# Use of the inter*RAI* Acute Care Assessment Instrument to Predict Adverse Outcomes among the Hospitalized Elderly

by

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## Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

## Abstract

**Objectives:** This research project was undertaken to review two commonly used screening instruments for the elderly who attend at hospital emergency departments in Ontario. These instruments were then contrasted with a new potential screening instrument made up of items drawn from the Minimum Data Set-Acute Care instrument (MDS-AC Version 1_CAN). The hypothesized outcome was better specificity and sensitivity utilizing the newly prepared instrument in predicting at an earlier point if an elderly emergency department patient would become an alternate level of care (ALC) patient. The ability of the screener to predict negative outcomes (delirium, longer length of stay) was also analyzed.

**Methods:** One dataset from a previous International Resident Assessment Instrument (inter*RAI*) organization study in southern Ontario completed in 2000 was utilized to inform this research. Each of the commonly used screening instruments was crosswalked to the MDS-AC items, then both univariate and bivariate analyses were completed. Three research questions were then posed. By testing various logistic regression models, the research looked to establish whether the newly developed instrument would be able to perform comparably to the other two currently-used instruments, and whether it would be more effective in predicting ALC status and particular adverse patient outcomes.

**Results:** The newly-developed instrument was found to perform more accurately. While several variables were tested, a core number were found to be more strongly predictive of future need for ALC status.

**Conclusions:** Future research in this area is recommended.

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## Dedication

This thesis is dedicated to my family, and in particular to my parents and my daughter Caitlin. They always believed I could complete this paper and to their relief, I finally did…

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## 1.0 Introduction – Seniors in the Canadian Population

Increasing life expectancy coupled with declining fertility rates have gradually been shifting the age distribution of populations in all industrialized countries toward older age groups. In large part, the decline in fertility rates has contributed to the overall aging of the Canadian population (Health Canada, 2002). For many decades, ending in the 1960s, the fertility rate averaged three births or more per woman and today we find a considerable decline at one and one half births per woman (Health Canada, 2002).

As a result of these factors, we now notice a trend in the number of Canadians who are 65 years and over as this population continues to rapidly increase. In 2001, there were 3,935,100 people aged 65 years and older, an increase of approximately 66% over the same measure in 1981 (Statistics Canada, 2008). In contrast, the entire Canadian population only increased by 25% during this same time period (Statistics Canada, 2008). As the large "baby boomer" cohort (those born between 1946 and 1965) ages, the projected population of seniors is expected to reach 6.7 million by 2021 and 9.2 million by 2041; this will be equivalent to one-quarter of the Canadian population (Statistics Canada, 2008). A snapshot of the population in 2006 shows that 13% at that time was 65 years and older (Statistics Canada, 2008).

While Canada's population is currently younger overall than many industrialized nations, current trends indicate this is likely to change (Health Canada, 2002). The impact of the baby boom generation will result in a dramatic upswing in the age of the population in the next 20 years, which will bring it into parity with other countries, such as the United Kingdom (Health Canada, 2002).

The segment of seniors aged 85 years and older (the "oldest old") has increased in numbers the most rapidly (Health Canada, 2002). While there were 430,000 who were 85 years and older in 2001, that number is projected to jump to 1.6 million in 2041 (Health Canada, 2002).

The geographical distribution of seniors in Canada tends to be highest in the most densely populated provinces - Ontario, Quebec, British Columbia and Alberta - where five out of six seniors over 65 years currently reside (Health Canada, 2002). Most seniors tend to live in the larger urban centres, and it is likely that this trend will continue, perhaps due to ease of accessibility to services, such as consumer goods and health care specialists (Health Canada, 2002). The growth in the number of seniors from 2000 to 2021 is predicted to be significant, and in some provinces will nearly triple (Table 1).

**Table 1. Percentage of Seniors in Each Canadian Province and Territory in 2000 and 2021**

| Province | 2000 (%) | 2021 (%) |
|---|---|---|
| BC | 13.0 | 18.1 |
| AB | 10.1 | 17.1 |
| SK | 14.4 | 19.5 |
| MB | 13.5 | 18.8 |
| ON | 12.6 | 17.7 |
| QC | 12.8 | 21.0 |
| NB | 12.0 | 22.2 |
| PEI | 13.1 | 19.9 |
| NS | 13.2 | 21.3 |
| NL/Lab | 11.6 | 22.5 |
| Nunavut | 2.6 | 7.2 |
| NWT | 4.1 | 11.0 |
| Yukon | 5.4 | 14.5 |

*Source: Health Canada: A report prepared by Health Canada in collaboration with the Interdepartmental Committee on Aging and Seniors Issues. (2002), http://www.phac-aspc.gc.ca/seniors-aines/pubs/fed_paper/pdfs/fedpager_e.pdf*

When we describe the group called "seniors" as a whole, we find that the majority of seniors are women (56%); 60% of these women were aged 75 to 84, and senior women made

up 70% of those aged 85 or older (Health Canada, 2002). There is some gender disparity amongst those who are married as well. In 1996, nearly 75% of senior men were married versus 41.4% of women (Health Canada, 2002). The majority of these widowed women are at higher risk for decreased income, due to either little involvement in the formal work force and/or historically lower wages than men (Health Canada, 2002).

Aboriginal seniors make up a small proportion of the total Aboriginal population in Canada. In 1996, only 3.5% of the Aboriginal population was 65 years and older (Health Canada, 2002). While this is likely to increase as the total number of Canadian seniors continues to grow, those people of Aboriginal descent still have a shorter life expectancy (Health Canada, 2002). This is likely a result of the higher prevalence of chronic diseases such as diabetes, heart disease and arthritis, quoted to be two to three times more prevalent in Aboriginal seniors versus the entire senior population (Health Canada, 2002).

As many as 80% of home-dwelling seniors suffer from chronic conditions (Health Canada, 2002). These chronic conditions include arthritis, rheumatism, high blood pressure, allergies, back conditions, chronic heart problems, cataracts and diabetes. Widowed women spend only one-quarter to one-third of their extra years of life free of disability (Health Canada, 2002).

Injuries also take their toll on those seniors living at home and the potential for injury becomes higher as a person ages (Health Canada, 2002). Women are nearly 60% more likely than men to be injured, with the most common type of injury being a fall (Health Canada, 2002). Eighty-four percent of all senior's hospital admissions are related to this unfortunate occurrence (Health Canada, 2002).

Due to their increasing age, multiple chronic conditions, polypharmacy and accidents (for example, falls), the health care needs of seniors are quite complex. Unfortunately, when seniors present to the Emergency Department (ED), their complexity as patients is often under-estimated by emergency personnel; this can result in under-assessment of their concerns, especially if the presentation of the condition is mild (Mion et al, 2001). The ED physician may not be prepared or equipped to take the time to complete a full geriatric assessment, not only due to the multifaceted nature of the problems that can be encountered but also because of the emergency physician's lack of training and skill set in working more comprehensively with this patient group (Sanders, 2001). Conversely, there are few geriatricians that are comfortable in the turmoil and confusion that can exist in the ED (Sanders, 2001). However, planning for the needs of the elderly should start at the first point of contact with the health care system and continue into the early stages of their admission or return to the community (Sanders, 2001). While a new model of care begs implementation, a busy ED does not lend itself to a comprehensive geriatric assessment.

Screening may be the key to identification of issues that can be best treated by family practitioners or specialists at another time, and the areas of pediatrics and psychology have utilized screening to detect things like developmental delay and mental health issues. Screening is becoming more popular in working with seniors, as health care providers can use this information to plan for appropriate interventions to address identified needs. For those seniors who have declined beyond the ability to return to their previous living arrangements, care plans need to be developed to allow the patient to be cared for either at home (with/without a significant other) with community care assistance, or in an institutionalized

care setting. Emphasis should be placed on preserving seniors' quality of life and allowing them to maintain their dignity as they continue to manage their multiple health concerns.

In summary, Canada has a rapidly growing elderly population wherein declining health is of concern. Health policymakers and clinicians alike are faced with challenges such as appropriate service selection, determining urgency of service provision, and predicting future needs for this demographic group. As such, it seems fitting that this thesis should address the need for the MDS_AC screening instrument to assess the elderly at the first point of entry into the health care system and the ability of the screening results to illustrate future care needs (i.e., potential for ALC designation). An overview of how the health care system is utilized by seniors will be presented, followed by a review of the literature that examines existing screening tools. Finally, the rationale for completing this study, methodologies, statistical analyses, findings, discussion, and recommendations for future research will be presented.

## 2.0 Literature Review

### *2.1 Use of the Emergency Department by Seniors*

Seniors present at hospital Emergency Departments (EDs) for a vast array of reasons. Much of the care required is clinically based. Issues that were commonly identified included impaired mobility (43%), impaired nutrition (20%), cognitive impairment (17%), and depression (14%) (Mion et al, 2001). Moons et al, (2003) noted other frequent reasons for attendance in the ED for the 65 and over age range: falls and cardiovascular and/or pulmonary diseases.

The Canadian Institute of Health Information (2010) found that most adults (defined as those age 20 and greater) attended the ED for concerns related to trauma, coma and toxic effects at a rate of 21.5% in 2008-2009. However, when data from those identified as 65 years and older was examined, seniors attended the ED most commonly for disease and disorders of the circulatory system at a rate of 14.9% in 20080-2009 (Canadian Institute of Health Information, 2010).

Seniors are also attending the ED to manage atypical psychosocial issues they confront in their home environments (McCusker et al, 2000; Gold and Bergman, 1997). An environment of elder abuse, loneliness or other complex concerns may complicate ED care. This is often because this type of issue is underdetected or is purposefully unaddressed, as the ED environment demands focused and mandated care to alleviate the physical condition(s) with which the patient presents (Aminzadeh and Dalziel, 2002).

The elderly population often requires care from a variety of health practitioners. As the health of these aging individuals declines, the ED is frequently the site where they go for urgent attention (Coleman, et al., 2001). This most often occurs when coordination of care

between these various practitioners breaks down, or care is necessary after regular family practitioner hours (Coleman, et al., 2001). The ED provides 24-hour accessible care, and serves as a "safety net" when smooth transition between various systems of care are disrupted (Aminzadeh and Dalziel, 2002; Wofford et al, 1993).

Another reason for seniors seeking care in the ED could be related to actual or self-imposed barriers to leaving the home. An example would be a patient possessing physical impairment, impacting their ability to climb down a flight of stairs or walk from their door to a transportation source. In a study by Moons et al. (2003), social isolation was found to be an important factor influencing an elderly person's decision to seek emergency care.

Once elderly patients are seen in the ED, there is a high risk for their return. Mion et al. (2001) saw rates of repeat ED visits ranging from 9 to 29%, and the same group saw more than 20% of elderly patients returning more than once to the ED after an initial visit (Mion et al., 2003). Return visits were the result of significant concerns not being dealt with at the index visit and a two year follow-up of geriatric consults in the ED by Sinoff et al (1998) found both high mortality rates and significant rates of long-term care admission.

### *2.2 Importance of the ED in the Care of Seniors*

There is increasing recognition of the importance of obtaining accurate clinical data as part of an elderly person's ED visits. There is a particular need to utilize assessment methods that are reliable , valid and practical in the stressful environment of the ED (McCusker, Bellevance, Cardin, Trepanier, and the Identification of Seniors at Risk (ISAR) Steering Committee, 1998). Such assessment methods are beneficial to the busy ED staff, but most of all to the patients who present for care.

There are many reasons for interest in the elderly population's utilization of the ED: it is often the first point of contact with the hospital system, it occurs at a time of possible crisis in the individual's health, and it is a time during which major decisions are made affecting short and, ultimately, long term health services utilization. Most research attempting to analyze the ED usage habits of the elderly has confined to the age range of 65 years and older. This allows for capture of more severe morbidity in the "younger old" cohort as well as providing some indication to the researcher as to the cut-off point for increased ED usage; this is identified by Meldon et al (2003), where data from the National Hospital Ambulatory Medical Care Survey in the U.S. described that approximately 20% of all ED visits were made by those 65 years and older, and the highest rate of ED usage was found to occur in the group who was 75 years and older. A report documented by the Canadian Institute of Health Information (2010) showed that the number of ED visits for those over 65 years of age has increased by 1.5% from the 2004-2005 to 2008-2009; this translates to an additional 107,114 ED visits in Ontario over this time period. Most studies estimate that from 12% to 21% of all ED visitors are 65 years and older (Mion, Palmer, Meldon, Bass, Siknger, Payne, Lewicki, Drew, Connor, Campbell, & Emerman, 2003; Moons, Arnauts, & Delooz, 2003; Ettinger, Casani, Coon, Muller, & Piazza-Appel, 1987; Aminzadeh & Dalziel, 2002; Strange, Chen & Sanders, 1992). Some studies report higher rates among women, perhaps due to age and marital status differences and higher morbidity rates (Ettinger et al., 1987; Lishner, Rosenblatt, Baldwin, & Hart, 1999).

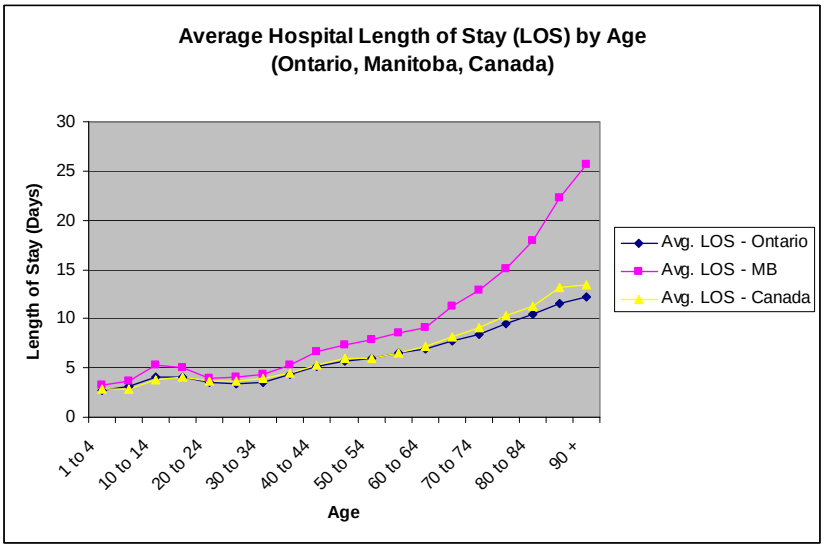
### *2.3 Reasons for Hospitalization of Seniors*

There are many reasons for more frequent hospitalization of the elderly than people in younger age categories. These reasons can often be traced to the increased number of co-morbidities and chronic conditions that the elderly tend to experience, which leaves them in a more vulnerable state. In Canadian data gathered in the 1998-1999 fiscal year, hospitalization of the elderly was related to a number of chronic conditions: cardiovascular disease, respiratory conditions, cancers and benign tumours (Canadian Institute of Health Information, 2001). Among older patients, there was a lower rate of hospitalization of those 65 to 74 years of age for cancers and benign tumours compared with those aged 85 years and older (Canadian Institute of Health Information, 2001). Respiratory conditions resulted in notably higher numbers for those 85 years and older compared to those 65 to74 years of age (Canadian Institute of Health Information, 2001).

Review of hospital trends shows a positive correlation between increasing length of stay as one ages, as identified by the Canadian Institute of Health Information (2001). In Figure 1, the graph shows similar length of stay (LOS) by age group in Ontario and Canada as a whole, while Manitoba LOS tends to creep higher after the fifth decade of life. For those individuals aged 60 to 64 years of age in Ontario and Canada, the average LOS in hospital is approximately seven days, while those in Manitoba have a LOS of approximately nine days (Canadian Institute of Health Information, 2005). For those patients aged 70 to 74 years in Ontario and Canada, the average LOS is approximately eight days, while Manitobans in this group reside in hospital for approximately 12 days (Canadian Institute of Health Information, 2006). Finally, by the time patients reach the 80 to 84 year age range, those in Ontario and the

rest of Canada are spending an average of 10 days in hospital per visit, compared to 17 days in Manitoba (Canadian Institute of Health Information, 2005).

**Figure 1. Average Hospital Length of Stay by Age in Ontario, Manitoba and Canada Overall.**




Source: Canadian Institute for Health Information (2006). Inpatient/Acute Admissions by Province of Facility Location. Available online at http://secure.Canadian Institute of Health Information.ca/Canadian Institute of Health Informationweb/dispPage.jsp?cw_page=statistics_results_topic_hospital_e&cw_topic=Health%20Services&cw_subtopic=Hospital%20Discharges
Note: Mean calculated for each age in order to compile data for Canada

In an attempt to decrease facility costs, there is keen interest in decreasing LOS. Nikolaus, Specht-Leible, Bach, Oster, & Schlierf (1999) were able to show that functional status was improved by providing seniors with a comprehensive geriatric assessment, and this in turn was able to reduce initial LOS and recidivism. As elderly patients usually never return to their pre-morbid status after a hospitalization, especially as it pertains to functional capabilities, it would naturally follow that the better the assessment by health care professionals at the initial point-of-care, the better managed will be future care needs, decreasing the need for repetitive ED visits and future hospitalizations.

### *2.4 Acute Care Hospitalization of Seniors*

Depending admitted to acute care beds more so than any other age group. This has a financial impact on health care budgeting, especially as in 2004-2005, when 46.6on the disease group, seniors (commonly those aged 75 years and older) are % of all hospital expenses were spent on acute care (Canadian Institute of Health Information, 2008). While this expenditure includes utilization of acute care by all ages, extrapolation of the data shows that patients in the age range of 75 to 85 years form the majority of many of the common disease groups where admission occurs (Canadian Institute of Health Information, 2008).

There are nearly 16,500 hospitalizations for every 100,000 people aged 65 years or older in Canada; alternatively, there were approximately 5,000 for every 100,000 younger than 65 (Statistics Canada, 2006). With large numbers of elderly attending the ED (the conduit through which many admissions to hospital pass), it would naturally follow that there are high rates of admission to hospital for this group (Creditor, 1993). Estimates of the rate of admission to hospital range from 10% to 68% for all elderly visiting the ED (Baum & Rubenstein, 1987; Ettinger et al., 1987; Sinoff, Clarfield, Bergma & Beaudet, 1998; Hustey & Meldon, 2002; Aminzadeh & Dalziel, 2002; Moons et al., 2003). Singal, Hedges, Rousseau, Sanders, Bernstein, McNamara & Hogan (1992) found that the elderly ED patients have hospital admission rates twice those of younger adults (47% vs. 19%), while Strange et al. (1992) found the elderly were admitted 5.6 times more often than the non-elderly.

Many reasons can be postulated for these differences in care practices between younger and older patients. First, the elderly may be presenting in a more severe state of illness on arrival to the ED, requiring more prolonged monitoring than can be provided by ED staff. MacNamara (1992) found that age of the patient seemed to influence behaviour of ED

physicians in terms of prescribing more tests, regardless of diagnostic category, service, or urgency of visit.

