



# Accessibility of Wound Data in Canada: The Current Situation for Non-healing Wounds

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## Introduction

While even healing wounds require significant health-care resources, ultimately the majority of the resources used are for wounds that are non-healing.<sup>1,2</sup> Non-healing wounds, which originate from different etiologies such as arterial and venous insufficiency, pressure and diabetic foot complications, are a serious public health problem that have devastating consequences for patients and result in high costs to health-care systems.<sup>2,3</sup>

Patients with non-healing wounds have poor health-related quality of life when evaluated in eight different dimensions (see Table 1).<sup>4,5</sup> Particularly, non-healing wounds limit quality of life in the physical dimension (role limitation and functioning), and this is worsened by a concomitant amputation, which is also related to more severe body pain.<sup>2</sup>

Wound-related costs are substantial, especially when amputations and hospitalization for infection are needed, but the cost of wound burdens remains difficult to estimate properly.<sup>2,6,7</sup> Global prevalence estimates of non-healing wounds vary. It is difficult to provide comparisons when

vastly different methods are used to collect data from different locations, care settings and types of wounds. However, robust data (e.g., prevalence estimates, time to heal, healing rate, related complications) support organizations like Wounds Canada and the World Union of Wound Healing Societies (WUWHS) in creating awareness of the challenges that individuals with wounds face in health-care systems, in providing solutions and in

**Table 1:** Dimensions of Health-related Quality of Life According to SF-36 Questionnaire (adapted from Brazier et al., 1992<sup>4</sup>)

Area	Dimension
<b>Functional status</b>	<ul style="list-style-type: none"><li>• Physical functioning</li><li>• Social functioning</li><li>• Role limitations: physical problems</li><li>• Role limitations: emotional problems</li></ul>
<b>Wellbeing</b>	<ul style="list-style-type: none"><li>• Mental health</li><li>• Vitality</li><li>• Pain</li></ul>
<b>Overall evaluation of health</b>	<ul style="list-style-type: none"><li>• General health perception</li></ul>



advocating to governments to ensure they make wounds a priority.<sup>8,9</sup> A picture of the real situation will help optimize prevention and management in Canada and worldwide.<sup>5</sup> Evidence-based data are a powerful way to mobilize stakeholders for the benefit of patients that live with wounds.

### **The State of Wound Data in Canada**

In 2013, The Canadian Institute for Health Information (CIHI) released data on the prevalence of compromised wounds in Canada in different settings and acknowledged wound management, especially in diabetic patients and in seniors, as a priority for Canadian health-care organizations.<sup>10</sup> The barriers to accessing different wound data (e.g., prevalence estimates related to wound types and settings, wound-related complications like hospitalization and infection) in Canada were fully exposed.

A previous paper by Woodbury and Houghton (2005) discussed the difficulties of retrieving credible data about the prevalence of non-healing wounds.<sup>11</sup> The authors also identified several gaps in our knowledge about the extent of non-healing wounds in Canada, including the prevalence

of diabetic foot ulcers and leg ulcers due to mixed arterial/venous disease. The scarcity of prevalence data that existed in 2003 was attributed to difficulties in retrieving credible data about the prevalence of non-healing wounds. This problem is still relevant today. Pamela Houghton has revisited the issue in her article “Wound Prevalence in Canada: Reflection After 20 Years,” on page 46.

For a long time, many researchers have requested better health data accessibility and direct measured health data and national databases.<sup>12-14</sup> The 2013 CIHI report highlighted many information gaps and made several wound-specific recommendations, such as the need for standardized and high-quality reporting of wound data, especially in acute care; better coding and data collection for non-healing wounds across all health-care settings, including cellulitis reporting in home care; the need for improved education and understanding of the etiology and types of wounds; the factors that contribute to wound development and their importance to overall health and care; and the need for improved recording and reporting of wound development, progression, treatment and outcomes.<sup>10</sup> Although

CIHI did report relevant data, the principal limit with using administrative databases is the underestimation of the true extent of the problem vasued by how data are collected.

This paper will review the current state of available wound data (e.g., estimated prevalence) in Canada—specifically for non-healing wounds—since the CIHI recommendations. This is not a systematic review of the literature, and some data may not have been discussed, but we have attempted to address the following questions: What wound data literature is available in Canada? Where can we get data easily? Are the data that are available accurate? What are the barriers for obtaining the proper figures and recommendations for improving wound data?

