Development of the Home Care Categorization Tool (HCCT) for Long-Stay Patients

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Introduction

• Ontarians deserve high-quality and consistent home care that is delivered using evidence-informed solutions

• As Ontario’s home care sector transitions to using a new standardized assessment instrument, the interRAI Home Care (HC), there was an opportunity to create a new approach to determining patient population based on the Home Care Client Care Model (CCM)

• The Home Care Categorization Tool (HCCT) was developed as an evidence-informed decision-support tool for use by care coordinators to promote a consistent process for patient population identification
Client Care Model (CCM)

• All Ontario home care patients are categorized using the CCM, a framework that defines five standardized patient populations that are based on the care needs of patients at home – complex, chronic, community independence, short-stay, and well.

• Patient attributes that contribute to each category includes:

  • Health conditions
  • Socioeconomic factors (i.e. supportive and intact social networks)
  • Degree of independence (i.e. functional needs)
  • Risk of experiencing acute episodes
  • Anticipated requirements for intensity of care coordination services

The CCM promotes: 1) care planning that supports outcome-based and quality patient experiences; 2) comprehensive care coordinator knowledge and understanding of patient care needs by each population; and 3) a foundation for consistency and measurable accountability through common Guidelines of Care.
Transition to the interRAI HC

In Ontario, one aspect of patient assessment is conducted using standardized assessment instruments from the interRAI suite of tools.

The RAI Home Care (RAI-HC) instrument has been used since 2002. The home care sector will transition from using the RAI-HC to the new and updated interRAI HC assessment instrument in the near future.

With this important transition, there was an opportunity to strengthen the evidence-informed approach to determining the CCM population for each patient using relevant attributes that are available through the interRAI HC.
Objective

- To develop consistent processes for care coordinators to identify patients into the most appropriate CCM population category using relevant patient attributes from the interRAI HC in an evidence-informed decision support tool, the HCCT.

The new HCCT requires care coordinator clinical expertise and judgement.
HCCT Algorithm Development Methods

Ontario long-stay adult home care patients who completed at least one RAI-HC assessment in fiscal year 2015-2016 were identified using the provincial technology solution (electronic health record system) utilized by care coordinators – Client Health and Related Information System (CHRIS).

### Inclusion Criteria
- Adult home care patients who received a RAI-HC assessment between April 1, 2015 and March 31, 2016
- Patients admitted and eligible for home care services

### Factors Tested
- Demographics: age, gender
- Clinical scores/scales and clinical assessment protocols (CAPs): MAPLe, CHESS, PS Algorithm, CRISIS Algorithm, various RAI-HC CAPs, PURS, DIVERT Score, DRS, Pain Scale, ADL Short, ADL Long, Self-Reliance Index
- Medical Complexity
- Caregiver Related Factors

### Classification and Regression Trees
- CART analysis was used to determine the best predictors of the CCM patient population categories.
- CART splits the data into segments that are as **homogeneous** as possible with respect to the dependent variable (i.e. CCM Population).
- Initial validation of the algorithm will be based on the **Split-sample validation** whereby the model is generated using a training sample and tested on a hold-out sample.
- Secondary validation will be done by **splitting the dataset by CCAC** (i.e. 14 samples)
The foundation of the HCCT is the Personal Support (PS) Algorithm, a new algorithm that considers patients’ functional and personal support needs. The outcome of which is a care group ranging from one to six. Patients in group six have the highest need for personal support. Based on the algorithm’s six care groups, six trees were developed using other outcomes from the RAI-HC including the CPS, MAPLe, CHESS, ADL Hierarchy (ADLH), CRISIS Score, and DIVERT Score.
Classification and Regression Tree Analysis
Results

Provincial HCCT Results – Care Group 1 Decision Tree

- Complex
- Chronic
- Community Independence

PS Algorithm = 1
(N = 15,683)

- CHESS (0-2)
  (N = 14,438)
  - CPS (0-1)
    (N = 13,981)
      - Community Independence (66%)
    - CHESS = 0
      (N = 180)
      - Community Independence (53%)
  - CPS ≥ 2
    (N = 457)
    - CHESS ≥ 1
      (N = 277)
      - Chronic (50%)
  - CHESS = 3
    (N = 1,060)
    - MAPLe (1-2)
      (N = 677)
      - Community Independence (59%)
  - MAPLe ≥ 3
    (N = 383)
    - Chronic (48%)
- CHESS ≥ 4
  (N = 140)
  - Chronic (40%)
Classification and Regression Trees Analysis Results

Provincial HCCT Results – Care Group 3 Decision Tree

- **Complex**
- **Chronic**
- **Community Independence**

**PS Algorithm = 3**
(N = 70,310)

**CPS ≤ 1**
(N = 23,222)

- **ADLH = 0**
(N = 6,810)
  - CHESS ≤ 1
(N = 2,962)
  - MAPLe ≤ 2
(N = 690)
  - CHESS ≥ 2
(N = 3,848)

- **CHESS ≥ 2**
(N = 3,848)
  - MAPLe ≥ 3
(N = 3,158)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **MAPLe ≤ 4**
(N = 25,439)
  - MAPLe ≤ 3
(N = 1,417)
  - CPS = 1
(N = 7,849)
  - ADLH = 2
(N = 30,344)

- **MAPLe ≥ 5**
(N = 4,905)
  - CPS = 1
(N = 7,849)
  - ADLH = 2
(N = 30,344)

- **CHESS ≤ 3**
(N = 32,672)
  - CPS = 2
(N = 35,232)
  - CPS ≥ 3
(N = 8,649)

