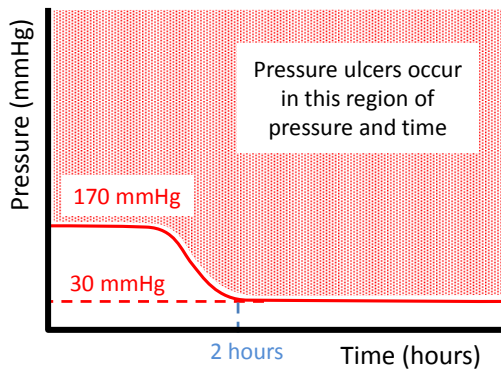


PressurePoint[®]: A colour-indicating patch for the prevention of pressure ulcers

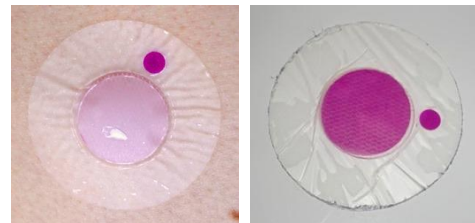


Background: Pressure ulcers are the result of exposure to localised pressure of a magnitude and duration that causes damage to underlying tissues. It is generally accepted that the greater the localised pressure and the longer the duration for which it acts, the greater the risk of pressure ulceration; this relationship is schematically represented in the diagram on the left.¹ Although the precise pressure and duration required to cause tissue damage varies from individual to individual and from time to time for a given individual, **the risk of tissue damage always increases with pressure-duration.**

Interface Pressure: The majority of pressure ulcers occur in individuals that are significantly immobilised in a bed or a chair. When resting against these soft surfaces, the human body exerts pressures at bony prominences within a narrow range, irrespective of weight or local anatomy. For example, when lying in a standard hospital bed the interface pressure under each heel is typically in the range 60-110 mmHg.² Referring to the above diagram, it can be seen that pressures within this range will result in a pressure ulcer within a matter of hours in the majority of immobile individuals. It has been argued that interface pressure is a poor indicator for pressure ulcer development in cases where a bony prominence overlies a significant muscle mass, for example the *gluteus maximus* muscle over the ischial tuberosities when seated.³ While this may be true, the sites at highest risk of pressure ulceration (sacrum and heel) are not covered by a muscle mass that could act in this manner and therefore, at these sites, interface pressure is a reliable indicator of the magnitude of the mechanical forces experienced within the underlying tissue.

Risk Factors: The risk of pressure ulcer development for an individual is the combination of a set of intrinsic and extrinsic variables. Intrinsic (individual specific) variables, such as age, incontinence and mobility, are frequently assessed by using a risk assessment tool such as the Norton or Braden scales. Extrinsic (non-individual specific) variables, such as pressure and its duration, are infrequently assessed and this is because assessment tools, such as pressure mapping systems, are expensive and require expert interpretation. Although the need for a low-cost, thin, flexible, visual indicator of pressure level has been recognised for some time,⁴ a suitable technology for the display of pressure duration has not been available to date. We have created such a technology and incorporated it into a new pressure duration indicating device, PressurePoint[®].⁵

PressurePoint[®] is a light, thin, flexible, breathable patch that permanently changes colour in a proportional manner with duration of exposure to pressures above 30 mmHg. The device is for use under bony prominences, specifically the heels, sacrum and shoulder blades. The PressurePoint[®] patch indicates the cumulative duration for which these sites have been loaded above the 30 mmHg safety threshold: the longer the loading duration, the more intense the colour of the patch, and the greater the risk of pressure ulcer development in any individual. This device is a tool to increase pressure awareness in individuals and their carers and can be used to improve and amend existing off-loading strategies.



1. *Nursing Standard*, A. Gefen, 23(46), 40-44, 2009. 2. See *Static and Dynamic Support Systems- Pressure Differences on the Body* by P. Jeneid (p287-299) in *Bed Sore Biomechanics*, Eds. R. M. Kenedi, J. M. Cowden, J. T. Scales, Macmillan Press, 1976. 3. *Nursing Standard*, A. Gefen, 23(45), 64-74, 2009. 4. See *Patient Monitoring* by P. W. Brand (p183-184) and *Interface Pressure Sensors: Existing Devices, Their Suitability and Limitations* by M. W. Ferguson-Pell, F. Bell and J. H. Evans (p189-197) in *Bed Sore Biomechanics, idem*. 5. Patent pending, W02014076468 (A1).