## **Wounds: The True Burden Is Not Known**

Little is known about the true burden of non-healing wounds due to the disparities in data availability worldwide.<sup>15</sup> Retrieving wound data with systematic methods is challenging because of variability in study design, reporting data estimates and measurement methods used.<sup>15-17</sup> The burden is also unclear because of underreporting in self-treated cases, varying definitions of *non-healing wound*, and inaccurate diagnostic coding for wound care and type of wounds. The common definition of *non-healing wounds* is “wounds that fail to proceed through an orderly and timely process to produce anatomic and functional integrity,”<sup>18</sup> which does not specify any timeframe for the healing or at what point the wound becomes non-healing. The absence of systematic classification that bridges the clinic and the research introduces difficulties that challenge the accuracy of the data. Differing definitions of wound etiology of non-healing wounds also introduce variability in reporting and data. Addressing all of the above should be the first step for the creation of better wound data. Establishing clear definitions will improve research data consistency, and health-care coding systems need to be part of the change. For example, the International Working Group on the Diabetic Foot (IWGDF,

2019) published definitions related to diabetic foot disease that help in retrieval of similar data about diabetic foot,<sup>15,19</sup> and the National Pressure Injury Advisory Panel (NPIAP) changed the terminology from pressure ulcer to pressure injury in relation to international guidelines.<sup>20</sup>

## **How many Canadians live with a non-healing wound?**

Without precise information, it can be difficult to address important wound management issues and to receive adequate support from governments because they rely on the information to set health-care priorities and develop policies.

*While CIHI prevalence data are commonly used as reference, these results are derived from databases that underestimate wound type occurrence and do not differentiate wound etiology.*

Considering this, a recent systematic review of 11 observational studies looked at the prevalence of non-healing wounds, but the results have demonstrated a high heterogeneity of included studies (see box on p. 63), which limits the significance of the results produced. However, results have shown a pooled prevalence of 2.21 per 1000 population in wounds of mixed etiologies and 1.51 per 1000 population in non-healing leg ulcers.<sup>15</sup> Only one of the included studies is from Canada; it reported prevalence of 1.4% for non-healing wounds in the Quebec home-care population.<sup>23</sup> Authors also highlighted the need

## Heterogeneity

In meta-analysis, the heterogeneity measurement of included studies is a statistical method that demonstrates the capacities to merge results from similar studies to estimate a global result. Heterogeneity is calculated from clinical or methodological diversity, or both, among studies. For example, variability of the participants, interventions and outcomes are clinical diversity, and variability in study design and risk of bias are methodological diversity.<sup>21,22</sup>

Different databases were used in the 2013 CIHI wounds report:<sup>10</sup>

1. Hospital Morbidity Database (HMDB): for acute inpatient setting and day surgery (all Canadian hospitals except Quebec, which had another type of data collection)
2. Continuing Care Reporting System (CCRS) and long-term care: for complex continuing care and long-term care such as residential care and hospital continuing care in Ontario (partial coverage of long-term care residents in Newfoundland, Nova Scotia, Manitoba, Saskatchewan and British Columbia; full coverage in Ontario and Yukon)
3. Home Care Reporting System (HCRS): for community care and home care (full coverage from Ontario, Yukon and British Columbia)

for better data collection in Quebec and for prevention-based patient care protocols to help health agencies provide optimal patient care.<sup>23</sup>

CIHI reported non-healing wounds broken down by health-care settings and found that almost 4% of patients in acute care, more than 7% of patients in home care, almost 10% of patients in long-term care and almost 30% of hospital-based continuing care patients are affected.<sup>10</sup> However, while CIHI prevalence data are commonly used as reference, these results are derived from databases that underestimate wound type occurrence and do not differentiate wound etiology.<sup>10</sup>

Canadian wound data looking at specific wound types are scarce. A systematic or scoping review could be a relevant way to retrieve all the available data (e.g., prevalence, healing rate, related complications such as infection, hospitalization and death) related to the Canadian wound burdens. However, we are able to report some prevalence data (below) related to pressure injuries, diabetic foot ulcers and venous ulcers in Canada. Overall, the trends demonstrate that CIHI may have underestimated wound prevalence in Canada and their results are a conservative view of the situation.<sup>10</sup>

