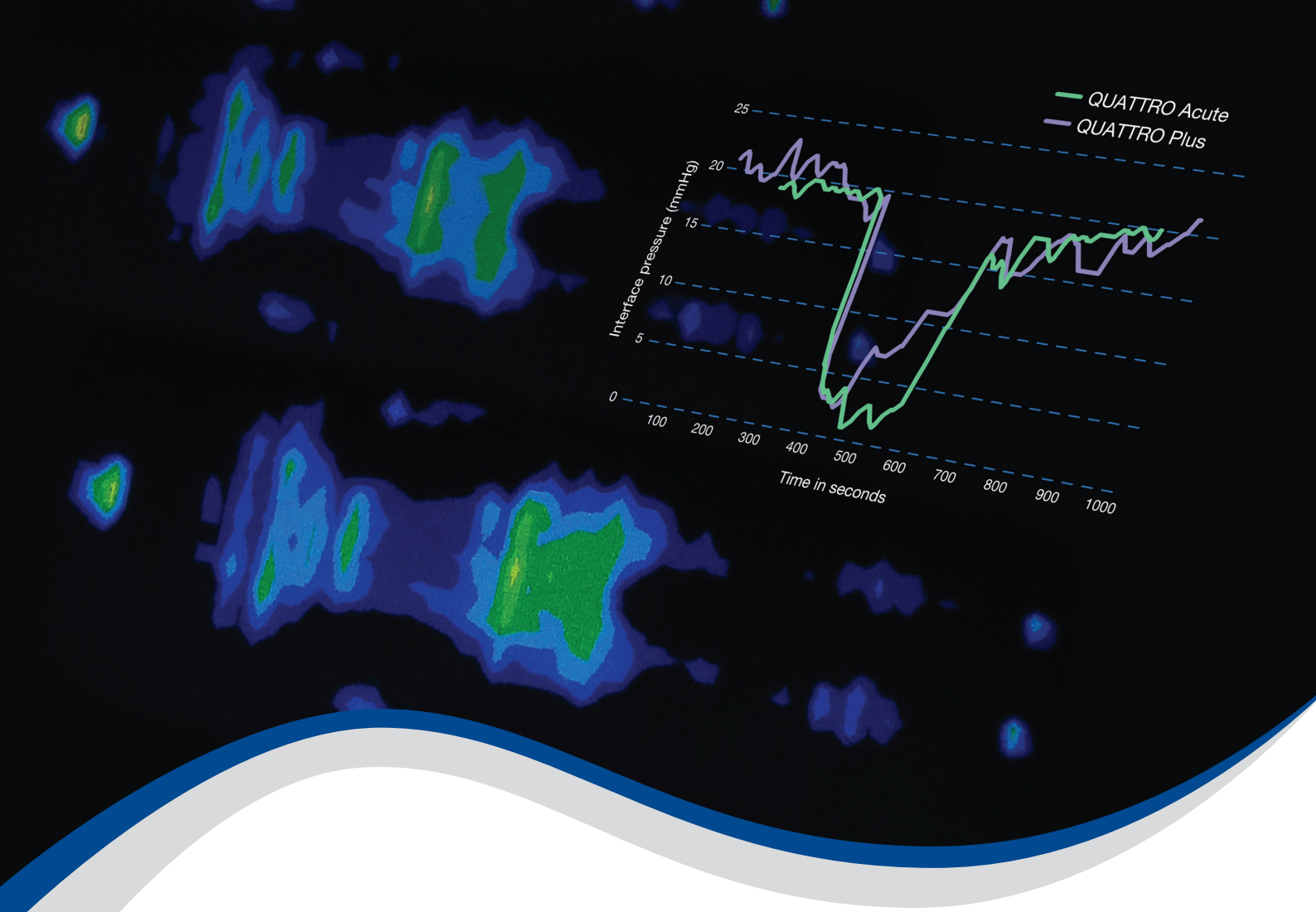


Understanding Support Surfaces
Using Interface Pressure

- Interface pressure is the pressure that occurs between the patient and their mattress or cushion.
- Interface pressures are a 'surrogate outcome' measure and offer clinicians an indication of how a support surface may offload pressure when in use.
- Assuming that lower pressures correspond to greater tissue perfusion then key performance considerations for support surfaces are;
  1. How much do support surfaces offload pressure, i.e. how low do interface pressures go?
  2. How long does the offloading period last, i.e. how much time is spent below specific arbitrary thresholds?
- Reactive support surfaces apply a constant pressure to the skin unless the patient moves or is repositioned. Active support surfaces periodically redistribute the pressure beneath the body and are recommended by the EPUAP / NPUAP for a wide range of patients who cannot be regularly repositioned.
- Effective pressure ulcer prevention and management strategies rely on periodic removal of pressure to promote tissue reperfusion. This is often achieved by combining an appropriate patient support surface with a patient-specific repositioning schedule.

