

# Compromised Wounds in Canada

## Executive Summary

Wounds are a serious health care issue with profound personal, clinical and economic implications. They can be excruciatingly painful and debilitating, and they can undermine function, mobility and quality of life. Chronic wounds in particular present unique healing challenges to those whose health is already compromised. The treatments, medications, interventions and dressings associated with wounds also represent a significant financial burden to the health care system.

Most importantly, many wounds are avoidable with the provision of better health care services and a greater focus on prevention.

This study explores the prevalence of wounds in 2011–2012 in Canada, using administrative data from hospitals, home care, hospital-based continuing care and long-term care facilities. To inform better management and prevention of wounds, a working definition of “compromised wounds” was developed. This study examines the prevalence of compromised wounds by type and by health care setting. It also evaluates several risk factors associated with wounds, such as diabetes, circulatory disease and age.

Key findings of this study include the following:

- **Compromised wounds a common concern:** Results show that, nationally, compromised wounds were reported in almost 4% of inpatient acute hospitalizations and for more than 7% of home care, almost 10% of long-term care and almost 30% of hospital-based continuing care clients. These results emphasize the importance of compromised wounds as a health issue, particularly among seniors.
- **Compromised wounds likely under-reported, particularly in acute inpatient care:** Since wounds in early stages are not always properly identified and captured in administrative records, there is under-reporting of wound prevalence in the acute care setting. While the proportion of patients in our study with compromised wounds in acute care was relatively low, it still represented almost 90,000 patients, excluding Quebec.



## Analysis in Brief

## Health System Performance

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Healthier Canadians.

### Our Mandate

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- **Diabetes a major risk factor:** Patients with diabetes were much more likely to have a compromised wound than patients without the disease. With rapidly growing diabetes rates, the burden of compromised wounds is expected to increase unless steps are taken to manage disease progression. Complications from diabetic foot wounds alone led to more than 2,000 amputations across Canada in 2011–2012. Early detection and treatment can reduce the need for and prevalence of amputations. The costs of amputations have been found to be 10 to 40 times greater than the cost of effective initiatives to prevent amputation.
- **Prevalence of wounds does not increase with advanced age in home, continuing and long-term care settings:** Age is a known risk factor for wounds, particularly chronic wounds. Surprisingly, however, this study found that the prevalence of wounds did not increase for seniors of advanced age (that is, older than 75) in home, continuing and long-term care. Those at highest risk of wounds may not live as long, possibly due to underlying chronic health conditions.

## Introduction

Wounds are common across the health care system.<sup>1,2</sup> “Wound” is a broad category that includes minor cuts and scrapes, serious trauma, as well as wounds that are part of a patient’s treatment, such as a needle puncture for a blood test or a surgical incision. This study focuses on potentially preventable compromised wounds that are either acquired in health care settings (such as surgical site infections and pressure ulcers) or that could be avoided with proper care and management of a patient’s underlying chronic conditions (such as diabetic foot). It provides an overall evaluation of the prevalence of these wounds and presents details on wounds where little comprehensive and comparable information currently exists.

There are profound human costs related to wounds that are often not fully appreciated. Wounds can have a significant impact on the health and quality of life of individuals and their families, causing pain, loss of function and mobility, depression, distress and anxiety, embarrassment and social isolation, financial burden, prolonged hospital stays and chronic morbidity or even death.<sup>3,4</sup>

Studies of wounds have reported widely varying estimates of the scope of the problem, largely due to different definitions and different focus populations. However, the studies agree that wound management is a considerable burden on health systems, in Canada<sup>1</sup> and elsewhere.<sup>5</sup> Pressure ulcers and surgical wound infections alone have been estimated to cost individual Canadian hospitals more than \$1 million each year.<sup>1</sup> Wound care is a labour-intensive activity that is projected to increasingly take place in the community.<sup>3</sup>

One of the reasons for focusing on compromised wounds is that many (though not all<sup>6</sup>) can be prevented or treated more effectively. Table 1 outlines some common prevention strategies. The management of wounds is increasingly being acknowledged as a priority for Canadian health care organizations.<sup>7–9</sup> This report is a response to the growing interest.

**Table 1: Summary of Prevention Strategies by Main Wound Type**

Wound	Prevention Strategies
<b>Arterial and Venous Wounds</b> <sup>10-12</sup>	<ul style="list-style-type: none"> <li>• Standardized assessment and diagnosis</li> <li>• Appropriate use of compression</li> <li>• Encouragement of appropriate mobility</li> <li>• Management of risk factors and comorbidities</li> <li>• Appropriate medical and surgical management</li> <li>• Limb salvage: referral to determine revascularization potential</li> </ul>
<b>Pressure Ulcers</b> <sup>13</sup>	<ul style="list-style-type: none"> <li>• Risk assessment policy and practice</li> <li>• Routine skin assessment</li> <li>• Appropriate skin care</li> <li>• Nutritional screening and ensuring appropriate nutrition</li> <li>• Appropriate, documented repositioning</li> <li>• Management of pressure, friction and shear on all surfaces over a 24-hour period</li> </ul>
<b>Diabetic Foot</b> <sup>14</sup>	<ul style="list-style-type: none"> <li>• Foot examinations by health care professional, at least annually</li> <li>• Self-care education</li> <li>• Professionally fitted footwear</li> <li>• Management by specialized interdisciplinary team</li> </ul>
<b>Iatrogenic Wounds</b> <sup>15, 16</sup>	<ul style="list-style-type: none"> <li>• Clear and consistent information for patients and caregivers</li> <li>• Appropriate use of prophylactic antibiotics</li> <li>• Appropriate prophylactic antisepsis</li> <li>• Appropriate hair removal</li> <li>• Appropriate skin preparation</li> <li>• Appropriate hand and forearm antisepsis</li> <li>• Perioperative glucose control</li> <li>• Appropriate dressings and dressing changes</li> <li>• Appropriate nutritional support</li> </ul>
<b>Cellulitis</b> <sup>17</sup>	<ul style="list-style-type: none"> <li>• Identification and management of underlying risk factors</li> <li>• Identification and management of comorbidities</li> </ul>

## Methodology

### Data Sources

Three data sources from the Canadian Institute for Health Information (CIHI) were used to identify wound prevalence across various health service environments in 2011–2012.

**Table 2: Summary of 2011–2012 Data Included in Reporting**

Setting	Data Source	Notes
<b>Acute Inpatient</b>	Hospital Morbidity Database	<ul style="list-style-type: none"> <li>• All Canadian hospitals</li> <li>• Mental health patients excluded to ensure comparability across provinces</li> <li>• Quebec data is collected according to different data standards, so was excluded from most analyses</li> </ul>
<b>Complex Continuing Care and Long-Term Care</b>	Continuing Care Reporting System	<ul style="list-style-type: none"> <li>• Partial coverage of long-term care residents in Newfoundland and Labrador, Nova Scotia, Manitoba, Saskatchewan and British Columbia; full coverage in Ontario and Yukon</li> <li>• Hospital-based continuing care (primarily Ontario complex continuing care setting)</li> <li>• Information from last assessment in 2011–2012</li> </ul>

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**Table 2: Summary of 2011–2012 Data Included in Reporting (cont'd)**

Setting	Data Source	Notes
Home Care	Home Care Reporting System	<ul style="list-style-type: none"> <li>• Full coverage in Ontario, B.C. and Yukon</li> <li>• Information from first home care assessment</li> </ul>

**Note**

In 2011–2012, most participating hospitals submitted acute care data to CIHI’s Discharge Abstract Database (DAD). For 2011–2012, hospitals in Quebec submitted data to MED-ÉCHO; this data was converted to the DAD’s data layout using standard CIHI protocols. Nevertheless, some differences remain due to differing data collection standards and definitions among hospitals. While statistical regression techniques can often be applied to adjust for these differences and include Quebec, this study measures simple health care setting prevalence, and more sophisticated approaches to adjustment cannot be applied. For this reason, Quebec was excluded from most reporting on wounds.

