

Title: Identifying Peer Long-term Care homes using RUG-III: a data driven tool

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Introduction:

The Resource Utilization Groups (RUG-III) case-mix system is used to classify residents in long-term care (LTC) homes. In Canada, over 1,400 LTC homes submit interRAI assessment data to the Canadian Institute for Health Institution. These data are used to compute risk-adjusted indicators of quality which are reported publicly (YourHealthSystem.CIHI.ca). Increasingly, care providers are interested in understanding how their facility performs relative to others providing similar services to persons with similar needs. Peer comparators are often identified based on facility structural attributes and administrative information. These attributes are usually pre-defined without frequent updates.

To better support LTC homes in quality improvement planning, CIHI has developed a dynamic data-driven proof of concept to match peer facilities based on case-mix attributes.

Methods:

Six years of interRAI assessment data from all LTC homes Complex Continuing Care hospitals across Canada (2014-2019) were used to build the peer selector methodology.

A K-Nearest Neighbour (KNN) machine-learning classification algorithm based on Gower's distance is used to quantify the similarity between each pair of facilities. This algorithm uses information on:

- Overall RUG-III distribution over seven categories
- Case Mix Index (CMI)
- Facility size
- Sector
- Province
- Urban/Rural area

An interactive R Shiny App allows choice of different case-mix metrics combinations to identify the most similar peers across Canada. Based on user needs, different weights can be assigned to the above factors. Closest peer facilities (e.g., "Top 5 peers") are determined for any facility of interest. Thereafter, risk-adjusted measures of quality of care can be compared among the selected peers.

Results:

The Gower's distance measure provides the flexibility of evaluating facilities' closeness based on both numeric and categorical metrics of users' choice. Preliminary evaluations demonstrate that the majority of facilities can be matched to at least five similar peers. Difficult to match facilities include speciality LTC homes (e.g., psychogeriatric care) with unique case-mix distributions.

Conclusions:

CIHI's peer selection methodology is a data-driven approach to identify peer facilities based on case-mix. Using this tool, peer selection becomes an automatic process rather than static

mapping. It provides the flexibility to leverage new interactive tools (e.g., R Shiny) to refine peer matches based on user needs, thereby enabling quality performance goal setting based on realistic and achievable benchmarks.