

Action[®] Ampla

Clinical Guide



Yes, you can.®



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When it comes to bariatric wheelchair design, **building bigger sizes is not the solution**

Introduction

► Globally, the medical field is witnessing a **“redefinition”** of the standard for wheelchair sizes, simply due to the rising influx of plus size users who no longer fit within the dimensions of traditional wheelchairs.



When it comes to bariatric wheelchair design, building bigger sizes is not the solution.

The equipment has to be designed to fit the user. It is not just a matter of constructing the chairs to be bigger, stronger and hold more weight*.

Bariatric chairs that are simply ‘stretched’ editions of standard adult wheelchairs won’t work for a plus size user group.

The users’ body shapes and centre of gravity will not only impact on the users’ comfort in the wheelchair and functional capabilities, but also on the stability of the chair itself. Plus size individuals may, therefore, have unique complications in finding comfortable seating due to varying body types and needs.

Plus size users have **unique complications** in finding the right wheelchair



* Wheelchair seating issues escalate as body weight increases.

Plus size The Statistics

2

32%

OF THE WORLD'S
POPULATION ARE
OBESE
(BMI \geq 35kg/m²)

68%

OF THE WORLD'S
POPULATION ARE
OVERWEIGHT
(BMI \geq 30kg/m²)

14%

of children and
adolescents are overweight
or obese, worldwide

62%

of the world's obese individuals
live in developing countries

almost

90%

of people living with type 2
diabetes are overweight or obese

ZERO

the number of countries that succeeded in
decreasing obesity in last 33 years

3.4 million

deaths caused by being overweight
or obese



More than **50%** of the world's **671 million** obese people live in **10 countries**: US, China, India, Russia, Brazil, Mexico, Egypt, Germany, Pakistan and Indonesia

In the UK, 64% of adults
are classed as being
overweight or obese

**Almost 3 out of 4
Indians** are overweight
and 1 out of 3 are obese



Source: The Lancet (2014),
Vol 384, August 30, 2014



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Common problems with existing bariatric wheelchair design

A lack of understanding or acknowledgement on the different type of body shapes and wheelchair configuration requirements:

Body shapes

- a** Apple Android
- b** Apple Panniculus
- c** Pear Shapes
- d** Gluteal Shelf
- e** Anasarca



Body shapes 3.1

- ▶ Plus-size users can have a wide variety of body shapes in addition to differences in BMI. Two people may weigh the same, however, how their weight is distributed (i.e. their body shape), may be completely different.

Body shapes are based on waist to hip ratio and are commonly classified into categories. Each body shape poses its own functional challenges in relation to transfers, mobility and equipment selection.

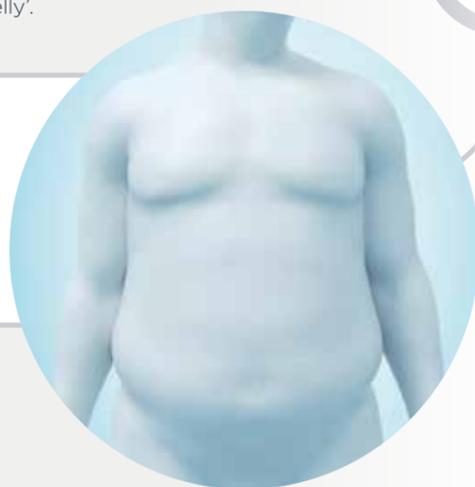
Apple (android) ▼

- ▶ Commonly referred to as being 'apple shaped', this body shape describes individuals who have excessive weight distributed around their stomach or abdominal area, otherwise known as abdominal or central obesity.

The type of fat associated with this body shape is known as visceral fat. It's a gel-like fat, which wraps around major organs including the liver, pancreas and kidneys and has a strong correlation between cardiovascular disease and type 2 diabetes. Typically, the apple shape is more common in males than in females. Men tend to be referred to as having a 'pot belly' or 'beer belly'.