Second, as the elderly are often undergoing more in-depth diagnostic testing, there is greater potential for diagnosis of a condition that is not amenable to discharge home. This has translated into increased length of stay for seniors in the ED (Canadian Institute of Health Information, 2010). The median wait time in the ED from physician assessment to visit completion in 2008-2009 for seniors was 155 minutes; in contrast, all adults (20 years and over) spent less than 57 minutes (Canadian Institute of Health Information, 2010).

Third, the elderly often arrive at the ED in a state of functional decline, which is often the limiting factor in their ability to be discharged home.

Finally, the time the elderly person arrives may impact hospitalization, with those arriving in the morning more likely to be admitted. The Canadian Institute of Health Information (2010) found that all adults tended to have an increase in visit rate to the ED from 0600, peaking at 1000. Those in the senior age group tended to attend the ED between 0900 and 1500 (Canadian Institute of Health Information, 2010).

### *2.5 Utilization of Acute Care Beds*

There is concern that acute care hospital beds may be utilized inappropriately by seniors. Patients may have above-average stays in these beds due to factors such as a lack of community resources necessary to care for the patients in their own homes or a lack of long-term care beds. In Ontario, seniors who are awaiting access to appropriate care other than an acute care hospital bed occcupy 18.6 % of hospital beds in the province (Ministry of Health & Long Term Care, May, 2007). Of these, 58 % are awaiting long-term care (LTC) placement

(Ministry of Health & Long Term Care, May, 2008). A study done by Hermans, Diederiks, and Philipsen (1996) in The Netherlands compared the judgment of different care providers as they reviewed the cases of stroke survivors and attempted to predict their appropriateness for home care in the community. The authors found there was inconsistency in the ability of care providers to assess the level of home care needed for this classic group of "bed blockers" (a colloquial term used for individuals who are staying in an acute care bed beyond the time necessary) based upon the provider's frame of reference (Hermans et al., 1996). Those who would be providing the home care knew that staffing levels would not be able to accommodate the level of care required for some patients and subsequently identified the patient as a candidate for another care venue, often as an inpatient (Hermans et al., 1996).

There continues to be a great deal of subjectivity regarding who receives continued service in a hospital setting, yet policy makers are aware that community resources are not available at levels capable of sustaining individuals in their homes.

### *2.6 Risks of Admission to Hospital*

Hospitalization has many risks, regardless of age, but in the elderly there are other confounding factors. With possible physical limitations, potential for iatrogenic compromise, and multiple co-morbidities, the outcome of hospitalization itself, regardless of factor resulting in admission, can significantly impact the patient (Creditor, 1993). Some use the term "frail" with this population, but there is not necessarily consensus on the definition of this term. They can come to the hospital in a more compromised position - they are often able to function may deteriorate rapidly when stressed (Beghe & Robinson, 1994; Zagonel, 2001).

Creditor (1993) notes that the normal aging process is associated with various types of physical decline. Examples of age-related changes include: a decrease in muscle mass and strength (e.g., increased risk of falls), instability in the vasomotor system (e.g., greater potential for orthostatic hypotension), a decreased bone density (e.g., risk of fractures, both accidental and spontaneous), decreased ventilation (e.g., potential for pneumonia), sensory decline (e.g., increased potential for delirium), decreased thirst and nutrition sensation (e.g., dehydration), decrease in skin turgor (e.g., potential for pressure ulcer), and the increased potential of urinary incontinence (Creditor, 1993).

While the decline that some of the elderly experience is a part of normal aging, elderly persons in hospitals are often compromised by combination of stressors and diminished physiological reserve. For example, Hirsch, Sommers, Olsen, Mullen & Winograd (1990) found that 65% of hospitalized patients experienced a decline in mobility as early as the second day of admission. This vulnerable group is faced at greater risk by the combination of a strange environment, a plethora of diagnostic tests, limited mobility, staffing inconsistencies, and the potential for nosocomial infections (Hirsch et al., 1990). It is therefore essential that acute care clinicians adjust their care patterns to account for the unique needs of the frail elderly (Creditor, 1993).

### *2.7 Alternate Level of Care*

As of July 1, 2009 in Ontario, patients who no longer require the resources of an acute care department will be designated as Alternate Level of Care, or ALC by a physician or his/her delegate (CancerCare Ontario, 2009). The ALC designation is applied when the patient's care goals have been achieved, they are no longer progressing in their care area (e.g.,

acute, mental health, complex continuing care or rehabilitation), or they are admitted for supportive care for services not available in the community (e.g., a social admission) (CancerCare Ontario, 2009). The designation concludes when the patient is discharged to any of a number of locations, including home, palliative, or supportive care (CancerCare Ontario, 2009). The patient is not designated ALC if they are waiting at home, waiting to be transferred from one acute care area to another (e.g., surgical bed to a medical bed), or if they are awaiting inter-hospital transfer (e.g., repatriation) (CancerCare Ontario, 2009).

There were 1.5% fewer Ontario elderly hospitalized in 2000-2001 compared to 1994-1995, and a decrease of 20.5% between 1995-1996 and 2002 (Canadian Institute of Health Information, 2005). There are likely many reasons for this drop in elderly acute care utilization; for example, transfer of patients to Alternate Level of Care or care of elderly by family or other caregivers in the community. This depends, as noted in Table 2, on the area of the province that the elderly patient resides. Some Local Health Integration Networks (LHINs) have seen a decided increase in the designation of ALC services (e.g., South West and South East LHINs), which may be an indicator of the lack of availability of long-term care facility beds, for example. Other LHINs (e.g., North Simcoe Muskoka and North Central) have a noted decline in the percentage of ALC days. This may be a result of reluctance or other deterrent to moving patients from acute care to an ALC status, despite the fact that they fit the provincially accepted definition. Overall, in 2005-2006, the percentage of ALC days in the province of Ontario was 9.3%, however this is expected to climb (Figure 3). In fact, in 2006/07, the Waterloo-Wellington LHIN saw a 92% increase in the average daily census of ALC patients.

## 3.0 Geriatric Assessment of Seniors

### *3.1 Comprehensive Geriatric Assessment (CGA)*

The World Health Organization (WHO), in its glossary of terms on ageing and health, defines comprehensive geriatric assessment (CGA) as "a process which includes a multidimensional assessment of a person with increasing dependency, including medical, physical, cognitive, social and spiritual components" (WHO, 1999). The potential benefits of such an assessment would theoretically be to "optimize medical treatment, improve prognosis, restore, maintain and maximize functional autonomy, compensate for the loss of autonomy with an appropriate support, improve quality of life, and reduce costs (Bernabei et al., 2000). The measurable dimensions of CGA are generally divided into four core domains: physical health, functional status, psychological health, and socioenvironmental factors (Rubenstein, 2004).

Wieland (2003) reports that the evolution of geriatric care in the U.S. came as a result of visionaries foreseeing "opportunities for cost containment and outcome improvement". When usual care was identified as not particularly cost-effective, the various models of care took root, including the VA hospital Geriatric Evaluation Management Units of the 1980s (Wieland, 2003). However, the debate regarding CGA continues today, outside of the VA hospital environment (Wieland, 2003).

The timing of assessment is usually crucial, and is determined by some marked change in the health status of the individual. Patients often present to health staff in a time of crisis and these triggers are usually a transitional point where CGA is appropriate. A sudden decline in physical health and functioning usually triggers added concern or inability to cope by family or friends, prompting their hospital visit (National Institute of Health, 1988). The NIH

(1988) indicated that actual or potential decline in health status, death of a supportive loved one, or other high stress situations should be considered to be transition points where CGA is appropriate.

The concept of CGA has gone through three major developmental phases (Rubenstein, 2004). The mid-1930s to 1975 saw the early development of geriatric assessment practices, recognition of geriatrics as a specialty in Britain by the National Health Service (in 1948) and the establishment of research initiatives that were specifically focused on older adults ((Brockehurst, 1978; Rubenstein, 2004). From 1975 until 1995, geriatric research was more prominent with the development and testing of instruments constituting CGA in VA hospitals in the United States. Policy and Practice initiatives for the elderly were produced by fledgling professional organizations (e.g., American Geriatrics Society) and government groups (e.g. NIH) (Rubenstein, 2004). The period from 1995 until today has seen the incorporation of geriatrics into the mainstream of health care, emergence of chronic disease management models, and the development of the standardized assessment systems (e.g., the Resident Assessment Instrument (RAI)) (Rubenstein, 2004). Today, there seems to be a convergence of these two pathways, with increasing acceptance and certification of geriatrics as a specialty field within the practice of medicine. This is likely due, in part, to the evolution of medical practice and a political and conceptual shift in the care of the elderly.

While CGAs have been reported as being conducted when the elderly patient is in-hospital (i.e., Geriatric Assessment Unit, Acute Care for the Elderly units, hospital consultation teams), there has been a move to identify problems with the elderly patient sooner in order to provide more efficient geriatric care (outpatient screening assessment programs, in-home assessment and case management programs) (Mann, Koller, Mann, van der Cammen &

Steurer, 2004; Rubenstein, 2004). Depending on the location of the assessment, there can be variation in the length and intensity of the process (Rubenstein, 2004). However, wherever it is performed, it is the central core and foundation around which care planning for the frail elderly patient occurs (Rubenstein, 2004).

A study by Teasdale, Shuman, Snow & Luchi (1983) considered whether a geriatric assessment unit (GAU) was an effective way to assess elderly inpatients on a medical floor. Earlier results from Rubinstein and colleagues (1987) in a specialized unit for the elderly, indicated that the patient disposition at discharge was improved (discharge home) for greater than 48% of the study patients. Teasdale's research (using a multidisciplinary team) found that while the concepts were beneficial in educating medical and other care staff to care of the elderly, it did not support the findings of other studies that saw an increase in discharge of the elderly back to their homes (Teasdale et al., 1983). As well, a mean length of stay that was three times the normal found on a general medical unit would today be difficult to justify not only in terms of outright cost but in future outcomes (i.e. readmission to hospital) (Teasdale et al., 1983).

Some studies found that utilizing a model of care on a specified unit for the elderly did reduce mortality considerably despite an increased LOS (Trentini et al., 1995; Saltvedt, Saltnes, Mo, Fayers, Kaasa & Sletvold, 2004). While the length of stay on the Geriatric Evaluation and Assessment Unit (GEMU) was 19 days versus 13 for those elderly on a usual medical ward, 80% of GEMU patients still living and in their own homes compared with 64% of medical ward patients (Saltvedt et al., 2004).

### *3.2 Acute Care of the Elderly Units*

Another model of elder care is the Acute Care of the Elderly (ACE) units. One ACE unit was studied by Palmer, Landefeld, Kresevic & Kowal (1994). Key elements of this unit were specially chosen nurses, familiar with the needs and care of the elderly patient; increase in the nurse to patient ratio; a non-threatening, informative physical environment; a multidisciplinary team collaborative approach to care; emphasis on discharge planning; and early mobilization (Palmer et al, 1994). These so-called "Prehab Units" have a particular focus on elderly patients with functional decline that was detected prior to admission (Palmer et al., 1994). While standardized instrumentation was not part of the assessment, portions of assessments were used, likely to save time in developing a rehabilitation plan of care. This raises concerns about reliability and validity of the results, but assessment burden is greatly reduced. The multidisciplinary team reviewed 10 of the 15 patients the unit held daily, thereby keeping attuned to abrupt changes in status that could further cascade the elderly patient towards further functional decline (Palmer et al., 1994).

Some studies have found that the use of targeted units for elder care and assessment has little effect in improving long-term outcomes and survival of patients in hospital. Reuben, Borok, Wolde-Tsadik, Ershoff, Fishman, Ambrosini, Liu, Rubenstein, & Beck (1995) studied hospitalized patients 65 years and older, screened on at least one of 13 criteria: stroke, immobility, impairment in basic ADLs, incontinence, malnutrition, confusion or dementia, prolonged bed rest, recent falls, depression, social or family issues, an unplanned readmission to hospital after a recent admission, a new fracture, and age 80 years and older. Those in the study group received a comprehensive geriatric assessment including consultation, with some follow-up, whereas the control group received the usual care. At a 12 month follow-up, the

study group survival rate was 74%; however, the control group showed nearly identical results, at 75% (Reuben et al., 1995).

An important paper released by the NIH in 1988 identified the goals for comprehensive geriatric assessment (CGA) as improving the accuracy of geriatric diagnoses, providing direction in selection of interventions in order to preserve current health status, recommending the most advantageous care environment, and monitoring patient status over time. These goals dictate that the vast amounts of rich clinical information derived from each patient must be organized and analyzed in a methodical way.

Development of a successful link between initial assessment and follow-up, whether in the community or in an institution, is key to maintenance of the patient at his/her highest level of functioning possible (National Institutes of Health, 1988). Utilizing the information obtained in an acute care setting is pertinent in establishing a baseline of functioning in the hospital, and important to identifying functional improvement or decline in the community. Those team members working in the community must have received accurate, timely data related to the patient's inpatient stay in order to provide care plans that are effective in reaching mutually agreed-upon goals. For example, physiotherapists must have information that the patient has progressed beyond the need of a walker to that of a cane in order to transition smoothly in working towards higher-level goals.

### *3.3 How is it done?*

The first reported study of comprehensive geriatric assessment utilizing a multidisciplinary team felt that frequent patient care conferences, involving family when possible, were necessary to reduce inpatient length of stay while maintaining care quality

(Bachman, Collard, Greenberg, Fountain, Huebner, Kimball & Melendy, 1987). While there were many implementation issues (the research did show a reduced length of stay, but functional capabilities were not assessed), this study has paved the way for future research into various comprehensive assessment modalities (Bachman et al., 1987).

There has been much debate over the years regarding what format comprehensive assessment of the elderly hospital patients should take. A review by Ellis and Langhorne (2005) focused on two models of in-patient assessment: the Geriatric Evaluation and Management Unit (GEMU) and the In-patient Geriatric Consultation Service (IGCS). As previously discussed, the GEMU consists of a ward that specializes in care of the frail elderly with processes in place to provide multidisciplinary assessment, review and therapy (Ellis & Langhorne, 2005). The IGCS entails assessment of the elderly patient by a multidisciplinary team who completes an assessment as a group, and then plans and recommends a plan of treatment for the frail elderly patient, which is the responsibility of the GP who manages implementation of the treatment (Ellis & Langhorne, 2005).

Stuck, Siu, Wieland, Adams & Rubinstein (1993) provided the first systematic review of the literature of the effects of comprehensive geriatric assessment (CGA). Of the 28 studies that were found to be most scientifically sound, the most effective models were those where there was no one to ensure recommendations were carried out by general practitioners, they often were not implemented (Stuck et al., 1993).

### *3.4 Who gets it?*

There is a fair amount of debate related towho the target population for CGA should be (Stuck et al., 1993; Beghe & Robinson, 1994). Do we need to assess everyone over 65 years of

age, or should the cut-off points limit assessment only to those over 75? The health care system will not support an "assessment for all" approach. Many of the 65 to 79 years age group are healthy, active individuals. Different age groups over the years have been identified as the target for research of this kind with recent research looking at those individuals who are 75 years and older in order to be more likely to include the frail elderly. While there continues to be discussion, many studies admit that targeting is important, especially inpatients who suffer from other co-morbidities such as cancer (Luk, Kwok & Woo, 1999). Regardless, the timing of the assessment is critical in order to ensure cost-effective elder care (Wieland & Rubinstein, 1996).

While poor health is not universal to the majority of older people, increased levels of disability and morbidity do occur (NIH, 1988). This consensus group identified that frail elderly people are best suited as the target population for comprehensive geriatric assessment due to their complex medical conditions, vulnerability, atypical and complex presentations of illness, increase in cognitive, affective and functional problems, particular vulnerability to iatrogenic disease, potential for social isolation and economic insecurity, and risk for premature institutionalization (NIH, 1988).

Perhaps the answer is not to target based on age, but to focus on those with numerous and severe co-morbidities instead (Monfardini & Balducci, 1999; Ellis & Langhorne, 2005). This approach might reduce excess utilization of resources on those who do not require CGA.

Many studies have had negative results potentially related to their lack of specifying an accurate age range for assessment (Gayton, Wood-Dauphinee, de Lorimer, Tousignant & Hanley, 1987; McVey, Becker, Saltz, Feussner & Cohen, 1989). Gayton et al. (1987) failed to show the efficacy of a geriatric consult team in the assessment of all patients aged 70 years

and older admitted to four selected medical wards. Rubinstein (1987) suggested that the results would have been different if the target group would more appropriately be those frail elderly 70 years and older. The National Institutes for Health (NIH, xxxx) stated in their consensus paper that consideration should be given to those in precarious physical, mental and social conditions.

### *3.5 Who does it?*

A study by Campion, Jette & Berkman (1983) found that while the multidisciplinary team did accomplish the roles of promoting the field of geriatrics, establishing a sense of teamwork and increasing awareness of the patient's functional disability, it did not appear to reduce the rate of readmission of the elderly to hospital. As a result, while length of stay was increased in order to provide intensive rehabilitation and supportive services, this extra cost was not recovered, as the patients returned to the emergency department in equivalent time periods compared to those who had not received the interventional services.

### *3.6 Utilization of CGA Recommendations*

In order for CGA to be effective, the suggestions made to improve care of the elderly need not only to be verbalized, but also to be implemented. Implementation of recommendations provided to community-based physicians from a CGA have found to vary from 49-79%, with similar results for compliance with recommendations by patients (Aminzadeh, 2000). Factors positively associated with implementation of recommendations included direct verbal or written communication between doctors, development of a short,

concise list of recommendations, and recent medical graduation to be important (Aminazdeh, 2000).

Other studies have found similar challenges. Allen, Becker, McVey, Saltz, Feussner & Cohen (1986) found that only 27.1% of potential recommendations were acted on independently by attending physicians. Teasdale et al. (1983) had also encountered this hurdle, with poor compliance with recommendations, likely as a result of being left to the discretion of the attending physician. These recommendations often included issues as basic as assessment of vision and hearing, and review of medications. McVey et al. (1989) found that a purely consultative approach was not effective in improving functional status. Unfortunately, a study on emergency department (ED) physicians by Sanders & Morley (1993) found that they did not understand the field of geriatrics, with 69% of ED physicians identifying insufficient continuing medical education in this area.

## 4.0 Geriatric Screening Assessment Tools Currently Used in the ED

Efforts to improve the treatment of the elderly in the ED have led to the development of a growing number of hospital and community-based geriatric screening and assessment programs. However, many of the available studies are descriptive or observational in nature, and they provide little insight into the effect of the interventions proposed (Aminzadeh & Dalziel, 2002). There are currently only two commonly used tools in ED settings: the Triage Risk Screening Tool (TRST) developed by Mion, Palmer, Anetzberger & Meldon (2001) and the Identification of Seniors at Risk (ISAR) developed by McCusker et al (1999, 2000, 2001). These early attempts at screening elderly in the ED have met with some success. While these tools are currently being utilized in clinical practice, further research is needed in order to identify if these instruments have the predictive power to determine the elderly patient's potential to become a more intense care responsibility on the already over-burdened health care system.

