Clinical Decision-Making Support

Options, consequences and key features for the rep, from the assessment findings

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Use with the findings of the hands-on assessment (Part B). Tick each card that applies; findings can occur alone or together. Always start pelvis up, then work pelvis down.

Person being assessed	Date	Clinician(s)

Clinical decision making · pelvis-up findings

Tick each finding that applies. Findings can occur alone or together, so consider every one that applies. Use the key features to plan the seat cushion and back support.

Limited lateral flexion

Unable to achieve neutral without stretch or movement, so this person must sit with a pelvic obliquity.

KEY FEATURES: SEAT CUSHION

- The seat must rise to meet the high side, for stability and pressure distribution.
- Support must be under the ITs, GTs and the entire femur on both sides.
- Off-the-shelf cushions designed to be modified (e.g. cut or built up) can usually accommodate up to about 15° of limitation.
- The foot supports will also need to be set at different heights, or built up on one side. With children this is often easier dimensionally than with adults.

KEY FEATURES: BACK SUPPORT

- Must come forward at the right places for PSIS and sacral support, and the posterolateral ribs on both sides.
- Supports the convex and concave curves of the trunk.
- Appropriate support to maintain the frontal sternal angle.

If this isn't accommodated: If the pelvis is supported more "level", the lateral trunk lean will increase, potentially leading to compensatory curves. Note: build up under the high side only when the obliquity comes from the pelvis up; if it comes from the pelvis down (e.g. hip flexion), accommodate the hip instead. It can be a combination.

Additional consideration: If using a custom mould with a significant obliquity and lateral trunk lean, consider lateral tilt when capturing the mould, to offset the lean and decrease work against gravity.

Limited rotation

This person must sit with a pelvic rotation.

KEY FEATURES: SEAT CUSHION

- The ITs and GTs will not be level: on the side that is forward, the IT and GT will be more anterior on the seat.
- Seat depth is greater on the forward side (this can look like a leg length difference).

KEY FEATURES: BACK SUPPORT

- The back support needs to meet the posterolateral pelvis. On the forward side the posterolateral pelvis is more anterior (e.g. R rotation: L posterolateral pelvis), so the back needs to come forward there.

If this isn't accommodated: If the person is seated with the pelvis in a more neutral position, their trunk will rotate and they may develop secondary or compensatory curves.

Limited spinal extension

This person must sit with a posterior pelvic tilt and/or a kyphosis.

KEY FEATURES: SEAT CUSHION

- Seat depth: make sure the measurement captures the posterior pelvic tilt, otherwise the depth won't be enough (no gaps under the distal femurs).
- The ITs and GTs will be more anterior; make sure they are supported appropriately.
- Loading may shift off the ITs and onto the sacrum, and the ITs are less prominent inferiorly. If the sacrum is loading, make sure it is protected.
- If the cushion has an anterior structure (e.g. an IT well or pre-ischial shelf), make sure it doesn't cause excessive anterior loading of the ITs.

KEY FEATURES: BACK SUPPORT

- Fill the gap: make sure the posterolateral pelvis, posterior sacrum and lumbar spine are supported at the resting angle, so the posterior pelvic tilt doesn't get worse.
- Consider peak pressure through the spinous processes, especially if thoracic extension is limited.
- Lateral contour for the posterolateral ribs (not just posterior), for pressure distribution, stability and positioning.
- For a kyphosis, the seat-to-back angle can be opened, with shape built into the person's side of the back support. Off-the-shelf back supports can usually be opened about 10–15° through the hardware.
- With tension-adjustable upholstery, the angle is opened through the chair mechanics, and the shape then has to be made adequate by adjusting the straps.

If this isn't accommodated: If the pelvis and trunk are positioned with more lumbar or thoracic extension than the body has available (e.g. a planar back or the pelvis pushed towards neutral), the person is likely to slide forward into a greater posterior pelvic tilt, with increased shear and pressure over the sacrum / coccyx and spinous processes. The kyphosis and forward head position may increase, closing the Life Box and affecting respiration, digestion, the visual field, comfort and sitting tolerance.

Additional consideration: Any time the seat-to-back angle is opened, there also needs to be the possibility of tilt (about 10–15°) for postural stability: static or dynamic, depending on the functions needed from the wheelchair. With a large posterior pelvic tilt, tilt-in-space also decreases shear, brings the head more upright and reduces the impact of gravity.

Limited spinal flexion

This person must sit with an anterior pelvic tilt.

KEY FEATURES: SEAT CUSHION

• The ITs move posteriorly; loading is likely through the pubic rami / pubic symphysis.
• Seat depth must account for the pelvic position, or it will be too long.
• Make sure the GTs are supported.