This type of shape is associated with:

- ▶ Upper body obesity
- ▶ Abdominal obesity
- ▶ Android or male obesity
- ▶ Centralised obesity


a


Common wheelchair related Issues ▼

Wheelchair seating issues related to an apple (android) body shape:

- ▶ User's centre of gravity located more anteriorly, this affects stability of the wheelchair
- ▶ User has reduced hip flexion affecting their ability to sit upright
- ▶ Hip abduction - legs fall outwards = risk of pressure buildup against the armrests or footrest hangers
- ▶ Issues with footplate location due to hip abduction issues
- ▶ Propulsion difficulties - unable to reach rear wheels

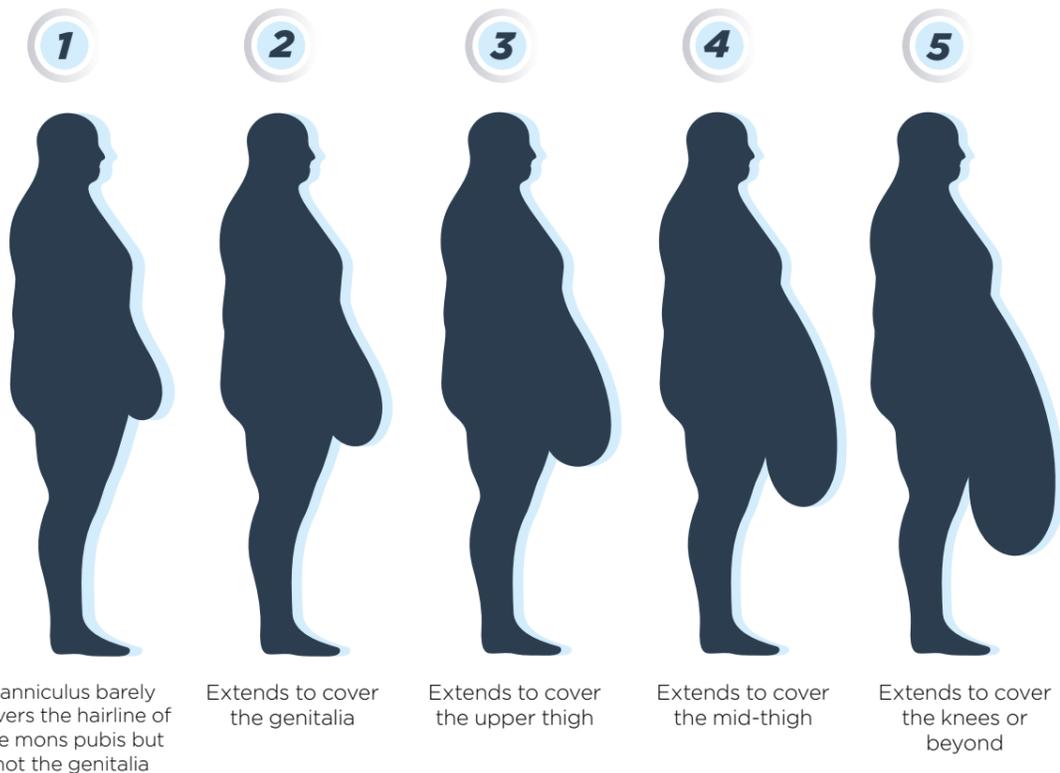
The chosen wheelchair should always depend on the individual body shape of the person

Apple (panniculus)

▶ A panniculus or pannus is the term used to describe a hanging mass of subcutaneous fat in the lower abdomen. Commonly referred to as an 'abdominal apron', the mass consists of skin, fat and in some situations the contents of the abdominal cavity following a hernia (most commonly of the bowel).

Panniculus can vary in size and severity and to identify each category, there is a grading system from 1-5:

b



Panniculus is a medical term describing a dense layer of fatty tissue

Common wheelchair related Issues

Wheelchair seating issues related to an 'Apple panniculus' body shape

- ▶ Shortened seat depth
- ▶ Anterior pelvic tilt
- ▶ Lumbar lordosis
- ▶ Reduced stability
- ▶ Difficulty with transfers

Pear shaped is the term used to describe someone who carries excess weight around their bottom and thigh region and is more commonly associated with females compared to males. Typically, excessive tissue can be distributed either medially (towards the inside of the thighs – known as Pear Abducted) or laterally (towards the outside of the thighs – known as Pear Adducted).



Pear Shape

In the case of pear adducted body shapes, excessive tissue on the outside of the thighs means the individual will require a wider seat.

The lower limbs in this case can typically achieve a midline (straight) position as the weight is distributed to the outside rather than the inside, making positioning of the hips, legs and feet far easier.

Excessive tissue on the inside of the thighs will cause the hips and legs to abduct (fall outwards) when seated.

This can make positioning or supporting the legs and feet a challenge, as the individual is not able to sit with their legs together.

Common wheelchair related Issues

- ▶ Footplate location
- ▶ Seat width
- ▶ Backrest width



Gluteal Shelf

Excessive tissue located around the buttocks creates a posterior (rearward) protruding mass of tissue commonly referred to as a shelf.