Screening, however, is only the first step. The health care system needs to use this information to plan for appropriate interventions to address the specific needs of the elderly patient. The health care system needs to use this information to plan for appropriate interventions to address the specific needs of the elderly patient. For those who have declined beyond the capability to return to their previous living arrangement, care plans must be developed that allow the patient to be cared for either at home (with/without a significant other), with community care assistance or in a long-term care facility. There should be emphasis placed on preserving the patient's quality of life and allowing them to maintain their dignity as they continue to manage their multiple health concerns.

### *4.1 The Triage Risk Screening Tool (TRST)*

The Triage Risk Screening Tool (TRST) model was developed in the U.S. by a group of researchers at the Cleveland Clinic (Mion et al., 2001). This study describes the tool's development in 1997 as a two-stage process, involving a literature review and the input of a subjective expert panel. After the panel of expert physicians, masters or doctorally prepared nurses, and social workers all specializing in gerontology had met on three occasions, consensus was reached and a total of five risk factors were identified (Appendix D). The Geriatric Clinical Nurse Specialist (GCNS) responsible for training all ED nurses in the use of the tool at regularly scheduled department meetings. After a two-week pilot study in two local hospitals, it was decided to add a sixth question, entitled "professional recommendations". For that item, nursing staff had the opportunity to input their personal judgment regarding functional capacity, medication non-compliance, suspected abuse (e.g., elder or substance), or any other issues of note (Mion et al., 2001). Patients who showed any signs of cognitive impairment or who scored two or more on the remaining risk factors were flagged as requiring follow-up by the GCNS (Mion et al., 2001). Those discharged were contacted within 72 hours by telephone and administered a number of questionnaires assessing any unmet medical, social, and /or psychological needs (Mion et al., 2001). All of this information was formatted into a letter forwarded to the patient's family physician.

Mion et al. (2001) predicted that this screening tool, designed to be highly sensitive and reasonably specific, would prove effective in predicting potentially at-risk elderly discharged from the ED. It resulted in patients with impaired mobility (43%), impaired nutrition (20%), cognitive impairment (17%) and depression (14%) being identified more often (Mion et al., 2001). However, some limitations and challenges with the tool were noted.

First, the volume of patients considered potentially at risk was greater than the 15% predicted; this extra workload impacted on the ability of the GCNS to provide effective follow-up, resulting in only 60% of the patients being contacted in follow-up. Second, there was some difficulty in finding those patients who needed follow-up. They may have either moved in with family, or possibly changed their location to one of more supportive care (e.g., nursing home). Third, with increasing complements of part-time and agency nurses, TRST screens were poorly completed, possibly due to a lack of education on need and positive outcomes. Finally, the patients may have just been too ill to involve them in the screening process.

Meldon, Mion, Palmer, Drew, Connor, Lewicki, Bass, & Emerman, (2003) further evaluated the predictive ability of the TRST in identifying those elderly ED visitors at risk for ED revisit, hospitalization or long-term care (LTC) placement within 30 and 120 days following ED discharge. The TRST was felt to be a useful tool in the detection and risk stratification of patients at risk for adverse outcomes (Meldon et al., 2003). In the process of logistic regression modeling, the item pertaining to patients living alone or having no caregiver from the original TRST was found to be negatively associated with the outcomes of hospitalization. Subsequently this item was removed from the model. The revised model using five items was found to be optimal (Meldon et al., 2003). Of the remaining items, those patients using five or more medications, having difficulty walking, or using the ED within the past 30 days, were found to be significantly more likely to revisit the ED or be hospitalized during the follow-up period (Meldon et al., 2003).

### *4.2 The Identification of Seniors at Risk (ISAR) Tool*

The Identification of Seniors at Risk (ISAR) developed by McCusker and colleagues over a period of years, and has been repeatedly studied and validated (McCusker, Healey, Bellavance & Connolly 1997; McCusker et al., 1998; McCusker, Cardin, Bellavance & Belzile, 2000; McCusker, Verdon, Tousignant, Poulin de Courval & Dendukuri, 2001; McCusker, Jacobs, Dendukuri, Latimer, Tousignant & Verdon, 2003; Dendukuri, McCusker, & Belzile, 2004; Warburton, Parke, Church & McCusker, 2004). The authors believed that the process of identifying high-risk elderly patients in the ED would require a new approach, and it was suggested that a simple screening checklist of selected risk factors and functional problems would be helpful (Newbern & Burnside, 1994; McCusker et al, 1997). The absence of an adequate checklist was initially noted (McCusker et al, 1997). McCusker et al (1998) felt that once elderly patients were identified "at risk", they should receive follow-up with referrals to appropriate community services (e.g. homecare, geriatric assessment) to prevent adverse outcomes. The ED visit utilized a screening questionnaire developed from literature review, the Short Portable Mental Status Questionnaire (SPMSQ) and the Older Americans Resources and Services (OARS) ADL questionnaire (McCusker et al, 1998). At clinical assessment, the SPMSQ plus the SMAF (functional autonomy measurement system), Geriatric Depression Scale (GDS), OARS Social Resources questionnaire, 4 questions from the alcohol abuse questionnaire (CAGE) plus a medication count was used for assessment (McCusker et al, 1998). From this, a multivariate logistic regression model identified six items as candidates for a screening tool to predict functional decline, repeat visits to the ED and hospitalization during the first 6 months after ED visit (McCusker et al, 2000). The questions identified are found in Appendix C.

McCusker et al (1999) found that when the ISAR was used with a cutoff point of 2 positive answers, 72% of patients with functional decline in the 6 months following the ED index visit were identified. In further study by Dendukuri et al (2004), the ISAR was found to have acceptable to excellent concurrent and predictive validity for a variety of outcomes, including both clinical characteristics (e.g. functional decline, AUC=0.72 with 95% CI=0.68-0.74; depression, AUC=0.78 with 95%CI=0.70-0.84) and health services utilization (e.g. hospitalization at 6 months following ED visit, AUC=0.68 with 95% CI=0.61-0.75).

When a patient received a positive ISAR, this automatically made him/her eligible for the second stage of the intervention, the brief standardized nursing assessment (McCusker et al, 2001). This consists of check boxes related to the prevalence of problems with communication, cognition, physical concerns (pain, incontinence, weight loss, joint problems), mobility, ADL, medication, behaviour/affect, active medical concerns, alcohol or social support limitations. There are also suggested interventions for each "yes" answer, providing staff with some guidance on how to proceed. The focus of this assessment was on unresolved problems, both new and pre-existing, that required either medical attention, initiation or review of homecare services or comprehensive geriatric assessment (McCusker et al, Mar 2003).

The reported advantages of the ISAR tool are its ease of administration and its use of self-report to decrease reliance on overburdened nursing staff for completion. This tool can be provided to the patient in the triage area on registration, and filled in either by themselves or in conjunction with an accompanying caregiver. It is found to have good general clinical utility when used on patients, either at first arriving in the ED or later in their stay when a decision

has been made to discharge (Dendukuri, McCusker, Bellavance, Cardin, Verdon, Karp, & Belzile, 2005).

Ultimately, the value of any screening tool is only as good as the interventions that are subsequently implemented (Dendukuri et al, 2005). The successful completion of the screening tool, but the lack of funding or motivation to complete the standardized nursing assessment (or other further assessment) may not achieve the standard of care felt necessary for the elderly and have no impact on recidivism. If the patient is temporarily immobilized due to their condition, the screening tool is not likely to be completed. The issue of the patient completing the tool on their own also has consequences, and many clinicians know that some patients who have limitations are too independent or proud to identify the fact they are having difficulties managing. This is also the case for those with cognitive impairment, as those moderately to severely impaired will often see no problems with their memory. As well, the stressful environment of the ED may impair the validity of the self-report of function (McCusker et al, 1999). The ED patient may forget to advise nursing staff of problems due to multiple distractions in the department, with the ultimate result that potentially limiting problems will not be recognized and interventions not initiated. Unlike the TRST, there is no specific request for staff ratings in the ISAR.

Wieland (2003) reports that the evolution of geriatric care in the U.S. came as a result of visionaries foreseeing “opportunities for cost containment and outcome improvement”. When usual care was identified as not particularly cost-effective, the various models of care took root, including the VA hospital Geriatric Evaluation Management Units of the 1980s (Wieland, 2003). However, the debate regarding CGA continues today, outside of the VA hospital environment (Wieland, 2003).

## 5.0 Impact on Elder Care from the Policy Perspective

Over one-third of Ontario's health care dollars (about $10.2 billion) are utilized by seniors (65+ years) (Health Canada, 1998). The continuing challenge that governments face is the ability to equitably fund the large number of hospitals in the province while keeping expenditures in check. In order to comprehend the costs associated with in-patient health care, a brief overview of how Ontario hospitals are funded is required. This needs to take into account past funding formulae, as well as development of federal databases which provide information to inform the Canadian health care experience for the future.

### *5.1 NACRS*

The National Ambulatory Care Reporting System (NACRS) was initiated to enable collection, processing and analysis of summary data on ambulatory care services (for example, ED visits and day surgeries) across Canada. The Canadian Institute of Health Information, who houses the NACRS database, notes that ambulatory care services have "grown significantly in recent years to become the largest volume of patient activity in Canadian health care" (Canadian Institute of Health Information, 2005). On a practical basis, the database is accessible to allow policymakers and health care management to make decisions and comparisons at a variety of levels, including facility and provincial (Canadian Institute of Health Information, 2005). It is also a good source of information for researchers and those involved in case mix group (CMG) and resident utilization group (RUG) development (Canadian Institute of Health Information, 2005). The database includes data related to clinical care, administrative function, finances, and service-specific data for the areas of day surgery and the emergency department (Canadian Institute of Health Information, 2005).

### *5.2 HIDS-Global Funding*

The federal government enacted the Hospital Insurance & Diagnostic Services Act in 1958, the first example of shared health care funding with the provinces (Joint Policy and Planning Committee (JPPC), 1998). While this funding was comprehensive, the level of micro-management it entailed was too labour-intensive, leading to the Global Funding System by 1969 (JPPC, 1998). Using this formula, a hospital could submit its budget with detailed justification of spending and be assured the following year to receive the same amount plus a percentage increase to allay increased operating costs (JPPC, 1998). For obvious reasons, this provided facilities a large pool of money to spend where they saw fit, but as time passed the lack of transparency with regards to fund utilization was at times called into question (JPPC, 1998).

### *5.3 Business Oriented New Development (BOND)*

In order to deal with the increasingly frequent practice of deficit funding practiced by some facilities, the province introduced the BOND program in 1982 (JPPC, 1998). The idea of this program was to eliminate the practice of funding a facility that made a practice of deficit spending by rewarding those able to balance their budgets (JPPC, 1998). As a result, any surplus a hospital was able to incur would be returned to the facility in the form of new programs, equipment, and capital funds (JPPC, 1998). For their part, the expectation was that the hospitals take responsibility for any deficits incurred (JPPC, 1998).

This formula showed signs of antiquity in the mid 1980s, especially when an alarm was raised by the provincial auditor, concerned over the wide variation in hospital costs between

facilities and a lack of supervision of expenses by the provincial Ministry of Health (JPPC, 1998).

### *5.4 Multi-component funding*

This led to the multi-component formula of funding, where a global budget was augmented by an adjustment for inflation and growth funding to allow for the pressures of population expansion (JPPC, 1998). In addition, if the hospital was small, if it started a new program or expanded an existing one, if specialized services were needed or if it required one-time funding for the cost of supplying a special service such as an exorbitantly priced drug, an adjustment to increase its funding base was supplied (JPPC, 1998).

### *5.5 Case Mix Groups (CMGs)*

In an attempt to make funding more equitable, research first begun in the U.S. on Diagnostic Related Groups (DRGs) was translated into the Canadian scene in the form of Case Mix Groups (CMGs) (JPPC, 1998). The case mix is based on the ability to group patients into clinical groups receiving similar types of health care resources (JPPC, 1998). As well, it is possible to estimate the relative use of the resources by attaching a weight to each group (JPPC, 1998). Therefore, the more intense the use of resources and the more serious the clinical concern, the higher the case mix index and subsequent funding to the facility.

The attachment of a weight to each clinical service was developed by the Canadian Institute of Health Information, and was known as the Resource Intensity Weight (RIW) for the service. As a result of limited availability of funding data in Canada, RIWs were initially translated from available information in Maryland and New York State (JPPC, 1998).

However, in the early 1990s, the Ontario Case Cost Project began to trial the collection of Ontario-specific data with a number of smaller facilities, with the final outcome of a database containing case weights specific to Ontario (JPPC, 1998).

### *5.6 Other Funding Formulae*

During the early part of the current decade, the JPPC attempted to provide other funding models in order to limit the number of hospital services provided and their cost. In 2001, Ontario distributed $95 million in funding in a lump sum, but the decision was made to utilize a funding formula which would take into account both utilization rates of facilities or volumes (how many people should a hospital treat in a year) and the cost of these services (how much should the hospital charge for said services) (JPPC, 2004). This funding model was in practice until 2006, when the 14 Local Health Integration Networks or LHINs were operationalized (JPPC, 2008). It is now uncertain as to how current health-allocation based models and the functionality of the LHINs will combine to fund Ontario hospitals (JPPC, 2008).

The pressure now being felt by the Ontario health care organizations, particularly hospitals, is that funding to facilities is now based on the number of days the patient is expected to be hospitalized and funded according to their RIW (JPPC, 1998). If the patient experiences complications, and the acute care stay is extended, hospitals will not be reimbursed for this event. Therefore, hospital management is continuously pushing clinicians (often through the use of utilization management staff) to ensure that staff are faithful to the care trajectory and that patients are discharged from the facility as planned.

Once patients have been discharged from acute care and have been designated as alternate level of care (ALC), the funding changes dependent on the patient's location of care. Care of these patients is extremely expensive in the hospital setting (approximately $1200 per day), where they could be cared in a long-term care facility for 1/10 of that amount (North Simcoe Muskoka LHIN Residential Hospice Operational Funding - PNI, 2008). The Ministry of Health and Long-Term Care in Ontario has begun to penalize acute care institutions that have empty beds or beds occupied by inappropriate patients in their current funding formula. As a result, other programs and services must be cut back or never implemented in these facilities in order to cut costs (Lakeridge Health, 2004). The province has provided funding ($29.2 million) for other care settings (e.g. convalescent home beds, interim long-term care beds) in an attempt to alleviate the back log and hospital penalization (Ministry of Health and Long-Term Care, 2005).

## 6.0 Electronic Health Records

In order to better identify and respond to the needs of highly complex patients, hospitals today are making the transition to automated health records. These records make tracking of care practices more efficient and more comprehensive. According to the Canada Health Infoway, there will be an operable electronic health registry framework in place across 50% of the population of Canada by 2009 (Richard Alvarez, November 23, 2005). Some of the challenges identified in the implementation of this framework include precipitating change amongst health care clinicians and management, prohibitive start-up costs for high-tech documentation systems, and sustainability of information technology investment opportunities (Richard Alvarez, November 23, 2005).

The fact that large depositories of data are available does not mean that clinicians or policy makers necessarily use those data to support decisions. Most clinicians do not possess the skill set to understand and assess data quality (e.g. reliability and validity). Conversely, the data collected in hospitals are often of limited quality due to incomplete reports and poor or untested psychometric properties of assessment tools.

Efforts to develop more ways to gather data must link the information available to actions that can be taken to improve the outcomes of our elderly inpatients. For instance, can the data be used to target interventions that can decrease the hospital length of stay? The hypothetical answer to this is yes. It seems logical that, if mechanisms were in place to differentiate the frail elderly from patients on acute medical or surgical wards who have no functional impairments or complex medical conditions, targeted interventions could be used to reduce the risk of adverse outcomes in the more vulnerable population. A great deal of the conventional nursing history could be streamlined to expedite the diagnostic process, allowing

direction to other hospital team members for specialized intervention (physiotherapy or social work), and prompting staff to plan for the patient's return to the community (with appropriate homecare resources) if warranted.

## 7.0 Background of inter*RAI* and the Acute Care Instrument

The research to date has pointed to some interesting potential solutions to address the needs of the frail elderly in acute care, but current screening and assessment approaches in acute care (including the ED) continue to be rudimentary and non-standardized. While the implementation of randomized controlled trials are often seen as the gold standard in research, research on assessment practices also needs to have a demonstrated ability to work in normal clinical environments. The inter*RAI* suite of assessment instruments is presently being used in a number of settings (Hirdes, 2006).

There have been many efforts to incorporate the various existing evaluation instruments in order to provide all of the information considered necessary for CGA (Bernabei et al., 2000). However, this has had limited success related to the high degree of burden placed on those staff, often nurses, who must complete the assessments (Bernabei et al., 2000). One group interested in enabling standardized assessment and provision of care at the bedside is inter*RAI*, an international, not-for-profit organization (Bernabei, et al., 2009). inter*RAI* currently includes more than 60 clinicians and researchers from about 30 countries, whose mandate is to develop, apply and adapt these instruments to cover a varied scope of clinical settings and patient populations. The areas addressed to date include: complex continuing care, long term care facilities, mental health, palliative care, post-acute care and rehabilitation, intellectual disabilities, assisted living, community health assessment and acute care (Morris et al., 1997; Hirdes, Fries, Morris, Steel, Mor, Fritjers, La Bine, Schalm, Stones, Teare, Smith, Marhaba, Perez & Jonsson, 2000; Carpenter, Teare, Steel, Berg, Murphy, Bjornson, Jonsson & Hirdes, 2001; Hirdes, Marhaba, Smith, Clyburn, Mitchell, Lemick, Curtin-Telegdi, Perez, Prendergast, Rabinowitz & Yamauchi, 2001; Steel, Ljunggren, Topinkova, Morris, Vitale,

Parzuchowski, Nonemaker, Frijters, Rabinowitz, Murphy & Ribbe, 2003). The inter*RAI* suite of instruments serve to improve the health and well-being of those that are assessed by measuring functional capabilities and tracking their change over time. This serves to highlight specific care needs, enabling patients to return to their highest level of independent functioning on transfer and/or discharge.

The inter*RAI* instruments set information standards that can be used in both research and clinical practice across the various health care spheres. The use of consistent language across instruments allows for cross-sector and cross-comparisons of the populations being served (Fries, Schroll, Hawes, Gilgen, Jonsson & Park, 1997). The capability to communicate more effectively across the continuum of care increases the potential to improve the continuity of care provided to patients (Hirdes, Ljunggren, Morris, Frijters, Finne Soveri, Gray, Bjorkgren, & Gilgen, 2006; Gray, Berg, Fries, Henrard, Hirdes, Steel, & Morris, 2009).

### *7.1 Benefits of the* inter*RAI*

Many benefits to utilization of inter*RAI* instruments have been demonstrated in the literature (Morris et al., 1997; Hirdes et al., 2000; Carpenter et al., 2001; Hirdes et al., 2001; Steel, Ljunggren, Topinkova, Morris, Vitale, Parzuchowski, Nonemaker, Frijters, Rabinowitz, Murphy, Ribbe & Fries, 2003). These benefits include continuity of care across various providers, reduction in direct care costs, establishment of outcomes evident to direct care providers, identification of necessary service needs, increased quality of care as accountability increases, and equity of care based on care need and not care location (Hirdes et al., 2000). An important question is whether these benefits can also be realized in acute care settings using the new inter*RAI* Acute Care instrument (Carpenter, Teare, Steel, Berg, Murphy, Bjornson,

Jonsson, Hirdes, 2001; Gray, Bernabei, Berg, Finne-Soveri, Fries, Hirdes, Jónsson, Morris, Steel, Ariño-Blasco, 2008).