KEY FEATURES: BACK SUPPORT

• Often the trickiest to get right: support the lordotic curve without pushing the trunk forward.
• There should be no gaps.
• Consider the shape and angle of the back support (for everyone).

If this isn't accommodated: If the pelvis is positioned with more lumbar or thoracic flexion than the body has available, this will negatively affect the visual field, and the person's relationship with gravity (base of support and centre of mass) will increase spinal extension.

Additional consideration: Tilt (tilt-in-space) is likely to be needed, but it is often not tolerated because of its effect on the visual field and a preference for being upright (possibly sensory).

Clinical decision making · pelvis-down findings

Make sure all pelvis-up findings are accounted for first.

Hip flexion limited relative to the seating

Hip flexion available is less than the seating requires (usually 90°; more in a bucket / dump, less with an open seat-to-back angle).

◯ **Option 1: open through the seat-to-back angle (tilt + recline: recline always needs tilt with it)**

• Open the seat-to-back angle to the thigh-to-trunk angle of the more limited side.
• Off-the-shelf back supports can usually be opened about 10–15° through the hardware; with tension-adjustable upholstery, open the angle through the chair mechanics and shape the back with the straps.
• Whenever the seat-to-back angle is opened, tilt (about 10–15°) must also be possible for postural stability: static or dynamic, depending on the functions needed.

POSITIVE CONSEQUENCES

• Accommodates the limitation in hip flexion, so the body can be positioned at rest without a compensatory pelvic tilt or obliquity.
• Open Life Box, with improved respiration, digestion etc.

POTENTIAL NEGATIVE CONSEQUENCES

• Visual field directed more upwards: affects social participation and function (e.g. independent power chair driving).
• Depth / length of the whole seating system increases: may limit transport and access to the environment.

◯ **Option 2: accommodate through the seat surface**

• The ITs, GTs and femurs all need to be supported independently (see the cushion zones).
• The pelvis is supported in the position found in pelvis-up (e.g. neutral / level). The limitation is accommodated by opening the hip angle with a slope that starts at the GT (not mid-femur) and runs down to the distal femur. The pelvis should not change position.
• The ITs must be supported adequately, not put on a slope.
• Foot position: different-height foot supports may be needed.
• Off-the-shelf cushions can often accommodate up to about 10–15° of limitation.
• For every degree opened, the overall height of the seating system increases: roughly 0.5–0.7 cm per degree (for a 30–40 cm slope from GT to distal femur), e.g. about 5–7 cm for 10°, 8–10 cm for 15°.

POSITIVE CONSEQUENCES

• Accommodates the limitation.
• Open (most optimal) Life Box supported: GI, respiration, bowel / bladder etc.
• Resting position and comfort.

POTENTIAL NEGATIVE CONSEQUENCES

• Overall height increased: may affect transport (vehicle height), access to tables / desks, and transfers.
• Aesthetics: knees lower than hips, feet possibly asymmetrical.
• Note: this does not lead to sliding, as long as the pelvis is supported level and separately from the GTs / femurs.

◯ **Option 3: combination**

• Accommodate by opening the seat-to-back angle and opening the hip in the seat surface.

POSITIVE CONSEQUENCES

• A mix of options 1 and 2, with a smaller change needed in each (e.g. less height increase, less upward visual field).

POTENTIAL NEGATIVE CONSEQUENCES

• Shares the potential negatives of both, to a lesser degree.

Moulded seating: most moulds accommodate up to about 30° of hip flexion limitation (off-the-shelf about 10–15°). **Over 30°:** a compromise to body shape / Life Box is needed in the name of seating for function, and the purpose of the chair shifts. Suggested recommendation wording: "The purpose of this wheelchair is now to prioritise function, environmental access and social participation. This will result in a non-optimal Life Box, potentially affecting respiration, digestion and comfort." **When this person is not in this chair, where are they?** Consider an alternative seating system (e.g. a comfort chair or an activity chair with a moulded seat) where the seat-to-back / hip angle can be opened further.

Supported supine must be in place for everyone (e.g. sleep system / night-time positioning) that supports the resting positions found in this assessment.

Where is the obliquity coming from? From the pelvis up: build up under the high side. From the pelvis down (e.g. hip flexion): don't build up; accommodate the hip instead. It can be a combination.

If this isn't accommodated (write what was seen during the assessment):
e.g. "In the absence of accommodating the 70° hip, this person will sit with a L pelvic obliquity and posterior pelvic tilt, likely leading to compensatory kyphosis, lateral trunk flexion and a closed, asymmetrical Life Box. Kyphosis usually brings shoulder protraction (limited upper limb function) and a forward head position. This may also affect digestion, bowel / bladder, circulation, pain / comfort, sitting tolerance, skin integrity and respiration."

