The Alberta Atlas Of Healthcare Variation (A-Atlas): A New Clinical Tool

By Michael Sidra MBA PhD, Dr. Adrian Wagg BS FRCP, Erin Thompson BComm, Ryan Sommer MScOT, Alice Chiu MPH MSc, Karen Williams BScN, Charlene Brosinsky RN BScN and Marlene Varga MSc BScN

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Introduction

A pressure injury is defined as localized damage to the skin and/or underlying tissue, because of pressure or pressure in combination with shear stress. Pressure injuries usually occur over areas of bone that are close to the skin's surface but may also be related to pressure from a medical device or object.[1] Pressure injuries can occur in any setting - at home, in hospital or in Long Term Care (LTC) facilities. Pressure injuries result in significant physical and psychological challenges for individuals adversely affecting all domains of a person's life, with pain and suffering as one of the most common outcomes.[2,3] In addition to the human burden, pressure injuries are an economic burden on health-care resources as treating pressure injuries can be expensive and cost the health-care system billions of dollars annually, in addition to taking up clinician time and resources, increasing length of stay in the hospital and increasing admissions to LTC facilities.[4-6]

Pressure injuries are a frequently occurring health problem worldwide in all health-care settings. Globally, in LTC, prevalence varies from 3.4%-32.4%.[7] In 2004, the pressure injury prevalence in Canada was estimated at 26% in all health-care settings (29.9% in non-acute care settings, 22.1% in mixed health settings, and 15.1% in community care).[8] In Ontario, the overall prevalence of pressure injuries across the spectrum of health-care settings was 13% and was highest in complex continuing care.[9] An analysis of Ontario databases revealed a low proportion of people with pressure injuries in Ontario LTC facilities (8.4%) and found that skin tears and pressure injuries were the most common causes of skin breakdown affecting 14.7% and 15.5% of participants.[10] In 2022, 22 LTC units/facilities in Alberta completed a standardized Pressure Injury Point Prevalence and Process audit on a sampling of residents (minimum sample number of five). Prevalence results ranged from 0 to 50% and facility acquired pressure injury results ranged from 0 to 42%. Approximately 70% of pressure injuries are considered preventable, but despite best efforts on prevention, and pressure injury prevention being recognized as a measure of quality by Accreditation Canada, pressure injury rates have not decreased when compared to other countries.[11]

Older people in continuing care homes are vulnerable to the development of pressure injuries as the aging process is associated with skin integrity changes that increase risk.[1,12] Immobility, incontinence, malnutrition, multiple co-morbidities and polypharmacy further increase the risk, especially when a combination of factors exist.[1] While research and interest in promoting and implementing best practice has grown to help prevent pressure injuries in all populations, there is a gap in getting the evidence into practice and compliance rates to pressure injury prevention strategies vary.[1,11] Implementation of pressure injury prevention clinical practice guidelines in continuing care homes is challenging.[13] Prevention requires active involvement of leadership and multidisciplinary teams, current knowledge of best practices, on-going education, standardization of pressure injury specific interventions, accurate documentation, resident and family partnership and the use of validated metrics to monitor outcomes and drive culture and practice.[1,5,11,14,15]

Atlas Of Variation

Clinicians strive to provide consistent and evidence-based health care for their patients; however, safety and quality of health care can vary across geographic and clinical areas. Understanding this variation is critical to improving the safety, quality, value and appropriateness of health care.[16] While some variation may be warranted, the persistent existence of unwarranted variation in health care, defined as variation unexplainable by variation in patient illness or preference, signals an opportunity for improvement in care.[17]

The Alberta Atlas of Healthcare Variation (A-Atlas), developed and maintained by Alberta Health Services (AHS), is a tool that highlights variation through topic-specific themes and easy-to-understand maps and graphs for clinical and administrative leaders within the organization. The goal of the A-Atlas is to raise awareness of

Adapted from Canadian Institute for Health Information. RAI-MDS 2.0: Beginners – Completing the Assessment workshop. Ottawa. ON: CIHI: 2020.

Figure 1: RAI-MDS 2.0 Assessment

clinical variation and prompt further investigation about why variation is present and whether the variation is warranted or unwarranted. The A-Atlas is not intended to judge performance or suggest ideal levels, instead it offers a data driven analysis to enable continuous quality improvement and stimulate action to improve patient outcomes. The first edition of the Atlas contains five topics, including Pressure Injuries in LTC.