Individuals with excessive gluteal tissue will most likely encounter problems positioning themselves right back in a seat as their excess tissue prevents them contacting the back support. This can change the individual's centre of gravity, which is especially important if considering wheelchair provision.



Common wheelchair related Issues

Related to the gluteal shelf

Excessive adipose tissue in the gluteal region can prevent plus size individuals getting adequate support from their backrest as excess tissue around their buttocks stops them making contact with the backrest. Individuals commonly complain of back pain and sliding down in their seat as they try to find a comfortable sitting position.

When measuring someone who has a gluteal shelf for a wheelchair it is helpful to measure the overall depth from the most posterior aspect of the calf to the most distal part of the gluteal region, as well as the height of the gluteal tissue which can be done by measuring from the top of the surface they are sitting on (firm surface needed) to the top of the gluteal tissue.

This will give you an indication of at what height the back support should be fitted, which will accommodate for some of the redundant tissue allowing the individual to sit further back into the chair. Remember however, to take into account the thickness of the seat cushion.

The provision of a privacy flap can prevent the individual from feeling as though their bottom is hanging out, or through the back support

Anasarca

is a severe and generalised oedema with widespread subcutaneous tissue swelling.

Odemea is the abnormal presence of excessive fluid between the cells



Anasarca

Subcutaneous tissue is found beneath the lowermost level of the skin and is where adipose (fat) cells are found. Anasarca is not a disease entity on its own - it signifies a severe underlying disease.

What is oedema and why does it occur?

Oedema can be described as an abnormal presence of excessive fluid in the interstitial space (fluid that lies in between cells). About 60% of our lean body weight is made up of water, of which two thirds (40%) lies within the cells (intracellular) and one third (20%) lies outside the cells (extracellular).

Oedema is caused by an accumulation of excess fluid in the interstitial space between the cells. This occurs due to changes in pressure (or forces) between the interstitial space and the extracellular space. When this happens, fluid moves between the two spaces, causing fluid levels to change.

- ▶ Localised oedema means that the oedema is localised to a specific region of the body, commonly due to venous/lymphatic causes, allergy or inflammation
- ▶ Generalised oedema involves more than one part of the body simultaneously and is most commonly due to cardiac, hepatic, renal or endocrine causes



Functional complications for the user

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The distribution of adipose tissue is the most critical consideration when working with a plus size user, as it will impact their functional ability within the wheelchair. For instance, a user with excess adipose tissue in the abdominal region (android body shape) is likely to be restricted in hip flexion and bending below the waist. Users may also have restrictions with reaching forwards or sideways from a seated posture, to access a grab rail.

► Weight & Measurements

Aside from the obvious different body shape and physiological changes, there are often psychological and environmental issues to address for plus-size users. Plus-size users may worry about whether their shape or size may inconvenience family members or caregivers and have concerns about equipment failure and getting through doorways, for example.

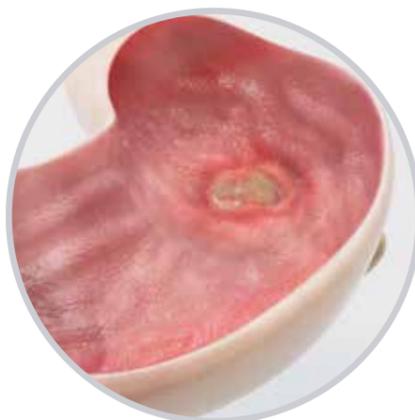
Many will not know their current weight and the prospect of having to be weighed can be a very daunting and emotional experience. It's important to give the individual time, understanding and respect when weighing them and make sure that this is done in a private environment away from onlookers. Having an understanding of the person's weight history will help to identify if the person's weight is stable or if there have been recent losses/gains. If a person's weight is not stable, consider this effect on positioning and on the wheelchair at the outset of the prescription.

Other measurements, however, should be completed with the individual sitting on a firm surface with the feet firmly supported. If measurements, apart from the distance between the ASIS, are completed in supine, inaccurate measurements could result as the effects of gravity act on the adipose tissue.

When measuring, it is helpful to use a caliper, if available, rather than a tape measure, to obtain accurate measurements. Care should be taken to measure the widest point when measuring the lower body, recognising that this measurement may not be of the hips, depending upon the individual's body shape and weight distribution. If the user presents with a gluteal shelf, additional measurements are required.

Risk factors

It is important to remember that plus size individuals are at increased risk of pressure ulcers due to factors including immobility and poor vascularisation of adipose tissue. Adipose tissue is not supportive and deep tissue injury can occur from immobility. The damage starts within the muscle, rather than the epidermis. Thus, damage can occur before it is observed on the skin level. People who are obese also are prone to profuse sweating, which can contribute to skin integrity issues through increased moisture on the skin over the bony prominences. In addition, the risk of pressure ulcers comes from increased risk of shearing if transfers and weight shifting are not completed well.



