

**The**

# **DIVERT**

Detection of Indicators and  
Vulnerabilities for Emergency Room Trips

**Scale**

## **Brief Information Guide**

Version 1.3 – Nov 2014

## **For more information:**

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## **PREFACE**

The DIVERT scale was developed to support decision-making concerning emergency department and hospital use among home and community care patients. Essentially, the DIVERT Scale is a validated decision support system that identifies a patient's likelihood of future unplanned ED use.

### **Context**

Home care patients, especially long-stay patients, are a prevalent group of Canadian seniors that are at high risk of emergency department use. Approximately 8% of all seniors (65+) in Ontario, and 33% of seniors over the age of 85 are long-stay community home care patients in any given year.

Close to 40% of Ontario long-stay home care patients have a hospital admission, or ambulatory emergency department visit within 6 months of being assessed by a case manager. Home care patients have approximately double the ED utilization rate of nursing home residents and other older adults in the community.

### **Purpose of this Guide**

This guide was produced in order to introduce the DIVERT scale and provide a general guide to its use. This guide provides essential information to augment peer-reviewed manuscripts (forthcoming).

This guide is an evolving document.

Please use the contact information in this document to access the most current version of this guide. Also, please send comments on how this document can better meet your needs.

## **DEVELOPMENT OF THE DIVERT SCALE**

The DIVERT scale was developed from a multi-year, census-level cohort study of home care patients in two Canadian provinces: Ontario and Manitoba (N=617,035). Census-level RAI-HC assessment records were linked prospectively to NACRS emergency department records in Ontario and Manitoba from April 1st 2007 to September 29th 2010 and January 1st 2006 to September 29th 2009, respectively.

The DIVERT scale was informed by decision tree analyses, the Andersen Behavioural Model, and a 7-member, 5-country clinical panel. A sensitivity analysis established the most discriminatory and coherent tool based on precision, overall discriminatory power, and clinical face validity (see Appendix A).

The DIVERT scale was validated on a separate data partition from Ontario and Manitoba (N=154,262). Multilevel analyses were conducted to test regional variation in the DIVERT scale performance. Disease stratified analyses were also conducted to test the DIVERT scale's generalizability across common disease classes.

The DIVERT scale showed good risk differentiation and clinical utility. It achieved an area under the curve of 0.62 (95% CI: 0.61-0.62) and showed clear differentiation in Kaplan-Meier plots upon validation (see Appendix B).

Multi-level analyses showed no regional variation in performance and disease stratified analyses showed no variation in performance across diagnostic groups. This indicated that the DIVERT scale predicted unplanned emergency department use across geographical settings and disease categories (see Appendix C and D for disease stratified analyses).

## DESCRIPTION OF THE DIVERT SCALE

The DIVERT scale is an empirically sound, visual representation of the predictors for ED visits among home care patients. It distinguishes 6 different risk categories (a score of 6 represents the highest level of risk) (see Appendix A).

Previous emergency department use, cardio-respiratory symptoms, and cardiac conditions feature heavily in the DIVERT scale. Many of the risk pathways in the DIVERT scale describe, so-called, 'ambulatory care sensitive conditions' – those that are generally agreed to be preventable by interventions in primary care.

The following clusters within DIVERT scale should be emphasized:

- Cardio-respiratory symptoms best differentiate home care patients' risk regardless of previous use.
  - These symptoms are common presenting complaints among older patients reflect immediate and, often, distressing events that prompt emergency department use.
- Cardiac conditions (CHF and CAD) further differentiate the presence of cardio-respiratory symptoms.
  - The presence of cardiac conditions in the DIVERT scale likely differentiates the real or perceived severity of the preceding cardio-respiratory symptoms.
- The relationship between cardiac conditions and other complex conditions represents the deleterious influence of other complex conditions and infections.
- Patients with poor prospects for functional improvement and mood symptoms are at higher risk of emergency department use than those without mood symptoms.
  - This demonstrates that a patient's mood symptoms moderate the effect of functional decline.
- The grouping of previous falls with a diagnosis of diabetes or a recent stroke represents an increase risk and, potentially, severity of future falls.
  - This increased risk may reflect the visual, spatial, and gait challenges associated with diabetes and stroke.
- Some geriatric syndromes differentiate the risk of emergency department visits among patients with no previous emergency department use or cardio-respiratory symptoms, including: falls, ADL decline, and nutritional status.
  - These factors might be a reflection of underlying chronic conditions (incl. dementia), medications, social isolation, frailty, or environmental factors.
- A stasis ulcer differentiated the risk of emergency department visits for patients without previous ED use or cardio-respiratory symptoms.
  - Stasis ulcers account for the majority of chronic wounds among older adults.