Hip extension limited relative to the seating

The hip can't extend to the seating requirement (e.g. with a large anterior pelvic tilt), so this person must sit with the hips flexed more than the seating requires.

◯ Option 1: close the seat-to-back angle

- Close the seat-to-back angle towards the thigh-to-trunk angle at the limit of the more limited side.
- Consider the shape and angle of the back support: support the lordotic curve without pushing the trunk forward.

POSITIVE CONSEQUENCES
- Accommodates the limitation, so the pelvis can rest without being pulled into an anterior tilt.
- Life Box and trunk supported in the resting position.

POTENTIAL NEGATIVE CONSEQUENCES
- Closed seat-to-back angle: may affect transfers, personal care (e.g. continence care, dressing) and comfort.
- Trunk may feel pushed forward if the back angle and shape aren't right.

◯ Option 2: through the seat surface (knees higher than hips)

- ITs supported in the pelvis-up position (not on a slope); the femurs are supported rising from the GT towards the knee, so the knees sit higher than the hips.
- Check seat depth and foot support position.

POSITIVE CONSEQUENCES
- Accommodates the limitation without closing the back angle as much.
- Pelvis held at rest, without an anterior tilt.

POTENTIAL NEGATIVE CONSEQUENCES
- Knees higher than hips: may affect transfers, aesthetics, personal care, and access to tables / desks.

◯ Option 3: combination

- Close the seat-to-back angle and raise the knees in the seat surface.

POSITIVE CONSEQUENCES
- A mix of options 1 and 2, with a smaller change needed in each.

POTENTIAL NEGATIVE CONSEQUENCES
- Shares the potential negatives of both, to a lesser degree.

If this isn't accommodated: this person is likely to be pulled into an increased anterior pelvic tilt, with increased lumbar extension and a closed, asymmetrical Life Box. This may also affect the visual field, pain and comfort, sitting tolerance, skin integrity (pubic rami / symphysis loading), respiration and digestion. Write what was seen:

Knee extension limited relative to the seating (hamstrings)

The knee can't extend to the seating requirement (thigh-to-lower-leg angle less than the seat-to-lower-leg support angle). Extending the knee further pulls the pelvis into a posterior tilt (or an obliquity).

◯ Option 1: open the hip angle

- The hamstrings originate on the IT, so more hip extension means less hamstring tension.
- ITs supported on their own level shelf; the femur is angled down from the GT (knee below hip). This is not a sloped seat, so it won't be unstable or cause shear.

POSITIVE CONSEQUENCES
- Respects body shape.
- Hamstrings relaxed.
- Less sliding and shear.
- Comfort and skin protection.

POTENTIAL NEGATIVE CONSEQUENCES
- Overall height of the seating system increases: transport, tables / desks, transfers.
- Aesthetics: knees lower than hips.
- Must not become a sloped seat: the ITs stay on a level shelf.

◯ Option 2: close the knee angle (foot behind the knee)

- Set the seat-to-lower-leg support angle to **no more than** the thigh-to-lower-leg angle found, so the foot sits behind the knee.

POSITIVE CONSEQUENCES
- Respects body shape.
- Hamstrings relaxed.
- Less sliding and shear.
- Comfort and skin protection.

POTENTIAL NEGATIVE CONSEQUENCES
- Less loading through the feet.
- Wheelchair frame / castors may limit how far back the foot supports can go.
- Foot clearance: check seat height and ankle dorsiflexion.

◯ **Option 3: combination**

• Open the hip angle **and** close the knee angle.

POSITIVE CONSEQUENCES

• A mix of options 1 and 2, with a smaller change needed in each.

POTENTIAL NEGATIVE CONSEQUENCES

• Shares the potential negatives of both, to a lesser degree.

Elevating leg supports increase hamstring tension: not for prolonged / everyday use.

Foot propulsion: if this person propels with their feet, check that the seat height and knee angle still let the feet reach the floor effectively.

If this isn't accommodated: this person is likely to sit with a posterior pelvic tilt (sliding, shear and a compensatory kyphosis) and / or a pelvic obliquity, affecting the Life Box. This may also affect skin integrity (sacrum / coccyx), comfort, sitting tolerance, respiration and digestion. Write what was seen:

Knee flexion limited relative to the seating (rectus femoris)

The knee can't flex to the seating requirement (thigh-to-lower-leg angle more than the seat-to-lower-leg support angle). Bending the knee further pulls the pelvis into an anterior tilt.