Quality Indicators And Risk Assessment

The Resident Assessment Instrument- Minimum Data Set 2.0 (RAI-MDS 2.0) is a validated clinical assessment developed by interRAI, an international research network. A modified version has been developed with permission by the Canadian Institute for Health Informatics (CIHI) for Canadian use. In Alberta, use is required under the Continuing Care Health Service Standards (CCHSS). CCHSS dictates completion by a regulated health-care provider (HCP) trained in the assessment, upon admission to a continuing care and quarterly thereafter, or in the case of a meaningful change in clinical status. The assessment encompasses over 400 data elements evaluating the needs, strengths and preferences of individuals in continuing care homes. Covering various domains, it assesses physical and mental health, social, support and psychological aspects, including skin integrity, number and stage of pressure ulcers and typical risk factors for pressure injury development.[18,19] The RAI-MDS 2.0 assessment tool has received extensive reliability and validity testing.[19,20] Data quality with respect to reliability, validity, completeness and freedom from logical coding errors was consistently high.[21]

Within the assessment, Section M2a. Pressure Ulcer captures the highest stage of pressure ulcer in the last seven days using the following scale:

Stage 1: A persistent area of skin redness (without a break in the skin) that does not disappear when pressure is relieved
Stage 2: A partial thickness loss of skin layers that presents clinically as an abrasion, blister, or shallow crater

Stage 3: A full thickness of skin is lost, exposing the subcutaneous tissues- presents as a deep crater with or without undermining adjacent tissue
Stage 4: A full thickness of skin and subcutneous tissue is lost, exposing muscle or bone.

The RAI- MDS 2.0 incorporates embedded decision-support algorithms providing clinical outcome scales, quality indicators (QIs) and Resource Utilization Groups (RUGs) which correlate to case mix methods (See Figure 1). An outcome scale derived from the MDS data is the interRAI Pressure Ulcer Risk Score (PURS) aimed at supporting interventions for those at risk of pressure injuries. QIs derived from RAI-MDS 2.0 aid in monitoring and improving care quality. They fall into prevalence and incidence categories, with adjusted QIs allowing fair comparisons among organizations or regions. Three relevant QIs related to pressure injuries are highlighted here. These QIs identify newly occurring pressure injuries and track severity changes over time.

1. *Percentage of residents who had a newly occurring pressure injury at stages 2 to 4 (PRU09):* Describes the number of residents with a pressure injury at stages 2 to 4 in their target assessment, but not in their prior assessment, out of all residents with valid assessments and an assessment in the previous quarter.
2. *Percentage of residents who had a pressure injury at stages 2 to 4 (PRU05):* Describes the number of residents with a pressure injury at stages 2 to 4 in their target assessment, out of all residents with a valid assessment.
3. *Percentage of residents who had a worsened pressure injury at stages 2 to 4 (PRU06):* Describes the number of residents with a pressure injury at stages 2 to 4 in their target assessment and a less-severe pressure injury (i.e., at a previous stage) in their prior assessment, out of all residents with valid assessments and an assessment in the previous quarter.

Pressure injuries emerge as the mostpractice-sensitive QI, followed by worsening pain, physical restraint use, antipsychotic medication use without psychosis diagnosis and indwelling catheters.[22] Examining and addressing these QIs promotes ongoing quality improvement in the realm of continuing care.