Various scales that have been developed from previous interRAI research have added substantially to the utility of these data sets for various audiences. For example, the Cognitive Performance Scale (scored from 0 intact, to 6 very severe impairment and has been crosswalked to the Mini Mental State Exam) identifies the degree of cognitive impairment exhibited by a patient (Morris, Fries, Mehr, Hawes, P:hillips, Mor & Lisitz, 1994; Harmaier, Sloane, Gus, Koch, Mitchell & Phgillips, 1995). These scales can be used longitudinally to track a patient's condition over time, allowing for adjustments to care plans as the person's condition changes.

Another benefit to using an inter*RAI* assessment instrument would be the potential to decrease the care burden on those patients assessed. Not only does the concept of case-mix accurately identify patient need for the given venue of care, information gathered is done in one single assessment instrument, thereby negating the need for each discipline to gather the same information in a different format. This could result in conservation of both time and energy (Hirdes et al., 2000).

### 7.2 *Challenges of interRAI*

The ultimate goal of inter*RAI* is to provide a seamless approach to assessment. Some of the more obvious benefits to such comprehensive care have been discussed, but what of the costs? One of the costs will be instituting change amongst various regulated and allied health professionals involved in carrying out the assessment. Many clinicians are comfortable with existing instrumentation, their facility may use computer templates in which to deposit the

information collected which are difficult to alter, or their may not be administrative support for the change. Future technological advances will necessitate the need for educational institutions to graduate those with an increasing comfort and competence in the computerized world.

Another cost is the continuing burden on assessors to collect this fairly large repository of information. Those providing care at the bedside are usually very cynical towards anyone approaching them with a new way of providing their care, especially if it requires prolonged and convoluted involvement with the patient, other care providers and family which they may feel they do not have time for, or is not part of their job; this could result in very definite risks to care. The benefits need to be demonstrated, and must to have a direct relevance to what they are providing to the patient in order to establish by-in with the project. Even administration is feeling somewhat intimidated in today's climate to approach their staff with requests to participate in anything outside of their normal routine, for fear of mass upheaval.

## 8.0 MDS-Acute Care

The MDS-Acute Care (MDS-AC) version to be discussed in this proposal was developed and pilot testing began in 1999 (Carpenter et al., 2001). As with other RAI instruments, the MDS-AC is a data collection tool divided into multiple sections, with each section containing questions relevant to a particular assessment domain. For instance, section G relates to cognition, and questions in this section cover memory, decision making ability, and delirium indicators (MDS-AC, Version 1_Can, pg.3). This particular instrument is divided into a total of 15 domains, averaging approximately 6 questions per section (Appendix B).

At the time of the study in which this data was collected, the MDS-AC was still considered experimental, requiring further research. The instrument was intended to provide a longitudinal view of patients from the time of admission to an acute care unit until discharge, either to home or another unit or care facility (Hirdes et al., 2001). The MDS-AC supports the gold standards for content of a comprehensive, standardized, evidence-based assessment instrument, encapsulating key elements in one document (NIH, 1988).

As noted previously, MDS instruments provide a multitude of benefits in the full spectrum of patient care. Many of the questions in the MDS-AC are found in other RAI instruments. For example, the items in Section F related to bladder and bowel continence are found in the MDS 2.0, the instrument mandated by many provinces, including Ontario since 1996 and utilized in regular assessment of those in long-term care facilities. This enables a patient coming from a nursing home setting to an acute care facility to have baseline data with regards to continence so that current care providers are aware of and can track any changes in the patient's status. There are direct cost savings in utilizing an instrument such as this. As previously mentioned, a comprehensive assessment is done up front, reducing the need for

repetition of questions by service providers. This also aids in preventing undue burden on the patient as well.

The needs of the patient become self-evident as the assessment identifies key areas of decline; for instance the presence of pain, along with description of its frequency and intensity, highlight the need for intervention, often as simple as provision of analgesia. With documentation available in many care domains, the overall quality of care should improve as there is less likelihood of overlooking care needs and the presence of comprehensive data increases the accountability of care providers. Finally, the MDS-AC is not particular to where you receive your care but rather is specific to particular indicators of decline that are present in a patient following an acute admission to hospital.

## 9.0 Summary

A picture of need, assessment type, process and timing are beginning to take shape as a result of this literature review. Providing appropriate health care to the elderly is by no means simplistic, and while it needs to start at the first point of patient contact with the health care system. The elderly population is continuing to grow, not only in Ontario but across Canada. These individuals are typically found to endure chronic conditions, sometimes more than one which potentially result in acute exacerbations. Patient attendance at an ED is a sentinel event for these individuals and they often get admitted to acute care settings for these exacerbations. Due to the nature of their conditions, and other issues that may accompany them to hospital (e.g., lack of support in the community), the senior population is prone to longer hospital stays. This can result in inpatients shifting to an ALC level of care and to a bed blocking status.

For this reason, geriatric screening is of the utmost importance for ensuring quality care and financial responsibility. Screening the elderly population at the time of entry to the ED may help to eliminate the need for admission to hospital and/or potentially reduce a patient's length of stay. This may prevent patients from reaching ALC status and becoming a barrier to appropriate use of the acute care system of care.

The challenge for policy makers and service providers is that budgetary limits continue to trend downwards while the population of those who utilize hospital services and are becoming increasingly in need of chronic care continues to grow. This is in addition to the population of elderly which continues to grow, the subgroup of those who are the most ill continuing to climb rapidly.

It appears that use of a targeted screening instrument, with moderately good sensitivity and specificity to a comprehensive assessment, using standardized instruments and utilizing a multidisciplinary team ensuring initiation of recommendations at a time of crisis for the patient, is the gold standard. The interRAI group has facilitated with this process in other sectors of health care system and now appears logical to apply to seniors in the ED / Acute Care hospitals. As a result, it is felt that an ED screening tool based on the interRAI AC has more predictive power than the two existing screeners now utilized and will aid in establishing a model indicative of identification of mortality, establishing ALC status, and translate importance of elder care in a clinical summary.

## 10.0 Research Plan

### *10.1 Study Objective*

This thesis aims to examine utilizing interRAI instruments to provide improved quality-of-life outcomes for the elderly patient, more effective use of hospital resources, and the need for a shift in care of the elderly towards the community.

### *10.2 Research Questions*

Data from a pilot test of the Resident Assessment Instrument – Acute Care (interRAI Acute Care), an assessment instrument for patients 75 years and older admitted to an acute hospital, will be analyzed in an attempt to address the following:

- What proportion of elderly acute hospital patients are screened as being "at risk" with the instrument compared with other similar geriatric screening instruments (e.g. Identification of Seniors At Risk (ISAR) or the Triage Risk Screening Tool (TRST))?
- Could the instrument be used to predict Alternate Level of Care (ALC) status as a basis for identifying elderly patients in need of specialized geriatric services?
- Could the instrument be used at admission to predict adverse patient outcomes during the inpatient episode?

### *10.3 Study Rationale*

The original MDS-AC reliability trial targeted elderly acute care patients, 70 years and older, in order to determine if:

1) The MDS-AC produces similar results when completed by 2 separate raters within a set period of time (i.e., inter-rater reliability);

2) The results obtained by the MDS-AC in select domains are similar to those obtained by stand-alone instruments (i.e., MMSE and the modified Barthel index [a scale of activities of daily living used to communicate the degree of a patient's disability between health care professionals]);
3) The MDS-AC is practical and informative in assessing this population in this setting.

Secondary data analyses on the data set of approximately 460 patients from five sites in Ontario will be undertaken. For the purposes of this study, analyses will be performed on the data set in order to determine the best set of items that will predict the need for either initiation or augmentation of current homecare services or prediction of future alternate level of care status, a precursor to long-term care admission.

This research has great potential for meeting the needs of patients and clinicians, as well as health care policy makers. First, it will address the need for a process in which to more appropriately assess the needs of this population in a way that allows for comparison with patients receiving home care services or residing in long-term care institutions. Earlier identification of those patients who may later become classified as being at the alternate level of care (ALC) stage has important policy implications for hospitals, as they attempt to manage competing demands on limited resources.

Second, the evidence produced by the research could provide a template on which all clinicians can plan care. In using the MDS-AC, this occurs when "triggers" for defining care plans most appropriate for particular individuals are activated. For instance, certain items related to cognition are found in the Cognitive Performance Scale common to most interRAI instruments. If the patient provides affirmative answers to the questions, this could highlight

the need for providing more supervision at home, or potentially placement in a long-term care facility. Ultimately, this may support improved outcomes on discharge.

Third, the MDS-AC emphasizes the functional capabilities of an individual, without dwelling unnecessarily on the diagnosis that resulted in his/her admission to hospital. With little research in this area, it is important that safety be the utmost priority for these people that will eventually be discharged. In order to make competent and evidence-based decisions, clinicians will benefit from quantitative rating of a patient's functional capabilities and at a fundamental level, provide peace-of-mind for hospital staff that the patient can function without due harm in the environment to which they are returning. As well, they wish to prevent the patient's return to the hospital emergency department because the patient was not prepared (in multiple domains) to return home.

Fourth, utilization of the MDS-AC instrument will provide clinicians with a common set of questions with which to obtain a standardized set of data, thereby improving continuity of care. This common language not only allows clinicians to compare, for example, the continence of a patient in one country against that in another country but also allows the communication of information of a patient as they move from one care setting to another. Many of the items are common to each of the interRAI suite of instruments, and allow for consistent care as a patient moves from a community setting, for instance, to a long-term care facility.

### *10.4 Study Design*

The study will be a secondary analysis of data from a longitudinal study carried-out in Ontario, looking at consecutive intakes of those people 75 years and older admitted to

hospital. All participants became involved on a voluntary basis. A sample size of 460 consecutive admissions to acute will be utilized in this study for statistical calculation.

The main goal of the study was to determine the utility of an instrument such as the MDS-AC to be used for screening frail elderly persons in acute care (Hirdes et al., 2001).

### *10.5 Population/Setting*

The study was conducted in six Ontario hospitals as part of the RAI-HIP Integrated Health Information System (IHIS) Acute Care study led by Providence Centre and the University of Waterloo. The sites were a mixture of teaching and community hospitals, varying in size (Kitchener, Guelph, Hamilton, Thunder Bay, Scarborough, and Whitby). The RAI-HIP study lasted two years in total, beginning in May 1999, and included not only testing of the MDS-AC, but also other instrumentation and care sectors , including the community and institutional settings (Home Care Quality Indicators, RAI-MH Pilot Implementation, and the RUG-III/RAI-PAC Study) (Hirdes et al., 2001).

### *10.6 Inclusion Criteria*

The patients considered as appropriate for the study were 75 years and older admitted from the community or from long-term care. Data were gathered beginning on a date decided upon by each facility. Consecutive intakes to the inpatient units were taken, unless high numbers of admissions were identified and unable to be kept up with by staff. If this was the case, systematic sampling was utilized, where every $2^{nd}$ or $4^{th}$ patient was assessed, depending on the practice of the facility.

Assessments were undertaken at specific points in time; the initial assessment using the MDS-AC was to take place within 24 hours of admission to the unit, and would include data collection for the 3 day pre-morbid period, as well as the past 24 hours of the admission period. If the patient was to be discharged from the unit prior to Day 7 of their stay, the second assessment period could occur no earlier than Day 3. The final assessment would be completed at the time of Alternate Level of Care (ALC) designation.

### *10.7 Study Protocol*

Assessments were to be undertaken by health care professionals in an acute care hospital setting, most often by nurses (Hirdes et al., 2001). Prior to forwarding the data to the research team, copies were made of the assessments and placed on the patient's chart in order for clinical staff to have access to the information, as well as to allow researchers to identify errors of omission in the data that needed to be addressed (Hirdes et al., 2001). Anonymizing of the original scannable forms was completed prior to their return to the research team. Feedback on data provided was sent expeditiously to each participating facility (often within 2 weeks), and in this particular sub-study, assessors were encouraged to utilize suggestions made as they altered patient's care plans to reflect best practice (Hirdes et al., 2001).

The assessment instrument was developed through pilot-testing at Providence Centre in Ontario and in collaboration with Dr. Len Gray at the University of Queensland in Australia.

### *10.8 Data Collection*

Clinicians were provided with a short training session in utilizing the MDS-AC prior to the start of the study. Assessments were reviewed as they were received to check for quality and sites were contacted in a timely fashion to identify missing or inappropriate values. All screening instruments were printed on scannable computer forms. Nursing staff completed the forms using a ballpoint pen, kept a photocopy of the form for the patient's medical record (if desired) and forwarded the original form back to the Research Department at Providence Centre, Scarborough, or the University of Waterloo research team. The forms were then read by a scanner and data housed on a secure server on-site at the University of Waterloo.

### *10.9 Ethics Approval*

Approval from the Office of Research Ethics at the University of Waterloo was obtained for the initial study. Some facilities required that they also review and approve the study.

### *10.10 Data Analyses*

Statistical analyses involved three distinct parts: univariate analysis, bivariate analysis and logistic regression. Regression models will be utilized to identify assessment items that are related to length of stay as well as negative outcomes, such as delirium.

### *10.11 Outcomes*

All sites of appropriate sample size were provided with status reports, allowing them to compare themselves with other sites in their area. Site identification was removed prior to

reporting. Although the study planned to provide longitudinal data as patients moved on to another care area from acute care, this idea was changed in consultation with the Office of Research Ethics at the University of Waterloo and the study sites themselves, citing high level of burden for site staff. As a result, tracking discharge location was possible, but changes in inpatient status with transfer to another care location were not monitored.

Other changes in protocol included the utilization of multiple sites from two cities (Hamilton and Waterloo), making up for the fact that some locations were not able to support multiple sub-study enrolment. This resulted in a variation in sampling that was not anticipated, yet welcome.

## 11.0 Results

This thesis was written in order to answer three pre-defined research questions. Utilizing various statistical methods with SAS 9.1, the data collected were examined to predict various patient outcomes.

### *11.1 Sample Description*

A summary of the demographic characteristics for the study sample is available in Table 2. The gender distribution leans somewhat towards men, where 57.3% of the dataset were male while the remaining 42.7% were female.

The sample consisted predominantly of persons 75-84 years of age (68.5%) or older than 85 years (30.2%). The oldest patient in the sample was 100 years old, and the youngest was 33 years old.

Most of the patients were widowed (51.9%), yet a substantial percentage were married (36.7%). About 4 % were separated or divorced and about 7 % were never married.

**Table 2. MDS-AC Sample Demographic Characteristics**

| Variable | Number of Respondents N = 460 | % |
|---|---|---|
| Gender | | |
| Male | 189 | 41.1 |
| Female | 254 | 55.2 |
| Missing | 17 | 3.7 |
| Age | | |
| 30-44 Years | 7 | 1.5 |
| 45-54 Years | 7 | 1.5 |
| 55-74 Years | 38 | 8.3 |
| 75-84 Years | 211 | 45.9 |
| Greater than 85 Years | 197 | 42.8 |
| Missing | 0 | 0 |

| | | |
|---|---|---|
| Marital Status | | |
| Married/Partner | 169 | 36.7 |
| Never Married | 31 | 6.7 |
| Widowed | 238 | 51.7 |
| Separated/Divorced | 20 | 4.4 |
| Other | 1 | 0.2 |
| Missing | 1 | 0.2 |
| Primary Language | | |
| English | 383 | 83.3 |
| French | 5 | 1.1 |
| Other | 72 | 15.7 |
| Missing | 0 | 0 |
| Living Arrangement (before admission) | | |
| Private home/apartment/Rented Room | 344 | 74.8 |
| Board and care/assisted living/group home | 29 | 6.3 |
| Continuing/Long Term Care Facility | 74 | 16.1 |
| Other | 11 | 2.4 |
| Missing | 1 | 0.2 |
| Living Arrangement (on discharge) | | |
| Private home/apartment/Rented Room | 216 | 47.0 |
| Board and care/assisted living/group home | 29 | 6.3 |
| Continuing/Long Term Care Facility | 117 | 25.4 |
| Deceased | 50 | 10.9 |
| Other | 48 | 10.4 |
| Missing | 31 | 6.7 |
| Hours in Emergency Department | | |
| 0-5 | 204 | 45.5 |
| 6-10 | 125 | 27.8 |
| 11-20 | 63 | 14 |
| 21-30 | 41 | 9.1 |
| 31-40 | 6 | 1.3 |
| 41-50 | 8 | 1.8 |
| 51-60 | 2 | 0.5 |
| Missing | 11 | 2.4 |

| Variable | Number of Respondents | % |
|---|---|---|
| Most Recent Hospitalization | | |
| None | 305 | 66.3 |
| 1 - 30 days prior to this admission | 86 | 18.7 |
| 31-90 days prior to this admission | 63 | 13.7 |
| Missing | 6 | 1.3 |
| Reason for Current Hospitalization | | |
| New Problem | 233 | 50.7 |
| Exacerbation of existing problem | 163 | 35.4 |
| Both | 64 | 13.9 |
| Missing | 0 | 0 |
| Precipitating Event | | |
| Within last week | 277 | 60.2 |
| 8-14 days prior | 72 | 15.7 |
| 15-30 days prior | 41 | 8.9 |
| 31-60 days prior | 34 | 7.4 |
| More than 60 days prior | 31 | 6.7 |
| Missing | 5 | 1.1 |
| Pain Frequency | | |
| Not present | 244 | 53.1 |
| Less than once per 4 hours | 64 | 13.9 |
| Once every 2 to 4 hours | 46 | 10.0 |
| Constantly | 105 | 22.8 |
| Missing | 1 | 0.2 |
| Pain Intensity | | |
| Mild pain | 45 | 9.8 |
| Moderate pain | 88 | 19.1 |
| Severe pain | 70 | 15.2 |
| Times pain is horrible/excruciating | 17 | 3.7 |
| Missing | 240 | 52.2 |
| Informal Caregiver overwhelmed by Patient's Illness | | |
| No | 380 | 82.6 |
| Yes | 70 | 15.2 |
| Missing | 10 | 2.2 |
| Length of Stay | | |
| 0 – 7 Days | 219 | 54.4 |
| 8-14 Days | 69 | 17.0 |
| 15-21 Days | 40 | 9.9 |
| 22-28 Days | 28 | 6.9 |
| 29 or More Days | 47 | 11.8 |
| Missing | 57 | 12.7 |

Despite the location of the assessments, the language spoken in 83.3% of cases was English. Surprisingly, occasions where French was spoken as the primary language occurred in only 1.1% of the assessments. With some of the assessments located in Toronto, and the multicultural nature of many Canadian cities, it is not surprising that other languages were used in 15.7% of interactions.

