

## ProCair Plus Outcomes

FEATURE		RATIONALE	BENEFIT	OUTCOME
CELL FEATURES				
Configuration	1 in 2 cell cyclic alternation of one cell inflated and one cell deflated	<p>Maximising the time off offload related to the time of being loaded increasing time for reperfusion to occur sufficiently. This is particularly relevant for those who have vascular pathology or a longer oxygen recovery requirement.</p> <p>Reactive hyperaemia is the transient increase in organ blood flow that occurs following a brief period of ischemia such as arterial occlusion from pressure. The physiological reaction lasts about one-half or three-quarters longer than the ischemic period.</p>	Increased duration of complete offload for skin reperfusion and maximised duration of reactive hyperaemia.	Reduction of Pressure Injury risk
Cell amplitude	8 inch/20cm cell depth (with 10cm diameter in torso cells) for effective offload	The most significant benefit of an alternating mattress is attributed to the cell cycle amplitude (depth), which ensures offloading for tissue reperfusion. The Pan Pacific Guideline recommend avoiding use of cells less than diameter of 10 cm or overlays.	Sufficient depth and width of the cell ensures the body is supported high to allow the offloaded cell to achieve complete offloading.	Reduction of Pressure Injury risk
Cell structure	Engineered cell structure to maintain height and depth when loaded	<p>The ability for a cell to retain its amplitude when loaded is essential to the realisation of the actual cell height and width.</p> <p>A cell that collapses under pressure will increase in width creating a zone of overlap with adjacent cells. This overlap zone on the skin will remain under pressure during all periods of the alternating cycle and will therefore not receive the offload at any time</p>	The cells designed to retain height and with when loaded. The internal construct of the cell ensures that the best possible alignment of the cell is maintained even when under load. This ensures that all sections of the skin are receiving the therapeutic occlusion and offload to facilitate reactive hyperaemia.	Reduction of Pressure Injury risk
Cycle time	A 12 minute cycle, whereby each set of 2 cells complete an inflation and deflation period	<p>Understanding natural nocturnal movement guides us to use similar interventions on people who either have diminished or absent movement, or who are unable to perform the movement independently whilst in the bed.</p> <p>Human average of 1.6 gross body movements occurring per hour. The frequency of all body movements both gross and minor averages fourteen instances per hour with almost a minute spent moving each hour.</p> <p>Increasing the duration between alternations comes at the risk of exposing the tissue to longer periods of pressure and would</p>	<p>Every 12 minutes every section of the body surface experiences reperfusion in lieu of this not occurring with spontaneous nocturnal movement.</p> <p>To ensure the mattress remains at this ideal therapeutic cycle time the ProCair Plus has a fixed cycle time to ensure that care givers are not able to inadvertently alter this required parameter.</p>	<p>Reduction of Pressure Injury risk</p> <p>Ease of use</p>

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		not be supported by the indicative evidence we have on the timing of nocturnal movement to prevent damage from pressure.		
Cell changeover	Static period where both cells are inflated	Achieving a static period where corresponding cells are both at maximum amplitude ensures that the person is not moving vertically as the cell exchange occurs. If the inflated cell begins to deflate prior to the deflated cell rising the person will drop with the deflating cells and re-rise with the inflating cells causing discomfort and motion sensitivity.	The ProCair Plus cycle time incorporates a static period between each alternation to ensure the person remains stationary and eliminate any undue effects from vertical motion.	Increased compliance and improved user experience
Rate of Change	Fast speed of Offload	The speed of offload is important to ensure maximum duration of tissue being offloaded. The more effectively the mattress can deflate to 0mmHg, the more time available for reactive hyperaemia and tissue reperfusion.	The ProCair Plus is designed to deflate in a shorter period as possible and thus increase the duration of time the deflating cell imparts pressure of values below 30, 20 and 10mmHg at the sacrum.	Reduction of Pressure Injury risk
Offload pressures	Maximum time below 10, 20 and 30mmHg (Closing pressure of venules, capillaries and arterioles)	<p>The function of an effective dynamic mattress is to hold contact pressures as low as possible for as long as possible, particularly under the most vulnerable areas such as the heel, sacrum and other bony prominences.</p> <p>The essential and significant benefit of an alternating mattress is attributed to complete or near complete off-loading delivering superior tissue perfusion compared with partial offloading.</p>	<p>Analysing the ProCair Plus utilising PRI, we are able to conclude that 29% of the 12-minute cycle (3 minute, 29 seconds) the interface pressure is below 10mmHg and 39% of time below 20mmHg.</p> <p>The ProCair Plus maximises the offloaded period, encouraging the greatest timeframe for reperfusion and reactive hyperaemia.</p>	Reduction of Pressure Injury risk
Maximum Pressures	Sufficient for cell height without increasing PI risk	<p>Although amplitude is important for perfusion, it does not mean that air pressures within the mattress need to be unduly high, inflation pressure needs only to be 'high enough' to lift the body clear of the deflated cell.</p> <p>The pressure of 30mmHg is also a value that represents occlusion of the arterioles, a necessary action to facilitate the body's protective vascular response once offloaded, reactive hyperaemia.</p>	<p>Tested to have a maximum sacral interface pressure of 31.7 mmHg. This pressure is sufficient to retain cell amplitude, avoiding 'bottoming out' and facilitating full offload of the adjoining cell.</p> <p>With the PRI threshold in the mattress set at 30mmHg the sacral pressure is equal to or less than 30mmHg for 94% (11 minutes 17 seconds) of the 12-minute cycle time.</p>	Reduction of Pressure Injury risk
MATTRESS FEATURES				
ClimateCair: TPU cells	High quality thermoplastic polyurethane cell material minimising heat collection	<p>Microclimate is the descriptor for heat and moisture accumulation at the skin surface. This is a risk factor for pressure injury and is essential to be managed as part of a surface system.</p> <p>An increase of 1°C in skin temperature results in an</p>	TPU is a high quality material, that along with being soft to touch and quiet, it is a heat conductor. Thus, it removes and dissipates local heat to contribute to microclimate management.	<p>Reduction of Pressure Injury risk</p> <p>Microclimate Management</p> <p>Increased compliance and improved user experience</p>