Talley

Understanding Interface Pressure

What is interface pressure?

Interface pressure is the pressure that occurs at the point of contact between the load and the support surface. In simplistic terms it is the pressure exerted between the patient and their mattress or cushion.

Interface pressure and pressure ulcer prevention and management

Pressure ulcers typically occur when tissue is subjected to prolonged periods of pressure. [1] When no pressure is applied to the tissues blood and lymph vessels remain open (Figure 1a), however, the greater the interface pressure the more compressed the underlying tissues will become and the more blood and lymph vessels will be occluded (Figure 1b). The application of constant, unrelieved pressure on the body can result in cell death and tissue necrosis in as little as 1 – 2 hours. [2, 3]

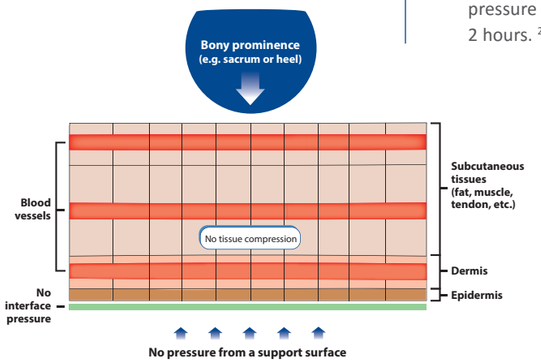


FIGURE 1a.
Schematic illustration to demonstrate the effect of no interface pressure to the skin. There is no tissue compression and blood vessels remain open.

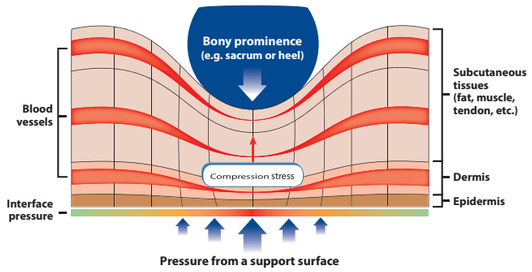


FIGURE 1b.
Schematic illustration to highlight skin and subcutaneous tissue compression and blood vessel occlusion when pressure is applied to the skin.

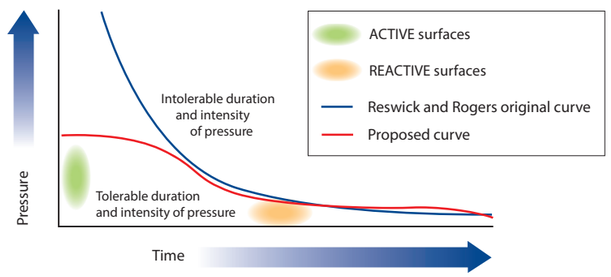


FIGURE 2.
Schematic graph to demonstrate the original theory of the interplay between pressure and time (Reswick and Rogers) and the current theory based on more recent work

The importance of time

Since pressure can occlude blood and lymph vessels, time (i.e. duration of occlusion) becomes a critical factor in pressure ulcer development. Tissue can withstand higher pressures for a short period of time and lower pressures for a longer period of time (Figure 2), [4] however, there is no absolute time threshold beyond which a patient will definitely develop or avoid pressure ulceration.

This interplay between pressure and time underpins the design characteristics of active (alternating) and reactive (static) support surfaces (Figure 2).