The highest level of education achieved by the patient sample was a graduate degree, but only 1.4% of the total sample accomplished this. Of all the educational levels, 36% of the sample achieved a grade 9 to 11 education, but due to a multitude of reasons (e.g. need for manual labour on a family farm, drafting for military service) many patients did not gain a high school diploma (20.6%).

With respect to the location of the patient prior to their visit to the ED and their subsequent admission, 74.8% were living in their own home, apartment or rented room and only 16.1% began his admission from continuing care or a long-term care facility. On discharge, however, only 47.0% of those patients who started their visit at home were able to return to their home. Most of these patients were discharged to a long-term care facility (25.1%) or to another location (10.4%). A substantial portion of this sample (10.9%) died after this admission.

Patients most commonly enter the inpatient system through the ED of the hospital. Most of the ED visits prior to assessment (0-5 hours - 45.4%, 6-10 hours - 27.8%) were of a short duration, but for an elderly patient this can be a long time. The recidivism of patients to the ED was also assessed by determining which patients had been readmitted to acute care hospital within the past 90 days from their current admission. While 67.2% had not been

discharged from a hospital within the past 3 months, 18.9 % had returned within 30 days and 13.9% and returned from 31-90 days, for a variety of reasons.

Most of the time, the presenting problem was a new issue (50.7%). This might possibly be an emergent issue, for example, a cardiac problem or a gallbladder attack requiring emergent surgery. As would be expected, with the high proportion of aged subjects, 35.4% of the patients presented with a pre-existing condition (e.g., a chronic illness such as diabetes or angina). A combination of pre-existing and emergent conditions brought 13.9% of the patients to the ED.

Patients do not like to attend the hospital if they can avoid it. However, when people feel they need emergent attention, the majority attend in a timely fashion. In this patient sample, we see that 60.1% attended the hospital within a week of the first symptoms of their attending issue appearing. This quickly tapered to 15.8% of those who did not seek emergent medical attention until at least a week had passed, but no longer than two weeks. Some patients waited excessive periods before seeking ED assistance: 9.0% waited 15-30 days, 7.5% did not seek help for 31-60 days and 6.8% waited longer than 60 days. Pain frequency and intensity are common problems for elderly patients. For example, 22.9% of those patients experiencing any type of pain are constantly in pain. As well, the number of patients experiencing moderate (40%) to severe (31.8%) levels of pain is notable.

One last concern highlighted in A significant number of patients/families present to the ED experiencing a high level of informal caregiver stress , and usually in a state of crisis. Approximately 15.6% arrive in the ED completely overwhelmed and not certain of what to do with their elderly family member or friend. They may have tried solutions in the community and these have either not worked or have not had the opportunity to get started yet. These

cases are often complex and require admission to sort out, as there is often no other alternative.

The length of time patients were found to be admitted to hospital in this dataset was calculated. While the majority of patients stayed on the ward for one week or less (54.4%), there were still a significant number admitted for over four weeks.

### *11.2 Research Question #1*

**What proportion of elderly acute hospital patients are screened as being "at risk" with the SRI instrument compared with other similar geriatric screening instruments (e.g. Identification of Seniors At Risk (ISAR) or the Triage Risk Screening Tool (TRST))?**

This study analyzed the screening capabilities of four screening instruments: the Self-Reliance Index or SRI (regular and high-score version), the ISAR and the TRST. All four tools utilize various activities of daily living, instrumental activities of daily living and physical function of a patient to identify patients at risk of adverse outcomes. A summary of results for of each of the instruments is provided below.

#### *11.2.1 Self-Reliance Index (SRI)*

This scale consists of items taken from the interRAI-Acute Care instrument as follows, with its corresponding instrument question number: decision making (g2b1), meal preparation capacity (f3ab1), ordinary housework capacity (f3bb1), transportation capacity (f3gb1), hygiene capacity (f1gb1), and bathing (f1hb1). These particular items were chosen as a close crosswalk to both the ISAR and TRST instruments. Each of these items was considered triggered if anything but a '0' (independent – performed on own) was selected (i.e., '1' –

modified independence, '2' – minimally impaired, '3' – moderately impaired, '4' – severely impaired). When the score for each patient (sum of all scale items) was greater than or equal to 2, the SRI _scale was considered triggered for that patient; if the SRI scale had a score of greater than 5, this was called the SRI_Score_Hi.

The SRI was scored at multiple times during the episode of care (first of either Day 7 in hospital or 24 hours pre-discharge). The ability of the patient to perform any of the activities independently changed over this time period, often significantly.

**Table 3. Percentage of each SRI_score item triggered**

| Screener | Percent Triggered |
|---|---|
| SRI_score | 85.5 |
| • Decision making | 46.7 |
| • Meal Preparation | 80.1 |
| • Housework | 85.9 |
| • Transportation | 85.987.7 |
| • Hygiene | 62.1 |
| • Bathing | 67.8 |

The process undertaken to analyze the SRI items involved collapsing each of them into binary responses. The sum of all six variables was then added together and the scale was it was arbitrarily forced to indicate the scale was triggered if the sum was greater than or equal to two. When this was completed, many participants had scores greater than or equal to two (74.1%, missing = 13.3%). The high rate of positive scores is suggests that it may include of a high number of patients who should not be included in the triggering category (false positives). In light of this, additional analysis was completed on the sum, and those scoring at the highly positive end of the scale (five or six) where further collapsed into binary responses. In this instance, only 49.6% triggered the two highest levels of the SRI.

### *11.2.2 Identification of Seniors At Risk (ISAR)*

The ISAR screener was examined in much the same way as the SRI. The ISAR, as mentioned, uses a six response screener and a cut off point of greater than or equal to two indicates that the patient has triggered the screener. The first item consisted of whether help was needed prior to the illness or injury that brought the patient to the ED (crosswalked to AC items f3aa through f3ga – Instrumental Activities of Daily Living). Each item was collapsed to a binary response of those scoring anything more than being independent in the activity versus being independent or identifying that the activity did not occur. The sum of these items or addition to the score for the ADL hierarchy scale (early loss personal hygiene, item h2i; middle loss toileting, item h2h; middle loss locomotion, item h2c; and late loss eating, item h2g) at 7 days of admission or discharge was greater than or equal to one, the item was triggered. In this sample, 87% had any dependence in their instrumental activities of daily living or triggered of the ADL hierarchy scale (Table 4).

**Table 4. Percentage of each ISAR item triggered**

| Screener | Percent Triggered |
|---|---|
| ISAR_final | 95.7 |
| • ADL hierarchy (1-6) or IADL sum >1 | 87.0 |
| • ADL hierarchy diff between premorbid and 24 hrs pre admit | 53.3 |
| • Hospital stay in past 3 months | 32.4 |
| • Vision impairment (prior to admission) | 13.7 |
| • Memory problem | 40.9 |
| • Medication (≥ 3) | 91.7 |

The second item on the ISAR screener queried whether more assistance than usual was required since the injury that brought them to the ED. In this instance, functional capability at

two time periods – pre-morbidly (normal self-performance 30 days prior to the event that brought them to hospital) and at 24 hours prior to admission was compared. If functional ability at 24 hours prior to admission was greater than or equal to two points worse than the premorbid status, the patient was scored as triggering this item. The ADL Hierarchy Scale was also compared at the same two times, and if the patient was one point worse at admission than in the premorbid period, he/she would also trigger the second ISAR item. After analysis, it was noted that 53.3% of patients triggered an increased need for help to care for self.

If the patient had experienced a hospital stay of one night or more in the past six months, this item was triggered as question three on the ISAR screener. This item was crosswalked from interRAI Acute Care item c5 or most recent hospitalization during the 3 months prior to current admission. In this sample, 32.4% triggered this item, with a small number (1.3%) of missing values for this response.

Vision was assessed as part of the ISAR screener. This attribute is unique to this screener. It appears that a relatively small number of patients have issues with their vision (13.7%); however, this item has a significant number of missing responses (12.8%).

Question 5 in the ISAR screener enquires about the patient's memory, asking if patients feel they have serious problems with it. Approximately 40.9% were identified as having memory problems; however, a clinician often takes this type of information as indicative of a higher proportion in the community as many elderly do not like to let on they may have memory issues or do not recognize it themselves (often identified by those around them). Self-assessment of this item is also something to question when discussing memory. Many elderly persons do not or will not identify themselves as having memory difficulty, and may end up with many false negatives.

The final question on the ISAR assesses the number of different medications taken every day. If the patient indicates they are taking more than three per day, this will trigger a positive response for this item. In this sample, 91.7% of patients are taking three or more medications. Again, when considered from a clinical perspective, it is fairly common to have patients in the 75 and over age range taking three or more medications.

### *11.2.3 Triage Risk Screening Tool (TRST)*

The TRST was also examined with this Acute Care dataset. The first question in the TRST asks about any history of cognitive impairment. This is crosswalked to the interRAI Acute Care items 'short term memory' (g1b1) and decision –making skills (g2b1) and is scored '1' if there is a memory problem or if there is any dependence in decision making. As summarized in Table 5, 49.4% of patients had a problem with their short term memory.

**Table 5. Percentage of each TRST item triggered**

| Screener | Percent Triggered |
|---|---|
| TRST_final | 82.0 |
| • Memory (24 hrs prior to admit) | 49.4 |
| • Ability to transfer (24 hrs prior to admit) | 53.5 |
| • Medication (≥ 5) | 82.6 |
| • Hospital stay in past 3 months | 32.4 |
| • Lives Alone | 30.0 |

The second question on the TRST is matched to the questions in the MDS-AC assessing the capability of the patient to transfer between bed, chair, wheelchair and standing (f1bb1) or to move between locations within a room on the same floor (f1cb1). More than half of the respondents had some difficulty with this activity, with 53.5% expressing some difficulty.

As on the ISAR screener, the number of medications a patient is taking is included as part of the screener scoring. In the instance of the TRST, the screener asks that patients taking five or more medications trigger this question. As noted previously, a large number were reported to be taking five or more medications (82.6%).

Hospitalization in the past three months was again crosswalked to MDS-AC item 'most recent hospitalization during the 3 months prior to the current admission' (item c5). Again, 32.4% of the patients affirmed that they had had a recent hospitalization.

Finally, the TRST instrument assessed those that live alone as premorbidly part of the screener. In this dataset, 30% of patients lived alone as a permanent living arrangement prior to their visit to the ED.

There is one final question found on the TRST that is unlike the other screeners. This is the free-hand, clinical recommendation of the health care professional completing the screening. The clinician may find particular issues, such as nutrition/weight loss, failure to cope, sensory deficits, incontinence, medication issues, depression/low mood as possible items for comment, but the clinician has the option to expand upon. The current dataset does not have an equivalent to this question, as there is no freehand documentation recorded on these or any other items in the acute care instrument.

**Table 6. Comparison of Percent of Screeners Triggered with/without Medication Item**

| Screener | Percent Triggered | Percent Triggered with Medication item removed |
|---|---|---|
| ISAR_final | 95.7 | 46.7 |
| TRST_final | 82.0 | 42.6 |
| SRI_score | 85.5 | N/A * |
| SRI_score_hi | 57.1 | N/A * |

* Screener does not contain a medication item

Table 6 identifies the portion of the patient sample that triggered each of the screeners . At first observation, the ISAR_final results illustrate that a significant number of patients are triggering this screener frequently (95.7%), with the TRST_final (82.0%) and SRI_score (85.5%) numbers close behind. Using a higher threshold, the SRI_score_hi is triggered for about half of the sample (57.1%). When the medication item is removed from both the ISAR_final and TRST_final, the number of patients triggering these screeners is decreased in both cases by nearly 50%. This shows that that the driving item in both of these screeners appears to be the number of medications a patient is taking. Many seniors take three or more or five or medications a day, so removal of this item limits the number of people who will trigger this screener.

### *11.3 Research Question #2*

**Could the instrument be used to predict Alternate Level of Care (ALC) status as a basis for identifying elderly patients in need of specialized geriatric services?**

The next step is to assess if any of the instruments would be able to predict the patient's progress toward ALC status, where they no longer need acute care, but may not be able to return home. This would enable health care agencies to be more prepared and proactive in predicting the clinical care and fiscal needs of seniors in the future.

Overall, ALC status was analyzed to determine the number of those in the sample who were determined to qualify. Table 7 illustrates that while the majority of those patients captured in the dataset did not become ALC, nearly 20% were qualified as such.

**Table 7. Percentage of the Patient Sample Who Qualified as ALC Status**

| ALC Status | Percent Triggered |
|---|---|
| **No** | 80.4 |
| **Yes** | 19.6 |

Each of the screeners was initially reviewed in light of whether they could predict ALC status purely from a cross-tabulation.

**Table 8. Summary of all Screening Instruments by Ability to Predict ALC Status**

| ALC Status | SRI_hi_score (%) | SRI_score (%) | TRST (%) | ISAR (%) |
|---|---|---|---|---|
| **Yes** | 29.4 | 22.6 | 23.4 | 21.5 |
| **No** | 70.6 | 77.4 | 76.7 | 78.5 |

In Table 8, the SRI_Score_Hi screener is able to predict ALC status in 29.4% of the cases while the TRST and ISAR are less effective (23.4% and 21.5% respectively).

In order to determine the validity of a screening instrument, analysis of sensitivity and specificity are necessary. The sensitivity of a test refers to how many of a disease or state that a particular test can identify. A test that is very sensitive will likely show a fair number of false-positive results, but true positives will rarely be missed. The specificity of a test indicates how accurately a particular disease or state is identified, as well as providing a limited number of false positive results. In this same example in Table 9, the SRI_Score_Hi was able to accurately identify those patients who were ALC status 49.4% of the time.The cross tabulations of each screening instrument by ALC status can be found in Tables 9 to 12, however a brief analysis of the score with regard to the sensitivity and specificity of each of or potential screeners with regard to ALC status is summarized in Table 9.

**Table 9.** **Sensitivity, Specificity, Positive and Negative Predictive Value for SRI_Score_Hi Related to ALC Status**

| | | *ALC Status* | | |
|---|---|---|---|---|
| | | ***Positive*** | ***Negative*** | |
| ***SRI_Score_Hi*** | ***Positive*** | **67** | 161 | → Positive predictive value 29.4% |
| | ***Negative*** | 14 | **157** | → Negative predictive value 91.8% |
| | | ↓ **Sensitivity 82.7%** | ↓ **Specificity 49.4%** | |

**Table 10**. **Sensitivity, Specificity, Positive and Negative Predictive Value for SRI_Score Related to ALC Status**

| | | *ALC Status* | | |
|---|---|---|---|---|
| | | ***Positive*** | ***Negative*** | |
| ***SRI_Score*** | ***Positive*** | **77** | 264 | → Positive predictive value 22.6% |
| | ***Negative*** | 4 | **54** | → Negative predictive value 93.1% |
| | | ↓ **Sensitivity 95.1%** | ↓ **Specificity 17%** | |

**Table 11.** **Sensitivity, Specificity, Positive and Negative Predictive Value for TRST Related to ALC Status**

| | | *ALC Status* | | |
|---|---|---|---|---|
| | | ***Positive*** | ***Negative*** | |
| ***TRST*** | ***Positive*** | **85** | 279 | → **Positive predictive value 23.4%** |
| | ***Negative*** | 3 | **77** | → **Negative predictive value 96.3%** |
| | | ↓ **Sensitivity 96.6%** | ↓ **Specificity 21.6%** | |

**Table 12. Sensitivity, Specificity, Positive and Negative Predictive Value for ISAR Related to ALC Status**

| | | *ALC Status* | | |
|---|---|---|---|---|
| | | ***Positive*** | ***Negative*** | |
| ***ISAR*** | ***Positive*** | **76** | 278 | → **Positive predictive value 21.5%** |
| | ***Negative*** | 0 | **16** | → **Negative predictive value 100%** |
| | | ↓ **Sensitivity 100%** | ↓ **Specificity 5.4%** | |

**Table 13. Summary of Sensitivity, Specificity, Positive and Negative Predictive Value for each Screening Instrument Related to ALC Status**

| ALC Status | SRI_hi_score (%) | SRI_score (%) | TRST (%) | ISAR (%) |
|---|---|---|---|---|
| **Sensitivity** | 82.7 | 95.1 | 96.6 | 100 |
| **Specificity** | 49.4 | 17.0 | 21.6 | 5.4 |
| **+ve Predictive Value** | 29.4 | 22.6 | 23.4 | 21.5 |
| **-ve Predictive Value** | 91.8 | 93.1 | 96.3 | 100 |

In this dataset, 67 patients triggered the SRI_Score_Hi and were also designated as ALC status. This is 16.8% of those responding (N = 399). The chi-square in this instance is 27.1 (df = 1, prob = <0.0001). With such a large chi square value, we would have to reject the null hypothesis and determine that there is definitely a relationship between the high score SRI and designation of ALC status.

In 2x2 cross tabulation (shown in detail in Table 9, in summary in Table13),the sensitivity of the screener in this sample was 82.7%, illustrating that about 4 in 5 patients who actually became ALC patients were identified by the SRI_Score_Hi screener. On the other hand the specificity of this screener is 49.4%, meaning that about half of those flagged as being at risk for becoming ALC patients actually had that status at follow-up.

To complete the cross tabulation results, we look to the positive and negative predictive values. The positive predictive value (or the precision with which we can predict ALC status from a triggered SRI_Score_Hi) is 29.4. From the negative predictive value, we can also postulate that there is a 91.8% probability that the patient who does not trigger the SRI_Score_Hi is also not designated as ALC status.

In the case of the SRI_Score, 77 people triggered this screener and ended up designated as ALC. The sensitivity of our sample utilizing this screener was 95.1%, that almost all those who actually became ALC patients were identified by the screener. On the other hand, the specificity with this cut-off dropped to 17%, meaning that the large majority of those who were flagged with the screener did not actually become ALC patients.

The positive predictive value (proportion of patients with a positive SRI_Score who are designated ALC status) is 22.6%, a lesser value than that of the SRI_Score_Hi (Table 10 and 13). The negative predictive value is 93.1%, which effectively identifies those who do not trigger the SRI_Score and are not ALC status.

The results for the TRST screener are also shown in Tables 11 and 13. These analyses showed that 85 patients were both designated ALC Status and the TRST screening instrument. The sensitivity of our sample utilizing this screener was 96.6%, the highest of all the screeners so far, meaning that this is the largest proportion all screeners with actual ALC status were positive in TRST screening results . The specificity of the TRST screener was 21.6%, a value between both the SRI_Score_Hi and the SRI_Score.

The positive predictive value (proportion of patients who are designated ALC status with a positive TRST) is 23.4%, comparable to the SRI_Score, yet somewhat lower than the SRI_Score_Hi. The negative predictive value is 96.3%, which effectively identifies those who

do not trigger the TRST and are not ALC status. It appears that the SRI _Score_Hi continues to be more effective, maintaining a nice balance between sensitivity and specificity.

