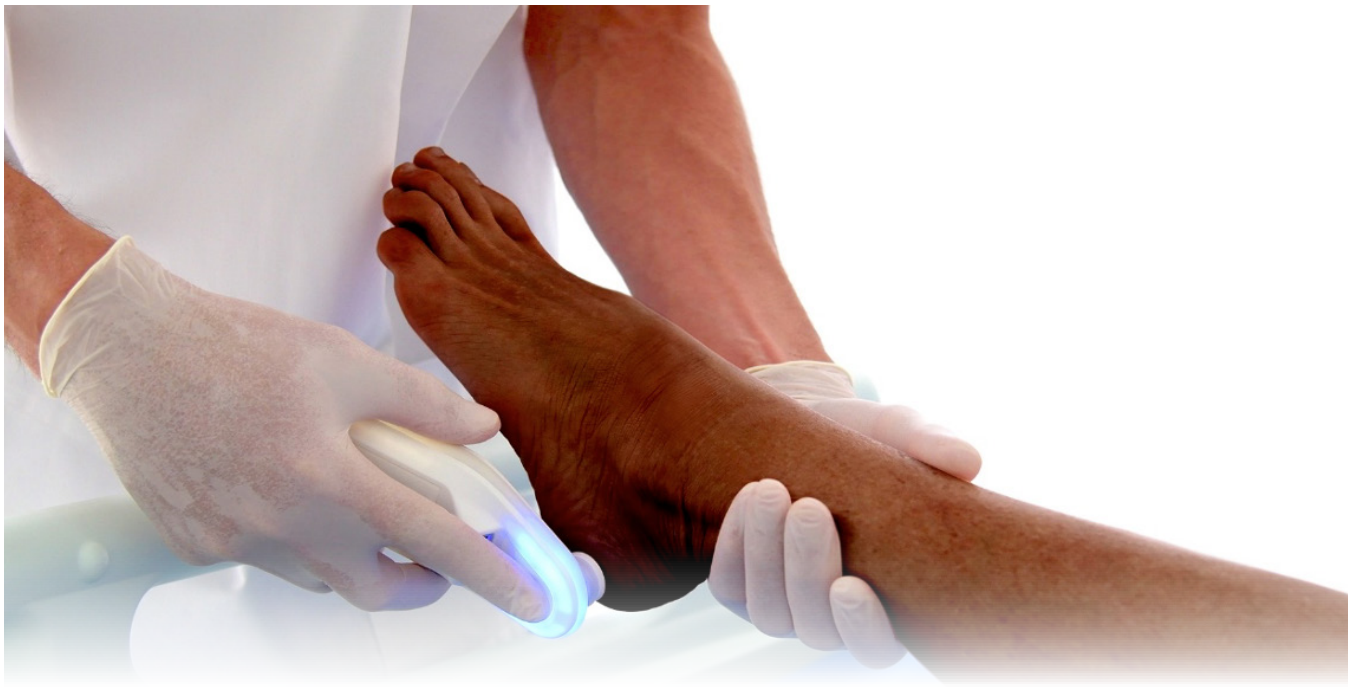

Decreasing Pressure Injuries in Long-term Care: A Quality Improvement Project

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How to cite: Gubbels C, Pearce Margaret M, Kuhnke J. Decreasing pressure injuries in long-term care: a quality improvement project. Wound Care Canada. 2025;23(1): 47-54. DOI: 10.56885/758383xkosms

Health care-acquired pressure injuries (HAPIs) cause significant pain and suffering to those who experience and live with these often-preventable wounds.[1,2] Ageing skin is at an increased risk of developing pressure injuries due to thinning, dryness and the person's co-morbidities.[1,3] In addition, if the elderly sustain a pressure injury, their disease burden increases, similary affecting their risk of developing another pressure injury.[4-6] Further, treating a HAPI is significant, costing up to $90,000 CAD for one wound.[1] Thus, preventing HAPIs across health-care communities of care needs to be a priority, including long-term care (LTC).