## Compromised Wounds

### Terminology

This report focuses on three main types of compromised wounds: wounds that are persistent and healing poorly (chronic wounds), wounds that result from an infection introduced to the skin (skin barrier breaches) and wounds that result from surgical interventions that do not heal as expected (iatrogenic wounds). Details of the codes and variables used to identify these wounds across the data holdings are presented in Appendix A.

- **Chronic wounds:** Wounds that are persistent (generally lasting more than three months) and difficult to heal. There are two main categories of chronic wound: arterial and venous wounds and pressure ulcers.
  - **Arterial and venous wounds:** Arterial wounds (gangrene) result from the inability of blood to reach the extremities, causing tissue death. Venous wounds (stasis ulcers or varicose ulcers) result from the inability of blood to return from the extremities and are often associated with infection or swelling in the extremities.
  - **Data limitations:** In the home, complex continuing and long-term care settings, there is no separation between arterial and venous wounds, so they are combined into a single category in this report. Only wounds at partial thickness or more (stage 2) were included in reporting.
  - **Pressure ulcers:** Also known as decubitus ulcers or bed sores, pressure ulcers are caused by continued compression of skin by the weight of the individual. This impairs blood circulation, which in turn damages the skin’s integrity, resulting in a chronic wound. Pressure ulcers are most common among individuals who are immobile and prone to spending extended periods of time in the same position.
  - **Data limitations:** Pressure ulcers are staged in all health care settings. As with stasis ulcers, only ulcers at stage 2 or above were included. As the reporting of pressure ulcers in acute care requires physician notes, unstaged ulcers were assumed to be significant and included in reporting. Additional challenges in reporting pressure ulcers are presented with the analytical results.
- **Skin barrier breaches:** Any breach of the skin barrier places the individual at risk of infection. While there are several types of skin barrier breaches, only cellulitis—a bacterial infection just below the skin’s surface—is included in this analysis, as it is collected more consistently across health care settings than other types of skin barrier breaches.
  - **Data limitations:** Information on cellulitis is not available for the home care setting due to reporting differences.

- **Iatrogenic wounds:** These wounds are an unexpected negative outcome of surgical treatment. While these primarily include surgical site infections, they also include undesirable post-surgical outcomes without infection, such as when a wound does not adhere properly.
  - **Data limitations:** A comprehensive list of codes associated with iatrogenic wounds in the acute inpatient setting is provided in Appendix A. In home, complex continuing and long-term care, however, iatrogenic wound details are not available, and iatrogenic wounds were defined by a combination of two pick-list variables: the presence of a surgical wound and surgical wound care; this may overestimate the prevalence of actual iatrogenic wounds.

## Results

### Prevalence of Wounds by Type and Setting

Table 3 illustrates that potentially preventable wounds are a burden across health care settings. Prevalence was highest in complex continuing care,<sup>i</sup> followed by long-term care and home care. Chronic wounds in particular were more frequent in the continuing care setting. The acute care setting had the lowest rate of wound prevalence but represented almost 90,000 patients with a compromised wound.

**Table 3: Summary of Wounds by Type and Health Care Setting**

Compromised Wound	Acute Inpatient	Home Care	Complex Continuing Care	Long-Term Care
<b>Arterial and Venous Wounds</b>	16,986 (0.7%)	2,573 (2.4%)	516 (2.6%)	2,033 (1.5%)
<b>Pressure Ulcers</b>	9,594 (0.4%)	2,584 (2.4%)	2,806 (14.1%)	9,338 (6.7%)
<b>Any Chronic Wounds</b>	25,867 (1.1%)	4,934 (4.6%)	3,155 (15.8%)	10,922 (7.9%)
<b>Skin Barrier Breaches</b>	26,613 (1.1%)	—	492 (2.5%)	1,270 (0.9%)
<b>Iatrogenic Wounds</b>	41,255 (1.7%)	3,152 (2.9%)	2,753 (13.8%)	1,818 (1.3%)
<b>Any Compromised Wound</b>	87,429 (3.7%)	7,892 (7.3%)	5,618 (28.2%)	13,298 (9.6%)
<b>Health Care Setting Total</b>	<b>2,359,431</b>	<b>107,631</b>	<b>19,935</b>	<b>138,994</b>

#### Notes

Acute inpatient includes all provinces and territories except Quebec and excludes mental health cases.

Home care includes all admission assessments for submitting jurisdictions.

Complex continuing care and long-term care include the most recent annual/quarterly assessment for all submitting jurisdictions.

#### Sources

Discharge Abstract Database, Home Care Reporting System and Continuing Care Reporting System, 2011–2012, Canadian Institute for Health Information.

The wound rates reported in home, complex continuing and long-term care settings were broadly consistent with rates presented in the literature, as was the prevalence of compromised wounds other than pressure ulcers in acute care settings.<sup>ii</sup> In acute inpatient care, iatrogenic wounds were the most common type of wound. This is not surprising given the large number of surgical patients. The relatively low prevalence of pressure ulcers (0.4%), on the other hand, is surprising. As outlined in Table A2 in Appendix A, acute inpatients are generally

i. Complex continuing care, primarily in Ontario, provides hospital-based, medically complex and specialized services, sometimes over extended periods of time, that are not available at home or in long-term care facilities. Complex continuing care had by far the highest reported prevalence of compromised wounds. Not only are the patients in this setting at highest risk, but some are admitted to complex continuing care beds in part to treat persistent post-surgical wounds or ulcers acquired in other settings.

ii. Prevalence of open and healed venous and arterial ulcers, for example, is estimated to be about 1.0% to 2.0% of the acute inpatient population.<sup>18–20</sup> Surgical wound infections have been estimated at 1% in the United States and France<sup>21, 22</sup> and between 4% and 5% in the United Kingdom.<sup>23</sup>

considerably younger and thus less likely to have many of the risk factors associated with wounds. A lower pressure ulcer rate in acute care than in home and continuing care is to be expected. However, prevalence of 0.4% is not in line with other Canadian studies, which have reported considerably higher rates, ranging from 25% (including stage 1 ulcers) to 8% (in an Ontario study of stage 2 ulcers and above).<sup>24–25</sup>

It is probable that the acute inpatient pressure ulcer numbers were considerably underestimated. Several studies in other countries have suggested that hospital patient records do not always capture adequate information about pressure ulcers<sup>26</sup> and that inadequate documentation, particularly of lower-stage ulcers, is common in both nurses' and doctors' notes. The findings of the present analysis suggest that better documentation may improve pressure ulcer reporting in acute care. For example, doctors and/or the interdisciplinary teams assigned to manage wound clients could be more explicit in their chart documentation, and patient progress notes could include more detailed staging information and ensure that wounds are reported. In addition, *all* pressure ulcers are currently reported as a Canadian Hospital Reporting Project (CHRP)<sup>iii</sup> nursing-sensitive adverse event, including stage 1 ulcers. Excluding stage 1 pressure ulcers from this indicator would potentially remove a disincentive for reporting them and enable more accurate identification of individuals at risk of more serious wound development.