### Pressure injuries

Pressure injuries (PIs) are present in all care settings (e.g., acute, long-term and community care) while venous ulcers and diabetic foot ulcers are mostly present in the community, with smaller numbers in the other settings. A study of PIs in Ontario estimated prevalence as 30%, 25% and 15% in long-term care, acute care and community care settings respectively, with a mean prevalence estimated at 26% across all health-care settings.<sup>24</sup> Another study from Ontario estimated prevalence at 13% overall.<sup>25</sup> In addition, in large wound audits carried out in 13 acute care hospitals, the dominant type of wound reported was PI, with a prevalence of 22.9%.<sup>26</sup> An older prevalence study (2001) reported PIs for hospitals in the United States and Canada ranged from 4.7% to 29.7%. The range for community settings was 19.2% to 29% and that for nursing homes was 15.3% to 20.7%. The highest reported prevalence was 33% for patients with spinal cord injuries cared for in community settings.<sup>27</sup> Finally, a small study in two long-term care facilities estimated the prevalence of PIs between 36 and 53%.<sup>28</sup> All these findings suggest higher prevalence than gleaned from international data from a systematic review, which have estimated the prevalence of PIs in acute care settings at between 6% and 18.5%.<sup>29</sup>

## Diabetic foot ulcers

The prevalence of diabetic foot ulcers (DFUs) in Canada was estimated at 75 per 100,000 people in a large cohort that represents 60% of the total population of Canadians with diabetes.<sup>30</sup> This study did not include data from Quebec and British Columbia, and prevalence was calculated using standardized mandatory national health administrative databases for hospital admissions and available provincial data for emergency room and clinic visits, home care and long-term care facilities.<sup>30</sup> DFUs are more prevalent in Indigenous communities of Canada and are estimated at 14.8%.<sup>31</sup>

## Venous ulcers

In one Ontario region, a new community leg ulcer service reported venous leg ulcer prevalence at 2 per 1000 people over 25 years of age.<sup>32</sup>

## Global prevalence estimates

It has been suggested to avoid comparing prevalence estimates across studies from Canada or with other countries.<sup>15</sup> There is no place for combining “apples and oranges” in this area of research because of the studies’ high heterogeneity. However, as an informational study, the prevalence of PIs in long-term care facilities is estimated to be between 11.8 and 13.7%, depending on the country,<sup>33</sup> and 14.8% in public hospitals.<sup>34</sup> The global prevalence of DFUs is estimated at 6.3% in a recent systematic review.<sup>35</sup> Venous ulcers affect up to 3 per 1000 people, and are more common in older people.<sup>32</sup>

## Current Data Accessibility in Canada

We listed sources of Canadian wound data by province and territory, regardless of the type of data; this is summarized in Table 2. We found that limited wound-related data are available for clinicians and researchers. According to our preliminary research, based on keywords, most public databases from provincial health-care authorities do not provide information. The lack of accessibility can limit our understanding of the current situation. In this context, society remains unaware

of the true impact of wounds on patients and on health-care systems.

The two most accessible organizations that share information are CIHI and the Quebec government, through the Régie de l’assurance maladie du Québec (RAMQ) or the Institut nationale de santé publique (INSPQ). In all cases, formal requests for information have to be completed. The Discharge Abstract Database (DAD) contains acute care discharge data from most Canadian hospitals, except those in Quebec, and is very relevant for wound data.<sup>36,37</sup> Databases are available by year and jurisdictional coverage.<sup>38</sup> Canadian Coding Standards are used, and this coding system is similar across the country.<sup>39</sup>

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health-care systems*

There are major limitations in accessing these databases. First, researchers must wait a minimum of 30 days for access to CIHI and a minimum of a year for the Quebec database. Second, access to these databases is expensive. This impacts researchers and health-care leaders considerably because they need research funding to provide new data in wound research and to improve the quality of wound care practice. Finally, researchers must have the skills required to manage and use metadata to come to any conclusions.

