REPOSITIONING FOR PREVENTING PRESSURE INJURIES

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Introduction

The underlying cause of pressure injuries (PIs) is multifaceted; however, by definition, pressure injuries cannot form without mechanical loading acting on the tissue.[1] Extended periods of lying or sitting on a particular part of the body without redistributing the pressure leads to deformation of tissues and, ultimately if damage thresholds are exceeded, tissue damage in the form of a PI.[1] Repositioning and mobilization are essential preventive measures for reducing PI occurrence. The recommendations and good practice statements presented below are generally relevant to all individuals at risk of PIs, except where specified.

General Repositioning for all Individuals in a Bed

Clinical question: What are the general considerations when deciding if repositioning is required for individuals at risk of pressure injuries?

R1: It is good practice to reposition individuals at risk of pressure injuries regardless of the type of pressure redistribution full body support surface being used. The interval between repositioning might be adjusted depending on the pressure redistribution capabilities of the support surface and the individual's response. However, no support surface can entirely replace repositioning.

(Good practice statement)

Clinical question: What are the general considerations regarding how to reposition individuals at risk of pressure injuries?

R2: It is good practice to reposition the individual in such a way that optimal offloading of pressure points and maximum redistribution of pressure are achieved.

(Good practice statement)

Supporting information

Repositioning reduces the duration and magnitude of pressure over vulnerable areas of the body and is unequivocally considered the best practice to prevent PI occurrence. Despite advances in technology, repositioning is regarded as a fundamental intervention to enable regular tissue regeneration through pressure offloading.[2,3] Studies have not compared the effectiveness of regular repositioning to the

absence of repositioning due to the ethical and practical constraints arising from the recognition that repositioning is considered necessary to relieve pressure on specific anatomical locations. Repositioning is also critical in preventing pulmonary and cardiovascular complications of immobility.

Optimal offloading refers to strategies or techniques that redistribute pressure away from pressure points to surrounding tissues, minimizing the risk of critical tissue deformation and ischemia. This includes both full body repositioning (e.g., turning the individual) and repositioning specific anatomical regions or micromovements (e.g., repositioning the limbs, repositioning the head, using a slight readjustment of the body when a full turn is not feasible, etc.). How effective repositioning techniques are will vary between individuals because anatomy, posture and deformity vary between different individuals.[4-6] A position that effectively offloads pressure in one individual may be inadequate for another, highlighting the need for individualised repositioning strategies.

Implementation considerations

- Consider the individual's goals of care and priorities when developing an individualized repositioning regimen. Work with the individual, their informal carer and the collaborative healthcare team to develop a repositioning regimen that meets the individual's needs.
- Consider an individual's positioning needs over a 24-hour period when developing a repositioning regimen. This should include where and when they sleep, lie and sit. Individuals who have limited mobility may also require specialist advice regarding full body support surfaces and other equipment they use, as well as assessment and planning that addresses body symmetry and postural support. Involve the collaborative healthcare team (e.g., physiotherapist, physical therapist, occupational therapist, seating specialist, etc.), particularly for individuals at long term risk of PIs.[7]
- Check all pressure points when repositioning the individual to ensure that pressure has been adequately offloaded (i.e., Check that recently loaded pressure points are relieved of sustained pressure). Areas such as the gluteal cleft, elbows, malleolus and wrists are vulnerable to PIs but are easily overlooked.
- Assess the individual's pain and comfort level before and after repositioning.[8-10] Evaluate the need for analgesia prior to repositioning. When required, pre-medicate prior to assisting the individual with repositioning.
- Assess the individual's full body when repositioning. Evaluate body alignment and posture to maximize comfort, support and pressure offloading. Use additional repositioning devices to provide comfort as required.
- Use positioning devices. These devices can assist in maintaining positioning, be used to elevate parts of the body off the support surface, and can promote body symmetry, posture and comfort. When placing a positioning device, take care that it is not positioned in a way that applies pressure to an anatomical area that is intended to be relieved of pressure (e.g., do not position a pillow directly against the sacrum when positioning the individual in a lateral position). Consider using specialist repositioning devices to support the individual's specific needs/body shape (e.g. fluidized positioners that can be shaped).[11-14]
- Check that no objects (e.g., mobile phone, cutlery, etc.) or medical devices are underneath the individual. When repositioning individuals with medical devices, ensure the device is also appropriately repositioned to prevent device-related pressure and friction. Further implementation considerations are available in the guideline section *Preventing Device Related Pressure Injuries*.

<u>Additional considerations for individuals who can self-reposition</u>

- Encourage the individual to self-reposition as often as possible. Informal carers might be involved by reminding the individual to regularly reposition.
- Assess and monitor individuals who are self-repositioning to ensure their self-repositioning techniques (e.g., bed movement) effectively offload pressure points and avoid shear and friction. For example, observe the individual self-turning to ensure that they are effectively offloading the sacrococcygeal region and heels.

- Assess the individual's experience of pain, and if required implement a pain management plan. Uncontrolled pain can be a barrier to regular repositioning.

Additional considerations for children and neonates

- Ensure that equipment used in repositioning neonates and children is appropriate for use in pediatric populations.
- Be aware that weight distribution varies as children grow. Infants and toddlers have proportionally heavier heads and are at increased risk of occipital PI. Body weight distribution slowly shifts toward adult proportions as the child grows.
- Pay particular attention to the head of infants and neonates as this is one of the most common anatomical locations in which they experience PIs. Frequently reposition the head where possible and safe (in neonates, discuss safe head positioning with the medical team[15]). Use regular repositioning and pressure redistribution devices (e.g., fluidized positioners) to offload pressure from the occipital ridge.

Additional considerations for individuals with agitation or dementia

- Use purposeful reminders to reinforce regular repositioning for individuals who can self-reposition.
- Use person-centred care approaches (e.g. distraction, music therapy, etc.) and communication techniques to facilitate acceptance of repositioning and maintenance of pressure-relieving positions.
- Consider using movement therapy as an outlet for excess energy to reduce high frequency movement associated with agitation that could introduce shear, increasing the risk of skin and tissues damage.

Additional considerations for individuals receiving end-of-life care

- Discuss goals of care and prioritize patient comfort.[16,17]
- Ask the individual and their informal carer about positions and equipment that best promote their comfort.[16]
- Inspect the skin at every opportunity and take additional care to avoid skin injury. Skin becomes increasingly fragile at the end-of-life and may be more prone to injury.[16]
- Implement smaller, incremental body repositioning (micromovements), and regularly reposition the extremities and head if the individual at end-of-life cannot tolerate full body repositioning.
- Address pain management requirements to facilitate repositioning with minimal discomfort. Pain may limit comfortable repositioning.[16]
- Discuss choices about repositioning frequency intervals that are best suited to the goals of care and comfort needs of the individual. Provide them with knowledge about pressure injury risk incurred with less frequent repositioning so they can make informed choices.

Additional considerations for individuals in home settings

- Encourage self-repositioning by scheduling repositioning into the daily routine where possible,[18] for example encouraging incidental movement or natural breaks in activities.

Manual Handling

Clinical question: What are the general considerations regarding how to reposition individuals at risk of pressure injuries?

R3: It is good practice to use specialized equipment designed to reduce friction and shear when repositioning individuals. If manual handling is necessary, techniques that minimize friction and shear should be applied.

(Good practice statement)

Supporting information

Principles of safe manual handling should be used to ensure the safety of the individual, their informal carers and the collaborative care team. [19] Selection of manual handling techniques should consider preventing skin exposure to pressure and shear forces.[20] Specialized equipment (including but not limited to mechanical lifting devices, transfer sheets, lateral air transfer devices, turn systems/devices, low friction fabrics, turn-assist devices and turn-assist features on beds[10,21-28]) and manual handling techniques (e.g., ergonomic techniques, two- to four-person lifts, etc.) that reduce the risk of friction and shear should be available and implemented.