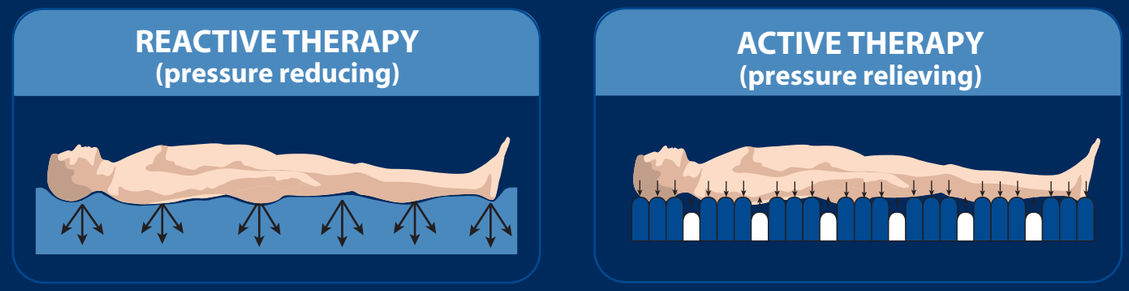


FIGURE 3.
An illustration to highlight differences between reactive therapy and active therapy support surfaces.

Pressure relief in healthy individuals

Healthy people avoid pressure ulcers by regular, spontaneous movement / repositioning. This relieves pressure on the skin and subcutaneous tissue and results in previously occluded blood and lymph vessels opening up to enable tissue reperfusion (Figure 1a). Blood delivers oxygen and nutrients to the tissues, whilst simultaneously removing metabolic waste products to prevent tissue damage.

Pressure management for patients

Managing the pressure is crucial in reducing the patients' risk of pressure ulceration. Effective pressure ulcer prevention and management strategies rely on periodic removal of pressure to promote tissue reperfusion. This is often achieved by combining an appropriate patient support surface with a patient-specific repositioning schedule.

Different types of support surface

Patient support surfaces are broadly categorised as reactive (static) or active (alternating) (Figure 3). Reactive support surfaces apply a constant pressure to the skin and subcutaneous tissue (Figure 4) unless the patient moves or is repositioned. Active support surfaces periodically redistribute the pressure beneath the body (Figure 5 - 7) and are recommended by the EPUAP / NPUAP for a wide range of patients who cannot be regularly repositioned. [1] The loading and offloading of tissues during active therapy is more representative of natural physiology and studies comparing alternating vs. constant pressure have reported a significant increase in skin blood flow for subjects in the alternating pressure group. [5]

Interface pressure and support surfaces

Interface pressures are a 'surrogate outcome' measure and offer clinicians an indication of how a support surface may offload pressure when in use. Assuming that lower pressures correspond to greater tissue perfusion (due to more blood and lymph vessels being open) then key performance considerations for support surfaces are;

1. How much do support surfaces offload pressure, i.e. how low do interface pressures go?
2. How long does offloading last, i.e. how much time is spent below specific arbitrary thresholds?

Pressure Redistribution Index (PRI)

This is the percentage of time that interface pressures are below specific pressure thresholds.

How do Talley measure interface pressure?

All interface pressure testing performed by Talley uses a standard test protocol which replicates the test procedure reported by the Tissue Viability Society in 2010. [6]

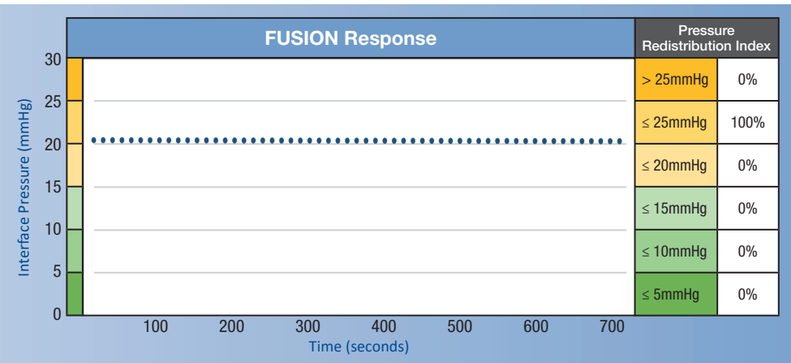
This consensus document was the result of a working group established in Europe through the US National Pressure Ulcer Advisory Panel (NPUAP) support surface standardisation initiative (S3I) and under the aegis of the EPUAP with the specific remit of developing test methods for the evaluation of support surfaces.

Interface pressure and support surface performance

FUSION RESPONSE®

- Non-powered mattress
- Reactive support surface
- Applies constant low pressure to the patient
- Foam encased in sealed air cells

FIGURE 4. Interface pressure-time curve for the FUSION Response (high specification reactive mattress).