## Pressure Ulcers

Information on the staging of pressure ulcers is presented in Table 4. As staging increases with the severity of wounds, it is expected that, given accurate reporting, the prevalence of wounds should decrease. There are several points of note in this table. First and foremost, almost half of the pressure ulcers reported in the acute inpatient setting were “unspecified.” In other words, they were not assigned a stage. The assumption made for the present analysis is that if the doctor considered the ulcer important enough to note in the patient's chart, it was a significant (stage 2 or greater) pressure ulcer.

The next major message to be taken from the table is that while rates in home, complex continuing and long-term care seemed more reasonable, the reported prevalence of stage 1 pressure ulcers in acute care was extremely low. As pointed out previously, this is obviously at odds with the prevalence rates reported in the literature, which are largely based on physical assessments of patients' skin rather than on administrative data. It is clear that there is very little stage 1 pressure ulcer reporting in acute inpatient care (though under-reporting seems to be an issue across health care settings). It should be emphasized that while stage 1 wounds were not included in this analysis, these wounds, if not attended to, are likely to develop into higher-staged pressure ulcers.

Further research is needed to improve identification of the risk factors for wounds, particularly in acute care, where wound reporting appears to be a challenge. Across all health care settings, skilled personnel are required to perform routine skin inspections to properly identify, classify and manage high-risk patients.

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iii. For more information about CHRP hospital indicators, please refer to the following document: Canadian Institute for Health Information. *Canadian Hospital Reporting Project Technical Notes—Clinical Indicators*. Ottawa, ON: CIHI; 2013.

**Table 4: Summary of Pressure Ulcer Staging by Health Care Setting**

Pressure Ulcer Staging	Acute Care	Home Care	Complex Continuing Care	Long-Term Care
<b>No Pressure Ulcer</b>	99.6%	95.4%	77.2%	90.0%
<b>Stage 1: Redness</b>	0.0%	2.2%	8.7%	3.3%
<b>Stage 2: Loss of Partial Thickness</b>	0.1%	1.7%	8.7%	4.2%
<b>Stage 3: Loss of Full Thickness</b>	0.0%	0.5%	2.7%	1.3%
<b>Stage 4: Underlying Tissue Loss</b>	0.1%	0.2%	2.7%	1.3%
<b>Unstageable</b>	0.0%	N/A	N/A	N/A
<b>Stage Unspecified</b>	0.2%	N/A	N/A	N/A
<b>Total Pressure Ulcers (Stage 2+)</b>	<b>0.4%</b>	<b>2.4%</b>	<b>14.1%</b>	<b>6.7%</b>

**Notes**

Acute inpatient includes all provinces and territories except Quebec and excludes mental health cases.

Home care includes all admission assessments for submitting jurisdictions.

Complex continuing care and long-term care include the most recent annual/quarterly assessment for all submitting jurisdictions.

Total value may not match the sum of individual values due to rounding.

**Sources**

Discharge Abstract Database, Home Care Reporting System and Continuing Care Reporting System, 2011–2012, Canadian Institute for Health Information.

## Pressure Ulcer Staging

The standards associated with pressure ulcer staging are included in the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Canada (ICD-10-CA) and the interRAI Minimum Data Set. Pressure ulcers are staged based on the extent of tissue damage detected. Stage 1 ulcers do not involve any underlying tissue damage; they are areas of redness or “non-blanchable erythema” that indicate poor circulation or irritation of the skin. Stage 2 ulcers include partial damage to the underlying tissue of the skin. Stage 3 ulcers are deeper and involve the complete subcutaneous tissue. Stage 4 ulcers are chronic wounds that involve damage to the tissue down to the musculature or bone beneath the tissue. In home and continuing care, stage 4 also includes chronic wounds that are through the bone, in addition to wounds that are not stageable due to the presence of slough, eschar or necrotic tissue in the wound. In acute care, pressure ulcer reporting includes unstageable or unclassified ulcers, which are wounds that go through the muscle or bone.

## International Challenges in Reporting Pressure Ulcers

An international expert working group identified the following issues related to evaluating rates of pressure ulcer occurrence:<sup>27</sup>

- Confusion over definitions (including “prevalence” and “incidence”) and inconsistency in
  - Collection of data;
  - Definition of study population;
  - Identification of pressure ulcers; and
  - Classification of pressure ulcers.
- Data collection and recording can be affected by
  - The level of training and skill of those doing clinical assessments and documentation;
  - The type and content of the data recording system;
  - The extent of standardization in terminology and reporting across data systems and health care settings; and
  - The ease with which data can be extracted from recording systems.<sup>27</sup>

It is known that many pressure ulcers are never reported. This means that retrospective studies (such as this one) may produce underestimates of their occurrence. On the other hand, inaccurately identifying and recording other skin lesions as pressure ulcers (misclassification) may result in overestimates.<sup>27</sup>

## Risk Factors for Wounds

In most cases, wound healing is a normal biological process. However, wound management can be affected by factors that have little to do with the wounds themselves.<sup>28</sup> In some cases, these factors can make the development of wounds more likely, or they may compromise wounds in their progress through the normal stages of healing. Using CIHI data reported consistently across health care settings, this study addresses a number of risk factors identified in the literature, including

- Diabetes;
- Thyroid disease (hyperthyroidism and hypothyroidism);
- Stroke (or cerebrovascular accident);
- Peripheral vascular disease;
- Other cardiovascular disease (cardiac dysrhythmia, congestive heart failure and hypertension);
- Cognitive problems (Alzheimer's and dementia);
- Lung disease (asthma, chronic obstructive pulmonary disease and emphysema);
- Neurological disorders or conditions affecting mobility (hemiplegia, quadriplegia, paraplegia, multiple sclerosis and Parkinson's); and
- Bowel or bladder incontinence.

Appendix B outlines the codes and variables used to define the risk factors, as well as the overall prevalence of these conditions across health care settings.

Several factors (such as obesity, medications, alcoholism and smoking, malnutrition and immune-compromised conditions) were unavailable for inclusion in the analysis. While these factors are not included in this report, their important contribution to the prevalence of wounds should not be overlooked.

One of the most dramatic demographic shifts of our time is the aging of the population. As the risk of most chronic conditions increases with age, perhaps one of the greatest risk factors associated with wound prevalence is age itself. Not only does disease prevalence increase with age, so does overall prevalence of conditions associated with wounds, such as immobility and incontinence. In addition, the quality of the skin tissue is known to degrade with age. The detailed analysis of the impact of age on wounds across health care settings is presented in Appendix B.

An overall summary of the prevalence of the risk factors included in the report is presented in Table 5. This table clearly illustrates that risk factors were consistently lowest in acute care, while complex continuing care and long-term care had a high prevalence of most risk factors. This largely explains the higher wound prevalence reported in these health care settings. Diabetes was reported in just less than 4% of acute inpatients, but one out of four home and long-term care clients reported it, and prevalence in complex continuing care was just less than 30%. Mobility concerns, cognitive impairment and incontinence were also higher in non-acute settings.