Weight & measurements



Determine an accurate weight

Most plus size individuals are concerned with how their bodies' overall width will fit into the narrowest chair possible. During the mat evaluation, the team must discuss with the user how much of the users' width could be compressible to fit into a narrower overall width without impacting skin integrity.

See page 21 for more details.



5 Key measurements

► **Plus size users should be measured when sitting, as in lying adipose tissue will spread giving untrue measurement.**

If the only means of measuring the hip width is in supine, measurement across the ASIS's should be taken below the abdominal mass.

Palpating the bony landmarks of the pelvis including the Anterior Superior Iliac Spines (ASIS) and the Posterior Superior Iliac Spines) can be extremely difficult due to excess adipose tissue. In these situations its advisable to look for skin folds or skin depressions.

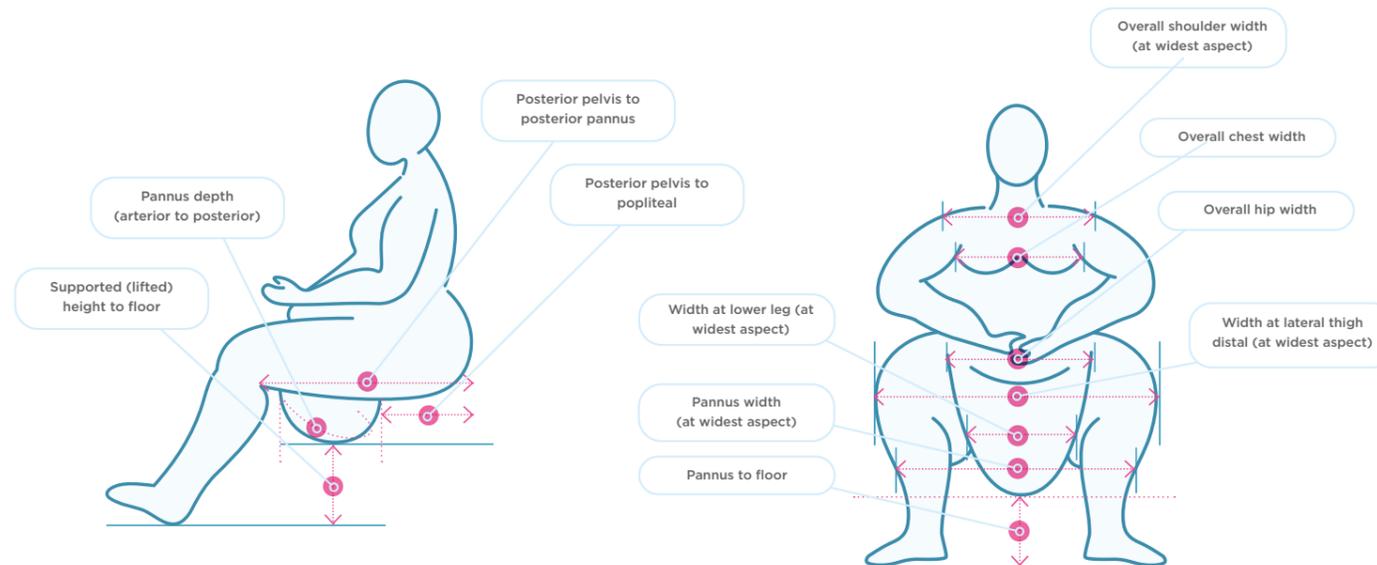
Measurements

Depending on the plus size users' diagnosis and endurance, this may require two to three people to safely and accurately complete. It is important to measure the user in a sitting position on a firm planar surface. This will assure the most accurate dimensions. Avoid measuring anyone in bed, on a sofa or on an 'easy chair' as the soft surfaces accommodates the tissue, making it difficult to account for wheelchair specifications. Ideal for this activity is a height adjustable therapy mat; the height adjustment allows femur support on the table surface while the feet can be in contact with the floor. An adjustable height table also makes sit-to-stand transfer assessment safer.

Measurements should be taken with a rigid measurement device; a metal tape measure, carpenter's rule or a pair of sliding calipers. Calipers can make measurements easier and reduce errors. These need to be large enough to accommodate the user width.