However, there is also limited value for this kind of data. A recent validation study in Alberta for the prevalence of PIs using DAD demonstrated the data’s low sensitivity. The authors suggest that this data source may not be accurate for determining overall PI prevalence, and results should be cautiously compared with other prevalence studies. Overall, their findings highlight the underestimation of the real prevalence.<sup>40</sup> We have to keep in mind that one of the primary

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purposes of collecting administrative health data is to inform resource utilization and surveillance. Database administrators in Canada use predefined classification codes to register conditions, and this may not be precise enough for the wound types or stages.<sup>41</sup> A wound remains a wound, and the etiology is then less important in a billing code system. This is why it is also important to conduct data-quality studies to remain informed about the strengths and limitations of the data in order to produce unbiased results.<sup>41</sup>

Done correctly, administrative data analysis may serve to identify the magnitude of prevalence and monitor annual trends to inform quality-of-care evaluations. To evaluate data within the same institution or to make comparisons between institutions, data must be sufficiently standardized and their quality needs to be comparable across jurisdictions. The concept of data quality is then both relative and multidimensional.<sup>41</sup> The CIHI data quality framework encompasses concepts of accuracy, timeliness, comparability, usability

and relevance,<sup>42</sup> but other organizations such as the Public Health Agency of Canada or Statistics Canada are using different data quality frameworks.<sup>41</sup>

Another relevant way to access wound data is by working closely with teams in specialty wound clinics. In Ontario, an analysis of non-healing wound management outlined 49 teams that dealt with wounds in a population sample size estimated at 12,028,905 and provided many relevant data for wound management.<sup>43</sup> It estimated that teams see an average of 579 patients per year, and their results have shown that the majority of wounds treated are non-healing: 45% diabetic foot ulcers, 15% pressure injuries and 13% venous ulcers.<sup>43</sup> A study that put forward a multi-disciplinary approach to non-healing wounds in Newfoundland and Labrador demonstrated that venous leg ulcers and pressure injuries were the dominant wound etiology.<sup>44</sup> Moreover, some clinics may have internal registries that code wound