**Table 5: Summary of Risk Factors by Health Care Setting**

Risk Factor	Acute Inpatient	Home Care	Complex Continuing Care	Long-Term Care
<b>Diabetes</b>	3.9%	25.5%	29.7%	24.9%
<b>Thyroid Disease</b>	0.2%	14.9%	15.0%	18.1%
<b>Stroke</b>	1.6%	15.3%	20.2%	22.1%
<b>Peripheral Vascular Disease</b>	0.4%	6.3%	7.4%	5.7%
<b>Other Cardiovascular Disease</b>	8.9%	62.5%	63.6%	62.7%
<b>Lung Disease</b>	3.9%	16.7%	19.3%	17.0%
<b>Cognitive Impairment</b>	0.6%	24.5%	24.6%	60.1%
<b>Neurological Disorders/Conditions Affecting Mobility</b>	0.6%	6.7%	17.7%	13.9%
<b>Bowel or Bladder Incontinence</b>	0.4%	7.1%	34.6%	43.0%

**Notes**

Acute inpatient includes all provinces and territories except Quebec and excludes mental health cases.

Home care includes all admission assessments for submitting jurisdictions.

Complex continuing care and long-term care include the most recent annual/quarterly assessment for all submitting jurisdictions.

**Sources**

Discharge Abstract Database, Home Care Reporting System and Continuing Care Reporting System, 2011–2012, Canadian Institute for Health Information.

**Wounds by Risk Factor**

Table 6 presents the prevalence of any compromised wound among those with risk factors. This table emphasizes the importance of peripheral vascular disease and diabetes in wound prevalence. By far, wound prevalence was highest among those with peripheral vascular disease, illustrating the profound significance of this risk factor for wound prevention and management. Almost half of peripheral vascular disease patients in complex continuing care, more than 40% in acute inpatient care and around 20% in long-term and home care reported a compromised wound.

One-third of those with diabetes in complex continuing care reported a compromised wound, along with 12% in long-term care, 11% in home care and 18% in acute care. Patients in acute inpatient, complex continuing and long-term care with cardiovascular disease had higher wound prevalence than those without. Incontinence was related to only slightly higher compromised wound rates in home, complex continuing and long-term care. Neurological disorders and conditions affecting mobility were also coupled with higher wound prevalence in long-term care residents.

**Table 6: Summary of Any Compromised Wound by Risk Factor and Health Care Setting**

Wound Prevalence for Risk Factor	Disease Presence	Acute Inpatient	Home Care	Complex Continuing Care	Long-Term Care
<b>Diabetes</b>	No	3.1%	6.1%	25.8%	8.7%
	Yes	18.1%	10.9%	33.7%	12.1%
<b>Thyroid Disease</b>	No	3.7%	7.5%	28.2%	9.5%
	Yes	7.7%	6.1%	28.1%	9.8%
<b>Stroke</b>	No	3.7%	7.7%	29.6%	9.5%
	Yes	3.7%	5.4%	22.7%	9.9%
<b>Peripheral Vascular Disease</b>	No	3.6%	6.3%	26.5%	9.0%
	Yes	41.6%	22.8%	49.0%	19.6%
<b>Other Cardiovascular Disease</b>	No	3.4%	7.5%	26.4%	8.9%
	Yes	6.5%	7.3%	29.2%	10.0%

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**Table 6: Summary of Any Compromised Wound by Risk Factor and Health Care Setting (cont'd)**

Wound Prevalence for Risk Factor	Disease Presence	Acute Inpatient	Home Care	Complex Continuing Care	Long-Term Care
<b>Lung Disease</b>	No	3.7%	7.3%	28.0%	9.4%
	Yes	3.2%	7.3%	29.1%	10.4%
<b>Cognitive Impairment</b>	No	3.7%	8.9%	29.9%	11.1%
	Yes	7.7%	2.6%	23.0%	8.6%
<b>Neurological Disorders/ Conditions Affecting Mobility</b>	No	3.7%	7.5%	28.5%	9.2%
	Yes	7.9%	5.4%	26.8%	12.1%
<b>Bowel or Bladder Incontinence</b>	No	3.7%	7.2%	27.3%	6.8%
	Yes	3.6%	9.0%	29.9%	13.3%

**Notes**

Acute inpatient includes all provinces and territories except Quebec and excludes mental health cases.

Home care includes all admission assessments for submitting jurisdictions.

Complex continuing care and long-term care include the most recent annual/quarterly assessment for all submitting jurisdictions.

**Sources**

Discharge Abstract Database, Home Care Reporting System and Continuing Care Reporting System, 2011–2012, Canadian Institute for Health Information.

Across all health care settings, there was a higher prevalence of wounds among people with diabetes, an illustration of the relationship among diabetes, wound etiology and potential to heal. Table 7 illustrates that people with diabetes were many times more likely to report wounds, particularly chronic wounds. The difference in wound rates was most dramatic in the acute care setting, where individuals with diabetes were at considerably higher risk of all wounds. Among acute inpatients without diabetes, 3.1% reported a wound, whereas more than 18% with diabetes reported a wound. We did not see such dramatic differences in wound prevalence rates in the other health care settings. This is probably due to the high prevalence of other risk factors. Nevertheless, these settings still reported higher wound rates among patients with diabetes.

With diabetes increasing, Table 7 emphasizes the importance of secondary prevention among those with the condition to ensure that those high-risk individuals are well cared for. Secondary prevention entails effectively controlling diabetes and ensuring adequate foot care. There is much work to be done in this area. Only about half of adults with diabetes report that they have their feet checked by a health professional.<sup>29, 30</sup>

**Table 7: Summary of Wounds by Health Care Setting for Patients With and Without Diabetes**

Wound	Status	Acute Inpatient	Home Care	Complex Continuing Care	Long-Term Care
<b>Arterial and Venous Wounds</b>	No Diabetes	0.3%	1.6%	1.9%	1.2%
	Diabetes	11.5%	4.8%	4.3%	2.2%
<b>Pressure Ulcers</b>	No Diabetes	0.3%	2%	12.5%	6.2%
	Diabetes	1.8%	3.5%	17.8%	8.3%
<b>Any Chronic Wounds</b>	No Diabetes	0.6%	3.4%	13.9%	7.1%
	Diabetes	12.9%	7.9%	20.5%	10%
<b>Cellulitis</b>	No Diabetes	1%	—	2%	0.8%
	Diabetes	4.8%	—	3.5%	1.2%

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**Table 7: Summary of Wounds by Health Care Setting for Patients With and Without Diabetes (cont'd)**

Wound	Status	Acute Inpatient	Home Care	Complex Continuing Care	Long-Term Care
<b>Iatrogenic Wounds</b>	No Diabetes	1.7%	2.8%	13.2%	1.2%
	Diabetes	3.6%	3.4%	15.1%	1.6%
<b>Any Compromised Wound</b>	No Diabetes	3.1%	6.1%	25.8%	8.7%
	Diabetes	18.1%	10.9%	33.7%	12.1%

**Notes**

Acute inpatient includes all provinces and territories except Quebec and excludes mental health cases.

Home care includes all admission assessments for submitting jurisdictions.

Complex continuing care and long-term care include the most recent annual/quarterly assessment for all submitting jurisdictions.