Current practice to prevent HAPIs in British Columbia (BC) includes identifying risk using

a risk assessment scale, such as the Braden Scale.[7] However, the Braden Scale is subjective and does not account for multi-morbidities, as seen in the current population of those living in LTC.[8,9] Further, in LTC, nurses no longer regularly assess each person's skin. Observing the person's skin is done by the unregulated health-care aides who report any skin breakdown, skin changes or concerns to the nurses.[10] When pressure injuries are visible on the skin, the damage is already done,[11] and often, it is too late for prevention interventions; the focus then becomes treatment and mitigation of worsening pressure damage.

Despite increased access to national and international pressure injury prevention guidelines, pressure injury rates have not changed over the past 20 years.[12-14] However, people entering LTC have changed, with increased complex health-care needs; leading to an increased frailty score.[15] The number of people requiring LTC is also increasing.[16] If the current approach to preventing pressure injuries continues, the number of people suffering from pressure injuries will only continue to rise. Therefore, an alternate approach was sought to support the LTC staff in identifying bony prominences at risk.

As national and international guidelines recommend, a sub-epidermal moisture scanner (SEMS) is considered part of the tissue and skin assessment.[1,3,17] The SEMS is a handheld device used to detect cellular level damage up to five days before damage to the skin is visible.

The SEMS measures the difference in the biocapitance or electrical charge from the fluid released from damaged cells that enter the subepidermis.[11,19] Cellular damage occurs when there is unrelieved pressure. Thus, fluid from the damaged cells escapes into the extravascular space to the subepidermis. Increasing fluid in the subepidermis changes the electrical charge in that area.[19] The measured difference in the change of the electrical charge indicates pressure injury risk.[19] The SEMS device manufacturer recommends taking six measurements at the sacrum and four on each heel.[18] Each location's measurements are averaged and expressed as a delta.[18] A delta reading of 0.6 or more indicates that location is at an increased risk of developing a pressure injury.[11,18]

Using a SEMS has been shown to reduce HAPIs across communities of care, including LTC.[20,21] Pressure injury risk assessments have remained unchanged in LTC homes across BC, with little or no change to the development of HAPIs. Because pressure injuries remain a concern, a QI project was implemented to decrease HAPIs in LTC using the SEMS in conjunction with head-to-toe routine clinical skin assessments (RCSAs).

Method

Alongside the staff, the QI project occurred on one floor at an urban LTC home in southern BC. The floor consisted of two units, with 14 people in each unit. Implementing SEMS and RCSAs was a new workflow for this LTC home staff. Thus, the SEMS and RCSA were done on each person's bath day to enhance consistency and staff compliance.[22] Two baths occurred on the day shift and two on the evening shift, for four baths with SEMS and RCSAs daily. The QI project occurred over eight weeks.

Before implementing the SEMS with RCSA, the plan was reviewed with senior leadership and the home's manager to obtain approval and buy-in. Once the project was approved and before the project started skin assessments were completed by Nurses Specialized in Wounds, Ostomy, and Continence (NSWOCs) to ensure standardized assessments of any pre-existing pressure

injuries.[23] Of note, there were 15 pressure injuries found, with nine attributed to the LTC home and the other six developed before admission.

Once the skin assessments were done, all staff involved in caring for those living on the project floor, including nurses, health-care aides, occupational therapists and the home's dietician, received education about the purpose and background of the QI project provided by the project manager.

The SEMS device utilized was the Provizio™ by Bruin Biometrics (See Figure 1.) It is licensed to objectively detect pressure injury risk at the sacrum and heels.[18] (See Figure 2).

Figure 1: Hand-held SEM device (Used with permission from Bruin BioMetrics)

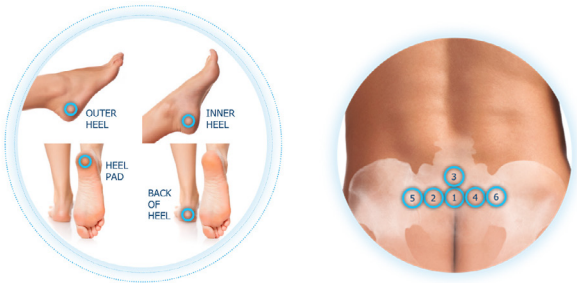


Figure 2: Where to scan (Used with permission from Bruin BioMetrics)

The education sessions also provided information on the SEMS and each person's role in the QI project, and nurses received a hands-on demonstration of the SEMS. The 30 minute education sessions occurred twice daily for one week. The implementation of the SEMS with RCSAs began following completion of the education sessions. (See Figure 3).