**Table 2:** Canadian Provincial and Territorial Data Accessibility

Provinces and territories	Data accessibility	References
<b>British Columbia</b>	<ul style="list-style-type: none"> <li>Ministry of Health</li> <li>Discharge Abstract Database (DAD)</li> <li>Community Health Database</li> </ul>	<ul style="list-style-type: none"> <li><a href="http://www2.gov.bc.ca/gov/content/governments/organizational-structure/ministries-organizations/ministries/health">www2.gov.bc.ca/gov/content/governments/organizational-structure/ministries-organizations/ministries/health</a> *</li> <li><a href="http://www.popdata.bc.ca/data/health/dad">www.popdata.bc.ca/data/health/dad</a></li> <li><a href="http://communityhealth.phsa.ca/">http://communityhealth.phsa.ca/</a> **</li> <li><a href="http://www.cihi.ca/en/discharge-abstract-database-metadata-dad">www.cihi.ca/en/discharge-abstract-database-metadata-dad</a> *</li> </ul>
<b>Alberta</b>	<ul style="list-style-type: none"> <li>Alberta Health Services: Wounds Clinic and data request to Health System Access for Research (AHS)</li> <li>Discharge Abstract Database (DAD)</li> <li>Alberta Health Services Wound Clinic site</li> </ul>	<ul style="list-style-type: none"> <li><a href="http://www.albertahealthservices.ca/findhealth/service.aspx?id=1026473">www.albertahealthservices.ca/findhealth/service.aspx?id=1026473</a>*</li> <li><a href="http://www.albertahealthservices.ca/research/Page16074.aspx">www.albertahealthservices.ca/research/Page16074.aspx</a>*</li> <li><a href="http://www.alberta.ca/health-research.aspx">www.alberta.ca/health-research.aspx</a></li> <li><a href="http://www.cihi.ca/en/discharge-abstract-database-metadata-dad">www.cihi.ca/en/discharge-abstract-database-metadata-dad</a> *</li> </ul>
<b>Saskatchewan</b>	<ul style="list-style-type: none"> <li>eHealth Saskatchewan: data portal with a request</li> <li>Discharge Abstract Database (DAD)</li> <li>Support website/group</li> </ul>	<ul style="list-style-type: none"> <li><a href="http://www.ehealthsask.ca/health-data">www.ehealthsask.ca/health-data</a> *</li> <li><a href="http://www.cihi.ca/en/discharge-abstract-database-metadata-dad">www.cihi.ca/en/discharge-abstract-database-metadata-dad</a> *</li> <li><a href="https://skinandwound.org/">https://skinandwound.org/</a></li> </ul>
<b>Manitoba</b>	<ul style="list-style-type: none"> <li>Health Care Statistics page</li> <li>Annual statistics for Health, Seniors and Active Living</li> <li>Discharge Abstract Database (DAD)</li> </ul>	<ul style="list-style-type: none"> <li><a href="http://www.gov.mb.ca/health/statistics/index.html">www.gov.mb.ca/health/statistics/index.html</a></li> <li><a href="http://www.gov.mb.ca/health/annstats/index.html">www.gov.mb.ca/health/annstats/index.html</a></li> <li><a href="http://www.cihi.ca/en/discharge-abstract-database-metadata-dad">www.cihi.ca/en/discharge-abstract-database-metadata-dad</a> *</li> </ul>
<b>Ontario</b>	<ul style="list-style-type: none"> <li>Open data, Public Health Ontario</li> <li>Health Data Branch Web portal</li> <li>Discharge Abstracts Database (DAD)</li> <li>Ontario Woundcare Interest Group</li> </ul>	<ul style="list-style-type: none"> <li><a href="http://www.publichealthontario.ca/en/data-and-analysis/using-data/open-data">www.publichealthontario.ca/en/data-and-analysis/using-data/open-data</a> **</li> <li><a href="http://www.cihi.ca/en/discharge-abstract-database-metadata-dad">www.cihi.ca/en/discharge-abstract-database-metadata-dad</a> *</li> <li><a href="https://data.ontario.ca/dataset/discharge-abstract-database-dad-ontario-hospitals">https://data.ontario.ca/dataset/discharge-abstract-database-dad-ontario-hospitals</a> *</li> <li><a href="https://chapters-igs.rnao.ca/interestgroup/45/about">https://chapters-igs.rnao.ca/interestgroup/45/about</a></li> </ul>
<b>Quebec</b>	<ul style="list-style-type: none"> <li>Régie de l'assurance maladie du Québec data and stats</li> <li>Support website/group</li> </ul>	<ul style="list-style-type: none"> <li><a href="http://www.ramq.gouv.qc.ca/en/data-statistics">www.ramq.gouv.qc.ca/en/data-statistics</a> *</li> <li><a href="http://www.msss.gouv.qc.ca/professionnels/documentation-sources-de-donnees-et-indicateurs/sources-de-donnees-et-metadonnees/med-echo/">www.msss.gouv.qc.ca/professionnels/documentation-sources-de-donnees-et-indicateurs/sources-de-donnees-et-metadonnees/med-echo/</a> *</li> <li><a href="http://www.rqsp.ca/">www.rqsp.ca/</a></li> </ul>
<b>New Brunswick</b>	<ul style="list-style-type: none"> <li>Health Data page</li> <li>Discharge Abstract Database (DAD)</li> <li>List of non-healing wound care clinics (may have data)</li> </ul>	<ul style="list-style-type: none"> <li><a href="https://nbhc.ca/">https://nbhc.ca/</a> **</li> <li><a href="http://www.cihi.ca/en/discharge-abstract-database-metadata-dad">www.cihi.ca/en/discharge-abstract-database-metadata-dad</a> *</li> <li><a href="http://www.horizonnb.ca/home/facilities-and-services/services/clinics/chronic-wound-clinic.aspx">www.horizonnb.ca/home/facilities-and-services/services/clinics/chronic-wound-clinic.aspx</a></li> </ul>