The final screener, the ISAR, is reviewed for comparison to the other three screening examples with regard to sensitivity and specificity (Table 12). In this case, all ALC patients had ISAR is triggered (100% sensitivity). While this is a phenomenal score, analysis of the specificity tempers this, with only 5.4% of patients who are flagged by this screener actually having ALC status negative . This specificity is much less than any of the other screeners, and in taking this result into consideration, this screener is judged to be ineffective in providing a good balance of suitable outcomes.

The positive predictive value for the ISAR where ALC status is the event of interest illustrates that this screener has a precision rate of 21.6%, the lowest of all the screeners. The negative predictive value again is 100%, which theoretically means that the screener is able to indicate that all patients who are not ALC status also do not trigger the ISAR.

Comparison was made between various combinations of triggered scales and the percentage of patients who were or were not designated as ALC. If all 3 scales were triggered (TRST and ISAR scoring 2+, SRI_score_hi scoring greater or equal to 5), 25.4% of patients would be designated as ALC status and 74.6% would be identified as not fitting the ALC criteria. If none of the scales were triggered, we found that none of the patients would be designated as ALC status. Considering all combinations of the three scales where the SRI_score_hi scale was triggered in addition to one other scale (either TRST or ISAR), 7.5% of those who triggered a combination of scales would be designated as ALC. Finally, if the TRST or ISAR were triggered but not the SRI, 7.1% of patients were also designated as ALC.

Further analyses dealt with whether the SRI_Score_Hi screener could be used to predict Alternate Level of Care (ALC) and from this result, predict the need for specialized geriatric services. This was done by modeling a number of independent variables in the MDS-AC that were thought to have impact on ALC status (age, sex, marital status, hours in the emergency department, where the patient was admitted from, and the city in which they were screened).

After trialing various models, Table 14 illustrates the most parsimonious option. If the SRI_Score_Hi is triggered, the odds are just over 5 times greater that the patient will also be designated ALC status. The analysis also illustrates that for every 10 years of age, a patient has nearly twice the odds of being ALC (OR = 1.95). If a patient starts out at a private home, the odds are twice as great that the health care staff will identify the patient as ALC status compared with those living in other settings. Finally, using Guelph and Hamilton together as a reference, it is found that Kitchener and Scarborough have much lower odds of becoming ALC patients.

**Table 14. Multivariate Modeling of ALC by Selected Independent Variables**

| Variables | Estimate (Standard error) | Odds Ratio (95% CI limits) | Pr > ChiSq |
|---|---|---|---|
| SRI score hi | 1.68 (0.34) | 5.36 (2.77-10.37) | 0.0001 |
| Age (in 10 yr increments) | 0.67 (0.21) | 1.95 (1.30-2.93) | 0.001 |
| Private Home | 0.74 (0.32) | 2.10 (1.11-3.96) | 0.02 |
| City (Ref=Guelph/Hamilton)<br>- Kitchener<br>-Scarborough | <br>-0.60 (0.30)<br>-1.69 (0.48) | <br>0.55 (0.30-0.99)<br>0.19 (0.07-0.48) | <br>0.05<br>0.0004 |

C=0.77

The analysis of each candidate screener was initially done to determine which would be best able to predict ALC status (Table 15). By reviewing the odds ratio for each screener, it is noted that those patients who trigger the high cut off SRI_score_hi screener are nearly five times as likely to be designated as an ALC status patient. This result is highly significant ($P < 0.0001$) and a C statistic which is greater than chance (0.5) at 0.66.

Those patients who trigger the regular SRI_score screener have less than four times the odds of being designated as ALC status. While the result is still significant (0.01), the C statistic indicates the result is just a bit better than chance (0.56).

The TRST screener has impressive odds when predicting ALC status. The analysis indicates that this screener is nearly eight times more likely to predict ALC status. This is an impressive result; however, the C statistic is not as high as that for the SRI_score_hi.

The ISAR is also assessed using continuous independent variable logistic modeling (Table 15). The results for this screener are unstable according to the SAS program output. Overall, this screener would not make sense to predict ALC status.

Finally, all scales were analyzed in terms of triggering them all at one time. Here the results show that if a patient was to trigger all three scales, they would be five times more likely to be identified as ALC status. The Pr value is significant and next to the SRI_score_hi, this is the second largest value (0.62).

**Table 15. Continuous Independent Variable Logistic Model**

| Screener (ALC Status) | Estimate (Standard Error) | Odds Ratio (95% CI) | Pr > Chisq | C statistic |
|---|---|---|---|---|
| SRI_score_hi | 1.54 (0.31) | 4.67 (2.52-8.65) | <0.0001 | 0.66 |
| SRI_score | 1.37 (0.53) | 3.94 (1.38-11.22) | 0.01 | 0.56 |
| TRST_final | 2.06 (0.60) | 7.82 (2.41-25.40) | 0.0006 | 0.59 |
| ISAR_final * | 13.43 (393.8) | 999 (.0001-999) | 0.97 | 0.53 |
| All Scales Triggered | 1.61 (0.45) | 5.0 (2.08-12.0) | 0.0003 | 0.62 |

* As identified by SAS, the validity of the model fit is questionable.

### *11.4 Research Question #3*

**Could the instrument be used at admission to predict adverse patient outcomes during the inpatient episode?**

A visit to the ED can take place for a number of serious concerns, as previously identified in the literature. One of the most life-threatening, but often unidentified concerns that elderly patients present to the ED with is delirium. In this dataset, delirium was fairly uncommon, with only 13.7% of patients screened as experiencing symptoms (Table 16).

**Table 16. Percentage of Patients Experiencing Symptoms of Delirium**

| Delirium | Percentage Triggered |
|---|---|
| **No** | 86.3 |
| **Yes** | 13.7 |

The MDS-AC instrument contains an item for assessing delirium (G3a-f). Again considering the sensitivity and specificity, a cross tabulation for delirium and each screener prediction was used to see if delirium is related to the screener score (Tables 17 through 20 ).

**Table 17. Sensitivity, Specificity, Positive and Negative Predictive Value for SRI_Score_Hi Related to Delirium**

| | | *Delirium* | | |
|---|---|---|---|---|
| | | ***Positive*** | ***Negative*** | |
| ***SRI_Score_Hi*** | ***Positive*** | **43** | 167 | → Positive predictive value 20.5% |
| | ***Negative*** | 13 | **149** | → Negative predictive value 92.0% |
| | | ↓ **Sensitivity 76.8%** | ↓ **Specificity 47.2%** | |

**Table 18. Sensitivity, Specificity, Positive and Negative Predictive Value for SRI_Score Related to Delirium**

| | | *Delirium* | | |
|---|---|---|---|---|
| | | ***Positive*** | ***Negative*** | |
| ***SRI_Score*** | ***Positive*** | **53** | 263 | → Positive predictive value 16.8% |
| | ***Negative*** | 3 | **53** | → Negative predictive value 94.6% |
| | | ↓ **Sensitivity 94.6%** | ↓ **Specificity 16.8%** | |

**Table 19. Sensitivity, Specificity, Positive and Negative Predictive Value for TRST Related to Delirium**

| | | *Delirium* | | |
|---|---|---|---|---|
| | | ***Positive*** | ***Negative*** | |
| ***TRST*** | ***Positive*** | **53** | 285 | **→ Positive predictive value 15.6%** |
| | ***Negative*** | 5 | **71** | **→ Negative predictive value 93.4%** |
| | | ↓ **Sensitivity 91.4%** | ↓ **Specificity 19.8%** | |

**Table 20. Sensitivity, Specificity, Positive and Negative Predictive Value for ISAR Related to Delirium**

| | | *Delirium* | | |
|---|---|---|---|---|
| | | ***Positive*** | ***Negative*** | |
| ***ISAR*** | ***Positive*** | **46** | 285 | → **Positive predictive value 13.9%** |
| | ***Negative*** | 0 | **16** | → **Negative predictive value 100%** |
| | | ↓ **Sensitivity 100%** | ↓ **Specificity 5.3%** | |

The summary of the sensitivity, specificity, positive and negative predictive values are provided in Table 21 from the details in the tables above.

**Table 21. Summary of Sensitivity, Specificity, Positive and Negative Predictive Value for each Screening Instrument Related to Delirium**

| Delirium | SRI_hi_score (%) | SRI_score (%) | TRST (%) | ISAR (%) |
|---|---|---|---|---|
| **Sensitivity** | 76.8 | 94.6 | 91.4 | 100 |
| **Specificity** | 47.2 | 16.8 | 19.8 | 5.3 |
| **+ve Predictive Value** | 20.5 | 16.8 | 15.6 | 13.9 |
| **-ve Predictive Value** | 92.0 | 94.6 | 93.4 | 100 |

When reviewing each of the scales once again, and comparing them to the outcome of delirium, we find that they trend in a similar manner to the ALC status seen in Table 13. Once again, the SRI_Hi_Score screener appears to have a good balance between the sensitivity and specificity. The proposed instrument is able to show that those patients possessing delirium score positive on the SRI_Score_Hi (sensitivity = 76.8%) and that the instrument is also effective in identifying patients who do not possess delirium who have a negative SRI_Score_Hi result (specificity = 40.2%).The positive predictive value for the SRI_Score_Hi (proportion of patients who possess delirium with a positive SRI_Score_Hi) is 20.5%, higher

than all of the other screeners. The screener correctly did not flag those who did not have delirium (negative predictive value) as 92%. Comparing this result to the other screeners listed, the SRI_Score_Hi screener appears to have the best outcome in terms of sensitivity/specificity and positive/negative predictive value balance.

Once it was determined that the future condition of the patient was best determined by the SRI_Score_Hi, this screener was utilized to run various logistic models. Delirium was the dependent variable modeled with various independent variables found in the MDS-AC assessment instrument to determine which variables would be most predictive of a patient's LOS in acute care hospital. It was apparent from the first few regression attempts that physical problems like hearing impairment, falls and pain intensity were not going to contribute to the model and were therefore eliminated. Table 22 illustrates the most parsimonious logistic regression model related to delirium.

**Table 22. Logistic Regression – Model Delirium by MDS-AC variables**

| Model (Delirium) | Variables | Estimate (Standard error) | Odds Ratio (95% CI limits) | Pr > ChiSq |
|---|---|---|---|---|
| Final Model | SRI_score_hi | 1.03 (0.34) | 2.80 (1.45-5.5) | 0.002 |
| | Family Overwhelmed | 0.66 (0.36) | 1.94 (0.96-3.92) | 0.07 |

C statistic = 0.67

The analysis revealed that the SRI_Score_Hi was associated with almost a three times increment in the odds of having delirium compared to those not achieving that cut-off score. This is important in management of the confused, elderly ED patient. As well, the item in the MDS-AC identified as 'Informal Care-Giver Status' (q3a) was utilized in determining the best model. When arriving at the ED with their elderly family member or friend, identification of this concern in concert with the SRI_Score_Hi screener was noted nearly twice as quickly.

Both components of the model appear to be significant, although family overwhelmed is just above the 0.05 level. The C statistic shows that our model result is greater than that which would occur by chance, (67%).

The length that a patient stays in hospital can also become a negative outcome, the longer the stay becomes. Each of the screeners was reviewed in light of their ability to predict LOS. As noted in Table 23, a t-test was performed.

**Table 23. Length of Stay (LOS) by each Screening Instrument**

| Screener | Mean LOS (days) (Upper/Lower CI) | t value | p value |
|---|---|---|---|
| **SRI** | 8.1 (14.6-16.4) | -3.23 | 0.001 |
| | 13.6 (18.8-20.6) | | |
| **TRST** | 6.1 (12.8-14.8) | -2.44 | 0.02 |
| | 12.2 (17.1-18.4) | | |
| **ISAR** | 2.5 (6.3-8.5) | -2.85 | 0.01 |
| | 11.7 (16.9-18.3) | | |

Linear regression was undertaken to determine the best model for being able to identify which variables would best predict length of stay. After testing a number of variables (age, sex, marital status, where the patient was admitted from, and the hours spent in the ED), a final model was established (Table 24). Once this was completed, linear regression analysis was utilized to determine if length of stay could be decreased by considering a number of the patient characteristics. In a stepwise fashion, various independent variables indicated above were interchanged from the model until p values were as near to 0.05.

**Table 24. Linear Regression – Model LOS by MDS-AC variables**

| Model (LOS) | Variables | Estimate (Standard Error) | | Pr > \|t\| |
|---|---|---|---|---|
| Final Model | SRI score hi | 6.7 (2.1) | | <0.0001 |
| | Age (in 10 yr increments) | 2.7 (0.98) | | 0.008 |
| | Private Home | 5.9 (2.3) | | 0.004 |

- $R^2$ only able to predict variation in LOS by 6.2%

A final model indicates that a person with increasing SRI score has an average LOS nearly 7 days longer than those who do not trigger the SRI high end screener. This has a significant impact on bedside care providers as well as policy makers; ability to identify these people up front may help in targeting care plans to specific needs and helping to decrease inpatient costs. As well, for every 10 years of increasing age, a patient also has an average LOS which is three days longer than patients in the decade prior. This may prompt care to be provided in a less intensive environment prior to discharging patients back to their location or origin. It makes sense that analysis found those patients who came from a private home to hospital ended up staying in hospital an average 6 days longer. They may be living alone or with an elderly spouse unable to provide the necessary support, and time may be required to get appropriate care in place prior to discharge.

## 12.0 Discussion

Throughout this paper, analysis has been directed at answering three research questions from the dataset reviewed. It is evident that the proposed instrument (algorithm of SRI _Score_Hi found within the MDS-AC (2000)) is more useful than the ISAR or TRST. While at first glance the SRI_Score_Hi screener items were triggered less often (85.5%) than the ISAR (95.7%) or TRST (82%), both of these screeners currently in use in Ontario take a count of the number of medications, which contributes to the overall trigger rate. The vast majority of seniors take more than three medications, so this answer was triggered over 82% of the time in the ISAR and more than 91% of the time in the TRST, resulting in both screeners providing less specific results than the SRI_Score_Hi.

When the sensitivity and specificity of all screeners was reviewed, it was apparent that the precision with which ALC status can be predicted from a triggered SRI_Score_Hi (positive and negative predictive values) is significantly better than any of the other screeners. This was also the case for assessing other negative outcomes, such as delirium

The research found that the SRI_Score_Hi screener was very effective in predicting whether a patient would be designated as an ALC status patient. The final logistic regression model (in conjunction with age, city of assessment, and coming to hospital coming from a private home), found that the SRI_Score_Hi was five times more likely to predict ALC status.

Other negative outcomes (for example, length of stay and delirium) were also well predicted, determined by further multivariate and logistic regression models. The length of stay was predicted by the SRI_Score_Hi to be about seven days longer (after controlling for age and the location of the patient prior to admission to hospital) and delirium was predicted

with the SRI_Score_Hi nearly three times more often. These are promising results that need to be further investigated.

The utilization of the ED by the elderly is higher than other age groups Some concerns could be better addressed through education in the community (whether by a family physician, nurse practitioner, or pharmacist) before they become larger issues. For example, simple solutions such as regular analgesia and use of the correct type of analgesia could reduce the number of patients presenting to the ED with pain. Exploring the need for groups specializing in relaxation techniques for the elderly or gentle exercise groups (e.g., swimming for people with arthritis) might be all it takes to ensure seniors can remain in the community.

The use of the medication item in both the TRST and ISAR screeners appears to result in an increased number of patients triggering the screener, creating an artificially high rate of persons being flagged as "at risk" (i.e., the medication item always triggers, resulting in more patients potentially seen as ISAR and TRST positive). The SRI, without a medication item prevents this and ensures that triggering of the screener is based solely on cognitive skills for decision-making as well as a number of ADLs and IADLs. This appears to be a more effective approach for screening the elderly in acute care.

The final model was derived not only from a statistical point of view but also from a clinical perspective. Use of the SRI screener and pointed questions (such as how overwhelmed the family is in caring for the patient) could be an effective strategy for identification of seniors needing additional support in acute care as well as triggering faster care plan development to manage length of hospital stay.

### *12.1 Strengths and Limitations*

There are many positive aspects to this study. The methodology behind the study is strong. The MDS-AC instrument itself has strong psychometric properties, as do all of the inter*RAI* suite of assessment instruments. As well, the SRI items used are equitable to those in both the TRST and ISAR and make cross walking straightforward.

The data utilized is of good quality and was collected by trained clinicians under standardized conditions from a variety of locations around Ontario. Data scanning and aggregation was also completed by experienced research assistants. This would assist in providing a dataset with minimal variability, making the collection accurate and results transferable to other Canadian locations.

The sample has been validated internationally, having been compared to data from similar studies in Australia and other parts of the inter*RAI* worldwide network. Work has continued over the last 10 years since this data was collected to refine assessment items, including the questions comprising the SRI.

The sample size of approximately 460 patients is adequate with which to draw suitable conclusions which bear some relationship to what would be encountered in regular clinical practice. The length of time to complete the screener also lends itself to the convenience required in today's intense and chaotic clinical environment. It would be futile to add further workload to clinicians if efficacious results were not expected, and this study does possess clinical relevance making the translation of research to clinical practice very worthwhile in this venue.

There are a number of limitations that impact on the study results, inherent in the instruments themselves as well as in the analysis of the data. First, the data has been

crosswalked from the results of one assessment instrument to a completely different screener (in the case of the TRST and ISAR). This can result in potential over-generalization from one instrument to the next and misinterpretation of the intent of the cross-walked item.

While the sample size was sufficient for this study, a larger number of participants would have been ideal. The ability to make accurate assumptions of the population is much stronger when the number of people you have with similar attributes is larger. It would have been yet a more powerful study if the sample size from each city population had been nearly 500 participants strong.

There were many assessors involved in the utilization of this instrument across the various communities in Ontario. Each assessor would bring their own bias and interpretation to the question and could impact the reliability or concordance between assessors (interrater reliability). Ensuring standardized training in utilizing the MDS-AC would need to be done and practicing with case studies would help in ensuring that results were as consistent as possible between sites.

### *12.2 Future Directions*

The care of the elderly is a topic of increasing interest. In order to build on this study, further large scale testing should be completed. This should include analysis of further variables (e.g., other negative outcomes than delirium, such as falls) and continued refinement of the assessment instrument. This could certainly have impact on the SRI algorithm.

The collaborative impact of inter*RAI* and its continued work to increase world-wide collection of data, analysis and research direction with will undoubtedly result in a future,

more predictive, algorithm. While the SRI algorithm consists of six particular items, further research might be able to produce a more predictive screener with only five items.

The ability to showcase strong preliminary results would be a prerequisite to proceed to the next step of government-funded review and financial backing. With the continuing prevalence of elder-care issues, a strong research proposal backed by a large pool of supportive data (like the NACRS database), and the power of a strong research-based organization Ie.g., interRAI), funding to continue further work in this area has a high probability of continuing on in a timely manner.

The proliferation of elder-care data will also be improved with the continued expansion of computerization (and software programs to collect and store this data). Mandating the use of standardized software packages for short screening tools will not only ensure this data is collected and utilized at the point of care, but will also ensure a repository for future policy and research purposes.

