The Influence of Social Vulnerability on Cognitive Decline and Hospitalization among Older Assisted Living Residents with and without Dementia

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.

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Abstract

Background: Concerns regarding social vulnerability have been reported among various populations including community-dwelling older adults, long-term care residents, and assisted living (AL) residents. Social vulnerability has been defined in numerous ways and has been associated with various adverse health outcomes such as cognitive decline, mortality, frailty, and morbidity. AL facilities are a relatively new care setting for older adults. AL facilities differ from long-term care facilities mainly in their staffing level and mix, and in their social model of care that promotes autonomy, independence, and dignity in a home-like environment. AL facilities are emerging as a popular residential option for older persons with and without dementia who require some level of care, both in the United States and Canada. Social vulnerability in AL facilities may be present and linked to adverse health outcomes, but remains relatively unexplored from a Canadian and dementia perspective. Understanding the influence of social vulnerability on cognitive decline and hospitalization among older AL residents with and without dementia is crucial to those residents' wellbeing and quality of life.

Objectives: This investigation used secondary data from the Alberta Continuing Care Epidemiological Studies (ACCES), a prospective study of 1,089 older (65+ years) designated assisted living (DAL) residents in Alberta, Canada. Clinical and functional data from ACCES were linked with provincial administrative health data in order to address two objectives: (1) To estimate the prevalence and correlates of social vulnerability in DAL residents overall, and stratified by dementia status; and (2) To examine the associations between baseline social vulnerability and subsequent health outcomes over one year, including cognitive decline and first-event hospitalization among DAL residents overall, and stratified by dementia status.

Methods: A total of 1,089 residents (from 59 DAL facilities) were included as participants (mean age 84.4±7.3; 77% female). Baseline (2006-2008) and one year follow-up assessments of resident characteristics were obtained by trained research nurses using the interRAI-AL assessment tool. Facility-level data were obtained using administrator interviews. Hospitalization events were obtained through linkage with provincial health service utilization data from the Alberta Inpatient Discharge Abstract Database. Social vulnerability was used as the exposure of interest. A social vulnerability index (SVI) was created by aggregating multiple variables from the interRAI-AL assessment tool. A SVI score was assigned to each resident and was then categorized as low, intermediate, or high social vulnerability based on the distribution in the overall sample. Cognitive decline was the first main outcome. Change in the Cognitive Performance Scale (CPS) score (derived from items on the interRAI-AL assessment) from baseline to one year follow-up was used to determine cognitive decline. Time to first-event hospitalization was the second primary outcome and was ascertained through linkage of interRAI-AL data with the Alberta Inpatient Discharge Abstract Database. Generalized estimating equations with a logit link were used to estimate odds ratios of cognitive decline associated with social vulnerability, adjusting for relevant confounding factors. Multivariable Cox proportional hazards models were used to estimate the risk of first-event hospitalization associated with social vulnerability. All models were further stratified by residents' dementia status at baseline.

Results: Among DAL residents, 42.5% experienced cognitive decline (among the sub-sample of n=889 that survived to follow-up), and 38.7% experienced hospitalization as their first event (among the sub-sample of n=1,066 with linked data) during the one-year follow-up. The distribution of low, intermediate and high social vulnerability among the overall cohort was

33.4%, 31.2%, and 35.4% respectively. Those with dementia were significantly more likely than those without dementia to experience greater severity of social vulnerability. In the dementia subgroup, the distribution of low, intermediate, and high social vulnerability was 25.2%, 28.9%, and 45.9% respectively, whereas in the non-dementia subgroup, it was 44.6%, 34.4% and 21.0% respectively. In general, social vulnerability was significantly positively associated with age, fatigue, depressive symptoms, health instability, cognitive and functional impairment, bladder and bowel incontinence, and number of emergency department visits in the past 90 days. Social vulnerability was also significantly associated with health region, although no discernable pattern was present.

Residents with intermediate or high social vulnerability levels (compared to low social vulnerability) showed a significantly higher risk for cognitive decline during follow-up (adj. OR=1.48, 95% CI 1.08-2.02 and adj. OR=1.74, 95% CI 1.18-2.56, respectively). Among the dementia subgroup, only those with intermediate social vulnerability showed a significantly increased risk for cognitive decline compared to those with low social vulnerability (adj. OR=1.92; 95% CI: 1.26-2.93). Among the non-dementia subgroup, only those with high social vulnerability showed a significantly increased risk for cognitive decline compared to those with low social vulnerability (adj. OR=2.01; 95% CI: 1.02-3.97).

Residents with high social vulnerability (compared with low social vulnerability), were at significantly increased risk of first-event hospitalization over one year (adj. HR=1.25; 95% CI: 1.02-1.52). A similar increased risk of first-event hospitalization was observed for those with relatively high social vulnerability (compared with low social vulnerability) among the dementia subgroup, adj. HR=1.46; 95% CI: 1.05-2.05). Among the non-dementia subgroup, social vulnerability was not found to be a statistically significant predictor of first-event hospitalization.

Conclusion: These findings suggest that social vulnerability may influence cognitive decline and first-event hospitalization among DAL residents overall and DAL residents with and without dementia. Particular attention should be paid to DAL residents with dementia as the presence of dementia seems to put residents at greater risk for social vulnerability and its associated outcomes. Clinical- and policy-level interventions in DAL may prevent and treat social vulnerability which may reduce associated cognitive decline and hospitalizations among its residents. Greater focus on individualized social programming in DAL facilities may serve to improve the social health status of its vulnerable residents. Further intervention research in this area is warranted.

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TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

List of Abbreviations

ACCES	Alberta Continuing Care Epidemiological Studies
ADL	Activities of Daily Living
AL	Assisted Living
CI	Confidence Interval
DAL	Designated Assisted Living
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
DSH	Designated Supportive Housing
DSL	Designated Supportive Living
E-DAL	Enhanced Designated Assisted Living
EL	Enhanced Lodge
HR	Hazards Ratio
IADL	Instrumental Activities of Daily Living
MMSE	Mini-Mental State Examination
3MS	Modified Mini-Mental State Examination
NINDS-ADRDA	National Institute of Neurological Disorders and Stroke-Alzheimer's Disease and Related Disorders Association
OR	Odds Ratio
SVI	Social Vulnerability Index
TSI	Test for Severe Impairment

1.0 Introduction

Social health and social vulnerability are increasingly recognized as influential determinants of health among older adults (1). Social health is defined as an individual's ability to positively interact with the surrounding community (2,3). This ability stems from communication skills, the maintenance of meaningful relationships, the availability of support systems, and a sense of accountability, empathy, and respect (2,3). Social health is depicted in someone who develops synergistic relationships, who feels supported emotionally and tangibly, and who enjoys participating in activities. Social vulnerability is on the opposite end of the social health spectrum and has been defined in various ways (4–10). In the current thesis, social vulnerability has been defined utilizing the operational definition put forth by Andrew and colleagues (10). As noted by these authors, social vulnerability is understood as an accumulation of social deficits that represent key domains (e.g., communication to engage in wider community, social support, empowerment and life control, among others) that interact to increase an individual's susceptibility to adverse health-related outcomes (10).