## QUICK USER GUIDE

### **Goal of the DIVERT Scale**

The DIVERT scale is intended to assist in targeting home and community care patients at risk of unplanned emergency department use. Beyond its use as a decision-support system to help direct home care resources, the DIVERT scale may also be utilized to prioritize communication and collaboration with primary care practitioners, primary care teams, and relevant specialists.

The DIVERT scale is not a diagnostic decision tool for any condition/disorder that can only be made by a qualified healthcare provider after a detailed evaluation. Users must exercise their best independent judgment when using the DIVERT scale.

### **Target Population**

The DIVERT scale was developed and tested on home and community care patients living in private dwellings (i.e., house, apartment, retirement community, etc.).

Home care patients, by definition, represent a frailer subpopulation of community-dwelling older adults.

The DIVERT scale was not developed or tested on nursing home residents or other institutionalized older adults.

### **Implications for Care**

#### *General suggestions:*

Interventions and models of care should be adapted to the unique needs of each subgroup identified by the DIVERT Scale. The resource intensity of each DIVERT subgroup intervention should be proportionate to the identified risk level and involve existing chronic disease management guidelines as well as appropriate clinical discretion for each patient.

#### *Implications for Home and Community Care services:*

The DIVERT scale can be used as a toll to help direct home care resources, and chiefly those designed for aid chronic disease management.

#### *Implications for Primary Care:*

Research suggests that faster access and stronger links to primary health care is an indispensable component of emergency department avoidance strategies. The DIVERT scale can be used by case managers to target home care patients who need urgent attention in primary care. Referrals could be made directly to primary care providers for urgent appointments, after hours primary care access, or home visits.

- For example, patients with cardio-respiratory symptoms, but without a formal diagnosis, may particularly benefit from early identification and management in primary care.

- Evidence suggests that many home care patients with cardiac conditions are not receiving ideal pharmacotherapy. A recent study showed that only 29% of long-stay patients with diagnosed heart failure are receiving optimal pharmacotherapy (see Foebel et al., 2011).
- A large Canadian study found that 40% of persons with one or more severe chronic conditions have not made a treatment plan with their primary care provider in over a year (see CIHI, 2009).

### **Modes of Implementation**

interRAI Home and Community Care instruments are mandated for home and community care patients in many jurisdictions. DIVERT can be generated from the interRAI Home and Community Care instruments at no additional cost. Software specifications or other coding can be obtained from the contact information in this document. Two broad methods can be identified from DIVERT scale scores generated from the interRAI Home and Community Care instruments:

1. *“Push Method”*: The home and community care agency’s decision support or IT unit can send automatic ‘risk notices’ regularly to case managers based on the DIVERT scores generated from new RAI-HC assessments completed over a specified time period. If patient primary care physician information is available then automatic ‘risk notices’ could also be sent (electronically if possible) to primary care physicians by the decision support or IT unit directly. Automated patient health profiles, based on the DIVERT scale, could be developed to augment risk notices.
2. *“Pull Method”*: Home and community care case managers can integrate the DIVERT scale into their practice decisions the same way as any other interRAI risk scale that is available on the interRAI home and community care instruments. Guidelines for intervention should be developed to train and support case managers on how to take appropriate action.

DIVERT can also be used outside the interRAI Home and Community Care instruments:

3. *“Screening Model”*: The DIVERT scale, with question prompts, can be used as a stand-alone screening tool for agencies not using interRAI instruments. Support is available through the contact information in this document.

## FAQ: Frequently Asked Questions

**Question:** How is the DIVERT scale different from other scales and care frameworks used in home and community care?

*Answer:* The DIVERT scale includes determinants that are not fully captured in existing decision support tools or in existing patient classification frameworks in home and community. Analyses show that the DIVERT scale is not correlated with other risk or summary scales available within the interRAI home and community care instruments. The DIVERT scale can be used to introduce a different perspective – one which focuses on the identification and management of the symptoms and conditions associated with ED use.

**Question:** How is the DIVERT scale different from other tools that predict ED and hospital use?

*Answer:* Simply, the DIVERT scale is specific to patients in home and community care. To our knowledge it is the first and only tool developed and validated on home and community care patients. However, the DIVERT scale has elements that are similar to other risk indexes using in adjacent care settings.