Excessive posterior pelvic tissue distribution requires at least three specific measurements with the user seated; posterior aspect of the tissue at the calf to the posterior aspect of gluteal tissue on the pelvis. Posterior aspect of the tissue at the calf to the posterior aspect of users' trunk and from the seat surface (mat table) to the top of the gluteal tissue on the posterior aspect of the pelvis.

Additional measurements for plus size users



Current Weight

i

Weight History

ii

iii

Measurements:

- Back of knee/calf to back of buttocks (seat pan depth)
- Back of knee/calf to thoracic-lumber trunk (for seat depth)
- Seat pan to under forearm (armrest height)
- Seat pan to top of gluteal tissue (lower aspect of back support height)
- Width from lateral calf to lateral calf (at widest aspect)
- Overall hip width
- Lateral elbow to lateral elbow
- Back of head scapula



Clinical benefits of the Action Ampla

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Backrest design

- ▶ The backrest has been designed to accommodate both apple and pear body shapes as well as supporting those with a gluteal shelf
- ▶ The width of the backrest changes from seat width 55cm and up, above the hip level towards the shoulders where it becomes narrower. This makes accessing the rear wheels and propulsion easier as the user's arms do not come into conflict with the backrest canes
- ▶ The width of backrest below hip level is the same as the seat width, this ensures that there is enough support at the rear of the pelvis at the level of the Posterior Superior Iliac Spines (PSIS) to stop the pelvis rotating backwards, preventing the user from sliding down the seat
- ▶ The backrest plate which offers four height adjustments accommodates for excess adipose tissue around the buttocks, enabling the user to sit further back on the seat and to make contact with the backrest (for instructions on how to measure the height of a gluteal shelf correctly, please refer to the measurement section, page 21)
- ▶ The backrest cushion which comes as standard fills up any remaining gap between the users back and the backrest itself. This ensures not only even pressure distribution, but optimises support, comfort and positioning for the user. The cushion is mildly contoured to match the natural curvatures of the user's back and firm enough to ensure it maintains its shape and functionality during use

- ▶ The backrest is foldable, ideal for transported and storage purposes. The folding mechanism is operated via a pull cord conveniently located under the front of the seat increasing ease of access and operation by the user
- ▶ The seat material itself has been specially chosen for its strength and durability, preventing the likelihood of hammocking or stretching, whilst remaining light and comfortable compared to a rigid seat plate
- ▶ The backrest cover is manufactured from breathable mesh fabric and features an integrated privacy flap



Seat Angle

- ▶ The seat angle is parallel to the floor to ensure those who foot propel can reach the ground easily
- ▶ The 0° seat angle also helps to promote independent transfers
- ▶ The set seat angle ensures the users pelvis remains levels and any unwanted pelvic movement does not occur whilst the user manoeuvres the chair with their feet

Seat to ground height adjustment

- ▶ The Ampla offers low seat to ground height adjustment, especially beneficial for those who use their feet to propel. The ability to lower the seat to ground height reduces the likelihood of users abandoning the use of their seat cushions to reach the floor.
- This in turn helps maintain skin integrity at the back of the legs and behind the knees, preventing the lower limbs inadvertently rubbing or catching the front of the seat surface. The Action Ampla has four built in seat heights that can be set.

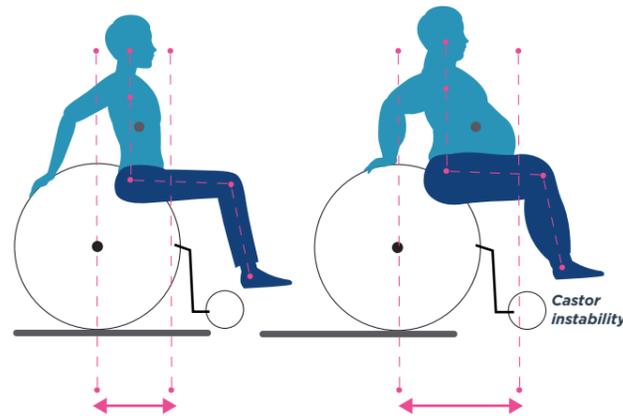
Center of gravity adjustment and active position

- ▶ The Ampla features Center of Gravity (COG) adjustment
- ▶ Moving the rear wheels forward helps to keep the user's weight over the rear wheels making propulsion easier (see section on COG)
- ▶ For those with excess abdominal tissue (apple body shape) having the rear wheels set in a more active position makes the wheels easier to reach. This prevents the tendency for users to slide their bottoms forward on the seat to propel their chair



► **The centre of gravity (COG) of a plus size person who is apple shaped is often located several inches forward from that of a person of average weight**

