

### Introduction

This Masterclass guide is an overview of the Bruin Biometrics Provizio® SEM Scanner. It explores how the device works and considers supporting evidence for its usage.

Pressure injury/ulcer (PI/U) can develop over minutes to hours. The Provizio® SEM Scanner targets a specific stage in the PI/U cascade<sup>1</sup> where localized changes in the biocapacitance properties of tissues at risk are identified; these changes reflect the inflammatory response and developing localized oedema and may be reversible<sup>1</sup>.

Currently, clinicians make subjective visual skin assessments (VSAs) to diagnose PI/U. SEM Scanner technology acts as an adjunct to current standard of care such as Visual Skin Assessment and Risk Assessment Tools. Results from the device enables early initiation of preventative measures and treatment.

Compared with visual skin assessment the device has been shown to enable healthcare providers to detect specific anatomical areas that are at increased risk of PI/U 5 days (median) earlier than VSA<sup>3</sup>.

A vital role of SEM assessment technology is the early identification of increased risk of PI/U in darker skin tones<sup>4</sup>.

### What Is It?

- The device identifies **changes in the biocapacitance of tissue which may indicate early pressure damage**, before the injury is visible on the surface of the skin
- It **specifically identifies localized oedema (SEM)**, a biomarker which **notifies practitioners of incipient damage, even if the skin and tissue are not exhibiting other signs of PI/U damage**, such as erythema - this is **early, actionable information**<sup>1</sup>
- A **small, noninvasive, wireless hand-held device and a charging hub** (figure 3)
- It includes a single-use sensor, a patient bar coded wrist band scanner and a display screen
- The **sensor is single-use, and can be quickly and easily replaced between patients** (figure 5)
- The **device may be used with dedicated software** (Provizio® SEM Scanner Gateway), which can be installed on a WiFi network
- The **device can scan a bar code wrist band worn by a patient, and uploads the data** to the Gateway Dashboard, when the device is returned to the charging hub

### Figure 1a: Mode of Operation Options

- The Barcode Button (figure 1b) allows the patient's bar-coded wrist band to be scanned after which, the SEM data is uploaded when the device is returned to the charging hub, providing the Provizio® SEM Scanner Gateway is installed on a WiFi network
- The Manual Charting Button is intended for use when bar coded wrist bands are not available or Provizio® SEM Scanner Gateway is not installed
- The Manual Patient ID Button allows manual entry of the patient ID
- A training button is also available for training purposes

### Keywords

- Sub-epidermal Moisture Scanner
- Pressure injury/ulcers (PI/U)
- Prevention
- Provizio® SEM Scanner
- Localized Oedema

### How it Works: The Ten Point Guide

- 1 **Turn on the device**, either by removing the device from the charging hub, or pressing the action button. The splash screen will display
- 2 Shortly, the replace sensor screen will display. **Remove the new sensor from the packaging** and place on the sensor head, ensuring you hear a click which indicates it is installed correctly
- 3 Press the 'next screen' button, and **choose the mode of operation (figures 1a and 1b)**
- 4 The display will move to the **Body Location Selection Screen**, where you may select the sacrum, left or right heel
- 5 **Begin the scan (figure 2, figure 4)**
- 6 **Once the scan is complete, press the home button.** The display will return to the replace sensor screen if using the single-use sensor
- 7 **Remove the single-use sensor** by gently pulling it from the sensor head
- 8 **Clean and disinfect the scanner**, following the instructions in the User Manual ([Link to User Guides](#))
- 9 **Place the device in the charging hub** to initiate data upload
- 10 **Charge the device** by placing it into the charging hub (figure 3). A green light confirms the scanner is charging correctly

### Figure 1b: Mode of Operation Buttons



Barcode Button

Manual Patient ID Button

Manual Charting Button

### What Patients Are Suitable?

- At risk for PI/U
- Suitable and sensitive on darker skin tones
- Intact skin

### What Patients Are Not Suitable?

- Patients with broken skin
- Paediatric patients

### Figure 2: Device in Use



### Figure 3: Device on Charging Hub



### Figure 4: Scanning Instructions

- Ensure that any surface moisture or matter is removed from the area on the skin being assessed
- Apply the sensor flat against the patient's skin in the area to be scanned with sufficient pressure until the scan is triggered (figure 2)
- When a successful reading is taken, the scanner will flash blue and emit a short audio tone
- Lift the sensor off the skin. The session circles above the body location map will turn white when all measurements are complete
- Repeat above steps to obtain a complete set of readings for sacrum, left and right heel
- $\Delta \geq 0.6$  may suggest increased risk of PI/U. The value should be considered in conjunction with clinical judgement
- Press the Body Location Selection Screen Button (figure 6) to return to the screen

### Figure 5: Device Sensor



### Figure 6: Body Location Selection Screen Button



### What Is the Evidence?

PI/U prevention is based on a challenged standard of care (SoC) pathway.

An over-reliance on skin and tissue assessments as the trigger to anatomy specific interventions, only once the skin redness has developed, needs to be challenged.

SEM technology as an assessment tool can assess signs of physiological tissue damage in real time. This technology has been one of the most widely evidenced technologies in PI/U prevention<sup>1</sup>.