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Multizone cells	Cell design specific to body location	increase of approximately 13% in tissue oxygen demand, making the skin more vulnerable to mechanical damage such as shear and friction.		
		Providing specific cells to varied body regions is essential in providing appropriate width of offloading according to the shape and size of the location.	The ProCair Plus has 3 fixed head cells, 10cm torso cells and narrower heel cells to accommodate the pressure needs of each individual location.	Reduction of Pressure Injury risk.
		Fixed head cells improve stability and support of the head, minimising the impact of cell motion.		Increased compliance and improved user experience
HeelCair: independent cell dropdown	Ability to completely offload heel cells for constant offloading	Narrower heel cells provide more concentrated pressure care specifically designed for prevention of PI in the heel region.		
		Complete offload of pressure is the only unequivocal way of minimising risk of pressure injury.	The ProCair plus has an easy to engage heel drop down available in all the heel cells. This allows for constant and complete offload of vulnerable heel tissue no matter the user height.	Reduction of Pressure Injury risk
		The heel is particularly susceptible to pressure given the weight bearing through this region when lying supine and in sitting.		
SafetyCair: Cell in cell design	Protection in case of inadvertent mattress deflation	The heel is a notoriously difficult place to treat pressure injury due to the thin depth of tissue, ease of bone involvement and poor outcomes from surgical intervention.		
		When power failure or rare fault occurs, the air cells of an alternating mattress can deflate.	Cell design incorporates a secondary cell bladder at the base of each cell. This remains inflated in the event that the upper cells deflate, preventing the user from bottoming out.	Reduction of Pressure Injury risk
		Technology must be built into the mattress design to prevent the user from bottoming out on the bed deck when air pressure is lost. This will prevent the high interface pressures associated with lying on a hard surface.		
Fowler Boost	Automatic support of the pelvis when head is raised.	When the bed enters the fowler position, recommended to not exceed 30 degrees, the proportion of torso weight is shifted from the back to the buttock region. The amount of force through the ischial tuberosities and/or sacrum (dependant on posture) is increased.	Novis ProCair Plus offers an automatic, immediate fowler mode. When the head of the mattress is elevated to 30 degrees the mattress recalibrates delivering sufficient pressure in the pelvic region to continue to deliver clinically effective offloading.	Reduction of Pressure Injury risk
		The mattress will therefore be required to deliver greater support pressure to the sitting region to ensure the person remains elevated by the mattress, that cell amplitude is maintained and the mattress does not bottom-out.	Absence of an auto fowler mode increases the risk of 'bottoming-out' and exposure to excessive, prolonged pressure.	Ease of use