### *12.3 Implications*

There are many practical implications to the use of ED screeners. With the many factors leading the elderly to present to the ED, a specific and quickly administered instrument to pinpoint concerns related to either the current visit or impacting the patient for future investigation would be a good use of limited health care resources.

While the use of this tool may be knowledge based, health care managers might have difficulties getting the tool utilized at the entrance point of care (e.g., ED). In order for it to be successful, by-in by extremely busy ED nurses will be required. Managers (and indeed, facility executive team members) need to present the data as supportive and the fact that the

screener is short will enhance utilization. If the screener is not viewed as useful, it will be seen as just another job for staff to undertake. In some cases, initial mandate of the use may be required to establish the screener's utility.

The utility of a tool, which takes a short period of time to complete, while providing direction to health care providers for further investigations would be welcomed by many acute health care organizations. Many ED settings would make welcome the use of an appropriately tested screener that could effectively point the way to the need for further comprehensive geriatric assessment. Its use might prevent the continued recidivism to the ED (perhaps as much as 33% in the first 90 days after a hospitalization), identification of potentially complex issues requiring in-depth assessment and improve flow of all patients through the ED system.

Another positive aspect that direct patient care clinicians in the ED would discover is that the SRI_score_hi screener could be completed by not only medical professionals, but by other regulated health care providers, if required. Care team members need to continually think outside of their traditional boundaries of care to assist other care providers. With the content predominantly related to executive and basic activities of daily living, staff such as occupational or physical therapists and social workers could assist in its completion. The directions to completion are easy to follow and the instrument could be completed quickly, with minimal assistance from medical staff.

The proportion of patients who are designated ALC status with a positive SRI_Score_Hi might in turn trigger the stimulation of government dollars to fund a project looking at fast-tracking elderly ED patients. This would improve the ED flow and better provide focused care to this group. The ability to be able to predict ALC status and negative outcomes (i.e. delirium) would also allow more accurate strategic planning, so funding for

more long-term care beds and geriatric programs (e.g., multi-disciplinary geriatric assessment teams) can be allocated proactively rather than reactively. The elderly population is continuing to get more attention due to the increasing numbers in this cohort, and political posturing showing a genuine interest in providing care to this ever-increasing group of voters would be politically popular.

The fewer numbers of patients being able to return to their homes could be indicative of the serious nature of the patient's situation and the inability of the patient/family or care providers to manage the patient in their original location (caregiver stress). Obtaining the data to illustrate the financial and social burdens on the healthcare system as well as family members will support the case for up-front screening, such as the SRI instrument.

## 13.0 Conclusions

The era of uncontrolled spending on health care resources has come and gone. The message from provincial governments that health care spending will be reduced to zero percent over at least the next two years is pending. With these limited resources, and an increasing population of elderly patients with chronic conditions in need of acute and long-term care, the need for an instrument to aid in quantifying those elderly patients in greatest need of these resources is not a luxury, but a necessity.

While screening instruments have been in place in Ontario for some time to assist with geriatric emergency care, there have been questions raised as to the efficacy of their results. In this study, it was possible to crosswalk the results of the MDS Acute Care study of 2000 to the items in two specific screening tools. Interestingly, neither instrument was of much assistance in paring out those in need of further assessment because of their emphasis on quantity of medications taken. In using the MDS Acute Care items as a screening modality, the results indicated that not only was this proxy screener of geriatric emergency department patients a better predictor of impending length of hospital stay but able to identify variables to observe closely which can predict negative outcomes for the patient (e.g., delirium).

Overall, the results of this study would be appropriate to bring to the attention of all Canadian provincial governments as a quick and efficient way to target those elderly patients who will become more resource-intensive within the health care system. This will aid in promoting fiscal responsibility to the Canadian taxpayer, but more importantly, will provide Canadian health care providers with a more effective, evidence-based instrument with which to provide the most targeted care to our increasing population of elderly senior Canadians.

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# Appendices

Appendix A: Minimum Data Set – Acute Care (MDS-AC) Version 1_CAN

**MINIMUM DATA SET - ACUTE CARE (MDS-AC)**
**Version 1_CAN**

## SECTION A. PATIENT IDENTIFICATION

*(Complete any information not found in the addressograph)*

| | | |
|---|---|---|
| 1 | NAME OF PATIENT | a. LAST/FAMILY NAME b. FIRST NAME c. MIDDLE INITIAL |
| 2 | BIRTHDATE | ☐☐☐☐-☐☐-☐☐ YEAR MONTH DAY |
| 3 | GENDER | 1. Male 2. Female |
| 4 | DATE OF ENTRY | Date this hospital stay began. ☐☐☐☐-☐☐-☐☐ YEAR MONTH DAY |
| 5 | HOSPITAL CHART No. | ☐☐☐☐☐☐☐☐☐☐ |
| 6 | HEALTH CARE No. | ☐☐☐☐☐☐☐☐☐☐☐☐ |

## SECTION B. SOCIODEMOGRAPHICS

| | | | |
|---|---|---|---|
| 1 | LANGUAGE | a. Primary Language:<br>0. English 2. Other<br>1. French Specify_____<br>b. Interpreter needed<br>0. No 1. Yes | |
| 2 | MARITAL STATUS | 0. Married/Partner 3. Separated/Divorced<br>1. Never married 4. Other<br>2. Widowed | |
| 3 | EDUCATION (highest level completed) | 1. No schooling<br>2. 8th grade/less<br>3. 9-11 grades<br>4. High school<br>5. Technical or trade school<br>6. Some college/university<br>7. Diploma/Bachelor's degree<br>8. Graduate degree | |

## SECTION C. ADMISSION DETAIL

| | | | |
|---|---|---|---|
| 1 | ADMITTED FROM | 1. Private home, apt or room, no home care<br>2. Private home/apt/room with home care<br>3. Board and care or assisted living or group home<br>4. Long term care facility (nursing home or chronic hospital)<br>5. Acute care hospital-not rehabilitation<br>6. Rehabilitation unit or hospital<br>7. Psychiatric hospital/unit<br>8. Other Specify_____ | |
| 2 | HOURS IN EMERG-ENCY DEPT. STAY AS INPATIENT | **Number of hours** in the Emergency Department prior to transfer to inpatient unit. Round up or down to nearest whole hour | |

## SECTION C (continued)

| | | | |
|---|---|---|---|
| 3 | REASON FOR CURRENT HOSPITAL-IZATION | a. 1. Primarily a medical problem<br>2. Primarily a surgical problem<br>3. Both | |
| | | b. 1. New problem<br>2. Exacerbation of existing problem<br>3. Both 1 and 2 | |
| 4 | PRECIPITAT-ING EVENT/ DESTABILIZ-ATION | Time of onset of the precipitating event/problem or destabilization that directly led to this hospitalization (time prior to date of admission A4) (i.e., how long ago was patient's health/function relatively stable)<br>0. Within last week 3. 31-60 days prior<br>1. 8-14 days prior 4. More than 60 days prior<br>2. 15-30 days prior Specify: | |
| 5 | MOST RECENT HOSPITAL-IZATION | Most recent acute hospital discharge **during** the **3 months prior** to current admission<br>0. None<br>1. 1-30 days prior to current admission<br>2. 31-90 days prior to current admission | |
| 6 | ADVANCE DIRECTIVE | Does the patient have an advance directive supported by documentation in the chart ? (e.g.,DNR)<br>0. No 1. Yes | |

## SECTION D. ASSESSMENT INFORMATION

1. **SIGNATURES OF PERSONS COMPLETING THE ASSESSMENTS**

| a. Signature of Assessment Coordinator: | b. Title: |
|---|---|
| | |

**CHECK** (√) to confirm completion of the following:

| | |
|---|---|
| Pre-morbid and early and late in-hospital columns completed | c. |
| Discharge Date, Resources, Diagnoses etc (page 7 ) completed | d. |
| List of **Medications** taken/ordered while in hospital is **attached** | e. |

| | | | |
|---|---|---|---|
| f. Date Assessment Coordinator signed that assessments are complete | ☐☐☐☐-☐☐-☐☐ YEAR MONTH DAY | | |
| g. Other signatures | Title | Sections/Items | Date |
| h. | | | |
| i. | | | |

## SECTION E. ASSESSMENT DATES

| | | | |
|---|---|---|---|
| 1 | ASSESS-MENT DATES (date assessment performed) | a. Assessment at admission; to be completed within first 12-24 hours in inpatient unit (Columns A and B1) | ☐☐☐☐-☐☐-☐☐ YEAR MONTH DAY |
| | | b. Second assessment; completed on first of: Day 7 or within 24 hrs of discharge (Column B2) | ☐☐☐☐-☐☐-☐☐ YEAR MONTH DAY |
| | | c. Third assessment; completed on day patient is designated Alternate Level of Care [ALC] (Column B3) | ☐☐☐☐-☐☐-☐☐ YEAR MONTH DAY |

***Throughout the MDS-AC assessment:***

- Assessment for **Premorbid** Period (Column 'A') to reflect typical activity/function **during the 30 days prior to the destabilization or acute event** that resulted in this hospital admission (see item C4), unless otherwise indicated.
- Assessment for **Pre-admission and In-Hospital** Periods ('B' Columns) to reflect activity/functioning **during** the **past 24 hours**, unless otherwise indicated.

## SECTION F: PHYSICAL FUNCTION

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | ACTIVITIES OF DAILY LIVING | **(A)** For **pre-morbid** performance: Code for typical self-performance **during the 30 days prior to the destabilization or acute event** that led to this admission (see item C4).<br>**(B)** For immediate **pre-admission** and **in-hospital** performance: Code for self-performance in most dependent episode during the **past 24 hours.**<br>**CODE:**<br>0. INDEPENDENT – no help setup, or supervision provided nor needed<br>1. SETUP HELP ONLY – article or device given to or placed within reach of patient<br>2. SUPERVISION – oversight, encouragement or cueing provided<br>3. PHYSICAL ASSISTANCE – patient involved in activity BUT received physical assistance (non-weight bearing or weight bearing) to complete the task<br>4. TOTAL DEPENDENCE–full performance of activity by other(s)<br>8. ACTIVITY DID NOT OCCUR | **(A) Pre-morbid Period** | **(B1) The 24 hrs prior to admission to unit** | **(B2) First of: Day 7 *or* 24 hrs pre-discharge** | **(B3) Upon ALC designation** |
| a. | MOBILITY IN BED | Including moving to and from lying position, turning side to side, and positioning body while in bed | | | | |
| b. | TRANSFER | Including moving to and between surfaces – to/from bed, chair, wheelchair, standing position (Note: Excludes to/from bath/toilet) | | | | |
| c. | LOCOMOTION | How patient moves between locations within a room and on same floor. If in wheelchair, self-sufficiency once in wheelchair | | | | |
| d. | DRESSING | How patient dresses/undresses (street clothes, underwear) | | | | |
| e. | EATING | How patient eats and drinks (regardless of skill). Includes intake of nourishment by other means (e.g., tube feeding, total parenteral nutrition) | | | | |
| f. | TOILET USE | Including using the toilet room or commode, bedpan, urinal, transferring on/off toilet, cleaning self after toilet use or incontinent episode, changing pad, managing devices (ostomy or catheter), and adjusting clothes | | | | |
| g. | PERSONAL HYGIENE | How patient maintains personal hygiene. Includes combing hair, brushing teeth, shaving, applying makeup, controlling body odour, washing/drying face, hands, and perineum (EXCLUDE baths and showers) | | | | |
| h. | BATHING | How patient takes full body bath/shower or sponge bath (EXCLUDE TRANSFER and washing of hair and back). Includes how each body part bathed: arms, upper and lower legs, chest, abdomen, perineum. | | | | |
| i. | TRANSFER TUB/SHOWER | How patient transfers to/from tub or shower | | | | |
| 2 | LOCOMOTION DEVICES | ***CHECK*** (√) all that apply: | | | | |
| | | Cane/crutch | a | A | a | A |
| | | Walker | b | B | b | B |
| | | Wheeled | c | C | c | C |
| | | ***NONE OF THE ABOVE*** | d | D | d | D |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | INSTRUMENTAL ACTIVITIES OF DAILY LIVING | **(A)** Typical pre-morbid *FUNCTIONING* in routine activities in patient's usual living situation **during the 30 days prior to destabilization or acute event** that led to this hospital admission (see item C4)<br>**(B)** *CAPACITY* to perform the activities as independently as possible. **Speculate** and code what you think the patient's ability and need for assistance would have been if patient had been in the community during the **past 24 hrs.**<br>**CODE**: IADL SELF-PERFORMANCE CODE<br>0. *INDEPENDENT*- perform(ed) on own<br>1. *SOME HELP*- perform(ed) with help some of the time<br>2. *FULL HELP*- perform(ed) with help all of the time<br>3. *BY OTHERS*- performed by others<br>8. **Column A only**: *ACTIVITY DID NOT OCCUR* | **FUNCTION** | **CAPACITY** | | |
| | | | **(A) Pre-morbid period** | **(B1) The 24 hrs prior to admission to unit** | **(B2) First of: Day 7 *or* 24 hrs pre-discharge** | **(B3) Upon ALC designation** |
| a. | MEAL PREPARATION-How meals are prepared (e.g., planning meals, cooking, assembling ingredients, setting out food and utensils) | | | | | |
| b. | ORDINARY HOUSE WORK-How ordinary work around the house is performed (e.g., doing dishes, dusting, making bed, tidying up, laundry) | | | | | |
| c. | MANAGING FINANCE-How bills are paid, checkbook is balanced, household expenses are balanced | | | | | |
| d. | MANAGING MEDICATIONS-How medications are managed (e.g., remembering to take medicines, opening bottles, taking correct drug dosages, giving injections, applying ointments) | | | | | |
| e. | PHONE USE-How telephone calls are made or received (with assistive devices such as large numbers on telephone, amplification as needed) | | | | | |
| f. | SHOPPING-How shopping is performed for food and household items (e.g., selecting items, managing money) | | | | | |
| g. | TRANSPORTATION-How client travels by vehicle (e.g., gets to places beyond walking distance | | | | | |

## SECTION G. COGNITION

| | | | (A) Pre-morbid period | (B1) The 24 hrs prior to admission to unit | (B2) First of: Day 7 or 24 hrs pre-discharge | (B3) Upon ALC designation |
|---|---|---|---|---|---|---|
| 1 | MEMORY | Short-term memory – seems/appears to recall after 5 minutes<br>0. Memory OK 1. Memory problem | | | | |
| 2 | DECISION MAKING SKILLS | How patient made decisions regarding tasks of daily life (Pre-morbid: e.g., when to get up or have meals, which clothes to wear or activities to do. In-hospital: e.g., uses call bell appropriately, selects own meal choices from menu)<br>0. INDEPENDENT – decisions consistent/ reasonable<br>1. MODIFIED INDEPENDENCE – some difficulty in new situations only<br>2. MINIMALLY IMPAIRED – in specific situations, decisions become poor and cues/ supervision necessary at those times<br>3. MODERATELY IMPAIRED – decisions poor, cues/ supervision required<br>4. SEVERELY IMPAIRED – never/rarely makes decisions | | | | |
| 3 | INDICATORS OF DELIRIUM | Code for behaviour in the **last 3 days** [Note: Accurate assessment requires conversations with staff and family who have direct knowledge of patient's behaviour over this time and their usual behaviour.]<br>0. Behaviour not present<br>1. Behaviour present, not of recent onset<br>2. Behaviour present, over the last 3 days appears different from patient's usual functioning (e.g., new onset or worsening) | (A) Pre-morbid period | (B1) The 3 days prior to admission to unit | (B2) First of: Day 7 or 24 hrs pre-discharge | (B3) Upon ALC designation |
| | | a. EASILY DISTRACTED (e.g., difficulty paying attention; gets sidetracked) | | | | |
| | | b. PERIODS OF ALTERED PERCEPTION OR AWARENESS OF SURROUNDINGS (e.g., moves lips or talks to someone not present; believes he or she is somewhere else; confuses night and day) | | | | |
| | | c. EPISODES OF DISORGANIZED SPEECH (e.g., speech is incoherent, nonsensical, irrelevant, or rambling from subject to subject; loses train of thought) | | | | |
| | | d. PERIODS OF RESTLESSNESS (e.g. fidgeting or picking at skin, clothing, napkins, etc.; frequent position changes; repetitive physical movements or calling out) | | | | |
| | | e. PERIODS OF LETHARGY (e.g. sluggishness; staring into space; difficult to arouse; little body movement) | | | | |
| | | f. MENTAL FUNCTION VARIES OVER THE COURSE OF THE DAY (e.g., sometimes better, sometimes worse, behaviours sometimes present, sometimes not) | | | | |

## SECTION H. BLADDER/BOWEL CONTINENCE

| | | | (A) Pre-morbid period | (B1) The 3 days prior to admission to unit | (B2) First of: Day 7 or 24 hrs pre-discharge | (B3) Upon ALC designation |
|---|---|---|---|---|---|---|
| 1 | BLADDER CONTINENCE | **(A)** Typical control of urinary bladder function **during the 30 days prior to the destabilization or acute event** that led to this admission (see item C4) | | | | |
| | | **(B)** During the **last 3 days**, control of urinary bladder function (Note: if dribbles, volume insufficient to soak through underpants)<br>**CODE:**<br>0. CONTINENT – complete control<br>1. CONTINENT WITH CATHETER – complete control with use of any type of catheter or urinary collection device that does not leak urine<br>2. OCCASIONALLY INCONTINENT – incontinent episodes less than once daily<br>3. FREQUENTLY INCONTINENT – tends to be incontinent daily, but some control present (e.g. on day shift)<br>4. INCONTINENT – inadequate control, multiple daily episodes<br>8. DID NOT OCCUR – no urine output from bladder | | | | |
| 2 | BOWEL CONTINENCE | **(A)** Typical control of bowel function **30 days prior to the destabilization or acute event** that led to this admission (see item C4) | | | | |
| | | **(B)** During the **last 3 days**, control of bowel function<br>**CODE:**<br>0. CONTINENT – complete control<br>1. CONTINENT WITH OSTOMY – complete control with use of ostomy device that does not leak stool<br>2. OCCASIONALLY INCONTINENT – incontinent episodes less than once daily<br>3. FREQUENTLY INCONTINENT – tends to be incontinent daily, but some control present (e.g. on day shift)<br>4. INCONTINENT – inadequate control, multiple daily episodes<br>8. DID NOT OCCUR – no bowel movement during entire assessment period | | | | |