**Question:** Does the DIVERT scale predict hospitalizations?

*Answer:* Yes. Since approximately 50% of ED visits are admitted and more than 90% of hospital admissions are from the emergency department, the DIVERT scale also predicts hospitalizations. However, the goal of the DIVERT scale as a decision-support and resource deployment tool is to avoid events prior to a hospitalization. Though less predictable than hospital use, emergency department visits are thought to be more preventable.

**Question:** What DIVERT scale cut-off point should I use for my implementation?

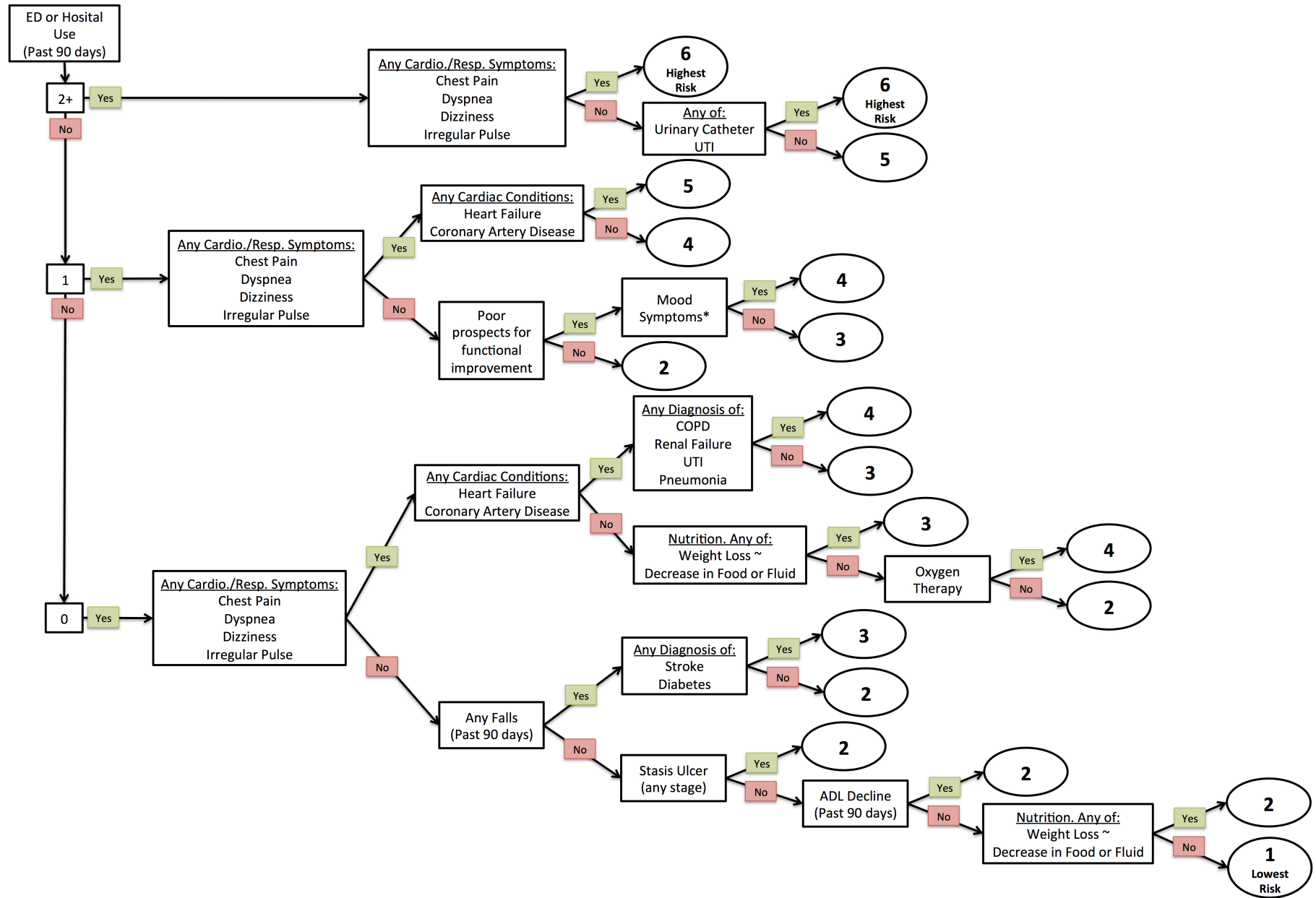
*Answer:* The DIVERT scale distinguishes 6 different risk categories. We generally do not suggest a dichotomous (i.e., all or nothing) approach when implementing the DIVERT scale. Care and communication protocols should be refined for each subgroup identified by the DIVERT Scale. The resource intensity of each DIVERT subgroup intervention should be proportionate to the identified risk level and involve appropriate clinical discretion.