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		This feature should be an auto response, essential in removing the need to care givers to activate it manually, which inevitable can be forgotten during busy periods assisting the person in the bed.		
CairAlert: Bed exit alarm	Bed pad to track planned egress prior to leaving the bed for falls prevention	Fall prevention alarms are commonly used to detect a person leaving a bed or chair. The alarm system has a twofold benefit, giving caregivers an opportunity to attend prior to the fall, or to ensure attendance to a fall is as fast as possible.	<p>An included feature that reduces the need for purchase of alternative falls prevention alarms.</p> <p>The alarm is activated when the user leaves the centre of the bed, allowing time for a caregiver to access the user prior to bed egress and potential fall.</p> <p>Can be turned off or removed if required.</p>	<p>Prevention of adverse events</p> <p>Falls Prevention and Management</p>
CPR Release	Utilised for fast deflation for CPR	<p>In case of a cardiac emergency, fast effective deflation of the mattress is required to deflate the mattress down to the bed deck. This facilitates an effective surface for CPR and other emergency medical interventions.</p> <p>The CPR valve must be easy to see and kept clear of the mattress cover, not being covered by the waterfall surface.</p> <p>Additionally, the mechanism needs to be clearly marked if the CPR valve is open or closed and not easily be able to engage if knocked or moved.</p>	<p>An easy to see easy to access CPR valve. Clearly marked with a twist mechanism. Low chance of accidental activation due to interlocking components.</p> <p>The CPR valve is also used to deflate the alternating cells, and the sub cells for removal.</p>	<p>Prevention of adverse events</p> <p>Improved emergency care</p> <p>Ease of use</p>
Max inflation mode	Creating a stable mattress surface	<p>Caregivers require a stable and predictable surface for care activities. This includes transfers, dressing, repositioning, wound care etc.</p> <p>Use of a bed pan requires a stable surface.</p> <p>Slide sheets and other friction reducing devices require through and complete contact with the mattress and the body surface. Only then will the antifriction properties apply to minimise caregiver and user risk when moving and handling.</p>	<p>The max inflate mode increases air pressure in each cell to provide a stable base for quality care activities.</p> <p>In order to alleviate risk of caregiver error, this mode auto reverts to alternating at 20 minutes to ensure the user is not exposed to high pressures at a longer duration, which increase risk of PI.</p>	<p>Improved quality of care activities.</p> <p>Reduced caregiver injury risk</p> <p>Ease of use</p> <p>Reduction of Pressure Injury risk</p>
Static Mode	Creating a pressure redistribution surface	Importantly but infrequently a comfortable, stable mattress surface will be required. Examples can include: incremental introduction of the alternation mattress, people having difficulty falling asleep in alternating mode, those preferring stability	The ProCair static mode allows the mattress to be utilised for both pressure relief of pressure redistribution to suit individual clinical requirements and preferences.	Increased compliance and improved user experience

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		<p>when eating, or when visitors are present. These situations should be rare or preferably never required.</p> <p>It is important to remember that static mode is a soft immersion surface, similar to a foam mattress. Thus, it creates pressure redistribution, but does not alleviate pressure.</p> <p>If utilising this mode for a duration longer than 30 minutes a potential increase in repositioning will be required to offload tissues.</p>		
User friendly alarm system	Easy to differentiate alarm code with easy access troubleshooting	<p>In case of a technical error caregivers need to be alerted to the situation as soon as possible.</p> <p>Once attending at the pump, clear diagnosis by the pump ensures staff can troubleshoot the concern as quickly as possible to maintain the mattress therapeutic integrity.</p> <p>Alternatively, more detailed descriptive diagnosis can be used to liaise with the manufacturer for troubleshooting or need for urgent repair.</p>	<p>The ProCair plus has a digital screen which on alarm will specify one of 10 different causations for the alarm. The pump is clearly marked with the alarm codes and reason for the error.</p> <p>If further information or a troubleshooting guide is required, a QR code on the pump will direct the caregiver to the user manual for more detailed assistance.</p>	<p>Prevention of adverse events</p> <p>Reduction of Pressure Injury risk</p> <p>Ease of use</p>
Quick release air hose	When air hose is disconnected for transport or power failure, no capping is required	<p>In the event of a power failure, if no battery is supplied, the mattress air hose will need to be disconnected and capped to prevent air loss. Connection of a cap can be a fiddly and time consuming process especially if multiple mattresses are involved.</p> <p>When a power failure occurs, caregivers have multiple tasks to focus on for safety, so minimisation of this process is desirable.</p>	<p>The ProCair Plus has a built in battery backup. In event of a power failure the staff have alternating mode for 5 hours prior to needing to disconnect the air hose, this decreases stress and ensures the user has optimal alternating mode.</p> <p>If event exceeds the battery time, the air hose simply needs to be removed from the pump. No capping is required as it is a one way valve. This decreases time and stress of this process.</p>	<p>Prevention of adverse events</p> <p>Reduction of Pressure Injury risk</p> <p>Ease of use</p>
COVER FEATURES				
Cover Manufacturer	Gold Standard Carflex materials	Utilising a reputable textile manufacturing company provides piece of mind that the product will meet all the expectations required for quality pressure care and longevity of the product.	Quality Carflex top covers ensure the maximum therapeutic benefits are received.	Reduction of Pressure Injury risk
Multiway stretch	Cover stretches in all directions	A multidirectional stretch fabric allows the cover to conform in all directions, facilitating its ability to immerse and envelop. A 2 or 4 way stretch only conforms in these distinct planes and may decrease the flexibility of the cover, minimise	The multiway stretch ensures that maximum reduction of shear and friction forces occur due to user movement or the effect of gravity.	<p>Reduction of Pressure Injury risk</p> <p>Increased product longevity</p>