- **CPS ≥ 4**
(N = 3,207)

- **ADLH ≤ 1**
(N = 1,342)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **ADLH ≥ 2**
(N = 3,310)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **CHESS ≥ 3**
(N = 2,560)
  - CPS = 3
(N = 8,649)
  - CPS ≥ 4
(N = 3,207)

- **ADLH ≤ 1**
(N = 1,342)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **ADLH ≥ 2**
(N = 3,310)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **CHESS ≤ 2**
(N = 6,346)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **CHESS ≥ 4**
(N = 911)
  - CPS = 1
(N = 7,849)
  - ADLH = 2
(N = 30,344)

- **ADLH ≤ 1**
(N = 1,342)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **ADLH ≥ 2**
(N = 3,310)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **CHESS ≤ 2**
(N = 6,346)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **CHESS ≥ 4**
(N = 911)
  - CPS = 1
(N = 7,849)
  - ADLH = 2
(N = 30,344)

- **ADLH ≤ 1**
(N = 1,342)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **ADLH ≥ 2**
(N = 3,310)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **CHESS ≤ 2**
(N = 6,346)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **CHESS ≥ 4**
(N = 911)
  - CPS = 1
(N = 7,849)
  - ADLH = 2
(N = 30,344)

- **ADLH ≤ 1**
(N = 1,342)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **ADLH ≥ 2**
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  - CPS = 0
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(N = 16,412)

- **CHESS ≤ 2**
(N = 6,346)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **CHESS ≥ 4**
(N = 911)
  - CPS = 1
(N = 7,849)
  - ADLH = 2
(N = 30,344)

- **ADLH ≤ 1**
(N = 1,342)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **ADLH ≥ 2**
(N = 3,310)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **CHESS ≤ 2**
(N = 6,346)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **CHESS ≥ 4**
(N = 911)
  - CPS = 1
(N = 7,849)
  - ADLH = 2
(N = 30,344)

- **ADLH ≤ 1**
(N = 1,342)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **ADLH ≥ 2**
(N = 3,310)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **CHESS ≤ 2**
(N = 6,346)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **CHESS ≥ 4**
(N = 911)
  - CPS = 1
(N = 7,849)
  - ADLH = 2
(N = 30,344)

- **ADLH ≤ 1**
(N = 1,342)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **ADLH ≥ 2**
(N = 3,310)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **CHESS ≤ 2**
(N = 6,346)
  - CPS = 0
(N = 8,563)
  - ADLH = 1
(N = 16,412)

- **CHESS ≥ 4**
(N = 911)
  - CPS = 1
(N = 7,849)
  - ADLH = 2
(N = 30,344)
Classification and Regression Trees Analysis
Results

Provincial HCCT Results – Care Group 6 Decision Tree

- **Complex**
- **Chronic**
- **Community Independence**

**PS Algorithm = 6 (N = 21,905)**

- **CPS ≤ 2 (N = 7,292)**
  - CPS ≤ 1 (N = 2,933)
    - MAPLe ≤ 3 (N = 1,184)
      - ADLH ≤ 5 (N = 1,074)
        - CHESS = 0 (N = 378)
          - Chronic (76%)
    - CPS = 2 (N = 1,587)
      - MAPLe = 6 (N = 110)
        - ADLH = 1 (N = 696)
          - Chronic (76%)
  - CPS = 2 (N = 1,587)
    - MAPLe ≥ 4 (N = 673)
      - ADLH ≤ 4 (N = 227)
        - Complex (69%)
      - ADLH = 5 (N = 469)
        - Complex (67%)

- **CPS ≥ 3 (N = 14,613)**
  - CPS ≥ 3 (N = 4,359)
    - MAPLe ≤ 3 (N = 612)
      - ADLH ≤ 4 (N = 162)
        - Chronic (83%)
      - ADLH ≥ 5 (N = 374)
        - Complex (60%)
    - MAPLe ≥ 4 (N = 536)
      - ADLH ≤ 4 (N = 162)
        - Chronic (83%)
      - ADLH ≥ 5 (N = 374)
        - Complex (60%)
Field testing was conducted to consider the clinical relevance and validity of the HCCT with involvement from 26 in-home care coordinators from across Ontario.

Following each the completion of each RAI-HC assessment, care coordinators reviewed the CCM population that they selected and responded to questions comparing their selection to the CCM population suggested by the HCCT.

Field testing began on November 28, 2016 and ended on December 30, 2016 - a total of 430 assessments were completed.
HCCT Field Testing Results

Results demonstrated that an acceptable 81% of the CCM populations selected by the care coordinators were a direct match to those predicted by the HCCT.

- For the 7% of patients that the CCM population did not match, the care coordinators indicated that if given a choice, they would change to the population predicted by the tool.
- For 12% of the assessments, the care coordinators disagreed with the HCCT predicted population.
- Provincially, the most commonly identified reason for changing the CCM population from the HCCT prediction was the patient’s health conditions, followed by the expected case management intensity.
Next Steps

The HCCT tool is expected to be implemented as a provincial technology solution prior to the transition to the interRAI HC. It will be used to support care coordinators in their decision-making process regarding the most appropriate CCM population for their patients.

The HCCT is intended to be used conjointly with care coordinators’ clinical expertise and judgment, and patient and caregiver needs and preferences.

Following the transition from the RAI-HC to the interRAI HC, there will be an opportunity for us to refine the HCCT model with the additional factors that will be captured in the interRAI HC.
QUESTIONS?