**Sources**

Discharge Abstract Database, Home Care Reporting System and Continuing Care Reporting System, 2011–2012, Canadian Institute for Health Information.

## *Diabetic Foot in Acute Inpatient Care*

Diabetes is a serious chronic disease, and it is a major factor in the story of wounds. In Canada, 2.4 million people (7%) were living with diabetes in 2008–2009, a figure that is expected to rise to close to 4 million by 2018–2019.<sup>31</sup> Diabetes is often associated with poor circulation and peripheral neuropathy, or a loss of feeling in the extremities. For people with diabetes, this loss of sensation often results in minor wounds that can develop into more serious wounds if left unchecked.

Ulceration of the foot is one of the major health problems for people with diabetes.<sup>32</sup> It is estimated to affect 15% to 25% of people with diabetes at some time in their lives.<sup>33</sup> Diabetes is associated with more than 80% of major amputations in some populations (90% in one Aboriginal population).<sup>34</sup> Canadians with diabetes are almost 20 times more likely to be hospitalized for amputations than those without diabetes.<sup>31, 35</sup> Early diagnosis, risk reduction and disease management by properly trained wound experts is considered critical to reducing unnecessary amputations. Amputation prevention efforts have reduced the prevalence of amputations.<sup>36</sup> Researchers have found that prevention efforts have 10 to 40 times the cost savings of amputations.<sup>37</sup>

Rates of diabetes are higher in First Nations communities in Canada, where prevalence is more than double that in the non-Aboriginal population.<sup>31</sup> Not surprisingly, complications related to diabetes, including foot care, are a particularly serious health issue for these communities,<sup>38, 39</sup> where access to health care can be particularly challenging.<sup>40</sup>

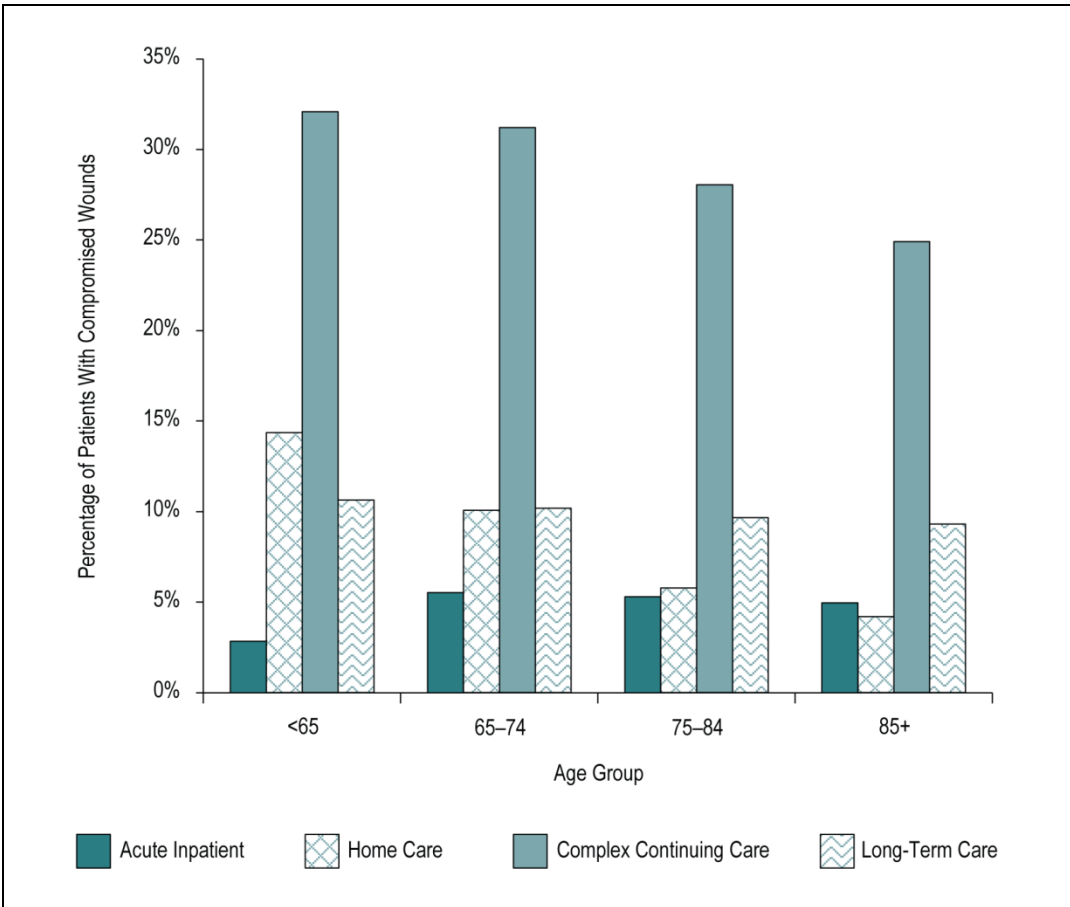
Due to the seriousness of diabetic foot, its prevalence was explored using acute inpatient data. While home, complex continuing and long-term care include information on diabetes, wounds and foot care, no causal relationship can be drawn among these reported factors. As such, diabetic foot can be explored in acute inpatient care only. A total of 6,341 amputations were performed in 2011–2012 in the acute inpatient setting. Of these, 2,066, or one-third of amputations, were performed on individuals reporting a diabetic foot wound. In addition, another 1,760 (28%) amputations were performed on patients reporting diabetes without diabetic foot. Combined, diabetes was associated with more than 60% of amputations performed in hospital.

## **Risk Factors by Age and Health Care Setting**

Age is a known risk factor for wounds, particularly chronic wounds. Perhaps surprisingly, as outlined in Figure 1, this study found that the prevalence of wounds did not increase for seniors of advanced age (that is, older than 75) in home, complex continuing and long-term care. Even in the acute inpatient setting, wound prevalence for those age 65 and older was stable at approximately 5% of patients. This phenomenon may be due, in large part, to the fact that those at highest risk of wounds are less likely to live as long because of underlying chronic health conditions, such as diabetes. The relationship among wound prevalence, risk factor prevalence and age in home care settings in particular may reflect the type of home care required. Home care

for seniors is generally focused on maintaining independence in the home. Younger clients may be more likely to have been discharged from acute care and to require follow-up care, such as assistance with post-operative wound dressing. Appendices A and B also include a breakdown of wound and diagnosis by age group.

**Figure 1: Percentage of Patients With Compromised Wounds by Age Group and Health Care Setting**



**Notes**

Acute inpatient includes all provinces and territories except Quebec and excludes mental health cases.  
 Home care includes all admission assessments for submitting jurisdictions.  
 Complex continuing care and long-term care include the most recent annual/quarterly assessment for all submitting jurisdictions.  
 All percentages were rounded for graphic display.