The prevalence of social vulnerability among community-dwelling older adults and long-term care (LTC) residents is of concern (10–13). Similarly, there is a suspected high prevalence of social vulnerability among assisted living (AL) residents (4,5,14–16). Several studies among older adults have illustrated significant associations between higher levels of social vulnerability and a heightened risk for various adverse health outcomes, including mortality, cognitive impairment and decline, and frailty (9,10,17–19). Social health also becomes more of a concern with age (6,10,20–26). Social health is at risk of deterioration among older adults because of the many age-related physical and cognitive changes (13) that impair one's ability to engage in activities that support social health.

One such change that may contribute to a decline in social functioning ability is the onset of dementia (27). Within North America, there has been a shift in the care of older adults with dementia over the past 5-10 years, specifically from more traditional LTC facilities (or nursing homes) to community-based care, including AL (5,28–33). However, recent publications have raised concerns about relatively low levels of social engagement, and as an extension, high levels of social vulnerability in AL facilities (14,34). Recognizing the potential for low social engagement present in AL settings, and the adverse health outcomes of social vulnerability, many among the research, care and resident/family communities have cited social needs as requiring improved assessment and management in AL (5,11,14–16,20,35–37). These stakeholder groups and communities support increased care targeting the social health of older adults with and without dementia (27,38,39).

Many AL facilities house residents with and without dementia. Care of these residents vary in important ways, and specific attention may need to be paid to specific groups (i.e., residents with dementia) due to their susceptibility and sensitivity to social vulnerability and unique care needs. The overall aim of the current thesis was to examine the prevalence and influence of social vulnerability on two main health outcomes (cognitive decline and hospitalization) assessed over one year among older AL residents with and without dementia. This research used secondary data from the Alberta Continuing Care Epidemiological Studies (ACCES), a large-scale prospective cohort study of 1,089 older residents of designated assisted living facilities (DAL), with linked administrative health data from Alberta, Canada. This secondary dataset is comprehensive and contained essential variables pertinent to the specific objectives of this investigation. Variables of interest primarily included a multitude of social variables that composed the social vulnerability index (SVI) (the exposure of interest), and outcome measures of interest, specifically cognitive decline and hospitalization. The data were longitudinal, which allowed for the calculation of risks and inferences on temporal relationships. Importantly, ACCES represents one of the first large-scale investigations of AL facilities in Canada. As a result, this research is among the first to investigate social vulnerability in this context.

Using the rich clinical and functional data available from ACCES and linked administrative health data for older (aged 65+ years) DAL residents in Alberta, two specific objectives were addressed:

1. To estimate the prevalence and correlates of social vulnerability in DAL residents overall, and among those with and without dementia; and,
2. To examine the associations between baseline social vulnerability and subsequent health outcomes over one year, including cognitive decline and first-event hospitalization among DAL residents overall, and stratified by dementia status.

Three hypotheses were addressed that contributed to our understanding and knowledge of social vulnerability in the AL population:

1. The prevalence of social vulnerability will be higher among DAL residents with dementia (vs. without), and will vary by age, sex, level of cognitive and functional impairment and by health region;
2. The correlates of social vulnerability will differ by dementia status; and,
3. DAL residents with higher scores on the SVI (indicating higher social vulnerability) will exhibit a higher risk for cognitive decline and hospitalization as compared with

residents with lower scores; this risk will be greater for the dementia subgroup.

This research is one of the first to use Andrew and colleagues' concept of social vulnerability in the AL setting and in a dementia-specific context. The prevalence and covariates of social vulnerability were elucidated. The strength and direction of associations between social vulnerability and the two main outcomes (cognitive decline and hospitalization) were also determined. It is hoped that the findings from this work will assist with the development of educational strategies directed at care providers in AL and family members to improve the identification of socially vulnerable residents. The findings may also further facilitate the development and implementation of targeted interventions to prevent the associated negative health outcomes.

In the upcoming sections, the following three main areas will be addressed and described in further detail: the prevalence and impact of social vulnerability, the AL model of care, and the unique health and social care needs of those living with dementia. First, social health and social vulnerability will be explored, along with the health implications of social vulnerability in those with and without dementia. Following this, the philosophy and emergence of AL settings will be summarized and we will see that the characteristics typical of an AL resident coincide with the risk factors for social vulnerability. The two primary outcomes (cognitive decline and hospitalization) explored in this work will then be described and justified. Upon completing the literature review, the methodology section will follow. This section describes the dataset used, the analytic sample, coding of variables, ethics, and the analytic plan. Following the methodology section, the results are presented in paragraph, table, and figure format. Finally, the discussion section provides an overview of the key findings and implications as well as the strengths and limitations of the study.

2.0 Literature Review

2.1 Social Health and Social Vulnerability

2.1.1 General Population of Older Adults

Social health has increasingly been recognized as an important domain of well-being (40,41) and is one of the seven domains of well-being which also include physical, spiritual, environmental, emotional, occupational, and intellectual domains (2). Social health is defined as an individual's ability to positively interact with the surrounding community (2,3). This ability stems from communication skills, the maintenance of meaningful relationships, the availability of support systems, and a sense of accountability, empathy, and respect (2,3). Where a person is deficient in one or many of these areas, they become socially vulnerable.

Presently, the social health field is satiated with different terminology (1,10,34,42–49). Terminology for one social factor is often interchanged with another. For example, social activity participation has been termed "social engagement" by Mendes de Leon (24) and "social participation" by Lövdén (50). In other instances, the same term is used to indicate separate concepts. For example, Obisesan and Gillbum (51) used the term "social integration" to describe the extent to which an individual possesses close social relationships and community ties, whereas Zunzunegui (47) used two separate concepts to capture Gillbum's conceptualization of social integration. Zunzunegui used "social integration" to describe community ties, and "social engagement" to describe close social relationships. "Social vulnerability," conceptualized by Andrew and colleagues (10), is also muddled by various terminology; however, one main tenant differentiates it from others.

Andrew and colleagues defined social vulnerability as an accumulation of social deficits that represent key domains (e.g., communication to engage in wider community, social support, empowerment and life control, among others) that interact to increase an individual's susceptibility to adverse health-related outcomes (10). This definition strays from the majority of research in the area of social health, by aggregating multiple social variables into one construct. Most social health research investigates social variables in isolation to one another (6,25,34,52,53). For example, studies often use one social variable as the exposure measure of interest (i.e. only social support, or only social engagement). In contrast, Andrew and colleagues' definition of social vulnerability aggregates social variables such as social support, social engagement, social networks, social capital, and communication (10). This approach mimics the lived experience of older adults, embracing the variety, complexity, and interactions of the numerous social variables in their lives. No social variable ever exists in isolation, therefore defining social vulnerability as an aggregate of social factors is more applicable to the reality of older adults.

In their conceptualization of social vulnerability, Andrew and colleagues identified nine domains: (1) communication to engage in the wider community; (2) living situation; (3) social support; (4) social engagement and leisure; (5) socially oriented activities of daily living; (6) empowerment, self-esteem, life control; (7) psychological well-being (e.g., as assessed by Ryff scales that examine data from six areas: self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth (54)); (8) self-reported perceptions, (e.g., "How do you feel in terms of… friendships, housing, finances, etc."); and (9) (contextual) socioeconomic status (SES); (9,10). These domains and the variables that compose them are believed to be dynamic rather than static (18). This dynamic nature is advantageous as it suggests that selected domains (and overall risk of social vulnerability) may be modified through prevention and treatment interventions.