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		protection from shear and friction in certain movement directions.			
		Multidirectional stretch improves the ability of the cover to resist delamination			
Low friction fabric	Minimising the effect of friction	Risk of friction and shear can be reduced with a low friction fabric. This can be achieved utilising a specialist designed smooth fabric that has a multi directional stretch.	Quality, appropriate low friction fabric is smooth, quiet, comfortable and minimises friction between the mattress and the skin.		Reduction of Pressure Injury risk  Increased compliance and improved user experience
		The balance is achieving the appropriate amount of friction reduction, without it becoming too slippery whereby the sheet and person will slide down the bed when in a fowler position.			
Vapour Permeable	Allows moisture vapour to pass through for 'breathability'	In assessing vapour permeability, the relevant measurement is moisture vapour transmission rate (MVTR). Increasing the MVTR potentially allows the trans epidermal water loss of intact skin to transpire through the cover. Decreasing the MVTR of the cover protects the foam from moisture degradation, increasing MVTR improves the vapour permeability. Changing the MVTR becomes a compromise between managing local climatic conditions and the person's trans epidermal water loss.	Meeting the desired MVTR range the cover demonstrates breathability, managing the risk of poor microclimate and improving the comfort of the user on the mattress surface.		Reduction of Pressure Injury risk  Microclimate Management  Increased compliance and improved user experience
		The recommended MVTR is a minimum 150-200 g/m2/ 24 hrs, which is equivalent to normal patient trans epidermal water loss.			
Moisture impermeable	Resists the passing of moisture particles which will remain on the surface for cleaning	The surface is required to be water resistant. This is a fine balance in the space between the fibres of the cover to be wide enough to facilitate breathability, whilst small enough to prevent liquid ingress. This is known as 'strike through'	The ProCair mattress is moisture impermeable minimising risk of strikethrough when used, cared for and maintained correctly.		Infection Control  Increased product longevity
AcuteCair: Fully Sealed Base	High strength and waterproof	The articulations of a bed create high force on the mattress base, the base needs to tolerate this in order to prevent breakdown of the cover under surface.  If the mattress internals are inadvertently contaminated, a waterproof base will prevent contaminants or fluids entering the bed mechanics.	The ProCair Plus has a fully sealed acute care grade mattress base to withstand wear and tear and prevent fluid contamination of the bed.		Infection Control  Increased product longevity
Welded and stitched seams	Strength of joins from stitching and contaminant	Although welded seams are a necessity for infection control, the durability of this fixation is reduced. Stitched seams are stronger, but not able to prevent ingress of fluid.	Seams are stitched and heat welded to ensure strong fabric bonds, that offer complete protection from fluid or infection ingress.		Infection Control  Increased product longevity