Implementation considerations

- Ask about the individual's experiences with manual handling. Some equipment or techniques might cause fear, pain or discomfort. Where possible, accommodate the individual's preferences when selecting manual handling techniques.[29]
- Keep specialized manual handling equipment easily available[30] and in good working order to encourage safe and timely use. Ensure that equipment is used within its safe working capacity (i.e., age, weight and dimensions of the individual).[31]
- Develop local procedures and policies (e.g., minimum number of staff based on individual's body weight/dimensions, appropriate transfer equipment, etc.) that support safe transfers.
- Lift rather than dragging, when repositioning the individual to avoid friction and shear. Use equipment designed to assist in transferring (e.g., low friction fabric transfer sheets, lateral transfer devices, etc.). Pay particular attention to the individual's heels during transfers.
- Minimize shear once repositioned. Verify that surface materials are not pulling on the skin at rest by applying a counterforce that eliminates or minimize "pull" on the skin. Strategies as simple as loosening sheets or hand pressure at the interface of the surface and skin may accomplish this.
- Do not leave manual handling equipment under the individual after use, unless the equipment is specifically designed for this purpose.
- Use positioning devices to more effectively maintain the individual's position.[32] Positioning devices and their covers should be designed for pressure redistribution through envelopment and immersion, with properties that meet recognized standards.
- Consider implementing a dedicated turn team with expertise in manual handling where available to promote optimal repositioning, adherence to repositioning regimens, and to reduce the risk of staff injuries, where available.[33]
- Weigh the potential benefits and risks of turn-assist technology, where available. Turn-assist is a feature of some powered pressure redistribution full body support surfaces by which individuals can be repositioned from side-side through adjustment in symmetry of the surface's inflation. If adequate turn angle and offloading can be achieved for the individual, turn assist features might reduce the occupational health and safety risk with repositioning.[28] The turn feature does not allow the body's posterior to ever be entirely free from contact with the support surface. Continue to assess the skin at regular intervals and evaluate whether offloading is truly occurring without shear.

<u>Additional considerations for neonates and children</u>

- Ensure that the selected positioning device is appropriate for the individual (e.g. select pediatric positioning devices that comply with the manufacturer's weight specifications and instructions for use).

<u>Additional considerations for individuals who can self-reposition</u>

- Provide individuals with assistive devices (e.g., slide boards or trapeze bars) to promote bed mobility and self-repositioning and ensure these devices are readily accessible.[34,35]

Repositioning Frequency

Clinical question: Should individualized repositioning based on clinical judgment versus repositioning on a fixed program be used to prevent PI occurrence in individuals at risk?

R4: It is good practice to reposition all individuals with or at risk of pressure injuries using an individualized regimen.

(Good practice statement)

R5: It is good practice to determine appropriate and individualized repositioning intervals based on comprehensive assessments of the individual's:

- **level of activity and mobility,**
- **ability to independently reposition,**
- **skin and tissue tolerance,**
- **clinical condition,**
- **comfort,**
- **sleep patterns,**
- **goals of care, and**
- **the support surface in use.**

(Good practice statement)

R6: It is good practice to assess for signs of early skin and tissue injury that may mean the individual requires more frequent repositioning or preferential positioning off damaged areas.

(Good practice statement)

Supporting information

We identified no comparative studies evaluating the effectiveness of an individualized regimen versus a fixed program to inform an evidence-based recommendation. When planning a repositioning regimen, it is important to conduct a comprehensive PI risk assessment and a skin assessment, and to consider the individual's overall comfort and goals of care.[36] Understanding the individual's level of activity, mobility and ability to reposition themselves helps determine the frequency and amount of assistance they will require to reposition. The frequency of repositioning may vary according to their PI risk, ability to move and reposition themselves safely, tolerance for current repositioning practices and the envelopment and immersion properties of the full body support surface.[36] The response of the individual's skin and tissue to pressure should always guide repositioning frequency.

Implementation considerations

- Assess the individual's level of activity, mobility and ability to reposition independently as a part of every risk assessment.[37-45] Be aware of the individual's spontaneous episodic movements and whether they are sufficient to prevent PIs when in different positions. Transient movements might decrease after a prolonged duration in one position for some individuals. Understanding the individual's movement patterns helps to develop the most appropriate prevention plan.[46,47]
- Assess the individual's clinical condition, including physical and mental health and cognition to identify risk factors for PIs that can be mitigated through an individualized PI prevention plan. See the guideline section on *Pressure Injury Risk* for more information.
- Monitor the individual's skin condition at each repositioning using strategies outlined in the guideline section on *Skin and Tissue Assessment*. If the individual is not responding as expected, they may

require more frequent repositioning. If the skin and tissue are showing early signs of damage (e.g., pain, erythema, hypo/hyperpigmentation in dark skin tones, localized edema, change in temperature), they may require more frequent repositioning with offloading of damaged areas.

- Involve the individual and their informal carers in decisions around repositioning frequency.[29,48] Evaluate the individual's priorities (e.g., un-interrupted sleep versus more frequent PI preventive care[36]) and discuss benefits, risks and strategies to meet the individual's needs. Recognize that priorities may change over time and the repositioning regimen should be regularly evaluated.

Additional considerations for individuals in home settings

- Consider the individual's repositioning regimen over the 24-hour period and advocate for any support required to achieve the individual's repositioning needs.[7] This might include equipment that could assist in the home environment (e.g., transfer aids, lateral positioning devices, etc.) and referral to supportive services (e.g., social work, home nursing/care support and respite care).

Clinical question: Should repositioning at two hourly intervals versus repositioning at three hourly intervals be used to prevent PI occurrence in individuals at risk?

R7: We suggest that either repositioning at two hourly or three hourly intervals could be implemented for most individuals at risk of pressure injuries, if they are also on an appropriate pressure redistribution full body support surface.

(Conditional recommendation, very low certainty of evidence)

Clarifiers:

- **Individualize frequency of repositioning based on a clinical assessment, as specified in the good practice statements.**
- **Critically ill individuals or others with systemic hypoperfusion or shock states may require more frequent, incremental repositioning and supplementation of full body repositioning with assisted small shifts in body position.**
- **Individuals receiving palliative or end of life care should be given the option of repositioning frequency intervals that are best suited to their goals of care and comfort needs, and with full knowledge of pressure injury risk incurred with less frequent repositioning.**

Evidence summary

The meta-analysis considered two randomized controlled trials (RCTs)[49,50] that compared repositioning at two hourly intervals to repositioning at three hourly intervals for individuals at PI risk. Both studies[49,50] were conducted in aged care settings and implemented a pressure redistribution foam (reactive) full body support surface. The meta-analysis showed that repositioning at two hourly intervals was associated with a non-significant higher rate of PI occurrence (1.3% versus 0.3%, relative risk [RR] 4.06, 95% confidence interval [CI] 0.87 to 18.98, p = 0.07, relative effect of 9 more PIs per 1,000 individuals treated [from 0 fewer to 55 more]. These results are not only non-significant but counter-intuitive (i.e. more PIs occurred with more frequent turning). There is very little confidence that this effect estimate represents a true effect. The evidence was downgraded due to the risk of bias and imprecision. In one study[49] no Category/Stage 3 or 4 PIs were reported. In the other study,[50] no PIs occurred in either the two hourly or the at three hourly repositioning groups. A risk ratio estimating the effect that the intervention might have had in preventing PI occurrence was unable to be calculated for the study;[50] a continuity correction was performed to account for zero events in both arms.[51] Given the comparable arm sizes in the study with zero events in both arms, and with 50% or fewer studies in the analysis having zero cases in both arms, we considered this correction adequate.[51-54] If data from the second study[50] was excluded from the meta-analysis, the event rate would be: 2 hourly 2.49% versus 3 hourly 0.61%, RR 4.06, 95% CI 0.87 to 18.98.