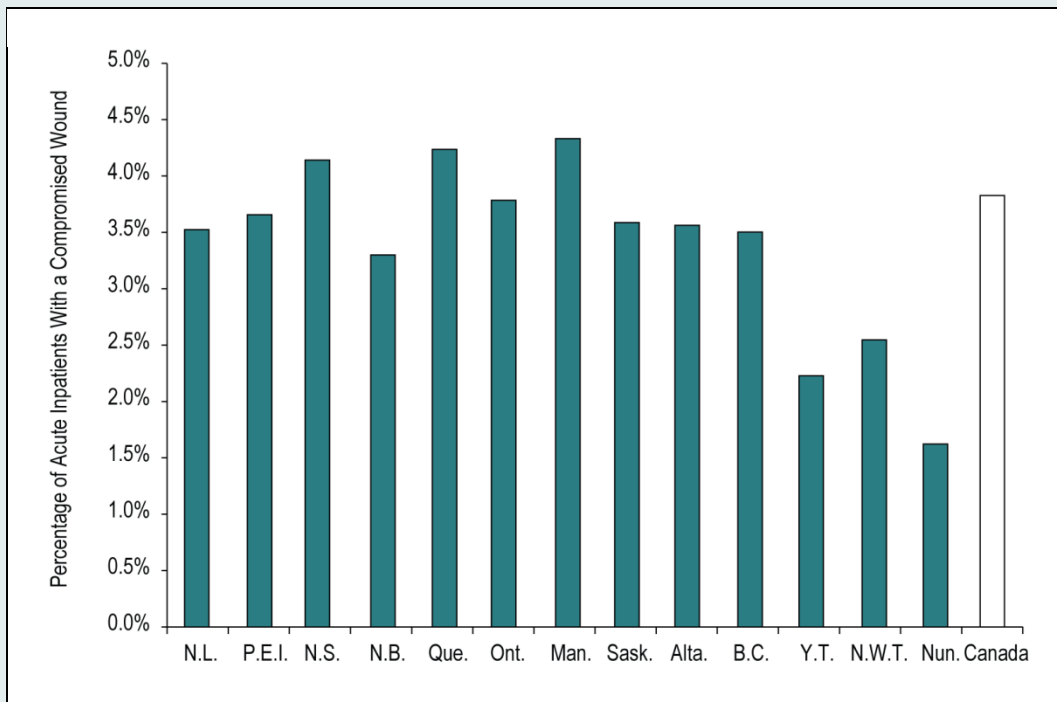
**Sources**

Discharge Abstract Database, Home Care Reporting System and Continuing Care Reporting System, 2011–2012, Canadian Institute for Health Information.

## Compromised Wounds by Province

Due to limitations with the submitted diagnosis type codes and profound differences in reported risk factors, data from Quebec was excluded from acute inpatient data for most reporting. Wound reporting within Quebec, however, is generally considered accurate and comparable. To provide a better sense of the overall prevalence of compromised wounds, Figure 2 includes the portion of acute inpatients with compromised wounds by province/territory. Rates were lowest in the territories and New Brunswick, while most provinces reported an overall compromised wound prevalence close to 3.5%. Three provinces had rates above 4%: Nova Scotia, Quebec and Manitoba. The variability in provincial reporting is likely related to the quality of wound reporting as opposed to the quality of services provided.

**Figure 2: Acute Inpatient Distribution of Compromised Wounds Across Canada by Province/Territory**



**Note**

Acute inpatient includes all provinces and territories (including Quebec) but excludes mental health cases.

**Source**

Hospital Morbidity Database, 2011–2012, Canadian Institute for Health Information.

## Reporting Challenges and Information Gaps

This study provides useful insight into the prevalence of preventable wounds across various health care settings. However, there are several limitations to the analysis, including a number of data-related challenges and gaps. While there is good coverage in the acute inpatient setting across most of Canada, the home care and complex continuing care data focuses primarily on Ontario, with a sub-sampling of data from other jurisdictions. In addition, the data that is collected in home and complex continuing care does not include as many details about certain wounds, such as cellulitis and gangrene.

It is suspected that inpatient wounds, particularly pressure ulcers, are significantly under-reported. In the acute care setting, almost half of pressure ulcers were unspecified, and there was very little reporting of stage 1 ulcers. Improved acute inpatient reporting would allow for an improved understanding of pressure ulcers, which would in turn facilitate improved prevention and treatment in this setting.

The information included in this report provides valuable insight into the prevalence of wounds, but there is limited information on the development, progression and/or treatment of wounds. Better reporting of this kind of information would improve identification of which wounds respond best to which treatments for which types of patients and of the causal relationships between type of wound and the type of care received; it would also make it more feasible to produce cost information regarding treatment. Better linkage of the details of a specific wound from one assessment to the next would also enable more detailed evaluation of wound progression.

Finally, information regarding some very important risk factors (cancer, malnutrition and smoking) is inconsistently available, leading to significant gaps in our description of factors that influence the prevalence of wounds.

In summary, to enhance capacity to adequately evaluate wounds, there is a need for

- Improved pressure ulcer staging education, standardization and quality of reporting, especially in acute care;
- Better coding and data collection for chronic wounds across all health care settings;
- Inclusion of cellulitis reporting in home care;
- Improved education and understanding of the etiology and types of wounds, the factors that contribute to their development, their importance to overall health and care, and the importance of adequate documentation; and
- Improved recording and reporting of wound development, progression, treatment and outcomes.

## Conclusions

This study sought to describe the prevalence of wounds in several health care settings using available administrative data from hospitals, home care, hospital-based continuing care and long-term care facilities. The study focused on compromised wounds by grouping three types of wounds: chronic wounds, skin barrier breaches and undesirable post-operative outcomes, or iatrogenic wounds. The definition excludes other wounds that are less preventable, such as uncompromised surgical wounds, malignant lesions, ostomy wounds (surgically created openings in the body) and wounds resulting from trauma. This specific working definition was selected to provide insight into those wounds that are preventable either by better managing the conditions associated with wound development or by improving care. The analysis produced a number of key findings.

First, the analysis demonstrated that compromised wounds are a substantial burden across all health care settings examined. The data indicates that approximately 4% of acute inpatients, more than 7% of home care clients, less than 10% of long-term care clients and almost 30% of those in complex continuing care reported a compromised wound. Second, diabetes and peripheral vascular disease were significant risk factors for developing wounds and having them not heal in all four health care settings studied. Diabetes in particular is an increasing health concern, with prevalence projected to increase substantially in coming years. Third, and perhaps somewhat counterintuitively, some wound-related risk factors decreased with age, which in turn resulted in lower wound prevalence with age. Surgical interventions, diabetes and stroke all became less common in the oldest age groups. One outcome of this phenomenon is that the highest prevalence of wounds

occurred among those age 65 to 74. In other words, individuals at the highest risk of wounds may be less likely to live long enough to reach higher age groups. This emphasizes the importance of wounds as a condition often associated with morbidity and, ultimately, mortality.

Wounds are increasingly recognized as a quality-of-care, clinical and policy issue. A number of pan-Canadian and jurisdictional initiatives have been established to improve wound prevention and management. Some examples of such activities include

- The identification of diabetic foot as a key health system priority by Canada's premiers;<sup>7</sup>
- A partnership between the Public Health Agency of Canada and the Canadian Association of Wound Care in response to the issue of diabetic foot;<sup>9</sup>
- A collaboration between the Canadian Association of Wound Care and the Canadian Association for Enterostomal Therapy to develop standards for wound management education and programming;<sup>41</sup>
- The development of provincial<sup>42</sup> and regional<sup>43</sup> wound care strategies;
- Initiatives targeting the prevention of pressure ulcers, such as Saskatchewan's, which reduced pressure ulcer incidence in long-term care facilities from 6% to 0.2% and prevalence from 8.8% to 3.7%; and<sup>44</sup>
- Surgical site infection reduction initiatives in jurisdictions across Canada<sup>45, 46</sup> and the Surgical Site Infection component of the Canadian Patient Safety Institute's *Safer Healthcare Now!* program.<sup>16</sup>

Compromised wounds can be avoided, or at least more effectively managed in their early stages. To minimize the financial and human burden of wounds, efforts should focus on prevention. There are clear opportunities for action, including better documentation of all wounds in all settings, but particularly of pressure ulcers in acute care, and for enhanced monitoring of the feet of people with diabetes in primary health care. Even with the acknowledged data limitations and gaps, this report demonstrates that wounds are a heavy burden for Canadians and their health care system, and it points to the importance of wound prevention and management across all health care settings.