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	impermeable from welding	A combination of stitched and welded seams gives durability whilst ensuring adequate infection control is maintained.		
Waterfall flap	Protection to the zip from contaminants	Zippers are unable to be sufficiently sealed for ingress of moisture and contaminants. A waterfall of fabric on the mattress sides protects the zip from exposure.	Four sided waterfalls of sufficient length to cover waterfall and sit flush to mattress side.	Infection Control Increased product longevity
Cable management system	Cable tracked down either side of mattress	The risk involved with stray cables is significant. Not only can it create a trip risk, but it can be caught in the bed mechanism. When this occurs, the cable can be damaged or severed, increasing the risk of electric shock via the metallic bed.	The ProCair mattress has easy to use cable management built into both sides of the mattress. This allows the cable to be tracked on the side to best align with the mains power inlet. Risk of fall is eliminated and risk of cable damage is reduced.	Prevention of adverse events Reduced caregiver injury risk Increased product longevity
4 sided zipper	Allows top cover removal for washing and access to cells	Machine washing of the cover is the most objective way to ensure the mattress is free from contaminants. It also minimises build up or particles which can compromise the cover surface.	Full four sided zipper allows ease of removal of the top cover for inspection of mattress and machine cleaning as part of a general maintenance and decontamination process.	Infection Control Increased product longevity
Antimicrobial	Protection for infection being trapped in the mattress surface	The mattress must also account for the ingress of bacteria, virus, fungi and other contaminating microbes. The mattress cover needs to possess anti bacterial, anti microbial, antiviral and fungistatic qualities through type of material, reduced size of space to permeate through, and treatment agents impregnated in the cover.	Quality Carflex cover offers full microbial protection.	Infection Control
Wipeable and washable	Able to tolerate disinfection chemical wiping and machine washed at sufficient temperature.	To minimise risk of infection the cover should be wipeable and tolerate a 10,000ppm disinfection chemical concentration with a contact time of at least 1 minute.  The cover needs to be easily removable to facilitate regular washing in a machine. For microorganisms to be deactivated a wash must be completed at a minimum of 65°C for 10 minutes or at a minimum of 71°C for no less than 3 minutes, according to AS/NZS 4146:2000. This also prevents build up of microorganisms in the washing machine causing cross contamination.	Wipeable to 10,000ppm and machine washable, the ProCair cover is designed to promote decontamination and cleaning processes.	Infection Control Increased product longevity
Fire Retardant	Minimising risk of ignition of mattress during a fire	Mattresses must meet the criteria specified in Local Fire Standards. A good indication of ignition resistance is the support surface compliance to CRIB 5 and BS 7177.	Fire retardant to all local and international fire standards ensuring a positive contribution to a fire safety program.	Prevention of adverse events Fire Safety
PUMP FEATURES				
FailSafe: Battery Back up	Continuing alternation for 5 hours following cessation of power	Failures in power source are an unfortunate concern for those with electrically powered medical devices. Caregivers are also inadvertently able to disconnect the power source.	The in built battery ensures that even without mains power the mattress is able to provide optimum pressure care for 5 hours. This minimises	Prevention of adverse events Reduction of Pressure Injury risk

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		Without power the alternating mattress is unable to provide optimal pressure care support. Even when the air hose is capped off alternation is not possible so is a less desired intervention following a power failure.	the negative outcomes caused by error or power failure, inadvertent mattress deflation.  This engages automatically to ensure no break in the alternation cycle.	Ease of use
AutoCair: Pressure Recalibration	Constant autocalibration of pressure for varied weight and posture	For optimum comfort and pressure redistribution, a mattress must be correctly inflated. The pressure required in the air cells is directly proportionate to the weight and posture of the person. If the air cell pressure is too high, then the mattress becomes too hard, giving high interface pressures, and if it is too low then it will 'bottom out'.	The ProCair Plus offers auto-calibration of pressure in real time. This means that the mattress is constantly always adjusting for changes in weight and posture in the cycle.	Reduction of Pressure Injury risk
		Maximum contact pressures on the sacrum are significantly lower on devices whose inflation pressure is adjusted according to subject's body mass.		Ease of use
		Some mattresses are only able to be calibrated upon set up, others recalculate at the end of each cycle or a predetermined time period. This can lead to delay in the mattress detecting and changing pressure.		
Digital operation	Easy to use, easy to see and differentiate features	A Caregiver requires a pump to be easy to read and easy to use. A simple well marked pump will decrease stress to the caregiver and decrease risk of incorrect settings being activated.	The ProCair Digital pump is clearly marked to ensure caregivers can easily assess the pump and make informed alterations if required	Prevention of adverse events  Ease of use
Safe working load (SWL)	Support heavier loads to 220kg	Sufficient air pressure needs to be supplied by the pump to ensure the mattress remains effectively inflated for alternation and minimising risk of bottoming out.	Increased volume of airflow to create fast inflation and support heavier loads to 220kg.	Reduction of Pressure Injury risk  Bariatric Care
Sound and vibration protection	Minimising impact of the pump on user experience	A common complaint from mattress users is the noise and vibration introduced when using an alternating mattress.	Users will have improved mattress tolerance due to the low noise and vibration created by the pump.	Increased compliance and improved user experience
		The pump needs to be designed and engineered with specific modifications in place to minimise these disturbances.	Features built into the pump are specifically designed to create this positive user outcome.	
Spring loaded attachment hooks	Providing a stable connection to the bed and minimising vibration	The interaction between the bed and the mattress pump must be tight to minimise vibration being exerted onto the bed frame.	Easy to engage. Spring loaded attachment hooks suit the majority of bed ends. The firm interaction with the bed minimises vibration and noise which will reduce user comfort.	Increased product longevity  Increased compliance and improved user experience
			Having a firm interaction also minimises risk of the pump being inadvertently knocked from the bed.	Ease of use