Few comparative studies have reported serious adverse events associated with different repositioning regimens, but the available evidence indicated there was no difference in mortality, length of stay in intensive care or duration of mechanical ventilation based on frequency of repositioning.[55] A Cochrane review[56] reported undesirable effects associated with repositioning at shorter (i.e., more frequent) intervals, including sleep disruption,[56-58] musculoskeletal pain,[56] wound pain[56] and more injuries to care staff.[56,59] The Guideline Consumer and Expert Panel Groups provided opinion that acceptability and feasibility of repositioning at two hourly intervals is variable across clinical settings and populations. Staff compliance rates were somewhat higher for 3- and 4- hour intervals (90-95%) than for 2-hour intervals (80%).[50] There are likely to be individuals at risk of PIs (particularly those in home settings) who cannot reliably access repositioning at two hourly intervals around-the-clock. Two economic analyses indicated that extending repositioning frequency from two hourly intervals to three hourly intervals when tolerated by the individual was more cost effective.[55,60] Cost savings were reported for a typical 100-bed aged care facility in the US, at a small cost of 0.18 quality adjusted life years (QALYs) per resident due to a small increase in risk exposure.[60]

Clinical question: Should repositioning at two hourly intervals versus repositioning at four, five or six hourly intervals be used to prevent PI occurrence in individuals at risk?

R8: We suggest <u>not routinely</u> extending repositioning intervals to four, five or six hourly for individuals at risk of pressure injuries.

(Conditional recommendation, very low certainty of evidence)

Clarifier:

- **Progressive extension of repositioning intervals may be appropriate for some individuals based on decreasing pressure injury risk, increased capacity for effective self-repositioning and maintenance of normal skin and tissue status.**

Evidence summary

The meta-analysis included five RCTs[49,50,55,61,62] that compared repositioning at two hourly intervals to repositioning at four, five or six hourly intervals for individuals at risk of PI. The meta-analysis showed that fewer PIs occurred with repositioning at two hourly intervals (4.6% versus 5.7%, RR 0.89, 95% CI 0.46 to 1.71, p = 0.73, relative effect of 5 fewer PIs per 1,000 individuals treated [from 24 fewer to 31 more]). There is very little confidence that this effect estimate represents a true effect. The evidence was downgraded due to the risk of bias and imprecision. In one of the studies,[50] no PIs occurred in either the two hourly or the at four, five or six repositioning groups. Although a risk ratio estimating the effect that the intervention might have had in preventing PI occurrence was unable to be calculated for this study because no events occurred, a continuity correction was performed and the event rate includes this study.[51]

The studies were conducted in intensive care[55,61] and aged care,[49,50,62,63] and pressure redistribution full body support surfaces were in use. Cost savings were realized when extending repositioning intervals to four, five or six hourly but at the expense of some loss of QALYs.[60]

The Guideline Governance Group carefully considered the balance of benefits and harms in making this recommendation. The meta-analysis showed a non-significant result. Extending repositioning to four, five or six hourly intervals did not increase PI incidence in some studies.[50,61] However, other studies in the meta-analysis did demonstrate lower PI occurrence with shorter repositioning intervals (i.e., two hourly) in long term care settings,[49] aged care settings,[62] and in individuals who were ventilated in intensive care.[55] Given the variability of PI outcomes across populations, <u>routinely</u> repositioning individuals at four, five or six hourly intervals was not considered advisable. However, progressive extension of the interval between repositioning events might be undertaken with careful individual assessment that considers the individual's PI risk factors, capacity for and patterns of self-repositioning (e.g., large and sustained

repositioning and transient/episodic repositioning),[46] skin and tissue status, and ability to communicate comfort.

Implementation considerations

- Discuss with all individuals who are at risk of PIs and their informal carers the risks and benefits associated with less frequent repositioning.
- Ensure that an appropriate pressure redistribution full body support surface is in place before extending the interval between repositioning events, and ensure that modifiable risk factors (e.g., nutritional deficits) are mitigated.
- Document when and how often the individual was repositioned, the position adopted and the results of the evaluation of the outcome (e.g., the skin and tissue status when repositioning).
- Reconsider the frequency and method of repositioning if the individual is showing signs of early tissue damage.

Additional considerations for individuals who can self-reposition

- Educate and encourage individuals who can reposition themselves to regularly engage in active full body repositioning, weight redistribution and pressure relief maneuvers.
- The frequency and quality of self-repositioning should be monitored. This information can help determine how often an individual requires assisted repositioning, and how much assistance an individual requires to reposition. Movement sensors could be used to monitor episodes of self-repositioning.[46]

Additional considerations for individuals in palliative or end of life care

- In collaboration with the individual and their informal carers, develop an individualized repositioning regimen that prioritizes comfort, preferences and care goals.[16]

Additional considerations for individuals living in home settings

- Consider the individual's access to resources required for repositioning, including pressure redistribution full body support surfaces, carers and manual handling equipment. Work with the individual and their informal carers to develop repositioning regimens that are resourced appropriately to meet the individual's clinical needs. For example, supplementing full body repositioning with frequent small body shifts and pressure relief maneuvers may assist in achieving pressure redistribution during intervals without access to carer assistance.
- Consider the needs of the individual's informal carers (e.g., sleep requirements, need for repositioning and manual handling equipment or additional support people). Encourage individuals and their carers to access community-based assistance when required.

Additional considerations for individuals with spinal cord injury

- Be aware that the individual's repositioning requirements will change over time.[18] For example, in the immediate post-injury phase and for up to two years post-injury, an individual with spinal cord injury (SCI) may require more regular repositioning, influenced by SCI-related skin changes (e.g. collagen degradation[64]). Individuals with SCI report skin and tissue tolerance generally increases over time but may begin to decrease again with the effects of aging. However, clinical events and other factors (e.g., ageing, illness, weight changes, etc.) will influence skin and tissue tolerance across the lifespan. Regularly re-assess the individual's pressure injury risk, skin and tissue condition and repositioning requirements.

Clinical question: Should small shifts (micromovements) in body position to augment a regular repositioning schedule versus usual care (no micromovements) be used to prevent PI occurrence in clinically unstable individuals at risk?

R9: It is good practice to initiate frequent, small and incremental shifts (micromovements) in body position for critically ill individuals who are too unstable to maintain a regular repositioning regimen, and to supplement regular repositioning.

(Good practice statement)

Supporting information

We identified no comparative studies evaluating the effectiveness of micromovements versus usual care in critically ill individuals to inform an evidence-based recommendation regarding pressure injury outcomes. This Good Practice Statement is based on indirect evidence (i.e., the effects of micromovements on interface pressure and tissue perfusion in both healthy volunteers[65] and at-risk patients[66,67]). Several evidence-based practice protocols have been published to guide implementation of small shifts and gradual return to repositioning regimens.[68,69] These protocols have become common practice in critical care units and a controlled trial with no micromovements would be ethically questionable.

Full body repositioning is not always possible due to physiological instability, particularly in critical care settings. Frequent, small and incremental shifts (micromovements) in body weight can improve skin and tissue perfusion,[65] and redistribute pressure.[65,70] Evidence from studies undertaken in the operating room has demonstrated a potential impact of this repositioning strategy in reducing PI occurrence.[71,72] Implementing frequent, small and incremental micromovements is feasible to offload or redistribute pressure as much as possible when regular repositioning is not clinically feasible. There are few clinical situations in which individuals cannot tolerate any form of modified repositioning regimen that is adapted to their individual response.

Implementation considerations

- Use frequent, small weight redistributions (micromovements) and repositioning devices (e.g., wedges, gel pads, fluidized positioners and pillows) to offload pressure when regular full body repositioning is not possible. Micromovements do not replace the selection of a more appropriate pressure redistribution full body support surface when needed, or regular full body repositioning.

Implementation considerations for critically ill individuals

- Evaluate hemodynamic and oxygenation status stabilization when moving the body.[69,73] Allow at least ten minutes to attain equilibrium before determining whether the position change is tolerated.[55,69] Revise the repositioning regimen in response to the individual's tolerance.
- In critically ill individuals who cannot tolerate slow, incremental turns, consider using frequent, small weight redistributions (micromovements), passive range of motion (ROM), repositioning the extremities, head rotation, heel elevation and tilting the body to lower angles. Select interventions based on individual tolerance.[49,69]
- In hemodynamically unstable individuals, perform a trial of full body repositioning at least every eight hours (unless clinical contraindicated e.g., in unstable spinal cord injury) to determine if a regular repositioning regimen can be re-established.[69,74] Resume regular full body repositioning as soon as the individual's hemodynamic and oxygenation status stabilize.
- Regularly inspect pressure points and respond to signs of pressure damage by increasing the frequency of micromovements.
- Ensure the individual's head is offloaded with regular repositioning and micromovements if they are sedated and ventilated, where it is safe to do so. Repositioning devices can be used to support the head

and redistribute pressure. Special repositioning devices can be used to support positioning of the head (e.g., a fluidized positioner designed for adjustment to the head shape[11-13]).