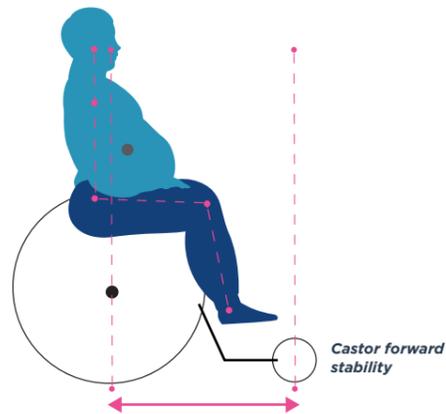
An anterior forward shift in whole body COG threatens stability of the wheelchair by placing the line of gravity closer to the boundary of the body's Base of Support (BOS). This puts more weight on the front castors making the wheelchair anteriority extremely unstable and thus more difficult to manoeuvre or turn.



Person's COG = ●

► **Wheelchair propulsion can also become very difficult and ineffective as the user's own centre of gravity moves further away from the wheelchair's center of gravity.**

80% of the user's body weight should be distributed over the rear wheels and the remaining 20% over the front castors.



► **Moving the rear wheel axles forward, helps to keep the user's weight over the rear wheels, making propulsion easier. To counteract forward instability, the castors of the wheelchair are also set further forward.**

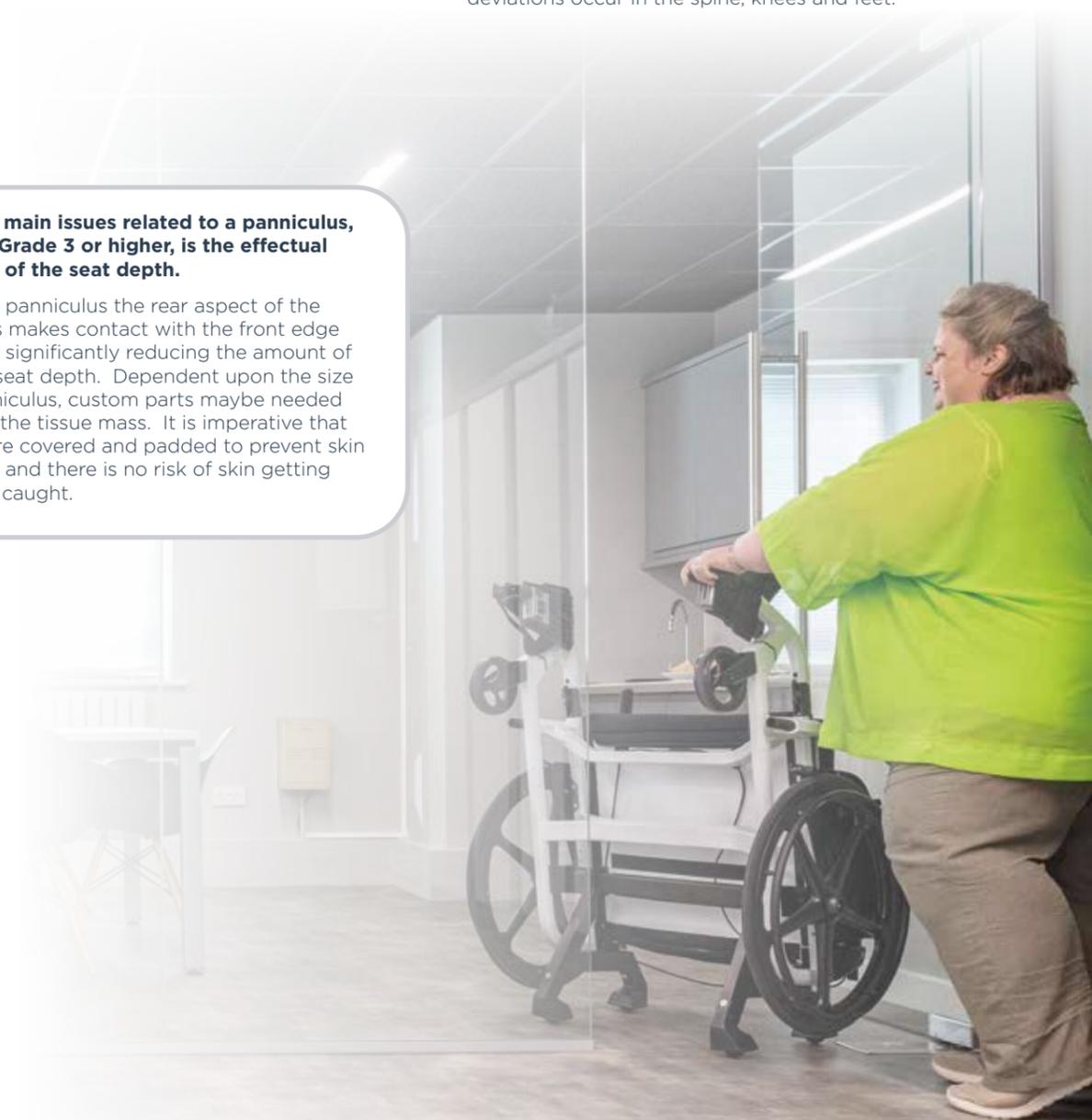
Excess adipose (fatty) tissue in the abdominal region can also create a barrier to full hip range of motion (ROM)