**Question:** Can the DIVERT scale to control for emergency department use in outcome studies or quality indicators?

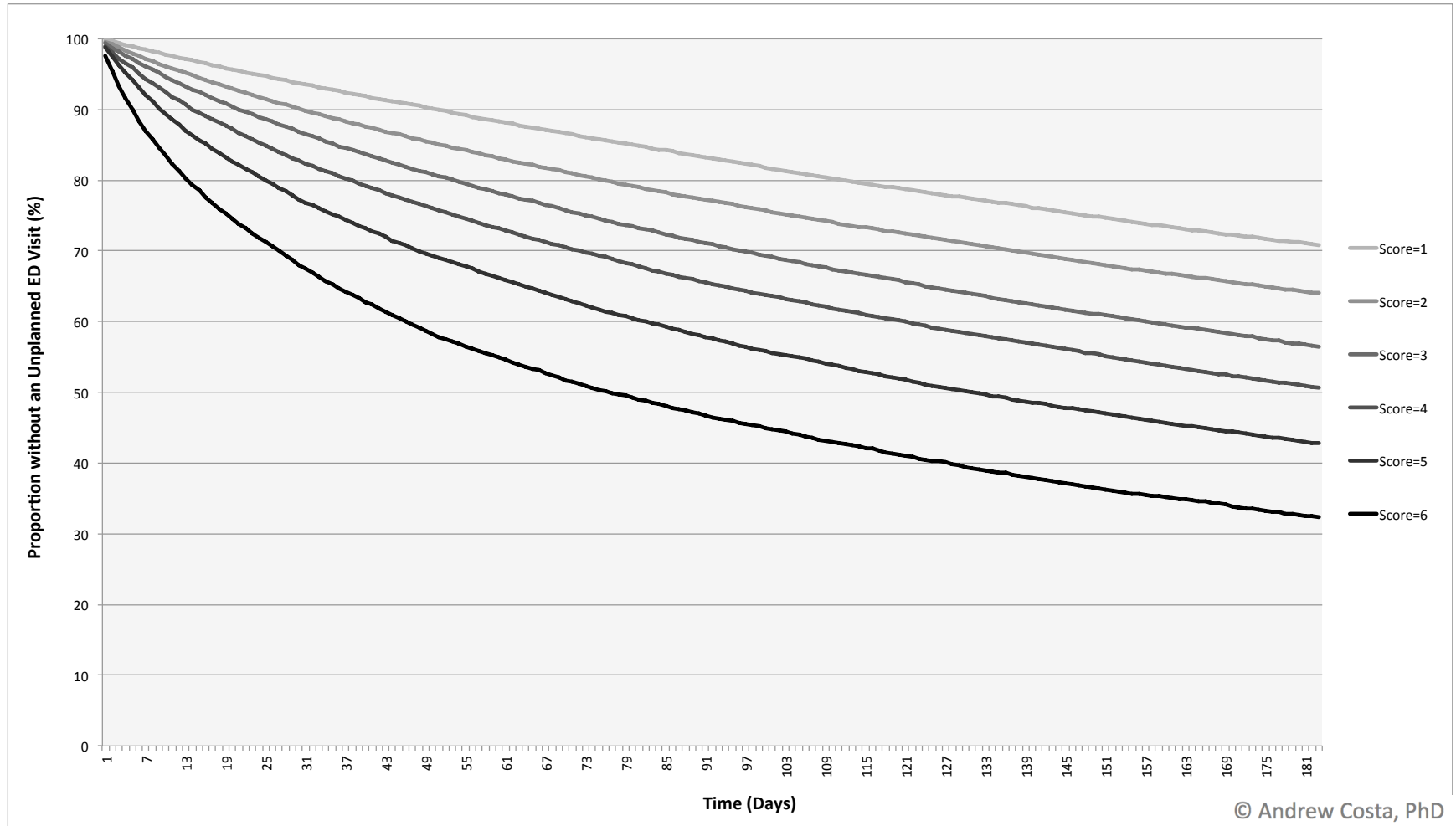
*Answer:* Good risk adjusters are those that are outside of the control of a health care provider (i.e., high post-acute referrals). Clearly there is some ability to intervene to manage the symptoms and conditions identified in the DIVERT scale. Rather than using the DIVERT scale to control for emergency department use, we'd suggest using the DIVERT scale to stratify the outcome. Stratifying allows for an 'apples to apples' comparison and should provide a better indicator of performance across the six DIVERT risk categories.