Implementation considerations for critically ill neonates and children

- Cease attempts to fully reposition infants (aged < 3 years) in the presence of new arrythmia, active fluid resuscitation with unstable blood pressure, active hemorrhage, change in baseline hemodynamic and oxygenation status that does not recover within 10 minutes of repositioning. Develop a local protocol that identifies the percent change in hemodynamic and oxygenation status that indicates intolerance of repositioning.[75]
- In critically ill infants who cannot tolerate slow, incremental turns, consider using frequent, small weight redistributions (micromovements), passive range of motion, repositioning the extremities, head rotation and heel elevation. Implement incremental shifts in body position. Commence with 15-degree body rotation and monitor clinical status. If tolerated, increase rotation to 30-degree.[75]
- Implement an interdisciplinary turning team (as one example, a respiratory therapist/ECMO specialist, registered nurse, physical therapist and certified/ specialty-trained wound and skin care professional) to collaboratively ensure the infant's airway is maintained, clinical needs are addressed, and harms are minimized.[75]
- Use repositioning as an opportunity to assess the infant's skin (including under medical devices), manage moisture (e.g., change wet linen), and to perform daily range of motion exercises.[75]

Positioning the Individual in Bed

Clinical question: Should 30-degree lateral positioning versus greater than 30-degree lateral positioning be used to prevent PI occurrence in individuals at risk?

R10: We suggest using 30-degree lateral positioning to prevent pressure injury occurrence in individuals at risk for pressure injuries.

(Conditional recommendation, very low certainty of evidence)

Clarifiers:

- **Individualize turning angles to ensure maximum offloading of both the sacrum and the trochanter. 30-degree lateral positioning may not be maintainable or adequately offload the sacrum in individuals with higher body mass index. Modifying to a 40-degree lateral position might be necessary.**
- **In pre-adolescent children, a 30-degree turn is equivalent to a full body turn due to their smaller body width.**

Evidence summary

This recommendation is made in the context of observational evidence that the 30-degree lateral position is associated with lower interface pressure[76] and higher transcutaneous oxygen over tissues as compared with individuals in the 90-degree lateral position. However, the position is not always achievable or effective, especially for many individuals with high body mass index (BMI),[77,78] and might be modified to a 40-degree lateral position for individuals or who are unable to maintain the 30-degree lateral position for adequate durations. A meta-analysis[56] of two RCTs[79,80] that compared 30-degree lateral positioning versus greater than 30-degree lateral positioning for individuals at risk of PIs showed

Figure 1: 30-degree lateral side-lying position

that the 30-degree lateral positioning was associated with a non-significant lower rate of PI occurrence (1.3% versus 0.3%, RR 0.62, 95% CI 0.10 to 3.97, p=0.62, relative effect of 42 fewer PIs per 1,000 individuals treated [from 100 fewer to 330 more]). There is very little confidence that this effect estimate represents a true effect. The evidence was downgraded due to a very high risk of bias, inconsistency and imprecision. One study was conducted for four weeks in an aged care setting[79] and the second study included individuals in an acute care setting who were followed for 24 hours.[80] Pressure redistribution full body support surfaces of varying types were used, and regular repositioning regimens were in place. No Category/Stage 3 or 4 PIs were reported in either study.[79,80] The longer study[81] demonstrated that 30-degree lateral positioning was cost effective based on the associated lower rate of PIs and lower nursing time costs.

The second study[80] reported variation in cost effectiveness. The Guideline Expert Panel Group provided the opinion that the 30-degree lateral position is not universally accessible or feasible because many individuals in the community may not have access to appropriate positioning devices or assistance to achieve a 30-degree lateral position. The position can be difficult to achieve and maintain,[82] particularly in individuals who have obesity or who are overweight. Several studies have demonstrated that individuals positioned in the 30-degree lateral position change to a supine position independently between repositioning events, even when positioning devices are used.[62,80] Therefore, careful implementation is required.

Implementation considerations

- Avoid lying positions that increase pressure, such as the 90-degree lateral position.[32,76,83,84]
- When repositioning individuals in the lateral position, offload the sacrococcygeal area without placing pressure on the trochanter. Positioning the upper leg forward of the lower leg, with support from a pillow may increase comfort and promote stability in the 30-degree lateral position.[85]
- Use positioning devices to assist the individual to maintain the 30-degree lateral position more effectively.[86,87] Ensure that the selected positioning device is appropriate for the individual and evaluate the effectiveness of the devices in sustaining the individual's position (e.g. smaller/less dense pillows and wedges may flatten when used to position individuals of greater weight).
- When repositioning individuals in the lateral position, ensure other body prominences (e.g., between the knees, heels and ankles) are also offloaded using appropriate repositioning devices.
- Some full body support surfaces offer automated lateral turning. These are available in integrated bed/mattress systems or as devices that can be positioned on an existing full body support surface. There is limited evidence on the efficacy of these devices on PI occurrence; however, they may be appropriate for individuals requiring frequent repositioning (e.g., in critical care settings) or for individuals who have limited access to assistance to reposition (e.g., in home care settings).[23,88,89]

<u>Additional considerations for individuals who can self-reposition</u>

- Encourage individuals who are independent in bed mobility to sleep in a 20-degree to 40-degree side lying position if not contraindicated.
- Provide diagrams and written instructions to assist self-repositioning individuals and informal carers to achieve a 30-degree lateral position.[82] Evaluate and regularly review the effectiveness of positioning.

Clinical question: Should 30-degree head-of-bed elevation versus 45-degree head-of-bed elevation be used to prevent PI occurrence in individuals at risk?

R11: We suggest that the head-of-bed elevation be maintained at 30-degrees or lower to prevent pressure injury occurrence; however, higher head-of-bed elevation may be required in some clinical situations (e.g. individuals at higher risk for aspiration).

(Conditional recommendation, low certainty of evidence)

Evidence summary

The meta-analysis of four RCTs[90-93] reported in an existing review[94] was re-conducted to explore the effect of maintaining the head-of bed at or below 30-degree elevation as an intervention to reduce PI occurrence. The meta-analysis showed that if the head-of-bed elevation is restricted to 30-degrees, 68 fewer individuals per 1,000 (between 112 fewer and 5 fewer) might experience a PI than when the head-of-bed is elevated to 45-degrees or more (11.1% versus 18.9%, OR 0.59, 95% CI 0.36 to 0.97, p = 0.04). There is little confidence that this effect estimate represents a true effect. The evidence was downgraded due to risk of bias and imprecision. Meta-analyses[94] demonstrated that undesirable effects, including ventilation-acquired pneumonia (6 RCTs, odds ratio [OR] 2.15, 95% CI 1.24 to 3.72, p = 0.007) and gastric reflux (3 RCTs, OR 1.85, 95% CI 1.04 to 3.3, p = 0.04), were higher when the head-of-bed was lower (i.e., adverse events happened more frequently with the intervention). All the studies were conducted in critical care settings over durations of one week or less. The Consumer Panel Group noted that head-of-bed elevation can also impact quality of life and comfort, and acceptability varies. In making this recommendation, the Guideline Governance Group noted that a higher head-of-bed elevation is determined by the individual's clinical needs beyond PI risk and may be required to prevent serious adverse events in certain populations.

Implementation considerations

- Keep the head-of-bed as flat as possible. Consider the individual's clinical needs, preferences and comfort when positioning the head-of-bed. Where possible, maintain elevations at 30-degrees or lower.
- Implement PI prevention strategies when elevating the head-of-bed for other clinical needs (e.g. reducing the risk of aspiration). Re-evaluate the full body support surface and elevate the thighs to minimize sliding that can lead to shear.