Andrew and colleagues also argue that it is the domains and the aggregate of the social variables captured by the SVI that are of significance, not the individual variables themselves. That is, no single variable drives the relationships found using the SVI; the removal of any one variable from the SVI does not cause the relationships found to become significantly stronger or weaker. However, in one (18) of the three publications (10,19) where Andrew and colleagues performed this sensitivity analysis, it was found that the removal of the social engagement or socioeconomic status domains from the SVI resulted in statistically non-significant relationships between social vulnerability and cognitive decline. The remaining four publications by Andrew and colleagues (9,17,55,56) did not show a 'jackknife by variables' sensitivity analysis to determine if the removal of a single variable or domain from the SVI drives the relationships found. Lastly, in order for the SVI to function, the basic tenant of social vulnerability must be upheld: the inclusion of multiple social variables representing different domains (10).

At present, the SVI has only been operationalized and validated in community settings (10). However, by complying with the basic tenant of social vulnerability, the social factors identified by Andrew and colleagues that are summarized in the SVI are likely transferable to the AL setting (57,58). Variables such as communication abilities, social support sources, and activity engagement remain necessary for social health regardless of place of residence.

This conceptualization of social vulnerability has been correlated with frailty, pain and cognitive impairment (10,19), and associated with mortality, cognitive decline, and morbidity among community-dwelling older adults (10,18,55). Information concerning the correlates and associations of social vulnerability will be discussed in more depth in section 2.2.

2.1.2 Older Adults with Dementia

Just as the SVI has not been applied to an AL setting, it has also not been directly investigated for a dementia-specific population. The studies that have used this definition of social vulnerability have either not measured cognitive function or dementia status, or have included both persons with and without dementia in analyses (9,10,17,18).

The burden of social vulnerability is believed to be greater for persons with dementia than those without. First, it is likely that persons with dementia are at a greater risk of social vulnerability (59). Second, it is expected that persons with dementia who are socially vulnerable experience worse outcomes.

Persons with physical or cognitive impairments, like those with dementia, participate in social activities less often than their higher functioning counterparts and those without dementia (13,38,39,60–62). This is likely because the ability to engage in the immediate and wider community is dependent upon one's functional abilities (34,38,39). Persons with dementia and cognitive impairment also experience a dissolving of social structures (18,47). In order to successfully socially interact with the surrounding community, people rely on normative social structures to direct their actions. For persons with dementia, these structures are blurred, changed, or absent. Without common social structures, interactions between groups (i.e., persons with dementia and persons without dementia) become ineffective, increasing the risk of social vulnerability.

Persons with dementia also often rely on others for social engagement (27,34), whether this is because of physical and/or cognitive impairments, or because of the dissolved social structure. Moreover, stigma surrounding a diagnosis of dementia and cognitive decline (63) may deter social interaction initiated by fellow residents or care partners. These social initiations may be deterred because of the negative views people hold about dementia, or because there is a misunderstanding that social opportunities are irrelevant to persons with dementia. This stigma may lead to depression, functional decline, and reduced self-confidence, self-esteem, and social interaction (64–67). The reliance on others for social engagement coupled with the stigmatized views of dementia greatly increases the risk of social vulnerability for persons with dementia. It is therefore likely that persons with dementia are more at risk for social vulnerability than persons without dementia because of their reduced functional abilities, dissolved social structures, reliance on others, and stigma surrounding a diagnosis of dementia. These factors are not necessarily specific to persons with dementia, but they are likely to be more prevalent among them.

Social vulnerability is also of specific concern for persons with dementia because if socially vulnerable, they may experience worse outcomes. Previous findings have shown that persons with dementia often experience worse outcomes than those without dementia (68–77). For example, community-dwelling persons with dementia experience greater Medicare and Medicaid use; greater home health, nursing facility, and hospital use; and more transitions in care (72,74). Other findings have shown that persons with dementia in institutions have an increased odds of hip fractures (68), and are more likely to be hospitalized (72–74) and have longer lengths of stay in hospital (70). Based on these findings that persons with dementia are likely to experience worse outcomes than those without dementia (in community, hospital, and institutions) (68–77), it is likely that AL residents with dementia are at higher risk for poor outcomes associated with social vulnerability compared to residents without dementia.

2.1.3 Summary

At present, research has demonstrated the utility of Andrew and colleagues' conceptualization of social vulnerability among community-dwelling participants (10). Knowledge gaps exist in the applicability of the SVI to an AL- and dementia-specific context. The research that has been conducted in the current thesis elucidates the applicability and relevance of social vulnerability among older AL residents with and without dementia. Determining its suitability in this setting is important because of the concerns raised about social vulnerability among the AL population, despite the promotion of a social model of care in this care setting (4,5,14–16).

2.2 Social Vulnerability and Health

The relationship between social and physical health is synergistic (78). Many social variables (e.g., inequalities, environments, support, engagement, cohesion, capital, and sense of control) have been associated with a multitude of health domains (9,79). In this section, the associations found using Andrew and colleagues' definition of social vulnerability will be highlighted, followed by a summary of associations observed in studies using alternative definitions of social vulnerability.

2.2.1 General Population of Older Adults

Social vulnerability, as defined by Andrew and colleagues, has been associated with cognition, mortality, and pain in three Canadian, community-based studies of older adults. Specifically, social vulnerability has been correlated with cognitive impairment (R^2=0.49; 95% CI: 0.13-0.86) (19). As a continuous variable, an increase in social vulnerability has been associated with an increased odds of cognitive decline [e.g., an odds ratio (OR) of 1.03 (95% CI: 1.00-1.06); p=0.02, for every one-point increase in social vulnerability (18)]. As a categorical variable (i.e., tertiles), those in the "high" social vulnerability group were observed to have a 36% increased odds of cognitive decline as compared to those in the "low" social vulnerability group (18).

Social vulnerability has also been associated with mortality. Every one-point increase in social vulnerability was associated with a risk of mortality of 1.05 (95% CI: 1.02-1.07) over 5 years, 1.08 (95% CI: 1.03-1.14) over 8 years (10), and 1.04 (95% CI:1.01-1.07) over 10 years (9). Further, among the fittest older adults (defined as those reporting 0 or 1 health deficit(s) on a frailty index), there was a 22% absolute mortality difference over 5 years between those in the highest versus lowest social vulnerability groups (when categorized as tertiles). Phrased differently, high social vulnerability was associated with an increased risk of death over 5 years among the fittest older adults (HR=2.5; 95% CI: 1.5-4.3; P=0.001) compared to those with low social vulnerability (17).

In the last Canadian, community-based study using Andrew and colleagues' concept of social vulnerability, social vulnerability was correlated with moderate/severe pain (R^2=0.44; 95% CI: 0.21-0.66) (19). Social vulnerability was also correlated with frailty in males (r_1=0.13; r_2=0.37) and females (r_1=0.24; r_2=0.47)[1] in two separate samples (10).