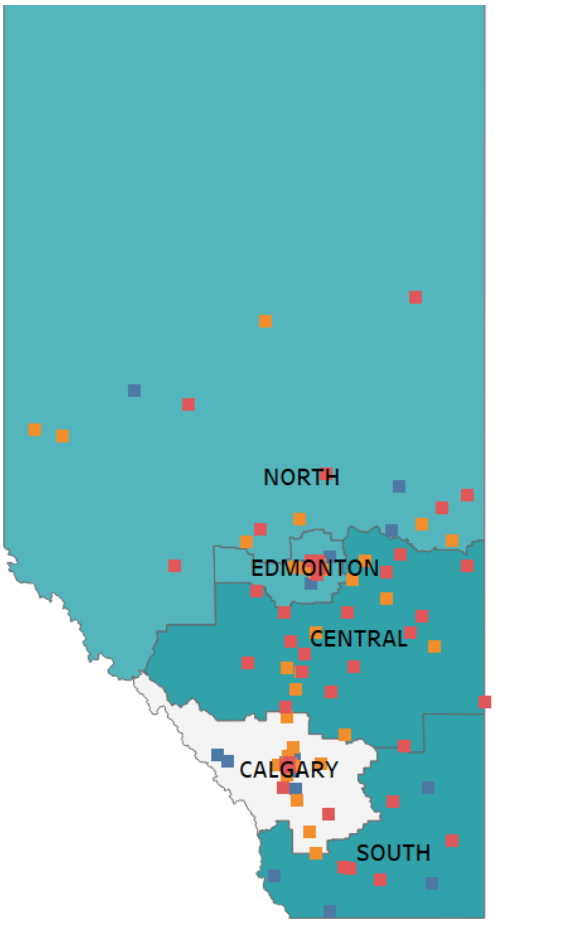

Figure 2: Facility and Zone level weighted median of adjusted Stage 2 to 4 pressure injury rates in 2021/22 Q4.

Methods

The Atlas examined variation in pressure injury rates across 182 LTC facilities during 2017/18 to 2021/22 using the RAI-MDS 2.0. The number of facilities in operation fluctuates from quarter to quarter. This study used a time series design

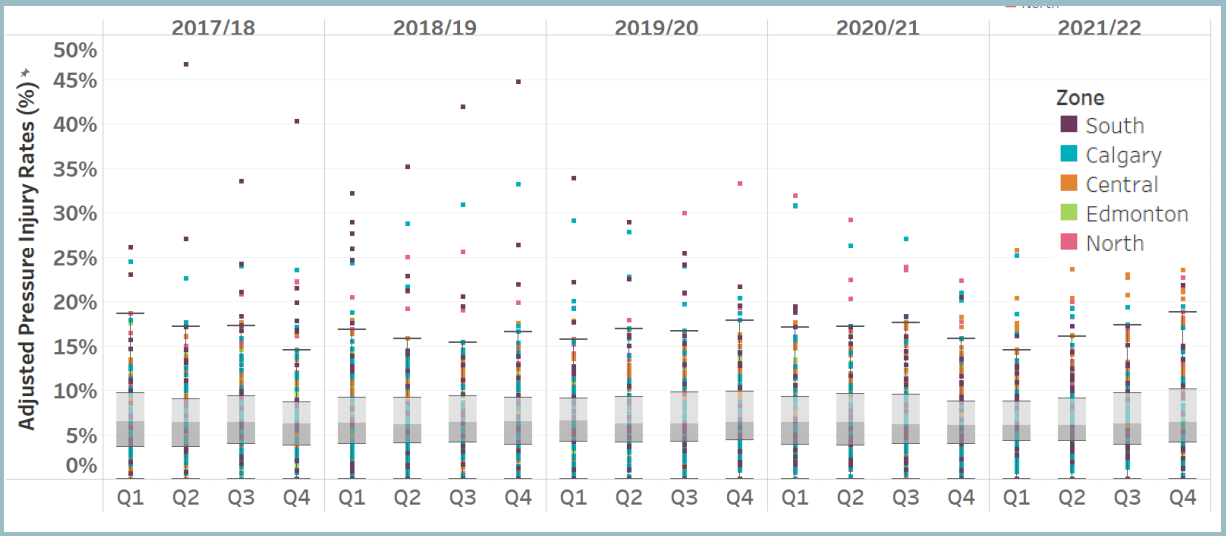

Figure 3: Adjusted Stage 2 to 4 Pressure injury rates by bed capacity in Long Term Care Facilities in 2021/22 Q4.