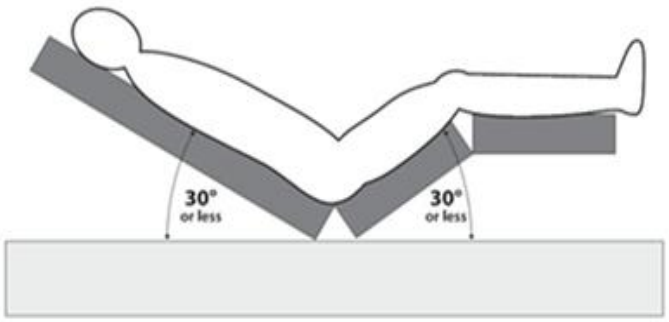


Figure 2: 30-degree head-of-bed elevation

- Regularly re-evaluate positioning requirements and reduce head-of-bed elevation when safe to do so.
- Investigate alternatives to sitting in bed (e.g., sitting out of bed for some duration, sitting out of bed during meals or gastric feeds). When the individual is sitting out of bed they can be positioned with postural and foot support, reducing PI risk compared to sitting in bed with head-of-bed elevated.[95]
- Avoid slouched positions that can increase pressure and shear on the sacrum and coccyx.[96]

Selecting a Prone Position in Critical Care

Clinical question: What are the general considerations regarding when to place an individual in prone position and how should an individual be protected whole in prone position?

R12: It is good practice to select a prone position when required by the individual's medical condition, and to cease prone positioning as soon as clinically appropriate.

(Good practice statement)

Supporting information

Prone positioning is most often used in critical care settings for management of medical conditions, (e.g., severe acute respiratory distress syndrome[97]). Prone position promotes gas exchange and improves lung function, reducing the requirement for ventilator support.[98,99] In these situations, the ability to implement major repositioning may be limited and there is an increased risk of PI occurrence on the anterior surface of the body.[100] The use of medical devices due to the individual's clinical condition also contributes to PI risk in the prone position. Small, incremental shifts (micromovements) may be the only opportunity to slightly offload areas at risk.

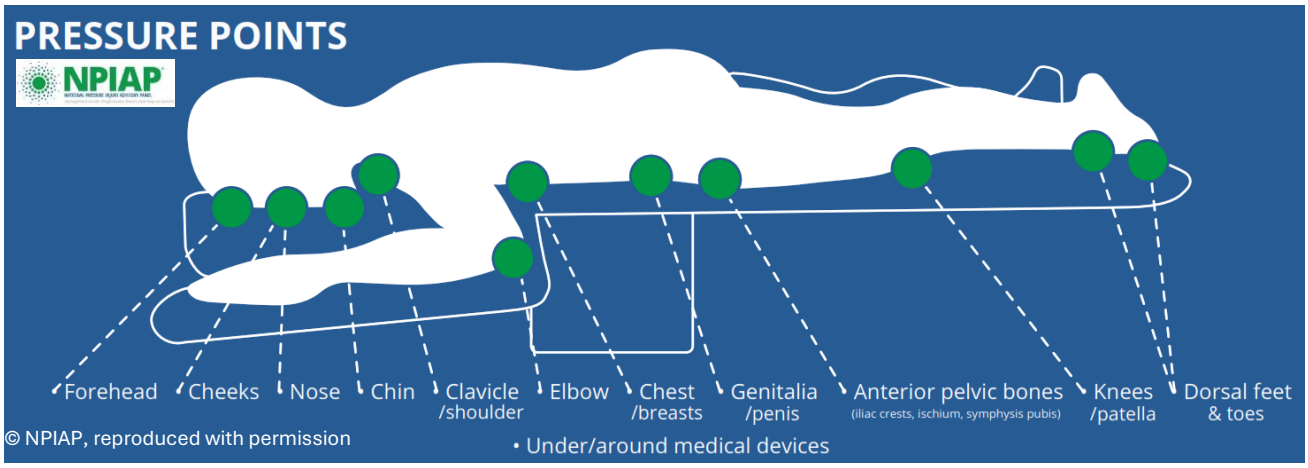


Figure 3: Prone position

Implementation considerations

- Implement an interdisciplinary proning team with specialized training in safely proning the individual in clinical areas where prone positioning is required for medical care.[97,101] Interdisciplinary proning teams collaboratively ensure the individual's airway is maintained, clinical needs are addressed and harms are minimized.
- Include a certified/ specialty-trained wound and skin care professional on a prone positioning team.[102]
- The full body support surface should be flat (no head-of-bed elevation) when positioning the individual in a prone.

Repositioning

- Limit the amount of time spent in the prone position. Develop a clear protocol with indications for proning and a safety checklist for positioning in prone (e.g., airway management, line management and positioning management).[97]

- Continue to reposition as the individual's medical condition allows. Consider using the swimming/freestyle position and supplementing repositioning with frequent, small movements of the extremities and head.[35] Alternate the arms and the head every two hours.[99]

Assessment

- Assess the skin at the face, thorax, clavicles, breast region, iliac crest, symphysis pubis, genitalia, knees, tibial plateau and toes before and after using the prone position,[103-105] and at each repositioning.

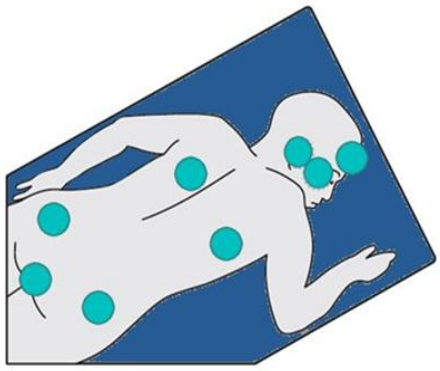


Figure 4: Swimming/freestyle position

Full body support surfaces and pillows

- Use pillows (e.g., viscoelastic foam or gel) under the chest and pelvis to avoid pressure on the abdomen. Use pillows under the shins to avoid stretching knee and ankle joints.[97,100] Consider using a preventive dressing for pressure points.[35]
- Use a facial pillow under the face/head to avoid direct pressure on eyes, ears and endotracheal (ET) tube.[35,74,106] When selecting the pillow, consider the likely duration of proning,[3] angle of face and ET tube, and pillow height.[35]
- Consider using headrests to avoid direct pressure on the orbits. Consider reverse Trendelenburg positioning of the full body support surface if optical pressure and edema are observed. A mirror can be used to assess the eyes.[99]

Skin and face care

- Regularly reposition the head as much as possible.[107]
- Consider using preventive dressings over pressure points in contact with the full body support surface (e.g. forehead, chin, clavicle, elbow, iliac crest, knee and dorsum of foot).[99]
- Keep the skin clean and dry from excess moisture.[103]
- Care for the eyes: use ophthalmic lubricant and tape the eyes shut horizontally.[35,107]
- Care for the mouth: ensure the tongue is inside the mouth and regularly assess for injury. Consider using a bite block.[35] Be aware of the risk for mucosal PIs and regularly assess inside the mouth.
- Manage moisture with frequent suctioning and use of topical skin protectants.[35]

Medical devices

- Remove any lines or devices that are no longer required.
- Avoid positioning the individual on medical devices, where possible.[100]
- Relocate medical devices away from pressure loading surfaces if possible. For example, place electrocardiogram (EKG/ECG) leads on the individual's back[35] and rotate clamps/locks on tubing so they are not underneath the individual.
- Use medical devices according to manufacturer's instructions. For example, some ET fixation devices are not approved for use in the prone position.
- ET tube securement devices may create additional pressure in prone position. Consider taping ET tube in place rather than using a securement device designed for safety in supine position.[107]
- Consider repositioning the ET tube from side-side. Validate the insertion depth is maintained when repositioning the ET tube.[103,107]
- Secure tubes and devices away from the skin, regularly evaluate and manage tubes and other medical devices and consider using preventive dressings under devices.[35,99,103]

Strategies to Optimize Repositioning Implementation

Strategies to optimize implementation of repositioning may include:

- Providing education and instruction to individuals and their informal carers to promote optimal self-repositioning frequency and techniques
- Mechanisms to prompt awareness and performance of repositioning
- Technology to indicate if repositioning is required based on the individual's bed mobility, activity or increasing interface pressure
- Technology to evaluate the effectiveness of repositioning in achieving off loading of pressure.

These interventions are frequently used as a part of a bundled implementation strategy that uses multiple interventions to reduce PI occurrence.

Clinical question: What are general considerations for promoting implementation of repositioning for individuals at risk of pressure injuries?