### Efficacy

- In a multicentre PI/U reduction programme (PURP)<sup>2</sup> conducted to determine the impact upon PI/U incidence reduction following implementation of the SEM assessment technology, **72% of 2,232 patients in the acute care cohort received additional interventions as a result of the objective data delivered by the scanning device**; clinical decision making was impacted in 69% of cases. In the hospice-care cohort a **47% reduction in PI/U incidence rates** was noted. In the community care cohort, **reductions in community acquired PI/U across two community care settings were 27% (patients at home) and 100% (community hospital)**. The authors write: **“In acute care sites, implementing the SEM Scanner into routine clinical practice has resulted in an overall 90.5% reduction compared to prior incidence rates.”**

- Considering the efficacy of the SEM assessment technology, Peko and Gefen (2019) reported **successful detection of fluid level changes in a tissue area as small as 1mm**; these results were reproducible<sup>5,6</sup>

- An analysis of data from 15,574 assessment involving 1995 patients found that use of the SEM device **resulted in more nurse action** to prevent PI/U than skin and tissue assessments (STAs) alone<sup>7</sup>. The multilevel model revealed strong evidence that **SEM Δ prompts were significantly associated with nurse action** (p<0.001; adjusted odds ratio: 1.99)

- After conducting a study on the effects of introducing SEM scanning technology into SOC, Nightingale and Musa (2021) noted the **benefits of access to objective and accurate data via the SEM scanning device** in decision making by clinicians, in relation to the importance of early intervention in prevention of PI/Us<sup>8</sup>

### Costs

- In a comprehensive cost-benefit analysis Gefen et al (2020) used a probabilistic cost-benefit model in the UK NHS setting<sup>9</sup>

- Two alternate acute hospital scenarios of lower (1.6%) and higher (6.3%) PI/U incidence rates were assessed, and it was concluded that **implementation of SEM Scanner technology would likely lead to significant financial benefits** and downstream cost savings in the order of £15.23 and £80.68 per admission, respectively. Estimated total savings from SEM Scanner utilization for an average UK Trust with 40,802 admissions yearly would range between £0.6 and £3.3 million annually<sup>9</sup>

- Using a Markov modelling technique Padula et al.,<sup>10</sup> concluded that **use of SEM technology in the US setting was associated with cost savings of US \$4054 per acute care admission**, avoiding the costs associated with PI/U in healthcare facilities, and possibly **seeing a return on investment in under a year**. The authors note: **“SEM Scanners as part of a prevention protocol are a dominant strategy compared to standard care since it lowers costs and increases Quality-Adjusted Life Years (QALYs).”**

- Portability, wireless connectivity, and ease of use<sup>5,9</sup> means that the device can be utilized by individual staff members, **benefiting time management and overall cost-efficiency** in a healthcare facility

### Ease of Use

- The device is **small, wireless, portable** and easy to use

- Peko and Gefen (2020) discuss the improvements in the newest version of the device, noting the ability to **perform scans on small areas of the body** such as the heels, due to smaller sensor size; beneficial overall reduction in size of the device and the user-friendly interface, and improved wireless connectivity<sup>6</sup>

*“The estimated total financial savings from implementing the SEM Scanner... would range between £0.6m to £3.3m per annum.” Gefen, 2020*

*“The SEM Scanner technology has proven cost-effectiveness, demonstrated in comprehensive published work.” Gefen, 2020*

*“...wide implementation of the SEM Scanner technology... is well justified from a financial perspective and will lead to cost savings.” Gefen, 2020*

*“SEM biocapacitance measures can complement visual STAs, facilitate earlier identification of the risk of specific anatomies developing PIs, and inform earlier anatomy specific intervention decisions than visual STAs alone.” Okonkwo, 2020*

*“Implementing scanning technology into routine clinical practice achieves consistent reductions in pressure injury/ulcer incidence.” Nightingale & Musa, 2021*

### Key Points

- **Portable and wireless**
- **Very user friendly; this device can be operated with minimal training**
- **Ability to use with Provizio® SEM Scanner Gateway software allows for very efficient storing and sharing of the data collected by the scanner**
- **Sensitive in darker skin tones<sup>4</sup>**

### References

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### Useful Links

Use your device to scan this QR code to visit the Provizio® SEM Scanner website



Provizio® SEM Scanner User Guides

Click here to contact Arjo, the exclusive distributor of the Provizio® SEM Scanner

### How to Cite This Article

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# Provizio® SEM Scanner

Validated efficacy<sup>1</sup> for early assessment of Pressure Injury (PI) risk and damage in peri-operative patients.

Provizio SEM Scanner delivers objective and anatomically-specific assessment of PI risk, empowering you to deploy a targeted prevention strategy that helps minimise PI incidence and reduce overall cost and time to care. This is especially important for peri-operative patients who, due to periods of immobility, can be particularly vulnerable to the effects of pressure and shear.

Findings from the latest publication<sup>1</sup> assessing the use of the SEM Scanner on a sample of 231 surgical patients:

- Using the SEM Scanner, **51%** of patients presented high SEM readings indicating early development of PI ( $n=116$ )
- Using the Braden Scale, only **16%** of patients were identified as At Risk ( $n=37$ )

"Because SEM measurement is a diagnostic tool that can detect early risk and damage, those undergoing surgery should have the areas of their bodies that have been subject to pressure/shear scanned immediately postoperatively and every day until discharge, or until SEM deltas normalise."<sup>1</sup>

The use of sub-epidermal moisture (SEM) assessments **is recognised in the EPUAP - NPIAP - PPIIA International Clinical Practice Guidelines** since 2019.<sup>2</sup>

\* Median

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For more information visit [www.arjo.com/Provizio](http://www.arjo.com/Provizio)

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