The user may lack the ability to flex at their hips (close their hip angle) preventing them from being able to sit completely upright. Opening the backrest angle can help to alleviate this issue. Excess abdominal tissue may also exert pressure on the femurs, this can affect the height of the footplates which the user feels is comfortable and can also force the upper legs into a more abducted (splayed) posture, making it difficult for the user to bring their legs into midline, which has a knock-on effect on the footplates.

Typically, users who are apple shaped sit with their feet more widely apart. Traditional footrests which attach on the lateral aspects of the wheelchair seat frame are often more appropriate than a centre mounted footplate or footrests in this case. However, care needs to be taken to prevent the user coming into contact with the footrest hangers as is commonly seen as a result of hip abduction, as this poses a risk of skin breakdown. As a result of limited ROM and changes in adipose tissue distribution, many plus size users adopt chronic postural presentations that threaten their functional capacity, leading to back pain and spinal shrinkage during physical tasks. The most prominent deviations occur in the spine, knees and feet.

One of the main issues related to a panniculus, especially Grade 3 or higher, is the effectual shortening of the seat depth.

On a larger panniculus the rear aspect of the tissue mass makes contact with the front edge of the seat, significantly reducing the amount of functional seat depth. Dependent upon the size of the panniculus, custom parts maybe needed to support the tissue mass. It is imperative that all edges are covered and padded to prevent skin breakdown and there is no risk of skin getting pinched or caught.



Footplate type ✓

- ▶ The footrests on the Ampla are angle, depth and width adjustable. This ensure that the feet can be in nearly all circumstances supported irrespective of the user's body shape and foot position
- ▶ Width adjustment helps accommodate for those who have pear body shape
- ▶ Footrest tubes are available in two lengths to accommodate for users of varying heights

Footrest hanger angle ✓

- ▶ Excess abdominal tissue (apple body shape) can reduce the amount of hip flexion a user has which can have a knock-on effect on their lower limb position. The footrest hanger angle on the Ampla accommodates for this. Allowing the user to position their feet comfortably on the footplates
- ▶ Excessive fluid in the lower limbs due to oedema may also prevent the user from being able to flex their knees to 90 degrees. The footrest hanger angle ensures the lower limbs are always adequately supported
- ▶ The tubing has a flat surface as opposed to being round which helps to reduce the risk of peak pressure build up in the event that lower extremities inadvertently make contact with the hangers
- ▶ A lever located under the legrests releases the footrest hangers. This prevents them from falling off the frame when the chair is put into transport position
- ▶ For those who foot propel a footrest hanger option without the footrest tube and footplate is available

Transport and anti-tip function ✓

- ▶ The innovative design of the anti-tip lever makes tipping the wheelchair onto its rear for transportation possible (illustration required)
- ▶ The end of the anti-tip lever resembles a ball which allows the user to wheel the chair on its rear through narrower doorways, helping improve environmental access
- ▶ When positioned on its rear the large rear wheels are off the ground, this makes it even easier for the user to remove them quickly and easily
- ▶ For those who do not wish to have the transport function on their chair an alternative anti-tip lever without the ball feature is available
- ▶ The transport function is also optional