Andrew and colleagues also conducted a study on social vulnerability in a European community-dwelling cohort of older adults (55). Here, they found social vulnerability was associated with disability and again with mortality. Those in the highest social vulnerability quartile exhibited an increased risk of disability (OR=1.36; 95% CI: 1.15-1.62) and mortality (HR=1.25; 95% CI: 1.07-1.45) over 5 years (55).

Investigations using alternative conceptualizations of social vulnerability have also found associations with health outcomes using various methodologies. A cross-sectional European study (23) of community and care home older adults found that low social capital (defined as low social support, low participation, and low levels of trust) was associated with increased odds of care home residence and psychiatric illness among community-dwelling and home care residents, and more severe functional impairment and poorer self-reported health among community-dwelling participants. These associations were stronger among community-dwelling older adults compared to the care home older adults (23).

A longitudinal community-based study found that having no social ties increased the odds of cognitive decline in 3- (OR=2.24; 95% CI: 1.40-3.58), 6- (OR=1.91; 95% CI: 1.14-3.18),

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[1] r_1 and r_2 denote samples 1 and 2 respectively.

and 12-year (OR=2.37; 95% CI: 1.07-4.88) periods (25). Two community-based longitudinal studies showed an association between low social support and mortality over 30 months (22), and a 60% increased risk of visiting the emergency department (80). In a systematic review of longitudinal studies, both social support and social integration were stronger predictors of mortality than well-established risk factors such as smoking and sedentary lifestyle (81).

Contrary to the findings above and specifically to those of Andrew (18) and Bassuk (25), Stoykova (53) found that a social network index (defined as size of social network, relationship satisfaction, perception of being understood, and social activity participation) was not associated with cognitive decline over 20 years among persons without dementia. In this study, those with prodromal and clinical dementia were removed from the analytic sample. The social network index was therefore not associated with age-related cognitive decline. This finding may imply that the observations reported by other investigators were misleading due to the inclusion of participants with prodromal or clinical dementia.

Studies exploring associations of social vulnerability have also been conducted in AL settings. A cross-sectional study of an AL population found that low perceived social support and low participation in activities were associated with poor general well-being (38). In longitudinal analyses, Tighe and colleagues observed a protective effect of activity participation against discharge from AL facilities (HR=0.996; 95% CI: 0.993-0.999) (82). In earlier sub-studies of ACCES, social engagement among AL residents was assessed using two measures: strength of social relationships, and average time involved in activities. Individually, both relatively poor social relationships (hazard ratio [HR]=1.52; 95% CI: 1.04-2.23) and little or no involvement in activities (HR=1.95; 95% CI: 1.23-3.09) conferred increased risks of nursing home placement among AL residents (5).

It is important to note that findings from cross-sectional investigations are limited as the cross-sectional nature does not allow for clear observations of directionality. Therefore, it is unknown whether the exposure of interest occurs before the outcome of interest. Longitudinal studies do, however, allow for directionality to be inferred; although some concerns with interpretations of direction of associations exist. The findings from longitudinal studies are therefore stronger than those from studies using a cross-sectional study design.

2.2.2 Older Adults with Dementia

Although the SVI has not been explored in a dementia-specific context, alternative measures of social vulnerability have been used in this population. Stoykova (53), as mentioned above, investigated the influence of a social network index (as defined above in section 2.2.1) on cognitive decline among community-dwellers with and without dementia. In her 20-year longitudinal community-based study, Stoykova found that a social network index was associated with dementia-related cognitive decline, but not age-related cognitive decline[2]. Stoykova's study showed that a strong social network index was protective of cognitive decline among those with prodromal and clinical dementia.

In another community-based longitudinal study, Bennett (83) found that those with Alzheimer's disease pathology who had larger social networks had slower cognitive decline than those with smaller social networks. Orrell (84) also found trends indicating that attending day programs (p=0.07) and having family social support (p=0.06) improved survival among persons with dementia.

Further, two previous sub-studies within ACCES found relationships between social

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[2] Age-related cognitive decline was investigated using a sample free of participants with prodromal and clinical dementia.

variables and risk of hospitalization and LTC placement among older AL residents with dementia. Specifically, relatively poor social relationships (HR 1.64; 95% CI: 1.07-2.52) and little to no time involved in activities (HR 2.14; 95% CI: 1.07-4.29) were related to an increased risk of LTC placement (85). The presence of relatively poor social relationships (HR 1.38; 95% CI: 1.06-1.81) was also associated with an increased risk of hospitalization among this study sample (86).

2.2.3 Summary

The research that has been completed to date applying Andrew and colleagues' concept of social vulnerability has elucidated many associations pertaining to health-related outcomes. Currently, social vulnerability has been associated with increased risks of mortality across varying time periods; is correlated with, and increases the odds of cognitive decline; is correlated with pain and frailty; and is associated with increased odds of disability (10,17–19,55). Studies using this concept have been executed in Canada and Europe, using community-dwelling samples. Research employing alternate definitions of social vulnerability in various settings and populations have also found associations with health outcomes such as cognitive decline, time to discharge from AL, and survival (25,82,84).

The associations between social vulnerability and various health outcomes are more consistent among samples of persons with dementia than in samples of the general public and persons without dementia. This observation may be the result of methodological techniques employed in general and non-dementia samples. Specifically, these results may be the outcome of reverse causality, where prodromal or clinical dementia precedes and stimulates declines in social health. Alternatively, this observation may be linked to the hypothesis that persons with dementia are more susceptible to experiencing social vulnerability, and to experiencing adverse health outcomes when socially vulnerable.

2.3 Assisted Living

AL facilities are emerging as a popular residential option for older persons with and without dementia who require some level of care, both in the United States and Canada (5,28–33,38,87,88). Numerous factors are contributing to this trend including the aging of the baby boom generation (30), the desire for an alternative to nursing homes (29,38,89), the preference for a more home-like atmosphere (87), the desire to age-in-place (29), and continuing care reforms at the government level (90). Other important contributors include shifts towards caring for persons with lower levels of physical and cognitive impairments in a more suitable lower level of care setting (i.e., AL settings), instead of in nursing homes where the level of care and level of need may not coincide (60,91,92); reduced independence and medication issues (62); declining availability of informal caregivers due to demographic shifts (90,92,93); concerns about nursing home care (60); lifestyle changes (90,93); and the desire for fewer responsibilities, such as property management and meal preparation (94).

Although there is no universal definition for AL (95), there is a common consensus describing AL facilities as independent living residences that emphasize emotional and social needs (31,95). AL facilities offer personal and support services that aim to maximize independence, freedom of choice, privacy, autonomy and aging-in-place (35,90,94,96–102). Despite this broad description, AL facilities vary significantly between and within provinces and regions (37,102,103). In particular, AL settings vary by cost, services, amenities, size and location, ownership type, admission/discharge criteria, and staffing level and mix (33,90,104–106). Further, the breadth and depth of staff training in dementia varies considerably between AL facilities (107). This diversity affects consumer choice and raises some questions and concerns about the ability of AL to adequately provide and care for the resident with and without dementia

(92,103,108).