◯ **Option 1: close the hip angle**

• The rectus femoris crosses the hip (origin at the AIIS), so more hip flexion means less rectus femoris tension.
• ITs supported on their own level shelf; the femur rises from the GT towards the knee (knees higher than hips).

POSITIVE CONSEQUENCES

• Respects body shape.
• Rectus femoris relaxed (no tension pulling the pelvis anterior).
• Pelvis can rest without being pulled into an anterior tilt; comfort and skin protection.

POTENTIAL NEGATIVE CONSEQUENCES

• Knees higher than hips: may affect transfers, aesthetics, personal care, and access to tables / desks.
• Check the hip angle stays within the hip flexion available.

◯ **Option 2: open the knee angle (foot in front of the knee)**

• Set the seat-to-lower-leg support angle to **at least** the thigh-to-lower-leg angle found, with foot supports that allow the feet forward (e.g. angle-adjustable / front rigging).

POSITIVE CONSEQUENCES

• Respects body shape.
• Rectus femoris relaxed (no tension pulling the pelvis anterior).
• Pelvis can rest without being pulled into an anterior tilt; comfort and skin protection.

POTENTIAL NEGATIVE CONSEQUENCES

• Overall length of the system increases: turning space and access to the environment.
• Feet further forward: may be more exposed, and may affect transfers and foot loading.
• Check hamstring length allows the knee this far open.

◯ **Option 3: combination**

• Close the hip angle **and** open the knee angle.

POSITIVE CONSEQUENCES

• A mix of options 1 and 2, with a smaller change needed in each.

POTENTIAL NEGATIVE CONSEQUENCES

• Shares the potential negatives of both, to a lesser degree.

Foot propulsion: if this person propels with their feet, check that the seat height and knee angle still let the feet reach the floor effectively.

If this isn't accommodated: this person is likely to sit with an anterior pelvic tilt (increased lumbar extension) and / or a pelvic obliquity, affecting the Life Box. This may also affect the visual field, skin integrity (pubic rami / symphysis loading), comfort, sitting tolerance, respiration and digestion. Write what was seen:

Knee range limited at the joint (or other cause)

E.g. a contracture: no extra muscle tension and the pelvis doesn't move, but the knee has no further movement past the angle found.

Solution: support the lower leg at the knee angle found

• Set the seat-to-lower-leg support angle to match the thigh-to-lower-leg angle found: **no more than** it if extension is limited (foot behind the knee), **at least** it if flexion is limited (foot in front of the knee).
• Don't try to stretch the joint through the seating: the range won't change and the force goes elsewhere.

POSITIVE CONSEQUENCES
• Respects body shape.
• No force through the joint: comfort, skin protection at the calf / heel / foot.

POTENTIAL NEGATIVE CONSEQUENCES
• Foot behind the knee: less loading through the feet; frame / castors may limit how far back the foot supports can go; check foot clearance (seat height).
• Foot in front of the knee: overall length increases (turning space, access); feet more exposed.

If this isn't accommodated: the lower leg will be pushed against the end of the knee's range. This can cause pain and pressure (calf, heel, foot), the foot may not reach the foot support, and the force can travel up the leg and push the pelvis back (sliding / posterior tilt) or into an obliquity. Write what was seen:

Hip abduction limited

The femur needs to be positioned in adduction to the degree found in supine (step 5).

Solution: let the femur rest in adduction

• Key feature of the seat cushion: it must allow the femur to rest in adduction.
• No deep contour forcing the knees forward; no medial thigh support (pommel) keeping the leg in neutral or abduction.

POSITIVE CONSEQUENCES
• Body shape respected.
• Optimal Life Box maintained.

POTENTIAL NEGATIVE CONSEQUENCES
• Aesthetics.
• Possible contact between the knees: consider pressure relief while respecting the position.

If this isn't accommodated: there will be pelvic rotation, leading to compensatory spinal rotation, negatively affecting the Life Box. Write what was seen:

Hip adduction limited

The femur needs to be positioned in abduction to the degree found in supine (step 5).

Solution: let the femur rest in abduction

• Key feature of the seat cushion: it must allow the femur to rest in abduction.
• No deep contour forcing the knees forward; no lateral thigh support keeping the leg in neutral or adduction.

POSITIVE CONSEQUENCES
• Body shape respected.
• Optimal Life Box maintained.

POTENTIAL NEGATIVE CONSEQUENCES
• Width of the chair, depending on the degree of abduction needed: affects environmental access, and access to the wheels if propelling a manual chair.
• May not be possible with the wheelchair frames / technology available.
• Aesthetics: knees wide, which can feel exposing.