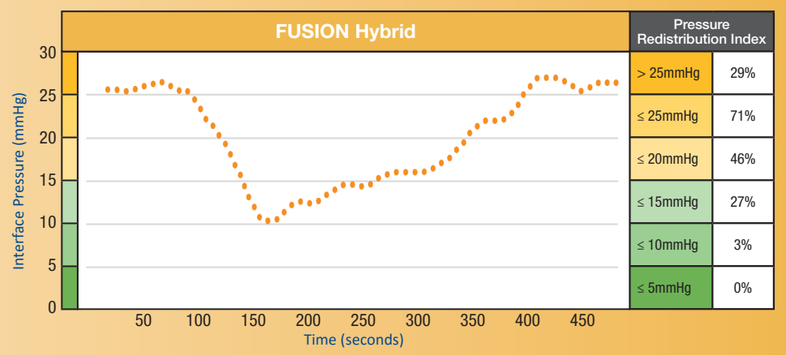


The FUSION Response offers a constant low pressure support surface with interface pressures remaining constant at just over 20mmHg.

FUSION HYBRID

- Without a pump this system operates as a reactive, constant low pressure support surface
- The addition of a FUSION pump turns this system into an active support surface
- Offers 1-in-2 cell active therapy
- 8 minute cycle
- Foam encased in air cells

FIGURE 5. Interface pressure-time curve for the FUSION Hybrid (powered hybrid mattress in 'Active Mode' with a 1-in-2 cell cycle).

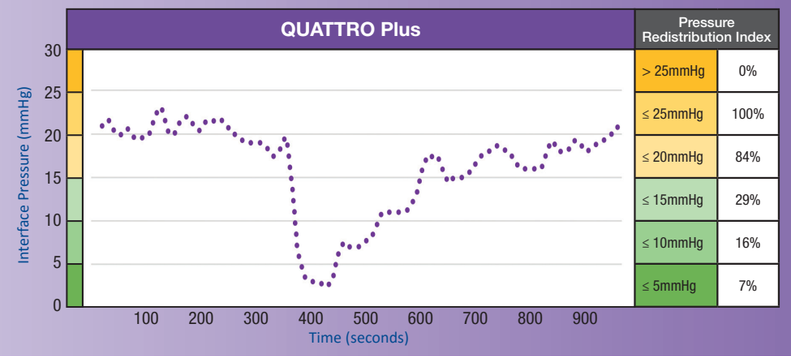


The FUSION Hybrid (when used in active mode) reaches a maximum of 27mmHg and a minimum of 10mmHg and reduces the interface pressure to 15mmHg or below for over 25% of its 8 minute cycle.

QUATTRO plus

- Active support surface
- Full dynamic mattress replacement system
- Offers 1-in-4 cell active therapy
- 16 minute cycle time
- Specialist air cells featuring TISSUEGard™ and Ortho-differential Support

FIGURE 6. Interface pressure-time curve for the QUATTRO Plus (active mattress replacement system with a 1-in-4 cell cycle)



The QUATTRO Plus reaches a maximum of 24mmHg and a minimum of 2mmHg and reduces the interface pressure to 10mmHg or below for over 15% of its 16 minute cycle.

QUATTRO acute

- Active support surface
- Full dynamic mattress replacement system
- Offers 1-in-4 cell active therapy
- Variable cycle time
- Specialist air cells featuring TISSUEGard™ and Ortho-differential Support
- Unique DEEP CELL therapy allows system to operate at low cell pressures, maximising pressure redistribution and offloading

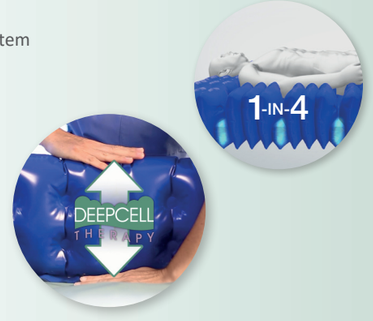
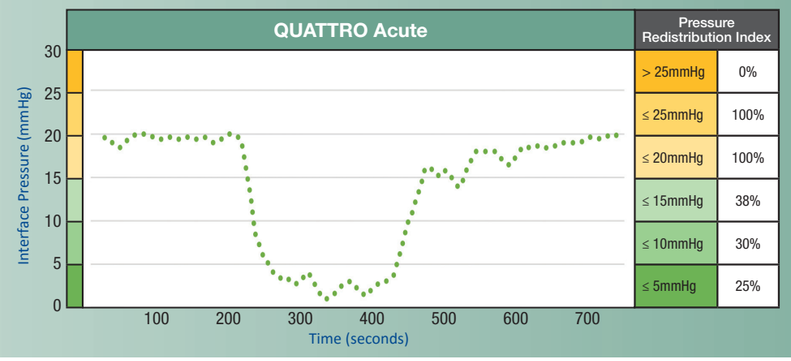