AL facilities also follow a social model of care (5,88,109), reflecting the promotion of autonomy, independence, and dignity in a home-like environment. In fact, some older adults may transfer to AL due to social isolation and loneliness (91) in hopes that this care philosophy will remedy their social vulnerability (10,35,93,110,111). Social health is clearly an important aspect of quality of life from the perspective of older adults, and it may also represent a key determinant in the decision to transfer living space.

Despite its philosophical approach to care, concerns have been raised in regards to AL residents' social well-being in both Canada and the United States (4,5,14). Included among these concerns is an apparent need for staff education around the detection of social vulnerability (14,15), and interventions to improve social health (16). Further, although not presently studied in AL, persons who transfer to a higher level of care (e.g., nursing home facility) may experience a meaningful reduction in their level of interactions (defined as visits and telephone calls) with family and friends (112). As previously noted, there is an expectation of increased social health in AL (27); however, since many of the same principles apply to nursing homes as AL facilities in the context of residential transfers, it is likely that AL residents also experience a decline in interaction post-admission to AL, despite the social model of care. Social vulnerability among AL residents is therefore of concern.

2.3.1 Assisted Living in Alberta

Alberta has been noted as one of the leading provinces in healthcare reform, often piloting innovative healthcare policies and spearheading healthcare reform [e.g., Mazankowski Report (2)]. Alberta has also been a leader in examining the role of AL within the Canadian context (4). In 2008, Alberta amended healthcare policies resulting in a shift from nursing home to AL care (33,88,113). This shift was in response to resource constraints and the desire among older adults (and their caregivers) to age-in-place in a more home-like setting (33,88,90). Some proponents of this shift argued that nursing home facilities often overcompensate for the physical and cognitive impairments of their residents. For example, it was stated that about 15% of people residing in nursing homes (90,114) could be adequately cared for in facilities offering less care, such as AL facilities (102).

At the time ACCES was underway (2006-2009), there was a commonly held view across several health regions in Alberta that AL could provide a suitable substitute for LTC. Although many residents did not need 24/7 nursing care, many residents were complex enough to warrant this amount and level of care. However, many were transitioned to AL facilities where the level, mix, and amount of health professional oversight were greatly reduced. AL facilities in Alberta[3] were not required to employ 24/7 onsite licensed practical nurses and/or registered nurses. They were, however, mandated to have at least one staff member on-site at all times who was proficient in emergency first aid (33). Concerns regarding delayed detection of health issues, poorer outcomes, and higher healthcare service use have been raised due to this relatively low staffing level and mix (14,115). Further, with lower staffing levels and the characteristically complex nature of residents in AL facilities (14,37,87,92,103), the suitability of these facilities for persons with psychiatric and physical conditions was questioned (92,100,108,116).

Within Alberta, there were also two broad AL designations: public and private. Facilities that were publicly funded were termed “designated facilities.” The designated facilities were named designated supportive living (DSL), enhanced lodge (EL), designated supportive housing

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[3] A comparison of assisted living facility models across the Canadian provinces can be found in Appendix A.

(DSH), designated assisted living (DAL) and enhanced designated assisted living (E-DAL) (109). At the time of the ACCES study, designated spaces that existed within Supportive Living facilities were contracted by a regional health authority (RHA). Both parties collaboratively established admission and discharge criteria[4], as well as the specific health and supportive services offered. In return for signing a contract with a RHA, the RHA provided funds to the facility (109) and access to skilled care via the local Home Care Program (102). In sum, admission and discharge criteria, and health and supportive services offered, differed considerably by residence and region during the time of ACCES.

Supportive services were provided through three domains: health and wellness, hospitality, and physical and social. Health and wellness services included access to a healthcare professional (personal care aide, licensed practical nurse and/or registered nurse; physician; podiatrist; physiotherapist; occupational therapist; speech/language therapist). Hospitality services included meal preparation; housekeeping; laundry; social, leisure and recreational opportunities; safety and security; activities of daily living (ADL) support; medication management; and coordination and referral to community services. Lastly, physical and social services offered included access to private rooms, ability to personalize rooms, and stipulations on pets, visiting hours and suites (109). Every facility had discretion over which services were provided, by which method (109), and the staffing level and mix that supported those services.

AL facilities in Alberta have evolved since the time of ACCES. Facilities that were included in ACCES are now termed Supportive Living Level 3 or 4 (88,117). Supportive Living Level 3 facilities are for individuals who are medically stable but need some support, and are not

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[4] Details concerning admission and discharge criteria can be found in "Designated assisted living (DAL) and long-term care (LTC) in Alberta: Selected highlights from the Alberta Continuing Care Epidemiological Studies (ACCES)" (109).

a risk to themselves or others. Level 3 facilities have 24-hour onsite access to healthcare aides and access to nursing services. Level 4 facilities provide a care option for those with more complex health conditions, who require ADL assistance, and who may have dementia. Like level 3 facilities, level 4 facilities have 24-hour access to healthcare aides, but additionally have onsite nursing (117). Moreover, Supportive Living Levels 1 and 2 are termed “Residential Living” and “Lodge Living” respectively. Supportive Living Levels 1 and 2 are composed of facilities that supply the least amount and intensive services, and therefore house persons with the lowest needs (33). All Supportive Living facilities provide housing, hospitality, and support services that are either supplied by the facility or coordinated by an outside party. The services provided by the facility and that are included in the monthly rental fee vary by institution (33).

Not only has the terminology used for designating AL spaces changed across Alberta, but more notably, the former Health Regions were dissolved. AL facilities are now governed provincially, and publicly funded personal and health care services are administered by Alberta Health Services rather than the RHA (102). This regulatory change aimed to increase the cohesiveness among AL facilities. Whether this goal was obtained is unknown.

2.3.2 Social Vulnerability in Assisted Living Facilities

As described in section 2.3.1, AL facilities generally promote a social model of care rather than a medical model of care typical of LTC. However, concerns regarding social vulnerability among AL residents have been raised. Specifically, a previous report based on ACCES discovered that a significant number of DAL residents had deficiencies in social engagement, and many would benefit from interventions targeting social engagement (37). These findings were surprising as one would expect that the adoption of a more social model of care would specifically promote opportunities for social engagement. These initial findings from

ACCES suggested that social health was an important area to address in future research.

Characteristics that increase the risk of social vulnerability (10,27,38,57,118–124) are common among AL populations in Canada and the United States. These characteristics include advanced age (≥80 years) (14,27,61,87,92,108,116,125–129), female sex (14,27,61,87,92,108,116,125,127–129), being widowed (27,87,92,108,116,128,130,131), having little or no control over the decision to transfer to an AL facility (37), mobility and communication issues (27), and impairment in basic and instrumental activities of daily living (ADL) (14,38,39,61,125–127,129,132,133). Other characteristics that increase the risk of social vulnerability and that may be relatively common among AL residents include social inactivity and withdrawal (14,126,134), high rates of multi-morbidity (14,19,126,127,129), and the presence of selected chronic conditions including depression (19,87,92,116,125,127,129,132), cognitive impairment (14,19,87,125,127–129,132) and dementia (14,61,116). These risk factors are additive (18,119), and are common among AL residents (14,27,61,87,92,108,116,125–129,132,133).