R13: It is good practice to provide education to the individual and their informal carers on:

- **the rationale for repositioning,**
- **its significance in preventing pressure injuries, and**
- **strategies to safely and regularly implement repositioning.**

(Good practice statement)

Supporting information

The Guideline Governance Group have identified consumer education interventions, including components of PI education interventions that are effective in achieving increased knowledge and behavior change, as a topic for future exploration as a clinical question. However, until a full exploration is undertaken, the Guideline Governance Group have made a Good Practice Statement to reinforce best practice because education and consumer engagement is such a significant component of addressing repositioning needs. Preliminary evidence indicates that education for all individuals at risk of PI is a significant component in successful implementation of PI prevention.[108] Education is particularly important for individuals with conditions that place them at lifetime increased risk of PIs (e.g., SCI and other neurological conditions) as it facilitates self-management.[109] However, education is also important for people at short-term PI risk (e.g., following surgery) as it enables individuals to actively engage in their own care and work with clinical staff to prevent PIs.[110]

Implementation considerations

- Provide education to the individual and their informal carers on the rationale for repositioning and its significance in preventing PIs. This understanding can encourage active self-management and participation in the care process,[18,30,48] foster a collaborative approach to care and safety,[16,48] and may increase adherence to repositioning schedules.
- Provide carers with individualized education and skills in repositioning and regularly evaluate their manual handling capabilities.[48]
- For individuals who are non-adherent to repositioning, explore and address potential reasons[48] (e.g., cognition, competence, pain, post traumatic stress disorder, etc.). Facilitate access to education, resources, equipment and referral to appropriate health professionals (e.g., occupational therapist, physiotherapist, physical therapist, psychology services, etc.).

Additional considerations for individuals with spinal cord injury

- Educate individuals with spinal cord injury (SCI) on repositioning during their initial rehabilitation period and regularly thereafter to reinforce self-management and adherence to repositioning over time.[18,48,109,111]

Additional considerations for individuals receiving end-of-life care

- Pressure injury prevention is an opportunity for informal carers to be involved in end-of-life care. Provide carers with individualized education and skills in repositioning, particularly if the individual is receiving home-based care.

Additional considerations for individuals in home settings

- Consider referral to allied health services (e.g., physiotherapy, physical therapy, and occupational therapy) for advice and education on repositioning, and assistance in accessing and selecting repositioning equipment.

Clinical question: Are repositioning reminder strategies effective in promoting adherence to repositioning regimens?

R14: It is good practice to implement repositioning reminder strategies to promote adherence to repositioning regimens.

(Good practice statement)

Supporting information

Repositioning regimens have been shown to have low rates of staff adherence.[62,112] Various types of reminder systems to prompt self-repositioning individuals, informal carers and health professionals to perform repositioning have been used to improve adherence. Reminder systems reported in the literature, including audio cues[113-115] and visual cues at the bedside,[116,117] have been associated with reduced PI occurrence[113] and improved adherence to repositioning.[114,115,117]

Some technologies are also used to provide a visual and/or sound alert to prompt repositioning. These technologies are addressed in additional clinical questions. The use of movement sensors is addressed below, and clinical questions regarding the use of interface mapping systems are currently being investigated by the Guideline Governance Group.

Implementation considerations

- Remind individuals who are independent in mobility to mobilize regularly.[118] Consider engaging the assistance of non-clinical staff and informal carers to remind more independent individuals to self-reposition.
- Consider using verbal cues, visual reminders (e.g. posters or turn clocks) [116,117] or facility-wide audio cues[113-115] to remind the care team that repositioning is required. These systems can also be used to prompt self-mobile individuals and informal carers.[33,113,119]
- At the organizational level, electronic medical record systems can be used to integrate reminders for repositioning and other PI preventive care.[30]

Additional considerations for individuals in home settings

- Educate individuals in the community to implement reminder strategies to promote regular repositioning (e.g., alarm clocks, wearable technology and smart apps).[120]
- Encourage self-repositioning by integrating repositioning into the individual's daily routine where possible, for example encouraging incidental movement or natural breaks in activities.[18]

Clinical question: Should a sensor system that measures the individual's movement be used to inform the frequency of repositioning versus not using a movement sensor system to prevent PI occurrence in individuals at risk?

R15: We suggest that a sensor system that monitors the individual's movement could be used to assist in evaluating repositioning needs for individuals at risk of pressure injuries when resources permit.

(Conditional recommendation, very low certainty of evidence)

Evidence summary

The meta-analysis included three studies[112,121,122] comparing the use of a sensor placed on the individual's body to measure the frequency of movement[≈] versus no system. The meta-analysis showed that using a movement sensor was associated with a non-significant lower rate of PI occurrence (0.7% versus 6.9%, RR 0.15, 95% CI 0.02 to 1.08, p = 0.06, relative effect of 58 fewer PIs per 1,000 individuals treated [from 67 fewer to 5 more]). There is very little confidence that this effect estimate represents a true effect. The evidence was downgraded due to risk of bias, inconsistency, indirectness and imprecision. The studies were conducted in critical care[112] and aged care[121,122] settings. Using a decision analytic model to simulate expected costs and outcomes, the patient wearable sensor was found to be cost-saving. Modelling from critical care settings in the US assumed better clinical outcomes (77% reduction in HAPIs) compared to standard care and an expected cost savings of USD 6,621 per patient over a one-year period. A 77% reduction in HAPIs may not be realistic in all settings. Regardless of simulated cost savings, this might not be economically feasible to implement in some clinical[121] and geographic settings. The Guideline Governance Group considered the feasibility of implementing movement sensors was variable based on issues reported in the evidence (e.g., individuals with cognitive impairment removing the sensor, having sufficient monitors in the health service for staff to view the sensor data,[122] etc.). Access is likely to be limited in many clinical and geographic settings.

Implementation considerations

- Sensor devices (i.e., movement sensors) should complement rather than replace clinical judgement and existing protocols and preventive strategies (e.g. risk and skin assessment, pressure redistribution full body support surfaces and regular repositioning).
- Regularly inspect the individual's extremities, including the head/ears, elbows and heels when using movement sensors. These technologies may not adequately indicate whether pressure has been offloaded at these vulnerable areas.[24,123]
- Consider using movement sensors to evaluate the individual's self-positioning capabilities to inform the development of an individualized repositioning regimen.[46,124,125] However, be aware that the movement sensor may not accurately detect the individual's episodic and/or small changes in position, nor evaluate the technique used to self-repositioning (e.g., whether it increases shear forces).
- Consider engaging local champions to educate staff on using the cues provided by movement sensors and to encourage implementation of repositioning regimens.[121,122]
- Locate monitors at appropriate places within the facility to maximize staff engagement with visual feedback data.[122]
- Ensure adequate staff are available to respond to sensor cues for repositioning.

[≈] All studies investigated the same frequency of movement sensor system, as detailed in the data extraction tables. In all the studies, the sensor was programmed with a scheduled repositioning frequency, based on which a visual cue was delivered to a monitor indicating to care staff whether the person was due to be repositioned. If the sensor detected sufficient self-repositioning had occurred, the duration before the visual cue was displayed was extended accordingly by the system.

Mobilization

Clinical question: Should an early mobilization intervention versus delayed mobilization or standard care be used to prevent PI occurrence in individuals at risk?

R16: We suggest that an early mobilization program be implemented in individuals at risk for pressure injuries based on the individual's activity tolerance.

(Conditional recommendation, very low certainty of evidence)

Evidence summary

The meta-analysis included six RCTs[126-128] and six non-randomized comparative studies[129-134] that compared early mobilization versus delayed mobilization for individuals at risk of PIs. The meta-analysis showed that an early mobilization protocol was associated with a significantly lower rate of PI occurrence (5.2% versus 6.9%, RR 0.75, 95% CI 0.61 to 0.92, p=0.009, relative effect of 17 fewer PIs per 1,000 individuals treated [from 27 fewer to 5 fewer]. There is very little confidence that this effect estimate represents a true effect.