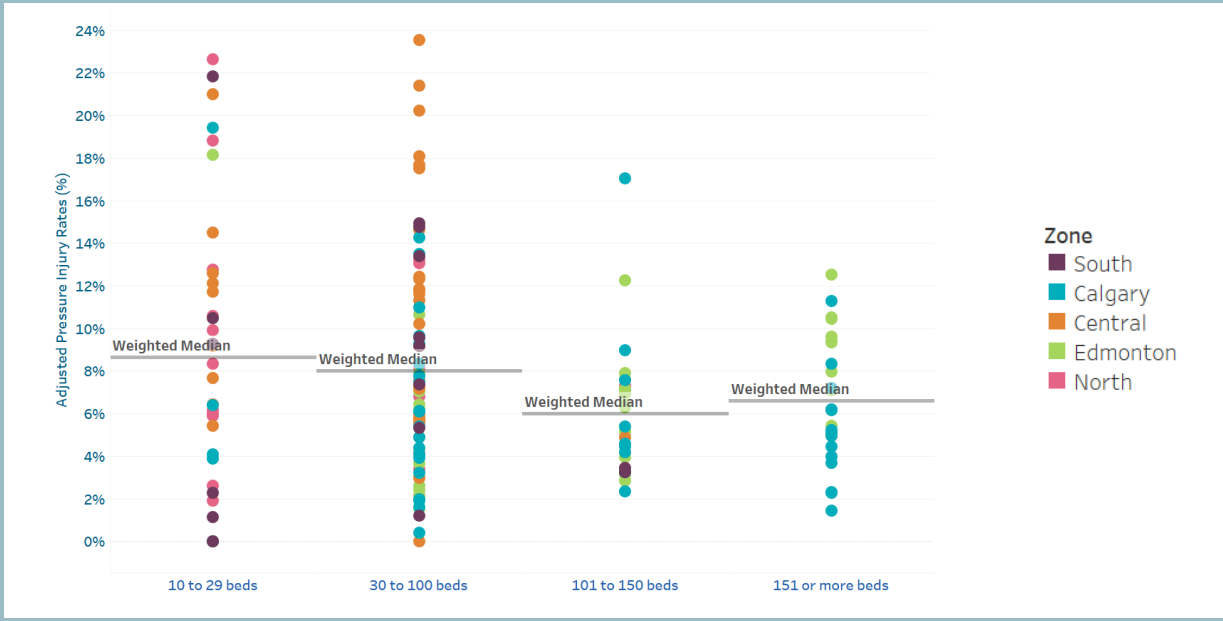

Figure 4: Adjusted Stage 2 to 4 Pressure injury rates by bed capacity in Long Term Care Facilities 2021/22 Q4

and explored pressure injury rates quarterly. All residents from LTC facilities with a bed capacity of 10 or more in Alberta were included in the analysis. The three-pressure injury QIs were assessed for variation. For each of the pressure injury quality QIs, both crude and adjusted pressure injury rates were computed. Adjusted rates considered were individual covariates including Personal Severity Index (PSI) Subset 1: Diagnoses; higher level of dependence in toileting; Resource Utilization Group (RUG); cognitive impairment and ages under 65. Facility-level stratification using Case Mix Index (CMI) was also applied. Pressure injury assessments were classified into first assessment and subsequent assessment. Assessments conducted within 90 to 92 days of