If this isn't accommodated: there will be pelvic rotation, leading to compensatory spinal rotation, negatively affecting the Life Box. Write what was seen:

Hip internal rotation limited

The leg needs to be positioned at the angle found in supine (step 6), in external rotation.

Solution: leg positioned in ER at the angle found

• Make sure any contouring allows this: behind the knee, the calf, and the angle of the foot (so the foot is not pushed into eversion).
• The foot support will likely need to be angled.

POSITIVE CONSEQUENCES
• Body supported in its resting position; body shape respected.
• Life Box maintained.

POTENTIAL NEGATIVE CONSEQUENCES
• Foot loading considerations.
• Space available.
• Need to consider loading areas and pressure relief.

If this isn't accommodated: there will be tension and / or an obliquity in the pelvis, affecting the Life Box, loading areas, etc. Write what was seen:

Hip external rotation limited

The leg needs to be positioned at the angle found in supine (step 6), in internal rotation.

Solution: leg positioned in IR at the angle found

- Make sure any contouring allows this: behind the knee, the calf, and the angle of the foot.
- The foot support will likely need to be angled.

POSITIVE CONSEQUENCES

- Body supported in its resting position; body shape respected.
- Life Box maintained.

POTENTIAL NEGATIVE CONSEQUENCES

- Foot loading considerations.
- Space available: feet / legs may press together.
- Need to consider loading areas and pressure relief.

If this isn't accommodated: there will be tension and / or an obliquity in the pelvis, affecting the Life Box, loading areas, etc. Write what was seen:

Putting it together

Any combination of these findings can exist. **Always start pelvis up, then work pelvis down.** For example, a pelvic obliquity can come from: limited lateral trunk flexion (lift the seat under the high side); asymmetrical mass (usually add under the low side, but limited lateral trunk flexion cancels this out, so it's no longer needed); limited contralateral hip flexion (open the hip angle); and limited ipsilateral hip external rotation.

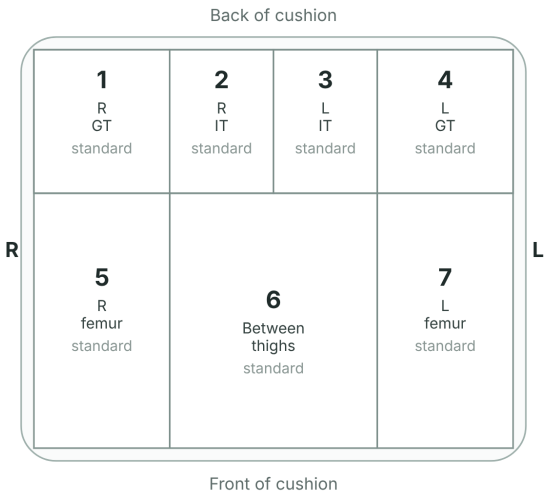
There are almost **always** compromises to be made for activities and participation. Go back to the **ICF model**: this assessment covers **Body Function & Structure**. Then discuss how each potential solution fits within **Activities, Participation** and **Environmental Context**. Different seating systems can prioritise different aspects, e.g. a comfort chair at home for body function & structure; a power chair for community access and social participation; a manual chair for transport in a vehicle / long-distance travel, for ease.

Always consider the full 24-hour period and where this person is throughout it.

Priorities for this person across the 24 hours (ICF: activities, participation, environment):

Key features of the seating system · for the rep

Summarise the key features for the rep, using the findings and the approach chosen. Set each cushion zone, then list the key features by component.



Cushion zones

1 R GT
2 R IT
3 L IT
4 L GT
5 R femur
6 Between thighs
7 L femur

The ITs are never sloped (that increases shear and the tendency to slide): only the GTs and femurs slope. **Examples:** L pelvic obliquity from the pelvis up (L side low, R side high): build up 1, 2, 5 to meet the high side (not if the obliquity comes from the pelvis down). Height and slope combine: e.g. L obliquity from the pelvis up AND limited R hip flexion: build up 1, 2, 5 and slope 1 and 5 down from the GT. Limited R hip abduction: keep 6 clear (no pommel) so the R femur can rest in adduction; draw the femur at its angle on the diagram. Limited L hip flexion with a neutral pelvis: 2 and 3 level; 1 and 5 level and supported more than the ITs (GTs sit higher than the ITs; need envelopment / immersion); 4 and 7 sloped down at the limited angle, starting at the GT.

Seat cushion

Back support

Foot supports

Head support

Base & orientation (tilt / recline)

Pelvic, lateral, upper limb and other supports

Notes for the rep

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