Typical early mobilization protocol[132,134,135]

- Individualize exercise based on capability
- Perform each stage 2-3 times/day as tolerated
- Progress to next stage as tolerated and safe
- Staged early mobilization:
  1. Passive range of movement exercises
  2. Dangling limbs over the side of the bed
  3. Sitting out of bed
  4. Standing with or without support/aids
  5. Walking with or without support/aids

Tools to support early mobilization protocol development and implementation are available at:

- Agency for Healthcare Research and Quality Early Mobility*
- John Hopkins Medicine Activity and Mobility Promotion (AMP) Programs#

The evidence was downgraded due to a high risk of bias,[127,134] indirectness and inconsistency. Several other desirable effects have been reported, including prevention of intensive care-related weakness (RR 0.49, 95% CI 0.32 to 0.74), prevention of deep vein thrombosis (RR 0.16, 95% CI 0.06 to 0.47) and prevention of pneumonia (RR 0.39, 95% CI 0.16 to 0.98).[127,134] The overall number of adverse events, including falls, injuries, cardiac or respiratory events, self-extubation, or line disconnections were not different between early mobilization programs and usual care.[134] However, there was an increase in the number of falls associated with early mobilization (3.3% versus 1.9%, odds ratio [OR] 1.74, 95% CI 0.38 to 8.08).[134]

No formal cost effectiveness analyses were reported. A meta-analysis[127] reported that early mobilization is associated with a reduced hospital length of stay (cost saving) and a second study[134] reported that early mobilization requires an increase in care staff time (cost).The literature[134] and the Panel Group provided expert advice that early mobilization may not be appropriate in the context of hemodynamic or pulmonary instability.

* https://www.ahrq.gov/hai/tools/mvp/technical-bundles-early-mobility.html
# https://www.johnshopkinssolutions.com/solution/amp/

Implementation considerations

- Evaluate the safety of individuals as they commence and increase mobilization.
- Progress individuals on bedrest to sitting and ambulation as rapidly as they can tolerate to offset the clinical deterioration associated with prolonged bedrest.
- Provide adequate supervision. This might require an increase in staffing.[118,129,135]
- Use appropriate mobilization techniques to avoid increased shear forces.
- Facilitate access to appropriate mobility aids and footwear.

Repositioning in the Operating Room

The repositioning recommendations and good practice statements presented above generally apply to individuals in the operating room, where they are possible to implement in that context. It is usually not possible to significantly reduce the length of time that the skin and tissues are subjected to pressure during a surgical procedure. Positioning options can be limited given the need to ensure a stable, visible and accessible operative field for the surgical procedure. The ability to reposition the individual is also limited, because the overall surgical position must usually be maintained to ensure procedural access, and movement may not be possible while the surgical procedure is being performed. Additionally, other adverse events from positioning in the operating room (e.g., peripheral nerve injury, musculoskeletal injury and eye injury) also require management.[136]

Key points for positioning in the operating room

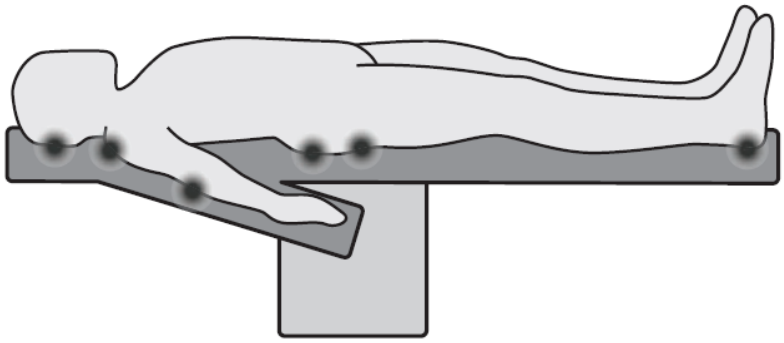
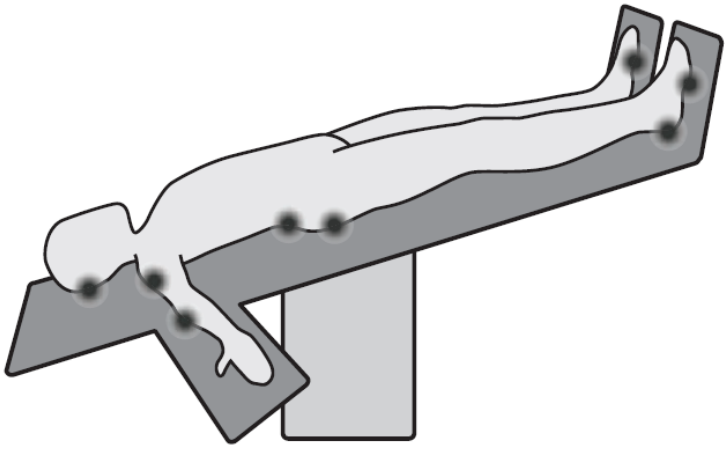
1. Select an initial position based on surgical requirements
2. Use pressure redistribution full body support surfaces and positioning devices
3. Know and protect the vulnerable pressure points for the selected position
4. Distribute pressure over the largest body area possible
5. Offload the heels
6. Pay attention to medical devices
7. Use a different position prior to and following surgery

Implementation considerations

- Follow local policies and standard safety practices when positioning an individual for surgery.[137]
- The initial position the individual is placed in should distribute pressure over the largest body surface area possible, reducing pressure on pressure points as much as possible. Be familiar with pressure points that are unique to the intraoperative position, which will require attention (see *Table 1*).
- Be aware of the intended surgical position, the equipment that will be used and the likely points of contact with the individual. Having knowledge of the intended procedures and equipment allows the selection of appropriate full body support surfaces and protective strategies in place.
- Position the individual preoperatively and postoperatively in a different position than that used during surgery.[138] When possible, wait until the individual has been anaesthetized before positioning them in the surgical position, then reposition immediately following the surgical procedure. This will minimize the duration of pressure exposure from the surgical position.
- Interface pressure mapping might be used in the operating room to guide effectiveness of initial positioning.[139,140]
- Offload the heels (See the *Heel Pressure Injuries* section of this guideline).
- Consider using preventive dressings (See the *Preventive Skin Care* section of this guideline).
- Use repositioning devices with pressure redistribution properties (i.e., ability to immerse and envelop) to assist in positioning.

- Evaluate individuals who enter the perioperative setting with medical devices in situ to determine how positioning and instrumentation may impact their pressure injury risk. Do not position the individual directly on a medical device unless it cannot be avoided.
- Plan to reposition the individual during surgery where possible, especilly for longer procedures (i.e. longer than 2 hours). Repositioning can be determined by the type of surgery, the surgical position, the duration of the surgery and the individual's clinical condition. IP mapping is another option to identify the need to reposition.[139,140] At commencement of the surgery, determine when during the procedure the individual could be repositioned so the team is prepared to take a short procedural break. This may be done using small shifts of body weight (micromovements)[71,72] and/or repositioning the extremities if the surgery is of longer duration.
- Document the position in which the individual was placed during surgery, including any straps or securements.

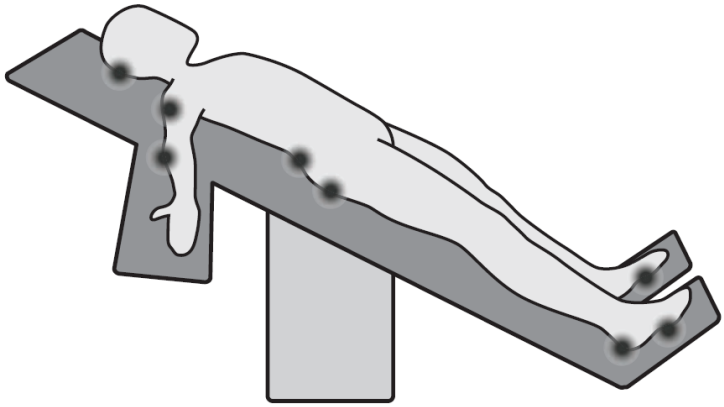
Table 1: Pressure points of concern in different surgical positions

Position and pressure points of specific concern	Illustrative position noting pressure points
Supine • Occiput • Shoulder blade (scapula) • Elbows • Sacrum • Coccyx • Buttocks • Heels	
Trendelenburg As per supine position PLUS: • Shoulders and scapula	