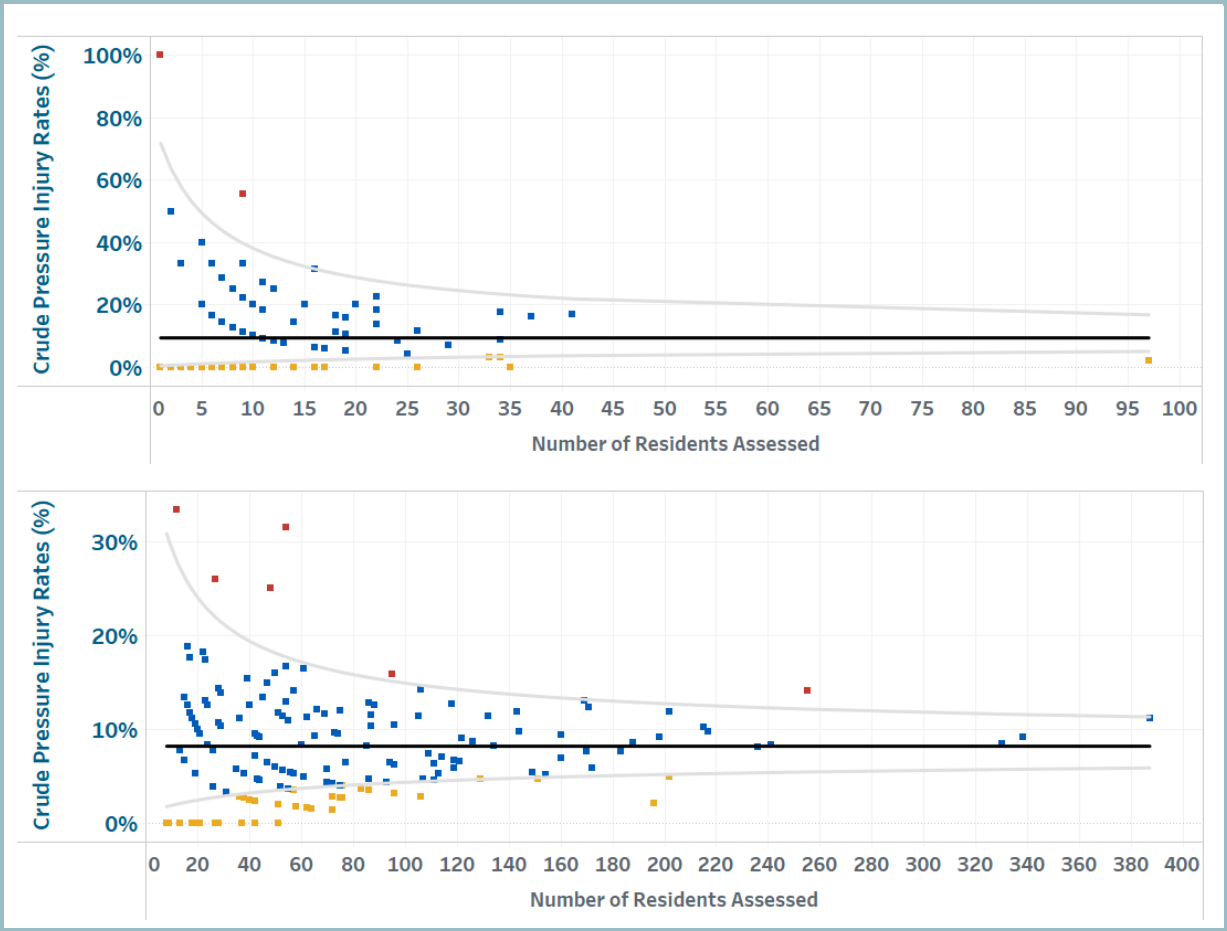

Figure 5: Crude pressure injury rates at first assessment (top) and subsequent assessment (bottom) at Long Term Care Facilities in 2021/22 Q4

admission are considered as first assessments; any following assessments are considered subsequent assessments. Whenever there is more than one assessment completed per resident per quarter, only the last assessment will be analyzed. Descriptive statistics and exploratory statistical methods were used. Weighted median pressure injury rates were computed at the provincial level and zone levels and weighted according to the bed capacity of individual facilities. Funnel plots were used to investigate the relationship between number of assessments completed and crude pressure injury rates as pressure injury rates have binomial distribution. The Wilson score interval was used to determine the 95% confidence limits of funnel plots.

Results

Our study sample comprised 182 LTC facilities, which included 356,278 assessments from 2017/18 to 2021/22. The mean standard deviation age of residents at assessment was 81.8 (12.6) years. Age at assessment ranged from 16 to 112. 62.9% were females. In Figure 2, the weighted median pressure injury rate at the provincial level was 6.4% (first to third quartile: 4.4% to 9.3%) in 2021/22 Q4. Weighted median pressure injury rates displayed some variations at zone level. The highest variance was in the South zone (weighted median, first to third quartile: 7.8% [3.3% to

10.2%]), the lowest was in Calgary zone (5.1% [3.9% to 7.4%]). The Central zone (7.5% [5.6% to 12.1%]), Edmonton zone (7.1% [5.4% to 9.4%]) and North zone (6.9% [4.8% to 10.1%]) were in between. Figure 3 shows the boxplot of adjusted pressure injury rates varies between 6.0% and 6.6%. Maximum rates display substantial variation over time. It is between 22.3% and 46.7%. Figure 4 shows the variation weighted median pressure injury rate that facilities are grouped by bed capacity ranges. In Q4 2021/22, adjusted pressure injury rates display the highest weighted median of 8.7% for 10 to 29 bed capacity ranges. The largest variation of 0.0% to 23.5% was found in the 30 to 100 bed capacity ranges. Figure 5 compares the crude pressure injury rates between first assessment and subsequent assessment. More substantial variations were found in subsequent assessments as represented by the dots outside the confidence limits.

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Discussion

The A-Atlas topic highlights accessible and interpretable data on pressure injuries in Alberta to encourage and advocate for routine monitoring, reporting and improvement activities to reduce pressure injuries in LTC. The A-Atlas, using validated assessment methods and systematic reporting, allows monitoring of trends in pressure injuries over time, comparison between regions and sites (adjusted for case mix) and ideally should be used to form the basis for quality improvement plans designed to address pressure injuries in LTC. Using the A-Atlas, health-care providers and policy makers can allocate health-care resources more effectively, implement changes where necessary and monitor the impact of these changes over time. Atlases of variation have been produced in many other jurisdictions, for example, the Office for Health Improvement and Disparities, part of the Department of Health and Social Care in England and Wales (https://fingertips.phe.org.uk/profile/atlas-of-variation) and New Zealand (https://www.hqsc.govt.nz/our-data/atlas-of-healthcare-variation/).