## SECTION I. COMMUNICATION/SENSORY PATTERNS

| | | | (A) Pre-morbid period | (B1) The 24 hrs prior to admission to unit | (B2) First of: Day 7 *or* 24 hrs pre-discharge | (B3) Upon ALC designation |
|---|---|---|---|---|---|---|
| 1 | HEARING | (With hearing appliance if used)<br>0. HEARS ADEQUATELY – no difficulty in normal conversation, social interaction, TV, phone<br>1. MINIMAL DIFFICULTY – requires quiet setting to hear well<br>2. HEARS IN SPECIAL SITUATIONS ONLY – speaker has to increase volume and speak distinctly<br>3. HIGHLY IMPAIRED – absence of useful hearing | | | | |
| 2 | VISION | (Ability to see in adequate light and with glasses if used)<br>0. ADEQUATE – sees fine detail, including regular print in newspapers/books<br>1. IMPAIRED – sees large print, but not regular print in newspapers/books<br>2. MODERATELY IMPAIRED – limited vision; not able to see newspaper headlines, but can identify objects<br>3. HIGHLY IMPAIRED – object identification in question, but eyes appear to follow objects<br>4. SEVERELY IMPAIRED – no vision or sees only light, colours, or shapes; eyes do not appear to follow objects | | | | |
| 3 | MAKING SELF UNDERSTOOD (Expression) | Expressing information content (however able)<br>0. UNDERSTOOD – expresses ideas without difficulty<br>1. USUALLY UNDERSTOOD – difficulty finding words or finishing thoughts. If given time little or no prompting required<br>2. OFTEN UNDERSTOOD – difficulty finding words or finishing thoughts, prompting usually required<br>3. SOMETIMES UNDERSTOOD – ability is limited to concrete requests<br>4. RARELY/NEVER UNDERSTOOD | | | | |
| 4 | ABILITY TO UNDERSTAND OTHERS (Comprehension) | Understanding verbal information content (however able) with hearing appliance, if used<br>0. UNDERSTANDS – clear comprehension<br>1. USUALLY UNDERSTANDS – misses some part/intent of message, but comprehends most conversation, little or no prompting<br>2. OFTEN UNDERSTANDS – misses some part/intent of message, with prompting can often comprehend conversation<br>3. SOMETIMES UNDERSTANDS – responds adequately to simple, direct communication only<br>4. RARELY/NEVER UNDERSTANDS | | | | |

## SECTION J. PAIN

| | | | (A) Pre-morbid period | (B1) The 24 hrs prior to admission to unit | (B2) First of: Day 7 *or* 24 hrs pre-discharge | (B3) Upon ALC designation |
|---|---|---|---|---|---|---|
| 1 | ACUTE PAIN | a. FREQUENCY of patient complaint or signs of acute pain **during last 24 hours**<br>0. No acute pain ***(skip to J2 )***<br>1. Less than once per 4 hours<br>2. Once every 2 to 4 hours<br>3. Constantly (twice or more each 2 hours) | | | | |
| | | b. INTENSITY of pain-code highest level of pain present<br>1. Mild<br>2. Moderate<br>3. Severe<br>4. Times when pain horrible or excruciating | | | | |
| | | c. From client's point of view, medications adequately control pain<br>0. Yes, adequate control<br>1. Medications do not adequately control pain<br>2. Pain present, no medications taken | | | | |
| 2 | RECURRENT PAIN | Chronic pain or long-standing, intermittent pain (e.g., arthritis, stomach ulcer, migraine) | | | | |
| | | a. FREQUENCY with which patient experienced chronic pain during the **last 3 months prior to current admission**<br>0. No chronic pain ***(skip to* K1 *)***<br>1. Less than weekly<br>2. 1+ times/week<br>3. Daily | | | | |
| | | b. From patient's perspective, chronic pain intensity usually DISRUPTED usual activities during the **last 3 months prior to current admission**<br>0. No 1. Yes | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| c. **SITES of recurrent pain.** *CHECK* (√) all sites of recurrent pain during the 3 months prior to current admission | Back pain | a. | Bone pain | b. | Chest pain while doing usual activities | c. | Headache / migraine | d. |
| | Hip pain | e. | Joint pain (not hip) | f. | Soft tissue pain (eg., muscle lesion) | g. | Stomach pain | h. |
| | Other | i. | Specify: | | | | | |

## SECTION K. MOOD AND BEHAVIOUR PATTERNS

| | | | (A) Pre-morbid period | (B1) The 3 days prior to admission to unit | (B2) First of: Day 7 *or* 24 hrs pre-discharge | (B3) Upon ALC designation |
|---|---|---|---|---|---|---|
| 1 | DEPRESSION/SAD MOOD INDICATORS | (Code for indicators observed in the **last 3 days**, irrespective of assumed cause)<br>0. Indicator not exhibited in the **last 3 days**<br>1. Indicator exhibited **up to 2 days of the last 3 days**<br>2. Indicator exhibited **daily in the last 3 days** | | | | |
| | a. Facial Expression | Sad, pained, worried facial expression (e.g., furrowed brow) | | | | |
| | b. Tearfulness | Crying, tearfulness | | | | |
| | c. Negative Statements | Patient made negative statements (e.g., "Nothing matters; I would rather be dead; What's the use; Let me die"; regrets having lived so long) | | | | |
| | d. Anxious Complaints | Repetitive anxious complaints (non-health related) (e.g., persistently seeks attention/reassurance) | | | | |
| | e. Unrealistic Fears | Expressions of what appear to be unrealistic fears (e.g., fear of being abandoned, of being left alone, of being with others) | | | | |
| | f. Persistent Anger | Persistent anger with self or others (e.g., easily annoyed; anger at care received) | | | | |
| | g. Repetitive Health Complaints | Repetitive health complaint (e.g., persistently seeks medical attention; obsessive concerns with bodily functions) | | | | |
| | ***NONE OF THE ABOVE*** | ***CHECK*** (√) if none of above symptoms observed in the last 3 days | | h. | h. | h. |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | BEHAVIOUR SYMPTOMS | **(A)** Behaviour symptoms and alterability: For pre-morbid period, behaviours **during the 30 days prior to the destabilization or acute event** the led to this admission (see item C4). If behaviour typically occurred less than twice per week, score as zero (0).<br>**(B)** Behaviour symptoms and alterability in hospital during the **last 3 days.**<br>0. Behaviour did not occur<br>1. Behaviour of this type occurred, easily altered<br>2. Behaviour of this type occurred, not easily altered | **(A) Pre-morbid period** | **(B1) The 3 days prior to admission to unit** | **(B2) First of: Day 7 *or* 24 hrs pre-discharge** | **(B3) Upon ALC designation** |
| | | a. Wandering-moved (locomotion) with no rational purpose, seemingly oblivious to needs or safety | | | | |
| | | b. Physically aggressive/abusive- others were hit, shoved, scratched, sexually abused | | | | |
| | | c. Verbally aggressive/abusive- others were threatened, screamed at, cursed at | | | | |
| | | d. Socially inappropriate behaviour-made disruptive sounds, noisiness, screaming, self-abusive acts, sexual behaviour, disrobing in public, smeared/threw food/feces, hoarding, rummaging through others' belongings | | | | |
| | | e. Resists care- resisted taking medications/injections or assistance with ADL, eating or changes in position | | | | |
| | | ***NONE OF THE ABOVE*** ***CHECK*** (√) | f. | f. | f. | f. |

## SECTION L. RESTRAINTS

| | | | | | |
|---|---|---|---|---|---|
| 1 | DEVICES AND RESTRAINTS | Code for use of each device type **since last assessment.**<br>0. Not used<br>1. Used, but used less than daily<br>2. Daily use – night only<br>3. Daily use – day only<br>4. Night and day, but not constant<br>5. Constant use for full 24 hours (with periodic release) | **(B2) First of: Day 7 *or* 24 hrs pre-discharge** | **(B3) Upon ALC designation** |
| | | a. Trunk restraint | | |
| | | b. Limb restraint - upper or lower extremities | | |
| | | c. Chair prevents rising | | |

## SECTION M. FALLS

| | | |
|---|---|---|
| 1 | a. Number (count) of times fell in **last 3 months prior to current admission.** If none, code "0", if more than 9 code "9". | |
| | b. Patient limited going outdoors due to fear of falling in **last 3 months prior to current admission** (e.g. stopped using bus; only goes out with others) 0. No 1. Yes | |

## SECTION N. SKIN AND FOOT CONDITIONS

| | | | (A) During the 30 days prior to admission | (B1) The 24 hrs prior to admission to unit | (B2) First of: Day 7 *or* 24 hrs pre-discharge | (B3) Upon ALC designation |
|---|---|---|---|---|---|---|
| 1 | PRESSURE ULCERS | a. Patient had one or more pressure ulcers at any time during the 30 days prior to and including admission date. 0. No 1. Yes 9. Unknown | | | | |
| | | b. Highest current pressure ulcer stage<br>0. No pressure ulcer (***skip to*** N2)<br>1. Any area of persistent skin redness (stage 1)<br>2. Partial loss of skin layers (stage 2)<br>3. Deep craters in skin (stage 3)<br>4. Breaks in skin exposing muscle or bone (stage 4)<br>5. Not stageable (necrotic eschar predominant; no prior staging available) | | | | |
| | | c. Number (count) of current pressure ulcers. If none, code "0", if more than 9 code "9". | | | | |
| 2 | SKIN PROBLEMS | Any troubling skin conditions other than pressure ulcers (e.g., burns, bruises, rashes, itchiness, body lice, scabies, stasis ulcers, troubling surgical wound) 0. No 1. Yes | | | | |
| 3 | FOOT PROBLEMS | Any troubling foot conditions (e.g., open lesions, infections, fungi) 0. No 1. Yes | | | | |

## SECTION O: NUTRITION AND ORAL STATUS

| | | | (A) Pre-morbid period | (B1) The 24 hrs prior to admission to unit | (B2) First of: Day 7 *or* 24 hrs pre-discharge | (B3) Upon ALC designation |
|---|---|---|---|---|---|---|
| 1 | ORAL PROBLEMS | CODE: 0. No 1. Yes | | | | |
| | | a. Chewing problem (e.g., poor mastication, immobile jaw, surgical resection, decreased sensation/motor control) | | | | |
| | | b. Dental problems (e.g., ill-fitting or lack of dentures, painful tooth, poor dental hygiene) | | | | |
| 2 | SWALLOWING | CODE:<br>0. *NORMAL* - Safe and efficient swallowing of all diet consistencies<br>1. *REQUIRES DIET MODIFICATION TO SWALLOW SOLID FOODS* (mechanical diet or able to ingest specific foods only)<br>2. *REQUIRES MODIFICATION TO SWALLOW SOLID FOODS AND LIQUIDS* (puree, thickened liquids)<br>3. *COMBINED ORAL AND TUBE FEEDING*<br>4. NO ORAL INTAKE (NPO) | | | | |
| 3 | TUBE FEEDING | a. Patient received food by enteral tube (gastrostomy or nasogastric) **prior to** date of current **admission** (see A4)<br>0. Never 2. During any of the 8 to 30 days prior<br>1. During any of the 7 days prior 3. More than 30 days prior | | | | |
| | | b. Patient received nutrition or hydration by enteral tube in the **last 24 hours**<br>0. No 1. Yes | | | | |
| 4 | WEIGHT CHANGE | a. Weight loss of 5% or more in the **last 30 days** or 10% or more in the **last 6 months**<br>0. No or unknown 1. Yes, planned loss 2. Yes, unplanned loss | | | | |
| | | b. Weight gain of 5% or more in the **last 30 days** or 10% or more in the **last 6 months**<br>0. No or unknown 1. Yes, planned gain 2. Yes, unplanned gain | | | | |

**NB:** ***ITEMS ON THIS PAGE TO BE COMPLETED AS THE INFORMATION BECOMES AVAILABLE, ANY TIME BETWEEN ADMISSION AND DISCHARGE***

## SECTION P. DATE OF DISCHARGE

| | | |
|---|---|---|
| 1 | DATE OF DISCHARGE | ☐☐☐☐-☐☐-☐☐ YEAR MONTH DAY |

## SECTION Q. RESOURCES FOR DISCHARGE

**1 LIVING ARRANGEMENT**

A. CODE for **permanent** living arrangement **prior to admission**
B. CODE for **permanent** arrangement expected **at discharge**
C. CODE for **initial** arrangement expected at discharge **if different than Q1B - otherwise leave blank**

| a. Type of residence | A Perm. prior | B Perm disch. | C Temp disch. |
|---|---|---|---|
| 1. Private home/apartment | | | |
| 2. Rented Room | | | |
| 3. Board and care/assisted living/group home | | | |
| 4. Homeless (with or without shelter) | | | |
| 5. Continuing/Long Term Care facility | | | |
| 6. Hospice | | | |
| 7. Deceased (for Column B) | | | |
| 8. Other Specify_____ | | | |
| 9. Unknown | | | |

| b. Live(d) with | A Perm. prior | B Perm disch. | C Temp disch. |
|---|---|---|---|
| 1. Alone | | | |
| 2. Spouse only | | | |
| 3. Spouse and other(s) | | | |
| 4. Child (not spouse) | | | |
| 5. Other relative(s) (not spouse or children) | | | |
| 6. Friends | | | |
| 7. Group setting | | | |
| 8. Other Specify_____ | | | |
| 9. Unknown | | | |

**2 AVAILABLE SOCIAL SUPPORTS (Family or close friends)**

CODE: 0. No 1. Possibly yes 2. Definitely yes

Presence of one or more family members (or close friends) who are **willing and able** to provide support after discharge

| | |
|---|---|
| a. Emotional support | |
| b. Intermittent physical support with ADLs or IADLs-less than daily | |
| c. Intermittent physical support with ADLs or IADLs-daily | |
| d. Full time physical support (as needed) with ADLs or IADLs | |
| e. All or most of necessary transportation | |

**3 INFORMAL CARE-GIVER STATUS**

CODE: 0. No 1. Yes

| | |
|---|---|
| a. Family (or close friend) overwhelmed by patient's illness | |
| b. Family relationship(s) require unusual amounts of staff time | |

**4 COMPLIANCE / ADHERANCE with MEDICATIONS**

Compliance with **medications** prescribed by a physician during the **30 days prior to** the destabilization or acute **event that led to this admission**

0. Always compliant
1. Compliant 80% of time or more
2. Compliant less than 80 % of time (including did not purchase prescribed medicines)
3. NO MEDICINES PRESCRIBED for that period

## SECTION R. DIAGNOSES AT DISCHARGE

| 1. List diagnoses established during or responsible for this hospitalization | ICD 9 code (if available) |
|---|---|
| a. | ☐☐☐☐.☐☐ |
| b. | ☐☐☐☐.☐☐ |
| c. | ☐☐☐☐.☐☐ |
| d. | ☐☐☐☐.☐☐ |
| e. | ☐☐☐☐.☐☐ |
| f. | ☐☐☐☐.☐☐ |

## SECTION S: REFERRALS AND SERVICES

**1 REFERRALS & SERVICES RECEIVED**

**(A)** Referrals and services received **during** the current **hospital stay**. ***CHECK*** (√) all that apply.

**(B)** Patient will receive assessment or service **after discharge** (i.e. therapy assessment or service has been ordered). ***CHECK*** (√)all that apply.

| | (A1) Referral to provider | (A2) Assessed by provider | (A3) Therapy / service provided | (B) Post Discharge |
|---|---|---|---|---|
| Speech-language pathology and audiology | a. | a. | a. | a. |
| Occupational therapy | b. | b. | b. | b. |
| Physical therapy | c. | c. | c. | c. |
| Respiratory therapy | d. | d. | d. | d. |
| Psychological therapy (any licensed mental health professional) | e. | e. | e. | e. |
| Geriatric service | f. | f. | f. | f. |
| ***NONE OF THE ABOVE*** | g. | g. | g. | g. |

## SECTION T. PREVENTIVE HEALTH ISSUES

**1 ADDICTIONS**

0. No 1. Yes

| | |
|---|---|
| a. In the **last 3 months** prior to current admission, patient felt the need or was told by others to cut down on drinking, or others were concerned with patient's drinking | |
| b. In the **last 3 months** prior to current admission, patient had to have a drink first thing in the morning to steady nerves (i.e., an "eye opener") or has been in trouble because of drinking | |
| c. Smoked or chewed tobacco daily in month prior to admission | |

**2 OTHER ISSUES NEEDING FOLLOW-UP**

***CHECK*** (√) all that apply

| | |
|---|---|
| No pneumovax in last 5 years | a. |
| No influenza vaccination in last 2 years | b. |
| ***NONE OF THE ABOVE*** | c. |

Appendix B: SRI items

**Self-Reliance Index (SRI) Items (from MDS-AC)**

1. **Decision Making** – How a patient made decisions regarding tasks of daily (In hospital: e.g. uses call bell appropriately, selects own meal choices from menu)
    a. Independent – scores '0'
    b. Modified Independence/ Minimally Impaired –/Moderately Impaired/Severely Impaired – scores '1'

2. **Meal Preparation** – How meals are prepared (e.g. planning meals, cooking, assembling ingredients, setting out food and utensils)
    a. Independent. – scores '0'
    b. Some Help/Full Help/By Others – scores '1'

3. **Ordinary Housework** – how ordinary work around the house is performed (e.g. doing dishes, dusting, making bed, tidying up, laundry)
    a. Independent. – scores '0'
    b. Some Help/Full Help/By Others – scores '1'

4. **Transportation** – How client travels by vehicle (e.g., gets to places beyond walking distance)
    a. Independent. – scores '0'
    b. Some Help/Full Help/By Others – scores '1'

5. **Personal Hygiene** – How patient maintains personal hygiene. Includes combing hair, brushing teeth, shaving, applying makeup, controlling body odour, washing/drying face, hands, and perineum (EXCLUDE baths and showers)
    a. Independent – scores '0'
    b. Modified Independence/ Minimally Impaired –/Moderately Impaired/Severely Impaired – scores '1'

6. **Bathing** – How patient takes a full body bath/shower or sponge bath (EXCLUDE TRANSFER and washing of hair and back). Includes how each body part bathed: arms, upper and lower legs, chest, abdomen, perineum.
    a. Independent – scores '0'
    b. Modified Independence/ Minimally Impaired –/Moderately Impaired/Severely Impaired – scores '1'

**Source:** Minimum Data Set – Acute Care (MDS-AC) Version 1_CAN, April 13, 2000

Appendix C: ISAR

**Identification of Seniors At Risk (ISAR) Screening Tool**

1) Before the illness or injury that brought you to Emergency, did you need someone to help you on a regular basis?
2) Since the illness or injury that brought you to Emergency, have you needed more help than usual to take care of yourself?
3) Have you been hospitalized for one or more nights during the past 6 months?
4) In general, do you see well?
5) In general, do you have serious problems with your memory?
6) Do you take more than three different medications every day?

Source: McCusker J, Bellavance F, Cardin S, et al. (1999). Detection of older people at increased risk of adverse health outcomes after an emergency visit: the ISAR screening tool. *Journal of the American Geriatric Society,47,* 1229-1237.

Appendix D: TRST

**Triage Risk Screening Tool (TRST)**

1) History of cognitive impairment (poor recall or not oriented)

2) Difficulty walking / transferring or recent falls

3) Five or more medications

4) ED use in previous 30 days or hospitalization in previous 90 days

5) Lives alone **and/or** no available caregiver

6) ED staff professional recommendations

Source: Mion, L.C., Palmer, R.M., Anetzberger, G.J., & Meldon, S.W. (2001). Establishing a Case Finding and Referral System for At-Risk Older Individuals in the Emergency Department Setting: The SIGNET Model. *Journal of the American Geriatrics Society, 49 (10)*, 1379-1386.