## Appendix A: The Detection of Indicators and Vulnerabilities for Emergency Room Trips (DIVERT) Scale

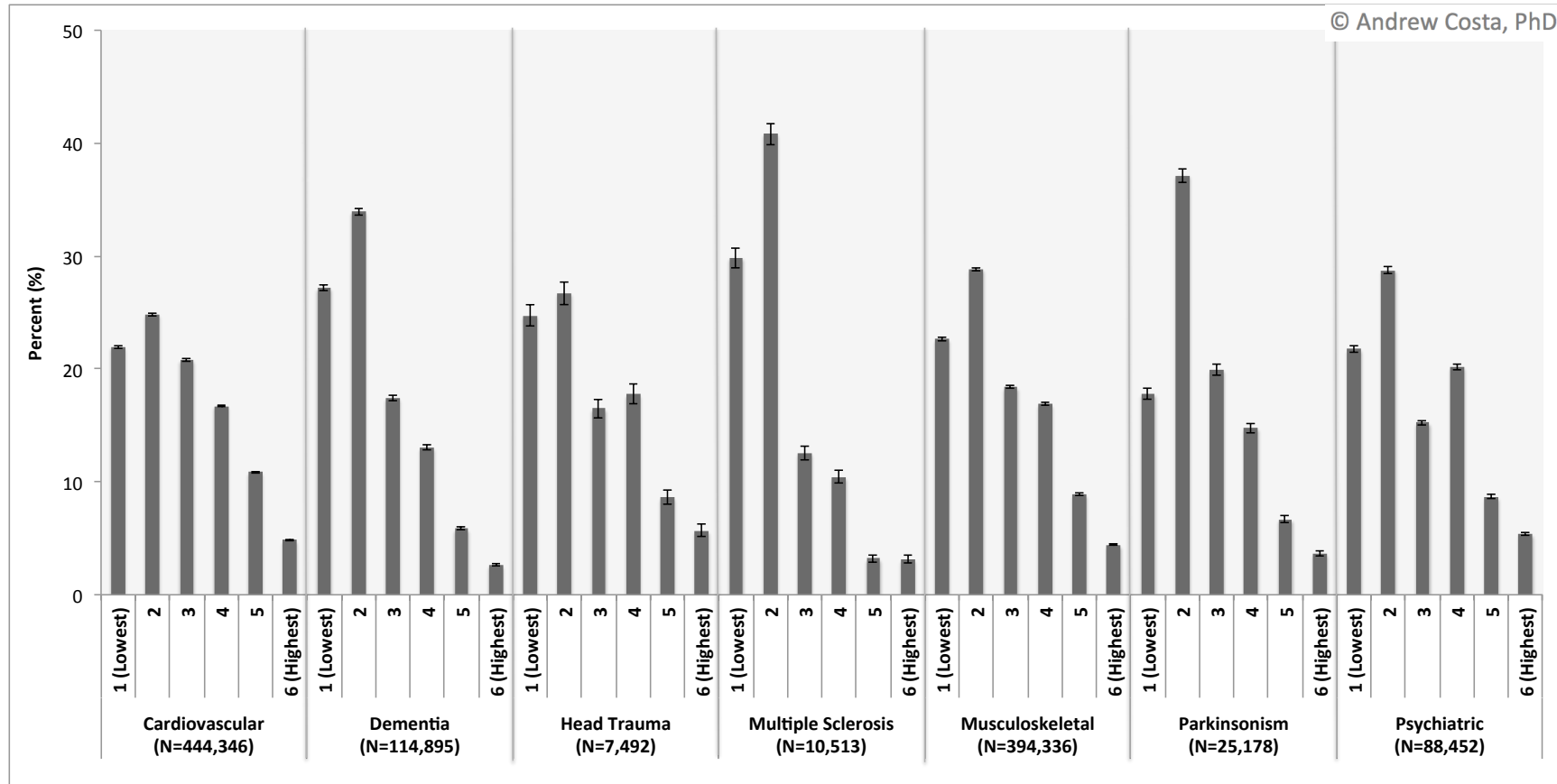


Appendix B: Validation of the DIVERT Scale to Predict Future Unplanned ED Visits among Home Care Patients, ON and WRHA



Appendix C: The Distribution of the DIVERT Scale across Diagnoses in Home Care, Ontario and WRHA