*cont'd. . . .*

Provinces and territories	Data accessibility	References
<b>Nova Scotia</b>	<ul style="list-style-type: none"> <li>Government data portal: nothing wound-specific</li> <li>Discharge Abstract Database (DAD)</li> <li>Provincial wound care site</li> </ul>	<ul style="list-style-type: none"> <li><a href="https://data.novascotia.ca/">https://data.novascotia.ca/</a> **</li> <li><a href="http://www.cihi.ca/en/discharge-abstract-database-metadata-dad">www.cihi.ca/en/discharge-abstract-database-metadata-dad</a> *</li> <li><a href="http://www.cdha.nshealth.ca/provincial-wound-prevention-and-management-program">www.cdha.nshealth.ca/provincial-wound-prevention-and-management-program</a></li> </ul>
<b>Prince Edward Island</b>	<ul style="list-style-type: none"> <li>Open Data portal</li> <li>Discharge Abstract Database (DAD)</li> </ul>	<ul style="list-style-type: none"> <li><a href="https://data.princeedwardisland.ca/">https://data.princeedwardisland.ca/</a> **</li> <li><a href="http://www.cihi.ca/en/discharge-abstract-database-metadata-dad">www.cihi.ca/en/discharge-abstract-database-metadata-dad</a> *</li> </ul>
<b>Newfoundland and Labrador</b>	<ul style="list-style-type: none"> <li>Health Open Data</li> <li>Discharge Abstract Database (DAD)</li> </ul>	<ul style="list-style-type: none"> <li><a href="https://opendata.gov.nl.ca/public/opendata/page/?page-id=datasets-tag&amp;id=35">https://opendata.gov.nl.ca/public/opendata/page/?page-id=datasets-tag&amp;id=35</a> **</li> <li><a href="http://www.cihi.ca/en/discharge-abstract-database-metadata-dad">www.cihi.ca/en/discharge-abstract-database-metadata-dad</a> *</li> </ul>
<b>Yukon</b>	<ul style="list-style-type: none"> <li>Open Data Yukon</li> <li>Discharge Abstract Database (DAD)</li> <li>Skin and Wound community of practice Yukon</li> </ul>	<ul style="list-style-type: none"> <li><a href="https://open.yukon.ca/data/">https://open.yukon.ca/data/</a> **</li> <li><a href="http://www.cihi.ca/en/discharge-abstract-database-metadata-dad">www.cihi.ca/en/discharge-abstract-database-metadata-dad</a> *</li> <li><a href="https://yukonwoundcarerehab.com/services/wound-care/">https://yukonwoundcarerehab.com/services/wound-care/</a></li> </ul>
<b>Northwest Territories</b>	<ul style="list-style-type: none"> <li>NWT Bureau of Statistics</li> <li>Discharge Abstract Database (DAD)</li> </ul>	<ul style="list-style-type: none"> <li><a href="http://www.statsnwt.ca/health/health-conditions">www.statsnwt.ca/health/health-conditions</a> **</li> <li><a href="http://www.cihi.ca/en/discharge-abstract-database-metadata-dad">www.cihi.ca/en/discharge-abstract-database-metadata-dad</a> *</li> </ul>
<b>Nunavut</b>	<ul style="list-style-type: none"> <li>Open Data Nunavut</li> <li>Health statistics</li> <li>Discharge Abstract Database (DAD)</li> </ul>	<ul style="list-style-type: none"> <li><a href="http://www.gov.nu.ca/health">www.gov.nu.ca/health</a> **</li> <li><a href="http://www.gov.nu.ca/health/information/health-statistics">www.gov.nu.ca/health/information/health-statistics</a> **</li> <li><a href="http://www.cihi.ca/en/discharge-abstract-database-metadata-dad">www.cihi.ca/en/discharge-abstract-database-metadata-dad</a> *</li> </ul>

\* A request must be made to access data.

\*\* No wound-specific data are available.

type and are linked to electronic medical records over time. These systems can facilitate research.

## Perspectives for Wound Data

Metadata are necessary to help enhance wound prevention and management in Canada. Easier access to metadata would allow researchers to look at what is working and what is not. This may also help to identify how we can increase data quality related to wound care and what can be done to allow comparison and pooled estimated prevalence. National funding organizations need to support researchers in this area, along with universities, provincial/territorial health authorities and relevant professional associations. Even

if small, local efforts are made to access local wound data, large, multicentric prospective studies across Canada are needed to answer the important question of how many Canadians live with wounds and with non-healing wounds. Enhancing wound coding systems and enabling better wound identification and etiologies in clinical practice can help clinicians collect relevant wound data to contribute to a national database. CIHI wound data analysis is likely the tip of the iceberg of a large health problem that needs to be addressed as soon as possible. Wound clinicians are aware of the problem and must rally patients with wounds, researchers and stakeholders to work together for better data and more efficient actions to change this situation. 



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