## Acknowledgements

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- Dr. Karen Campbell
- Dr. Pamela Houghton
- Dr. Anita Stern

Please note that the analyses and conclusions in the document do not necessarily reflect those of the individuals mentioned above.

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## Appendix A

Table A1 outlines the ICD-10-CA codes and the variables from the Continuing Care Reporting System (CCRS) and Home Care Reporting System (HCRS) associated with the defined wounds of interest. The ICD-10-CA codes are required to define the wounds of interest within the diagnosis information recorded in Hospital Morbidity Database (HMDB) data. HMDB data also includes diagnosis typing information for ICD-10-CA codes. Only significant codes were considered (that is, types M, 1, 2, 6, W, X and Y and type C in Quebec reporting, where applicable). For HCRS and CCRS, the data available from the pick-list items was used. While there are ICD-10–based codes available in CCRS and HCRS, this information is optional, and coding is incomplete for wound reporting. There was no reporting of gangrene in home or continuing care, or of cellulitis in home care. Table A2 provides an overview of the breakdown of age groups by health care setting, whereas Table A3 provides the prevalence of these wounds by health care setting and age group.

**Table A1: Defining Wound Care Using ICD-10-CA Codes and HCRS/CCRS Data Elements**

Nature of Wound	Type of Wound	Applicable ICD-10-CA Codes (Types M, 6, 1, 2, C, W, X, Y)	Home/Continuing Care
<b>Chronic Wounds</b>	Decubitus/Pressure Ulcer	Decubitus ulcer—pressure area ( <b>L89, except L890</b> ) To be presented further by pressure ulcer stage	HCRS: Highest Stage Pressure Ulcer ( <b>N2a</b> ) CCRS: Highest Stage Pressure Ulcer ( <b>M2a</b> )
	Arterial and Venous Wounds/Stasis Ulcers	<ul style="list-style-type: none"> <li>• Skin ulcers (<b>L97</b>) and skin ulcer NEC (<b>L984</b>)</li> <li>• Varicose veins with ulcer (<b>I830, I832</b>)</li> <li>• Atherosclerosis of extremities with gangrene (<b>I70.21</b>)</li> <li>• Gangrene (<b>R02</b>)</li> <li>• Post-thrombotic syndrome with ulcer (<b>I8700, I8702</b>)</li> <li>• Diabetic foot ulcer with gangrene (<b>E1051, E1151, E1351, E1451, E1071, E1171, E1371, E1471</b>)</li> <li>• Diabetic foot ulcer (<b>E1070, E1170, E1370, E1470</b>)</li> </ul>	HCRS: Highest Stage Stasis Ulcer ( <b>N2b</b> ) CCRS: Highest Stage Stasis Ulcer ( <b>M2b</b> )
<b>Skin Barrier Breaches</b>	Cellulitis	Cellulitis ( <b>L03</b> )	HCRS: Not Available CCRS: Cellulitis ( <b>I2b</b> )
<b>Iatrogenic Wounds</b>	Post-Operative	<ul style="list-style-type: none"> <li>• Post-procedural complications/infection/disruption (<b>T802, T813, T814, T8182, T874, T870^1, T871^1, T87201, K9141, K9144</b>)</li> <li>• Post-device, implants and graft infection (<b>T826, T827, T835–T836, T845–T849, T857</b>)</li> <li>• Obstetric surgical wound or puerperal infection (<b>O860, O86102</b>)</li> </ul>	HCRS: Surgical Wound ( <b>N3d</b> ) + Surgical Wound Care ( <b>N5c</b> ) CCRS: Surgical Wound ( <b>M4g</b> ) + Surgical Wound Care ( <b>M5f</b> )



**Table A2: Summary of Age Category Distribution by Health Care Setting**

Health Care Setting	<65	65–74	75–84	85+
Acute Inpatient	65%	13%	13.6%	8.4%
Home Care	16.5%	15.6%	34.4%	33.5%
Complex Continuing Care	17.3%	16.1%	32.7%	33.9%
Long-Term Care	5.9%	9.4%	29.8%	54.9%

**Notes**

Acute inpatient includes all provinces and territories (including Quebec) but excludes mental health cases.

Home care includes all admission assessments for submitting jurisdictions but excludes cases without a defined age.

Complex continuing care and long-term care include the most recent annual/quarterly assessment for all submitting jurisdictions.

**Sources**

Discharge Abstract Database, Home Care Reporting System and Continuing Care Reporting System, 2011–2012, Canadian Institute for Health Information.

**Table A3: Summary of Wounds by Age Category**

Compromised Wound	<65	65–74	75–84	85+
<b>Acute Inpatient</b>				
Arterial and Venous Wounds	0.4%	1.3%	1.3%	1.2%
Pressure Ulcers	0.2%	0.6%	0.8%	1.1%
Any Chronic Wounds	0.6%	1.8%	2.0%	2.2%
Skin Barrier Breaches	0.9%	1.4%	1.6%	2.0%
Iatrogenic Wounds	1.5%	2.8%	2.2%	1.2%
Any Compromised Wound	2.8%	5.5%	5.3%	5.0%
<b>Home Care</b>				
Arterial and Venous Wounds	4.1%	3.5%	1.9%	1.6%
Pressure Ulcers	4.2%	2.4%	1.9%	2.0%
Any Chronic Wounds	7.9%	5.7%	3.6%	3.4%
Iatrogenic Wounds	6.9%	4.7%	2.3%	0.8%
Any Compromised Wound	14.4%	10.1%	5.8%	4.2%
<b>Complex Continuing Care</b>				
Arterial and Venous Wounds	3.0%	3.4%	2.4%	2.2%
Pressure Ulcers	16.8%	14.5%	13.4%	13.1%
Any Chronic Wounds	18.5%	16.8%	15.1%	14.7%
Skin Barrier Breaches	2.8%	3.0%	2.4%	2.1%
Iatrogenic Wounds	16.1%	16.4%	14.2%	11.1%
Any Compromised Wound	32.1%	31.2%	28.0%	24.9%

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**Table A3: Summary of Wounds by Age Category (cont'd)**

<b>Compromised Wound</b>	<b>&lt;65</b>	<b>65–74</b>	<b>75–84</b>	<b>85+</b>
<b>Long-Term Care</b>				
<b>Arterial and Venous Wounds</b>	1.5%	1.6%	1.3%	1.5%
<b>Pressure Ulcers</b>	6.8%	6.9%	6.8%	6.6%
<b>Any Chronic Wounds</b>	8.0%	8.3%	7.8%	7.8%
<b>Skin Barrier Breaches</b>	0.9%	1.0%	0.9%	0.9%
<b>Iatrogenic Wounds</b>	2.4%	1.7%	1.5%	1.0%
<b>Any Compromised Wound</b>	10.6%	10.2%	9.7%	9.3%

**Notes**

Acute inpatient includes all provinces and territories except Quebec and excludes mental health cases.