Skirt guard ✓

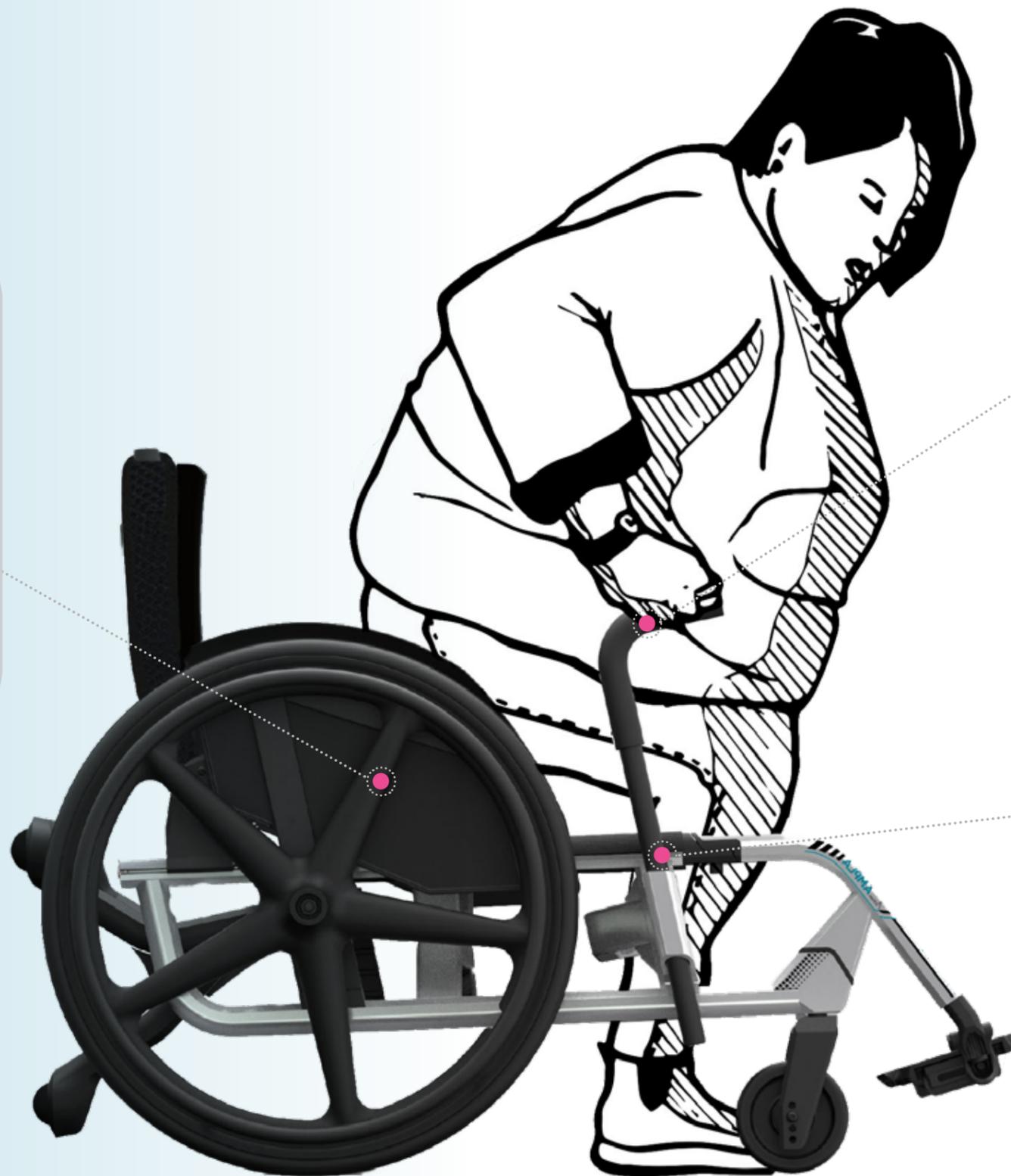
- ▶ Considering the common plus size body shapes, armrests are not commonly used by this user group, therefore the Ampla comes as standard with skirt guards in place of an armrests
- ▶ The skirt guard prevents contact between lateral aspect of thighs and the rear wheels whilst keeping the area around the users knee free (Ideal for those who have a pear body shape)
- ▶ The skirt guards are manufactured from reinforced material. Plus size users want their chairs to be as narrow as possible. The reinforced skirt guard prevents weight of adipose tissue pushing against the skirt guard which may cause interference with the rear wheels
- ▶ Armrest pads have been reported to cause injury to users arms through friction build during propulsion

Transfer levers ✓

- ▶ To assist with transfers in and out of the chair in place of armrests
- ▶ The levers are positioned on the frame to maintain stability of the wheelchair, and prevent it tipping forward when the user transfers in or out
- ▶ The levers can be lifted and turned so the handles face the opposite direction permitting access under tables for example
- ▶ The levers can also be lifted and turned to the side, dropping down out of the way completely if access under furniture remains problematic

Brake location ✓

- ▶ The brakes are located under the skirt guards. This higher position means the user does not have to flex at the hips to access the brakes. As mentioned limited hip flexion is common for those with excess abdominal tissue (apple body shape). The location of the brakes therefore makes using the brakes far easier



7

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Plus-size: An introduction EU - 03/2020



Yes, you can.®