Reverse Trendelenburg

As per supine position PLUS:

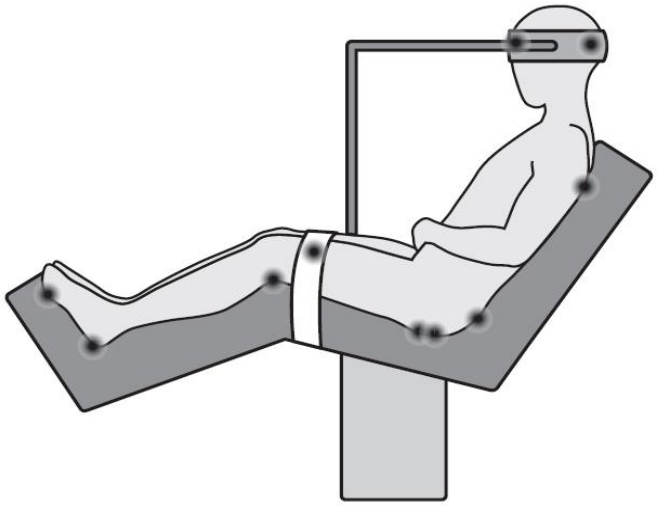
- Soles of the feet
- Shoulders and scapula



Sitting/modified sitting

As per supine position BUT ESPECIALLY:

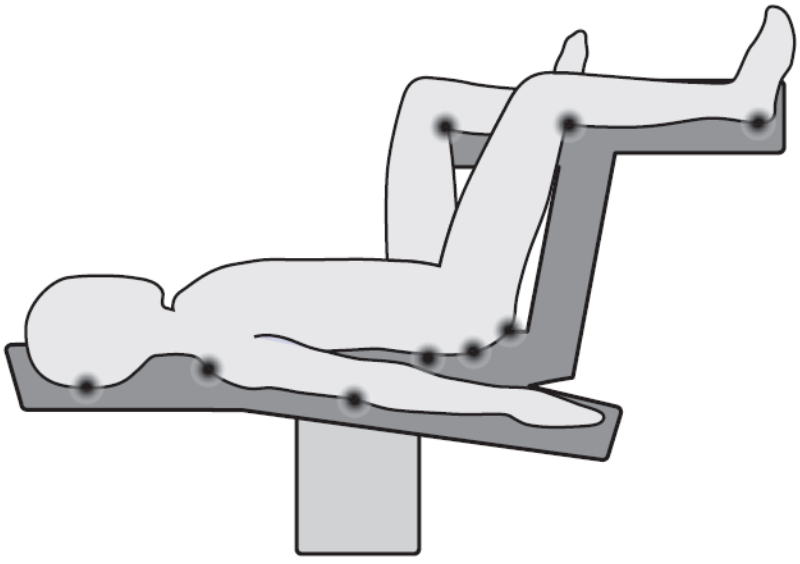
- Buttocks
- Ischium
- Coccyx
- Sacrum
- Back of knees
- Heels



Lithotomy

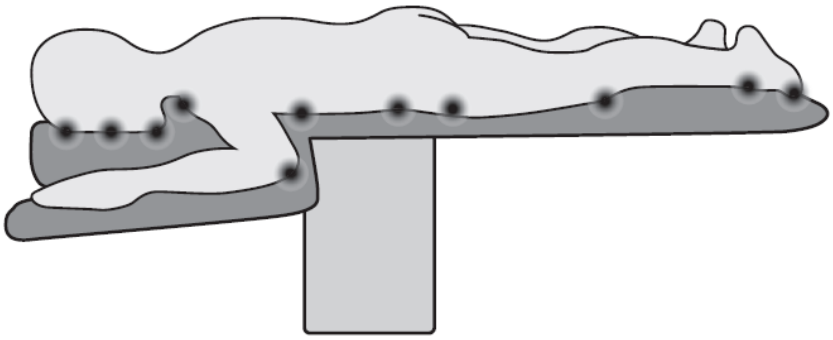
As per supine position BUT ESPECIALLY:

- Sacrum
- Coccyx
- Back of knees



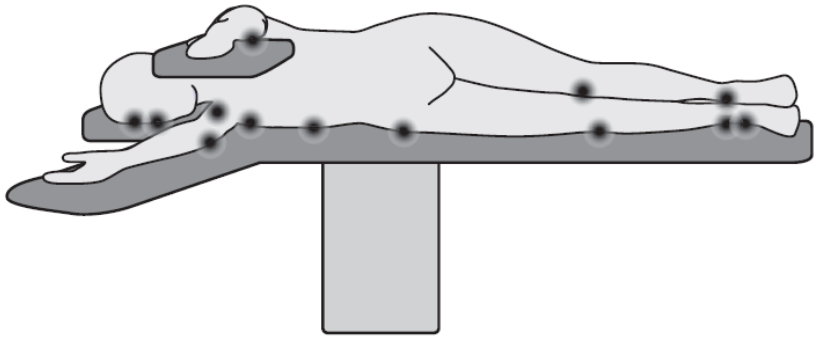
Prone

- Forehead
- Chin
- Cheeks
- Shoulder (anterior)
- Elbow
- Chest (breasts)
- Genitalia
- Anterior pelvic bones (iliac crests & ischium)
- Knees (patella)
- Dorsal feet and toes
- Nose (if positioned incorrectly)



Lateral

- Lateral face and ear
- Elbow
- Shoulder
- Axilla
- Superior and dependent arms
- Ribs
- Hips (trochanter)
- Malleoli
- Bent lower leg
- Knees
- Ankles

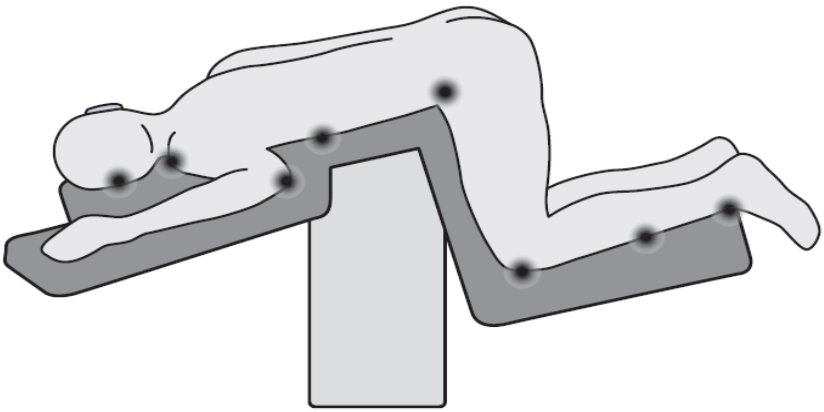


Kneeling position

(knee/chest position)

As per prone position BUT ESPECIALLY:

- Face and ear
- Anterior chest
- Elbows
- Anterior pelvic bones (iliac crests and ischium)
- Knees
- Anterior tibia
- Anterior ankle

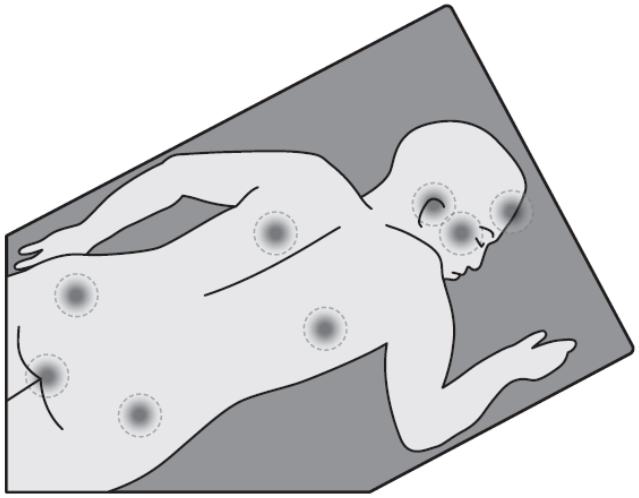


Freestyle/swimming position

(Note: "Hidden" pressure points on the individual's underside are illustrated with dotted outlines)

As per prone position BUT ESPECIALLY:

- Lateral face and ear



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