Exploring the concept of social vulnerability within the AL context is appropriate for four reasons: (a) social vulnerability is not a unique characteristic of any one demographic; (b) no individual is devoid of all social deficits (10); (c) concerns have been raised about the social vulnerability of AL residents (4,5,14–16); and, (d) many of the characteristics of AL residents coincide with those known to increase the risk of social vulnerability.

2.3.3 Summary

AL facilities are becoming an increasingly popular residential choice among older adults, including those with significant cognitive impairment and dementia. These facilities are characterized by a philosophy that promotes a social model of care, including a focus on independence, dignity, privacy, autonomy, and aging-in-place. Despite implementing a social model of care philosophy, concerns have been raised about the social vulnerability (e.g., low social engagement, low social participation, poor social relationships) of residents.

As demonstrated in this section, significant overlap exists between the characteristics known to increase the risk of social vulnerability and many of the characteristics of AL residents. AL residents are therefore likely to be at high risk for social vulnerability and the associated adverse health outcomes. Because of this overlap and the observed negative health outcomes described in section 2.2, [specifically those observed in an ACCES sub-study that used preliminary measures of social vulnerability (37)], AL residents should be a target for more comprehensive social health research and interventions.

2.4 Outcomes Relevant to Social Vulnerability in AL

The following sections provide a summary of the relevance of two particular outcomes of interest to the exploration of social vulnerability in AL settings, namely, cognitive decline and hospitalization, and the hypothesized mechanisms of action.

2.4.1 Cognitive Decline

Cognitive decline has been extensively investigated as an outcome of interest in numerous areas of research (18,135–137). Within the past two decades, cognitive decline has become a focus within the social health field of research (18,25,47,53). Growing demands for information about cognitive decline among older adults has stemmed from a general public fear of cognitive decline and dementia (138). Family caregivers also request more information on cognitive decline (i.e., how to prevent or slow cognitive decline). Cognitive decline is also important to family caregivers because they often experience negative physical and psychiatric health outcomes (139) like stress, caregiver burden, depression and anxiety (140,141), and reduced immunity (142) leading to infection and disease.

Cognitive decline also has great implications for those directly affected. Cognitive decline affects memory, language processing, decision making, attention, perception, and executive function (143). As a consequence, cognitive decline is negatively associated with quality of life, the capacity for independence (144–147), and is positively associated with mortality (148,149). With these consequences in mind, it is important to investigate approaches to prevent or delay the progression of cognitive decline. Modifying social vulnerability may provide an intriguing intervention to explore further in this area.

The presence of dementia may also modify the relationship between social vulnerability and cognitive decline. Stoykova (53) demonstrated that a poor social network index was only associated with cognitive decline in persons with dementia and not in persons without dementia. This finding suggests that dementia modifies the relationship between social vulnerability and cognitive decline. The mechanisms through which dementia achieves effect modification are unknown. Slowing cognitive decline among residents with dementia would be an important outcome that would preserve function, and therefore quality of life and independence. It is therefore important to determine if social vulnerability influences cognitive decline among residents with dementia. These findings would inform tailored prevention and treatment interventions for those with and without dementia.

The present research aimed to fill these knowledge gaps and contribute information about the association between social vulnerability and cognitive decline in a particularly vulnerable population of older adults. This information may be used to inform the research community, healthcare professionals, the public, and those directly affected by cognitive decline. Ultimately, with this new information, it may be possible to reduce the risks of adverse outcomes for those with and without dementia (e.g., poor quality of life, disability and institutionalization) and for their family caregivers (e.g., caregiver burden and depression).

2.4.2 Hospitalization

Hospitalization is common among older adults; however, many of these hospital admissions may be preventable (73,150), especially for persons with dementia (74). Avoiding these hospitalizations is essential to reducing many negative health outcomes.

Once hospitalized, older adults are at greater risk than younger adults for reductions in physical health and functional ability during and after hospitalization. These risks are generally greater for those with dementia (73,76). Older adults are more likely than younger adults to experience functional decline in ADL during hospitalization, and are less likely to recover to baseline functioning post-hospitalization (151). Older adults are also at risk for cognitive decline (152), delirium (153), and preventable iatrogenic conditions (154) during a hospital stay. Further, hospitalization is a predictor of long-term care admission (72), which is associated with poorer physical and cognitive function, as well as poorer social supports. The negative outcomes associated with a hospitalization among older adults with and without dementia are numerous and severe. Determining the factors that increase the risk of hospitalization is therefore important.

Researchers have begun to investigate the psychosocial factors that affect hospitalization. A sub-study of ACCES demonstrated an association between poor social relationships and an increased risk of hospitalization among persons with dementia in AL facilities (86). Poor social relationships have also been related to a shorter time to discharge from AL (to, for example, nursing home or hospital) among residents of AL facilities (5,82). These findings raise concerns regarding facility-level engagement opportunities.

Facility-level engagement opportunities affect all residents, but may have varying effects among particular resident subgroups. Whether dementia modifies the rate and outcomes of hospitalization is important to understand. Conflicting findings have been reported for risk of hospitalization for persons with dementia. Some studies have found a protective effect of dementia and hospitalization risk (86,155,156), while others have found that persons with dementia are at greater risk for hospitalization than those without dementia (72–74). For example, persons with dementia have been found to experience more than three times the number of hospital stays per year (157), to have longer lengths of stay (70,158), and to be more likely to die in hospital (70). These observed differences may be the result of setting and available resources. For example, persons with dementia in the community often do not have skilled healthcare professionals readily available and are therefore admitted to hospital when an acute exacerbation occurs. Conversely in nursing homes, skilled healthcare professionals are trained and available in these same instances and residents are therefore cared for in the nursing home instead of being transferred to hospital. The differences and conflicting findings concerning hospitalization between persons with and without dementia warrants further investigation.

Understanding the drivers of hospitalization and how those drivers differ among those with and without dementia requires further investigation. An investigation into how social vulnerability influences the rate of hospitalization in these populations supports this area of inquiry. It is hoped that the findings from the current investigation of social vulnerability and hospitalization risk among AL residents with and without dementia will help to elucidate areas for future intervention trials that aim to modify social vulnerability as a risk factor for potentially avoidable hospitalization.

2.4.3 Mechanisms of Action

A brief overview of some of the relevant mechanisms that may underlie observed associations between social vulnerability and adverse health outcomes (i.e., cognitive decline and hospitalization) are summarized below. These mechanisms will be applied to the study findings in section 6.3.

Numerous mechanisms have been hypothesized to explain how social vulnerability contributes to health outcomes, namely, cognitive decline and hospitalization in an AL-context. These mechanisms fall under three broad categories: psychological, physiological, and behavioural (9). These mechanisms are likely to be interdependent.

2.4.3.1 Psychological Mechanisms

Social engagement defines social roles and provides an identity, a sense of belonging to a community, value, and attachment (1). Self-efficacy, which is promoted or supressed by social networks and interactions, is associated with health behaviours and functional performance through individual beliefs in ability to accomplish an action (159–161). Self-efficacy is important for health promoting behaviours. For example, low self-efficacy is associated with greater fear of falling and poorer functional outcomes (162,163). Reduced physical function may lead to dependence and loss of feelings of worth. This chronic stress may elicit physiological reactions that increase the risk of cognitive decline (137). Further, reduced feelings of worth may lead to depression, and mood disorders are among the top ten reasons for hospitalization among Canadians (164).