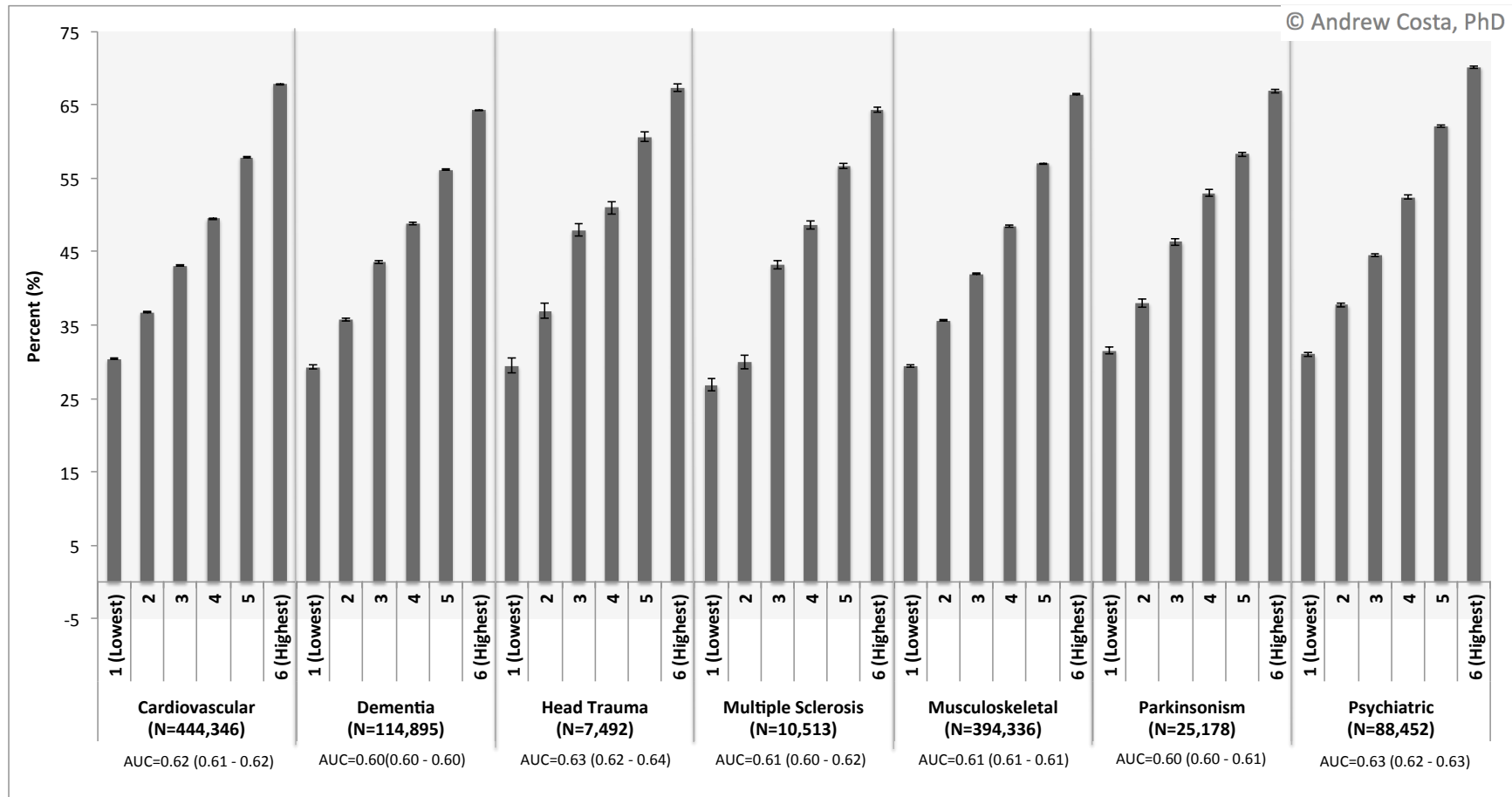
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Cardiovascular = Stroke, CHF, CAD, Hypertension, Peripheral vascular disease (PVD).  
 Musculoskeletal = Arthritis, Hip fracture, Fracture (non-hip), or Osteoporosis.

Dementia = Alzheimer’s disease or related dementias.  
 Psychiatric = Any psychiatric disease.

Appendix D: Proportion of Home Care Patients with unplanned ED visits within 6-months of RAI-HC assessment by DIVERT Scale and Diagnoses, Ontario and WRHA



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