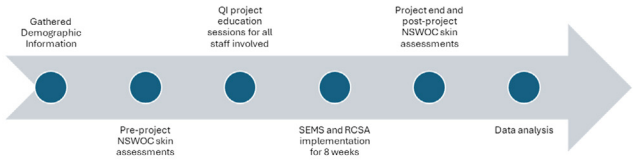


Figure 3: Project Timeline

The nurses were to conduct the SEMS and RCSAs on the person-in-care's bath day regardless of their Braden Scale risk score. The health-care aides were responsible for informing the nurses when the person finished their bath, shower or bed-bath and were ready for their assessments. The nurses would then conduct the SEMS and RCSAs and document their findings on a chart provided by the QI project manager. (See Table 1.) Data collected included: the SEMS measurements for the heels and sacrum, whether an RCSA was done, note of any new skin damage, and the implemented pressure injury prevention interventions if the SEMS assessment indicated risk. The project concluded with skin assessments repeated by NSWOCs. (See Figure 4).

Table 1: Example of SEMS and RCSA Chart

Instructions for use: To be completed weekly on the person's bath day by the responsible nurse. One per person on the unit.

Week	Date	De-identified Number	Right Heel SEMS Measurement	Left Heel SEMS Measurement	Sacral SEMS Measurement	Skin assessment done? (Y/N)	Skin damage present? Location	PIP Interventions Implemented?
1.								
2.								
3.								

Abbreviations: SEMS=sub-epidermal moisture scanner; RCSA=routine clinical skin assessment; PIP=pressure injury prevention