These atlases cover a wide range of health conditions and have been used as a monitoring tool in evaluation of quality improvement efforts such as activities designed to reduce the incidence of surgical site infections. Clearly, atlases raise the profile of health conditions under study; this, in itself, may prove sufficient to precipitate action to improve care along the lines of an audit and feedback cycle, a proven mechanism of quality improvement.[23,24] Atlases may also serve as the foundation for system-wide quality improvement initiatives, allowing a coordinated approach to the design of high value programs of care. However, the evidence that atlases do lead to a reduction in clinical variation is limited. [25,26]

Production of the A-Atlas is only the first step in improving the quality of care and alone may be insufficient to secure meaningful change. Data need to be produced in a timely fashion and accessible and available in a form understandable to the intended audience. In Spain, where atlases have been used for over two decades, a multifaceted dissemination program accompanies the publication of each, to ensure maximum expos-

ure.[27] This has been replicated in many other areas where atlases are used.[28]

This may not be enough. In a UK study of primary care organization managers, only half had used the atlas. There was a lack of awareness, staff capacity for analysis, or the content was thought inapplicable to local decision-making.[29] Data on medical practice variations create the additional conundrum that, as opposed to a guideline, they rarely tell the user what to do, thus considerable evidence informed practice support is required for meaningful improvement. There is also considerable difficulty in identifying unwarranted variation; the assumption that all variation is unwarranted has been erroneously made by some authorities. Such identification is an essential prerequisite to meaningful action and research has identified factors which might be considered when making these judgments.[30,31] There have been calls to refine atlases allowing for interpretation of any differences found, support for the selection and application of levers for change that align with local context and provision of evidence-based options for implementation.[32] Likewise, the organizational infrastructure that addresses training and education, optimal health services delivery for prevention and system-wide communication, clinical champions and processes for risk assessment need to be in place in order to successfully address the underlying problem.

The A-Atlas does have some strengths and limitations that must be considered. An important strength of the A-Atlas is that it provides a visual overview of the current state of pressure injuries in LTC across the province. These visual representations and interpretations are useful for providers and decision makers as they clearly identify areas for quality improvement work. The A-Atlas also allows the user to drill down to specific areas while longitudinal data allow for the identification of trends. A limitation of the A-Atlas is that variation may exist not only between sites, but also within each site. This type of variation within the clinical microsystem in which care is provided, may be 'hidden' and not easily assessed by the reader without further analysis of the data. Finally, the current A-Atlas is a 'static' product and the ability to routinely update the A-Atlas with new, up-to-date information is currently unavailable due to data handling issues. However, work is underway to explore how this could be possible in the future.

Conclusion

Newly occurring and worsening pressure injuries are a challenge across LTC facilities in Alberta. Despite multiple risk reduction/prevention strategies and early identification and treatment approaches, there is inconsistency with how best practices are utilized across sites. The newly created Alberta Atlas of Healthcare Variation (A-Atlas) reveals the degree of variation by showing weighted median pressure injury rates across provincial zones, adjusted pressure injury rates over time, weighted median pressure injury rates between facilities grouped into different bed capacity ranges and crude pressure injury rates between first and subsequent assessments across sites. Through use of the A-Atlas as a catalyst for change, we hope that operational and medical leaders can be better informed regarding the opportunity to improve pressure injury care and where best to target efforts.

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Conflicts Of Interest

The authors declare there are no conflicts of interest.

Michael Sidra MBA PhD is Senior Program Lead Provincial Systems, Programs and Performance, Alberta Health Services.
Dr. Adrian Wagg MB BS FRCP(LOND) FRCP(EDIN) FCGS FHEA(MD) is Professor, Department of Medicine, University of Alberta and Scientific Director, AHS Provincial Seniors & Continuing Care, Alberta Health Services.
Erin Thompson BComm PMP is a Senior Project Manager, Improving Health Outcomes Together, Alberta Health Services.
Ryan Sommer MScOT is Director, Improving Health Outcomes Together, Alberta Health Services.
Alice Chiu MPH MSc is Senior Analyst, Improving Health Outcomes Together, Alberta Health Services.
Karen Williams BScN is Quality Lead, Provincial Seniors Health and Continuing Care, Alberta Health Services.
Charlene Brosinsky RN BScN is an Accreditation Advisor, Alberta Health Services.
Marlene Varga MSc BScN is Pressure Injury Prevention Lead, Covenant Health.

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