FIGURE 7. Interface pressure-time curve for the QUATTRO Acute (active mattress replacement system with a 1-in-4 cell cycle and the unique DEEP CELL therapy air cells)



The QUATTRO Acute reaches a maximum of 20mmHg and a minimum of 1mmHg and reduces the interface pressure to 5mmHg or below for 25% of its cycle.

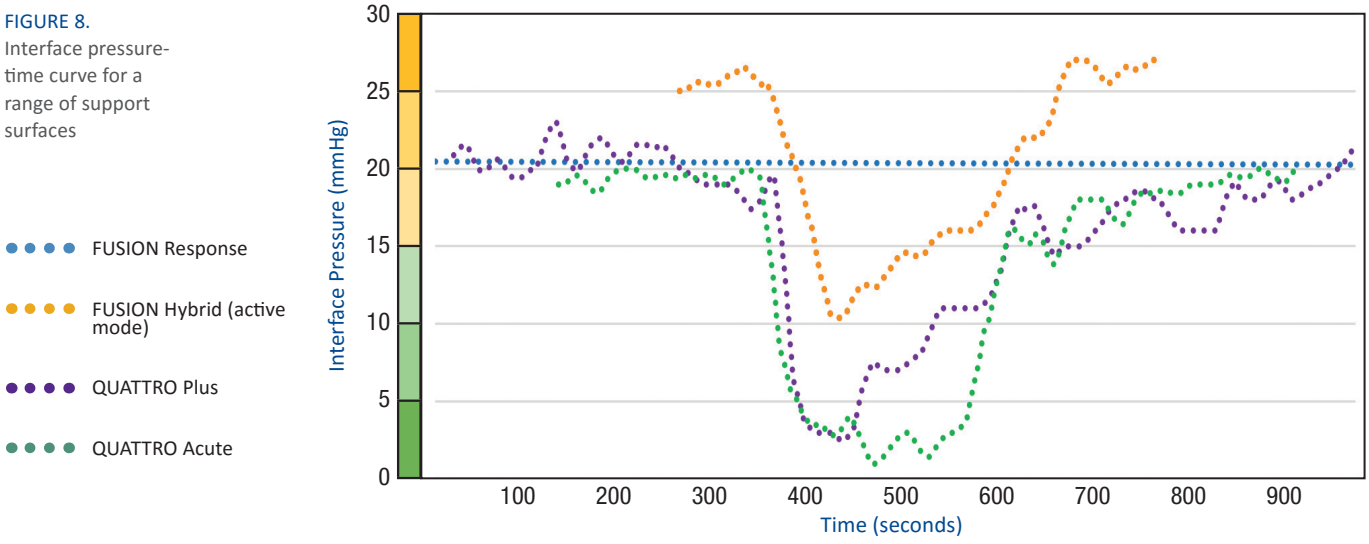
- FUSION Response is a reactive support surface and offers patients constant low pressure.
- The FUSION Hybrid (when used in active mode), QUATTRO Plus and QUATTRO Acute offer patients active therapy and reduce the interface pressure during the 'offloading phase' of the cell cycle.
- The QUATTRO Therapy systems offer very low interface pressures with the QUATTRO Acute offering the lowest interface pressures for the longest duration (see Figure 8 and Table 1).
- Differences in interface pressure between these active support surfaces are due to differences in air cell configuration and design.

Interface pressure comparison - at a glance

Pressure Redistribution Index	Support Surface			
	QUATTRO Acute	QUATTRO Plus	FUSION Hybrid (active mode)	FUSION Response
> 25mmHg	0%	0%	29%	0%
≤ 25mmHg	100%	100%	71%	100%
≤ 20mmHg	100%	84%	46%	0%
≤ 15mmHg	38%	29%	27%	0%
≤ 10mmHg	30%	16%	3%	0%
≤ 5mmHg	25%	7%	0%	0%

TABLE 1.
Pressure Redistribution Index (reported as % of cycle)

FIGURE 8.
Interface pressure-time curve for a range of support surfaces



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