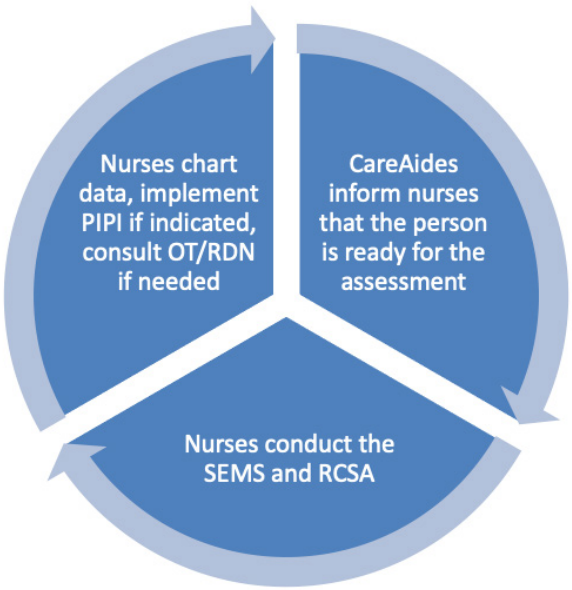


Figure 4: Project Process

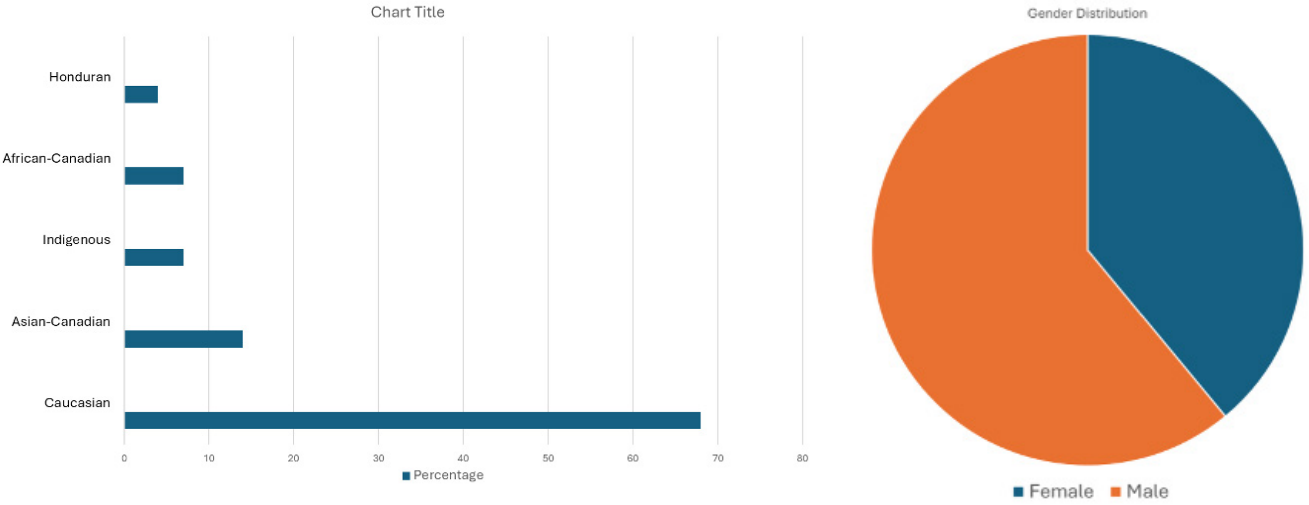
Results

The primary outcome of this LTC QI project was to determine if implementing SEMS with RCSAs would decrease the frequency of HAPIs during the eight weeks. Thus, after eight weeks of implementing the SEMS with the RCSA, the project manager collected and analyzed the data, hoping to achieve a p-value of ≤0.5 when comparing the pre- and post-project skin assessments.[24] The pre-project HAPI rate was 32% (n=9), and after eight weeks, the post-project HAPI rate was 4% (n=1) — a clinical and statistically significant result.

The total number of SEMS with RCSAs over the eight weeks was 94, averaging four scans per person. The number of SEMS pressure injuries (when the person's SEMS assessments deem them at risk of developing a pressure injury, with no visible pressure injury present) was 23 times—the number of pressure injury prevention interventions implemented equaled 19. The most implemented pressure injury prevention intervention was minimizing layers.

Descriptive statistics, including age, gender, and ethnicity, were collected before the implementation of the SEMS with RCSA to understand for whom this intervention was being implemented. Most people living in the unit were male, 61%, compared to 39% females. The average age was 60.4, with the youngest being 33 and the oldest 89. Regarding ethnicity, the majority were Caucasian, 68%, followed by Asian Canadians, 14%; 7% Indigenous; 7% African Canadians; and 4% Honduran (See Table 2).

Table 2: Descriptive Statistics



Implications for Nursing Practice

Current pressure injury prevention practice in BC's LTC homes relies on subjective risk assessments, such as the Braden Scale, and reported observations by unregulated health-care aides.[7] When tissue damage is visible, the damage has already occurred. Therefore, with the development of a new pressure injury, nurses now not only need to treat the pressure injury, but the person who has sustained this injury is at risk of pain, suffering, potential alteration in their activities of daily living, as well as further increasing their risk of developing another pressure injury.[1]

The population of Canadians requiring admission to LTC homes is increasing, putting more and more people at risk of developing a pressure injury,[4,25-27] Thus, implementing an objective measure of risk, such as the SEMS with RCSAs, can potentially transform pressure injury risk assessments, leading to decreased pressure injury incidences.[28] Decreasing the number of HAPIs in LTC can potentially decrease nursing workloads and health-care spending.[29] However, the most important nursing implication that SEMS with RCSAs may provide is improving the quality of life for people living in LTC by preventing HAPIs. (See Figure 5).

Figure 5: Trajectory of Pressure Injury Risk in LTC

Discussion

This QI project in a LTC home demonstrated a statistically and clinically significant decrease in HAPIs for those on the project floor. The current pressure injury prevention practice has not improved rates of HAPIs in LTC in Canada. The ratio of nurse to persons-in-care for this home's two units was 1:14 making it challenging for the nurse to provide daily skin assessments for the 14 persons-in-care. In addition to this challenging ratio, the complexity of those living in LTC has increased,[15] further increasing one's risk of developing a pressure injury.

