (2018). Medical Costs of Fatal and Nonfatal Falls in Older Adults. Journal of the American Geriatrics Society, 66(4), 693-698.

37. Vellas, B. J., Wayne, S. J., Romero, L. J., Baumgartner, R. N., & Garry, P. J. (1997). Fear of falling and restriction of mobility in elderly fallers. Age and Ageing, 26(3), 189-193.

38. Gov. UK (2022) NHS injury costs recovery scheme: tariff and charges from 1 April 2022. https://www.gov.uk/guidance/nhs-injury-costs-recovery-scheme-tariff-and-charges-from-1-april-2022

39. Hospital Adjusted Expenses per Inpatient Day USA (2021). https://www.kff.org/health-costs/state-indicator/expenses-per-inpatient-day-by-ownership/

40. Strobl, W. M. (2013). Seating. Journal of Childen's Orthopedics, 7(5), 395-399.

41. Effgen, S. K. (2013). Meeting the physical therapy needs of children. Philadelphia: F.A. Davis.

42. Russell, D.J., Rosenbaum P.L., Wright, M., Avery, L.M. (2013). Gross Motor Function Measure (GMFM-66 & GMFM-88) User's Manual. London: Mac Keith Press.

43. Cobb, JR. (1948) Outline for the Study of Scoliosis. Instructional Course Lectures, American Academy of Orthopedic Surgeons, 5, 261-275.

44. Mo, F., & Cunningham, M. E. (2011). Pediatric Scoliosis. Current Reviews in Musculoskeletal Medicine,4(4), 175-182.

45. Dimond, B. (2010). Legal aspects of pain management. London: Quay Books.

46. Angelo, J. (1993). Using Single-Subject Design in Clinical Decision Making: The Effects of Tilt-in-Space on Head Control for a Child with Cerebral Palsy. Assistive Technology, 5(1), 46-49.

47. Michael, S., Porter, D., & Pountney, T. (2007). Tilted seat position for non-ambulant individuals with neurological and neuromuscular impairment: A systematic review. Clinical Rehabilitation, 21(12), 1063-1074.

48. Aissaoui, R., Lacoste, M., & Dansereau, J. (2001). Analysis of sliding and pressure distribution during a repositioning of persons in a simulator chair. IEEE Transactions on Neural Systems and Rehabilitation Engineering, 9(2), 215-224.

49. Sonenblum, S.E., Sprigle, S.H. (2011). The impact of tilting on blood flow and localized tissue loading. Journal of Tissue Viability, 20(1), 3-13.

50. Menges, D., Seiler, B., Tomonaga, Y. et al. Systematic early versus late mobilization or standard early mobilization in mechanically ventilated adult ICU patients: systematic review and meta-analysis. Crit Care 25, 16 (2021). https://doi.org/10.1186/s13054-020-03446-9

51. Monsees, J, Moore, Z, Patton, D, et al. A systematic review of the effect of early mobilisation on length of stay for adults in the intensive care unit. Nurs Crit Care. 2023; 28(4): 499-509. doi:10.1111/nicc.12785

52. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel and Pan Pacific Pressure Injury Alliance (2019). Prevention and Treatment of Pressure Ulcers/Injuries: Quick Reference Guide. Emily Haesler (Ed.). https://guidelinesales.com/page/Guidelines

Notes

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