Home care includes all admission assessments for submitting jurisdictions.

Complex continuing care and long-term care include the most recent annual/quarterly assessment for all submitting jurisdictions.

**Sources**

Discharge Abstract Database, Home Care Reporting System and Continuing Care Reporting System, 2011–2012, Canadian Institute for Health Information.

## Appendix B

Table B1 outlines the codes used to identify specific high-risk chronic conditions associated with wounds in each health care setting. Table B2 provides a detailed review of the prevalence of these conditions by health care setting and age group. Unless otherwise stated, only diagnosis codes of a significant type were reported.

**Table B1: Summary of Variables and Codes Used to Identify Risk Factors Across Health Care Settings**

Condition	Continuing Care Reporting System Minimum Data Set 2.0	Home Care Reporting System Minimum Data Set	Discharge Abstract Database Diagnoses M, 1, 2, 6, W, X and Y
<b>Other Cardiovascular Disease</b>	I1e: Dysrhythmia I1f: CHF I1h: Hypertension	J1e: Irregularly Irregular Pulse J1b: CHF J1d: Hypertension	I47^–I49^ I50^ I10^, I11^, I12^, I13^, I15^
<b>Peripheral Vascular Disease</b>	I1j: Peripheral Vascular Disease	J1f: Peripheral Vascular Disease	I739^, I702^, I792
<b>Stroke</b>	I1u: Stroke	J1a: Stroke	I60^–I64^
<b>Lung Disease</b>	I1jj: Asthma I1kk: Emphysema/COPD	J1z: Emphysema/COPD/Asthma	J45^ J44^, J43^
<b>Diabetes</b>	I1a: Diabetes	J1y: Diabetes	E10^–E14^
<b>Thyroid Disease</b>	I1b: Hyperthyroidism I1c: Hypothyroidism	J1ab: Thyroid Disease (Hyper or Hypo)	E05^ E039^
<b>Cognitive Impairment</b>	I1r: Alzheimer's I1v: Dementia Other Than Alzheimer's	J1g: Alzheimer's J1h: Dementia Other Than Alzheimer's	G30^ F01^, F02^, F03^, F07^, F1^7
<b>Neurological Disorders/ Conditions Affecting Mobility</b>	I1w: Hemiplegia/paresis I1z: Paraplegia I1bb: Quadriplegia I1y: MS I1aa: Parkinson's	J1j: Hemiplegia/paresis J1k: MS J1l: Parkinsonism	G81 G820^–G82^ G823^–G825^ G35^ G20^–G22^
<b>Bowel or Bladder Incontinence</b>	H1a: Bowel Continence = 4 H1b: Bladder Continence = 4	I3: Bowel Continence = 5 I1a: Bladder Continence = 5	R15^, R32^, N3939^, N393^, N394^

### Notes

CHF: congestive heart failure.

COPD: chronic obstructive pulmonary disease.

MS: multiple sclerosis.

**Table B2: Summary of Risk Factors by Age Group**

Risk Factor	<65	65–74	75–84	85+
<b>Acute Inpatient</b>				
<b>Diabetes</b>	2.7%	6.9%	6.4%	4.4%
<b>Thyroid Disease</b>	0.1%	0.3%	0.3%	0.5%
<b>Stroke</b>	0.7%	2.6%	3.4%	4.2%
<b>Peripheral Vascular Disease</b>	0.2%	0.9%	0.8%	0.7%
<b>Other Cardiovascular Disease</b>	3.2%	14.5%	20.5%	25.6%
<b>Lung Disease</b>	1.8%	7.3%	8.6%	7.7%
<b>Cognitive Impairment</b>	0.3%	2.0%	4.6%	7.8%
<b>Neurological Disorders/ Conditions Affecting Mobility</b>	0.3%	0.9%	1.2%	1.1%
<b>Bowel or Bladder Incontinence</b>	0.3%	0.5%	0.3%	0.3%
<b>Percentage Surgical Cases*</b>	30.4%	40.4%	30.1%	18.6%

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**Table B2: Summary of Risk Factors by Age Group (cont'd)**

Risk Factor	<65	65–74	75–84	85+
<b>Home Care</b>				
Diabetes	25.6%	34.6%	28.5%	18.0%
Thyroid Disease	10.0%	13.0%	15.1%	18.1%
Stroke	9.5%	15.9%	17.2%	16.1%
Peripheral Vascular Disease	6.2%	7.7%	6.3%	5.8%
Other Cardiovascular Disease	36.2%	59.9%	67.5%	71.4%
Lung Disease	14.8%	20.5%	18.0%	14.5%
Cognitive Impairment	4.6%	17.1%	30.4%	31.7%
Neurological Disorders/ Conditions Affecting Mobility	8.6%	9.24%	7.4%	3.7%
Bowel or Bladder Incontinence	6.3%	5.6%	6.9%	8.4%
<b>Complex Continuing Care</b>				
Diabetes	31.5%	39.1%	31.9%	22.3%
Thyroid Disease	8.2%	13.0%	15.2%	19.1%
Stroke	17.7%	22.4%	21.9%	18.8%
Peripheral Vascular Disease	6.0%	8.3%	8.3%	6.8%
Other Cardiovascular Disease	38.7%	60.7%	68.7%	72.8%
Lung Disease	14.3%	22.5%	22.0%	17.9%
Cognitive Impairment	5.3%	14.7%	27.1%	36.7%
Neurological Disorders/ Conditions Affecting Mobility	29.7%	20.6%	17.0%	10.9%
Bowel or Bladder Incontinence	37.2%	33.2%	31.8%	36.7%
<b>Long-Term Care</b>				
Diabetes	26.8%	34.5%	30.2%	20.2%
Thyroid Disease	12.1%	13.5%	17.0%	20.2%
Stroke	19.1%	25.5%	24.5%	20.5%
Peripheral Vascular Disease	4.4%	6.4%	6.1%	5.5%
Other Cardiovascular Disease	34.4%	53.2%	62.7%	67.7%
Lung Disease	13.6%	19.0%	18.6%	16.2%
Cognitive Impairment	24.4%	47.3%	63.4%	64.6%
Neurological Disorders/ Conditions Affecting Mobility	29.6%	23.0%	17.1%	8.9%
Bowel or Bladder Incontinence	40.4%	41.6%	43.6%	43.1%

**Notes**

\* Surgical cases were identified using the Case Mix Group+ (CMG+) 2012 grouping methodology. Any case assigned to a group based on an intervention, rather than the diagnosis information, was considered a surgical case. CMG+ surgical partition cases were included for acute care to identify the portion of cases where surgery occurred by age group.

Acute inpatient includes all provinces and territories except Quebec and excludes mental health cases.

Home care includes all admission assessments for submitting jurisdictions.

Complex continuing care and long-term care include the most recent annual/quarterly assessment for all submitting jurisdictions.

**Sources**

Discharge Abstract Database, Home Care Reporting System and Continuing Care Reporting System, 2011–2012, Canadian Institute for Health Information.

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