Although the SEMS with RCSA QI project did demonstrate a decrease in the frequency of HAPIs at the project's LTC home, compliance was an issue, with both the SEMS and RCSAs and implementing the equivalent pressure injury prevention interventions when a SEMS pressure injury was documented. The compliance rate for the weekly SEMS and RCSA was less than anticipated. The decreased compliance was partly related to the person-in-care refusing assessments and the fact that nurses often worked short-staffed during the project timeline. The nurses deemed the assessments not essential when short-staffed, thus missing the significance of pressure injury risk assessments.

In addition, the number of documented SEMS pressure injuries was greater than the number of documented pressure injury prevention interventions. The expectation was that the number of pressure injury interventions would equal the number of SEMS pressure injuries. It was unclear if interventions were implemented and not documented or if no interventions were put in place.

Despite the positive outcomes, the findings cannot be generalized to the LTC population as the average age of people who participated in

the quality improvement project was 20 years younger than the average person living in LTC. The average age of people living in LTC in BC is 83 years.[15] Further, the number of people living in LTC homes within the health authority where this quality improvement project occurred is just over 6,000.[30] Given the relatively small number of people who participated (n=28) and the significant age difference in this quality improvement project, the population of the QI project does not reflect those living in LTC in BC.

Recommendations For Future Practice

Recommendations for future practice include broadening the scope of the QI project to homes that are more reflective of the LTC home population to fully understand if SEMS with RCSA positively impacts HAPI rates in LTC. There are 51 LTC homes within the same health authority as the project home.[30] This project home was chosen because of concerns about the number of HAPIs and the manager's enthusiasm for improving outcomes. To better understand how the SEMS and RCSA can impact the frequency or incidence of HAPIs in the LTC population, it would be prudent to replicate this QI project at other homes that are more reflective of the LTC home population. Thus, to generalize the findings of this QI project to the entire region cannot be done; and therefore, expanding the scope to a larger, more reflective population is recommended.

Another recommendation for future practice includes using the SEMS with RCSAs with the current risk assessment, the Braden Scale, and standardized, home-specific pressure injury prevention bundles. Pressure injury prevention bundles are standardized pressure injury interventions that have been reported to decrease the incidence of pressure injuries.[31-32] The pressure injury prevention bundles would correlate with the Braden subscales of sensory, moisture, mobility, nutrition, activity, friction and shear, providing nurses with home-specific options. Using the SEMS with RCSA and the Braden Scale risk score allows for a person-centred approach to pressure injury prevention. When the SEMS indicates an at-risk delta measurement, nurses are provided with a timely objective risk assessment, which triggers them to implement pressure injury prevention interventions at that moment or to re-evaluate the interventions currently in place. In addition, reviewing the Braden Scale when the SEMS indicates risk can also ensure all interventions prescribed in the bundle for the Braden subscale scores are implemented, providing person-centred interventions (See Figure 6).

Recommendations for Future Practice:

- Increase scope reflective of LTC
- SEMS+RCSE+Braden+PIPI Bundles

Figure 6: Recommendations for Future Practices

Conclusion

Pressure injuries have been a concern for years with minimal outcome improvement, even though in LTC worsening pressure injuries is a Canadian Institute for Health Information quality of care indicator.[33] Current practice for pressure injury prevention has not altered the HAPI rates. The sense of urgency to prevent HAPIs has been lacking, resulting in the unaltered rates of HAPIs. This QI project showed a lack of understanding of the significance of HAPIs, with decreased compliance rates when short-staffed.
If the significance of HAPIs were fully understood, preventing HAPIs would have been a priority,

especially when staffing shortages are a concern.

The regular use of SEMS with RCSAs provides in-the-moment risk assessments for overburdened nurses, highlighting the need to act immediately. This has the potential to transform pressure injury risk assessments in LTC. Nurses now have a tool to objectively determine risk at the bedside, prompting them to intervene immediately to prevent pressure injuries and provide targeted person-centred pressure injury prevention interventions. While this QI project has shown limited positive outcomes, it has shown that SEMS is a potential option as an adjunct to the current practice that has not been available to the British Columbia health-care system until now. The potential decrease in HAPIs can not only save nursing time and health-care dollars but also equitably improve the quality of life and outcomes for those living in LTC.

Disclaimer

The Provizio™ SEMS devices and sensor heads used in this study were provided free of charge by Bruin Biometrics LLC, USA.

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