2.4.3.2 Physiological Mechanisms

The psychological stress generated from experiencing social vulnerability elicits physiological responses. These chronic responses exert some negative influences on the body that act on the neuroendocrine, immune, and cardiovascular systems (i.e., increased cortisol levels, reduced immune function, high blood pressure, increased heart rate, high cholesterol and uric acid levels, atherosclerosis, and other cardiovascular risks) (40,46,165–178). Both the risk factors for cardiovascular diseases and cardiovascular diseases themselves are associated with cognitive decline (179). Cardiovascular diseases are also three of the top five reasons in Canada for hospitalization (4,164).

2.4.3.3 Behavioural Mechanisms

Social influence through social norms and social pressure influence health behaviours such as healthcare seeking and adherence, diet, and engagement in physical activities (1,180). These health behaviours can promote or oppose health. Again, cardiovascular risk factors and cardiovascular diseases such as obesity, diabetes, hypertension, and coronary heart disease (which are related to poor health behaviours), increase the risk of cognitive decline (179) and hospitalization (4,164).

2.4.4 Summary

Cognitive decline and hospitalization are both plausibly associated with social vulnerability using many interdependent mechanisms as theoretical frameworks. Social vulnerability represents a potentially modifiable risk factor that if improved, may reduce the risks of cognitive decline and hospitalization among persons with and without dementia. Determining whether dementia modifies the influence of social vulnerability on cognitive decline and hospitalization is crucial in developing tailored interventions. The present research aimed to provide insight into these knowledge gaps.

3.0 Study Rationale, Research Objectives and Hypotheses

3.1 Study Rationale and Objectives

AL facilities have become a popular residential option for a diverse population of older adults (5,28–33,38,87,88). Accumulating evidence over the past decade has raised some concerns regarding the appropriateness of these facilities for persons with dementia, cognitive impairment, and/or physical impairments (92,100,108,116,181). Evidence has also raised concerns regarding the state and consequences of social vulnerability among AL residents, in spite of the focus on a social model of care as a key philosophy of AL (4,5,14–16). The unique conceptual approach to identifying social vulnerability developed by Andrew and colleagues may have particular relevance to residents of AL facilities. To date, their approach to defining social vulnerability has primarily been examined among community-dwelling older adults. Their research among community-based populations has shown important relationships between higher levels of social vulnerability and heightened risks for various adverse health outcomes, including mortality, cognitive decline, disability, frailty and pain (10,18,19,55).

The current investigation addresses an important research and knowledge gap by examining the relevance of Andrew and colleagues' approach to defining social vulnerability among older residents of AL facilities, including a specific focus on those with and without dementia. Their comprehensive measure, termed the Social Vulnerability Index (SVI), was used to examine the prevalence, correlates and health consequences of social vulnerability among AL residents with and without dementia included in the ACCES study (37,182). As cognitive decline and hospitalization are particularly important outcomes to older AL residents and their caregivers, they were selected as primary outcomes of interest in relation to residents' baseline level of social vulnerability. It is hoped that the findings of the current research will help to focus future research, and clinical and policy efforts towards social vulnerability, AL residents, and care for residents with and without dementia. Results may also help to identify individuals at risk, where prevention initiatives may be employed.

The present study used secondary data from ACCES providing detailed measures on the clinical, functional and social characteristics of 1,089 older (aged 65+ years) residents of DAL linked with provincial administrative health data, in order to address two main objectives:

1. To estimate the prevalence and correlates of social vulnerability in DAL residents overall, and among those with and without dementia; and,
2. To examine the associations between baseline social vulnerability and subsequent health outcomes over one year, including cognitive decline and first-event hospitalization among DAL residents overall, and stratified by dementia status.

3.2 Study Hypotheses

Three hypotheses were addressed that contributed to our understanding and knowledge of social vulnerability in the AL population:

1. The prevalence of social vulnerability will be higher among DAL residents with dementia (vs. without), and will vary by age, sex, and level of cognitive and functional impairment;
2. The correlates of social vulnerability will differ by dementia status; and
3. AL residents with higher scores on the SVI will exhibit a higher risk for cognitive decline and hospitalization as compared with residents with lower scores; this risk will be greater for the subgroup with dementia.

4.0 Methods

4.1 Data Source: Alberta Continuing Care Epidemiological Studies (ACCES)

The Alberta Continuing Care Epidemiological Studies (ACCES) was a prospective cohort study that began in 2006 and ended in 2009 (37). Data collection targeted residents, family members, and administrative employees of designated (publicly funded) AL and supportive housing facilities (DAL) and long-term care (LTC) facilities across Alberta, Canada. Baseline resident-level data were collected using the Resident Assessment Instrument for Assisted Living (interRAI-AL) and the Resident Assessment Instrument for Long-Term Care Facility (interRAI-LTCF) assessment tools, followed by a one-year follow-up assessment (37).

4.1.1 Study Population

The present sub-study of ACCES used data collected from the DAL cohort only. The facilities studied were publicly funded designated facilities (DSL, EL, DSH, DAL, and E-DAL) and are now termed Supportive Living Level 3 or 4 facilities (88,117). For simplification, all publicly funded facilities will be referred to as DAL. These facilities were located across Alberta in five former Health Regions, consisting of three rural and two major urban settings. Total bed spaces ranged from 10-507, with an average of 108 spaces; DAL specific spaces ranged from 8-104, with an average of 44 spaces. Further, 59% of DAL facilities were non-profit, 36% for-profit, and 5% were owned or operated by the health region. Facility inclusion criteria included:

- Having been in operation ≥6 months;
- Small facilities with ≥4 residents, and large facilities with ≥10 residents aged 65 years or older; and
- Target clientele were free of developmental disabilities or mental illnesses (37).

Sixty eligible DAL facilities were approached, of which 59 agreed to participate in ACCES (98.3% response rate). All eligible DAL residents of these participating facilities were approached for study participation. Participant inclusion criteria included:

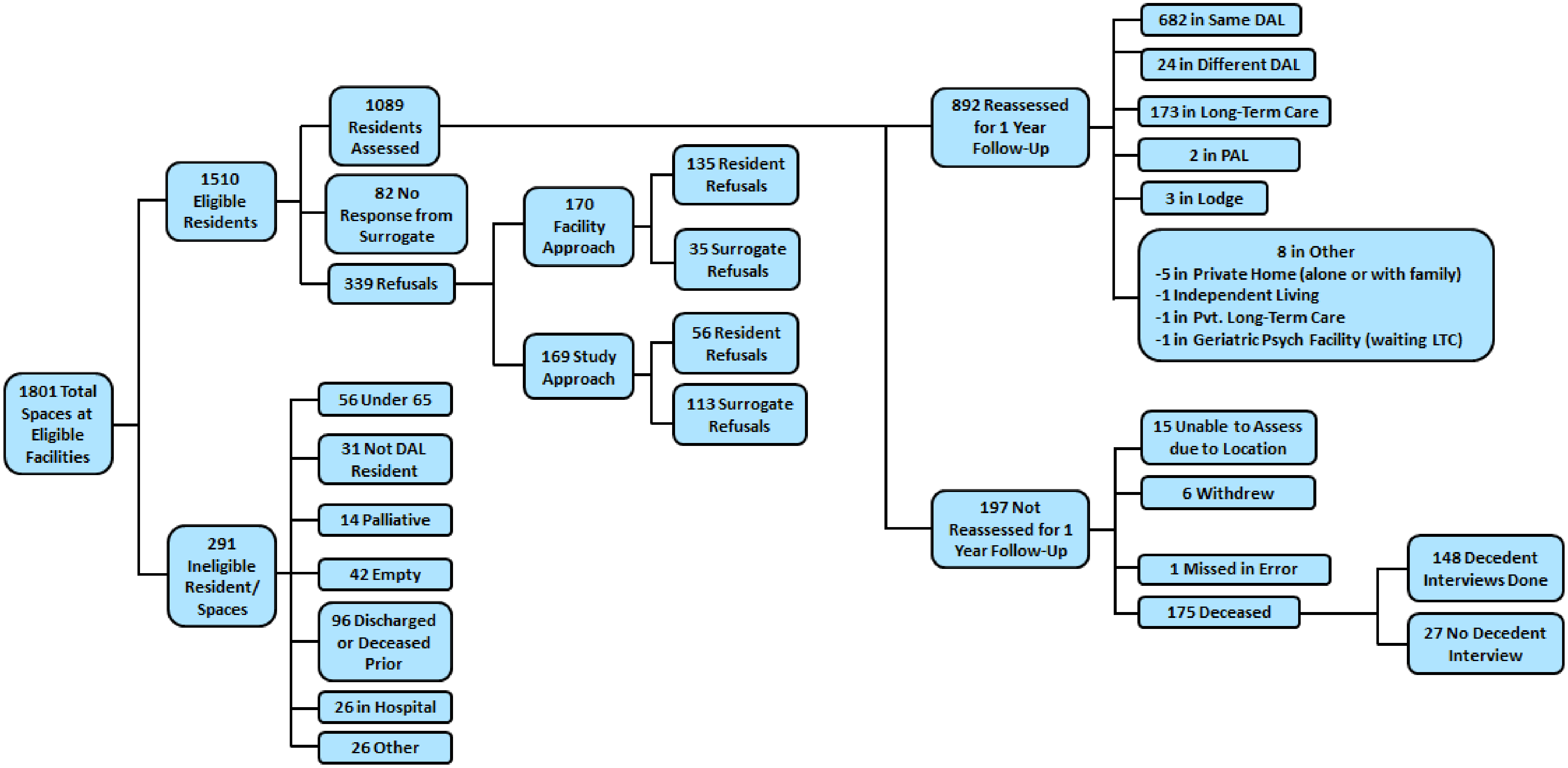
- ≥65 years of age;
- Was admitted >21 days prior to beginning of study;
- Was on a long-term stay;
- Was not deemed palliative;
- No facility representative or family member thought their research participation would be inappropriate (37).

All 1,510 eligible participants were approached for study participation, and 1,089 gave consent to study participation (72.1% response rate). Facility staff introduced research nurses to residents where after an initial independent approach, obtained written informed consent from residents deemed capable of making their own informed decisions. Where decision making capabilities were compromised, written informed consent was obtained from designated surrogate decision-makers and from residents (e.g., with verbal consent witnessed by facility staff) (182).

Reasons for non-participation included refusal to participate (22.5%; 339 residents), and inability to reach and contact the legally designated surrogate (5.4%; 82 residents). Age and sex were available for 86.5% (364 residents) of the 421 non-participants, and demonstrated a similar age-sex distribution (mean age 84.4 ± 7.1 years, 74% women) as participants. About 98% (1,069 residents) of research participants or surrogate decision makers consented to linkage with healthcare utilization data. Two participants were lost to follow-up and 1 moved out of province, leaving 1,066 study participants for analyses of health utilization outcomes (including hospitalization). The sample size available for models examining cognitive decline over one year differs slightly from this sample because of the requirement for cognitive outcome data. Further details regarding these two analytical samples are provided in section 4.2.

Figures 4.1.1 and 4.2.1a-b depicts flow charts for how the study populations were generated. Figure 4.1.1 is shown here, and figures 4.2.1a and b are shown in section 4.2 where the respective analytic samples are discussed.

Figure 4.1.1: Generation of Alberta Continuing Care Epidemiological Studies Designated Assisted Living Study Sample



4.1.2 Data Collection

4.1.2.1 Resident-Level Data Collection

At baseline (2006-2008) and at 1-year follow-up (2007-2009), residents were assessed by trained research nurses using the interRAI-AL tool (Appendix B) (interRAI-AL; see www.interrai.org/instruments.html). The interRAI-AL tool is a standardized, comprehensive assessment which collects information on residents' sociodemographic characteristics, medication use and services, physical and cognitive status, social health, health conditions, and behavioural problems (183–185). The best available sources of information were used to assess the various items on the interRAI-AL tool including interviews with the resident, family member, and staff, as well as resident chart reviews. Items on the interRAI-AL tool were used to derive various validated scales. Such scales included the Activities of Daily Living Self-Performance Hierarchy Scale (ADLH) (186); Cognitive Performance Scale (CPS) (187), Depression Rating Scale (DRS) (188); and Changes in Health, End-Stage Disease, and Symptoms and Signs (CHESS) Scale (189). Descriptions of these scales are found in section 4.3.1 and 4.3.4 where applicable. Coding for these scales is found in Appendices H and I.

4.1.2.2 Facility-Level Data Collection

A key facility employee (administrator, manager, or director of care) from each of the 59 participating institutions completed the facility survey (Appendix C) at approximately the mid-point of follow-up. Information gathered from the surveys pertained to establishment date, facility ownership (for-profit, not for-profit, or health region owned), location (rural vs urban), size and type, and type of care available. Other variables included presence of dementia beds; staffing levels, mix, and oversight (24/7 care on-call vs on-site Registered Nurse and/or Licensed Practical Nurse [RN/LPN], physician involvement); admission and retention criteria; health and social services; fees; and challenges (37). Only health region was used in the cognitive decline and hospitalization analyses. Health region was used in lieu of other facility-level variables because it represents a high-level systems- and facility-level variable. Health region encompasses many of the other facility-level variables such as rural or urban status, the services available to residents, community size, and governance. See Appendix I for coding of health region.

4.1.2.3 Family Member-Level Data Collection

A comprehensive family interview was completed with a family member at baseline and at 1-year follow-up for residents who were alive and in the study. Where a resident was discharged or died prior to the 1-year follow-up assessment, facilities would complete and submit a discharge tracking form. Study nurses would then contact a designated family member for a Discharge (Appendix D) or Decedent Interview (Appendix E) (with the added Moves Addendum; Appendix F) (37). Family member-level data was used to fill in 154 missing resident data for the "level of control person had over decision to move into assisted living" variable from the interRAI-AL assessment. After the missing data was revised, 15 residents had missing data for this social variable. This variable was essential to the development of the social vulnerability index (SVI) – exposure measure. More information on the SVI can be found in section 4.3.2. Family member-level data were also used to ascertain first-event outcomes. Further information on first-event outcomes can be found in section 4.3.3.2.

4.1.2.4 Linked Administrative Data

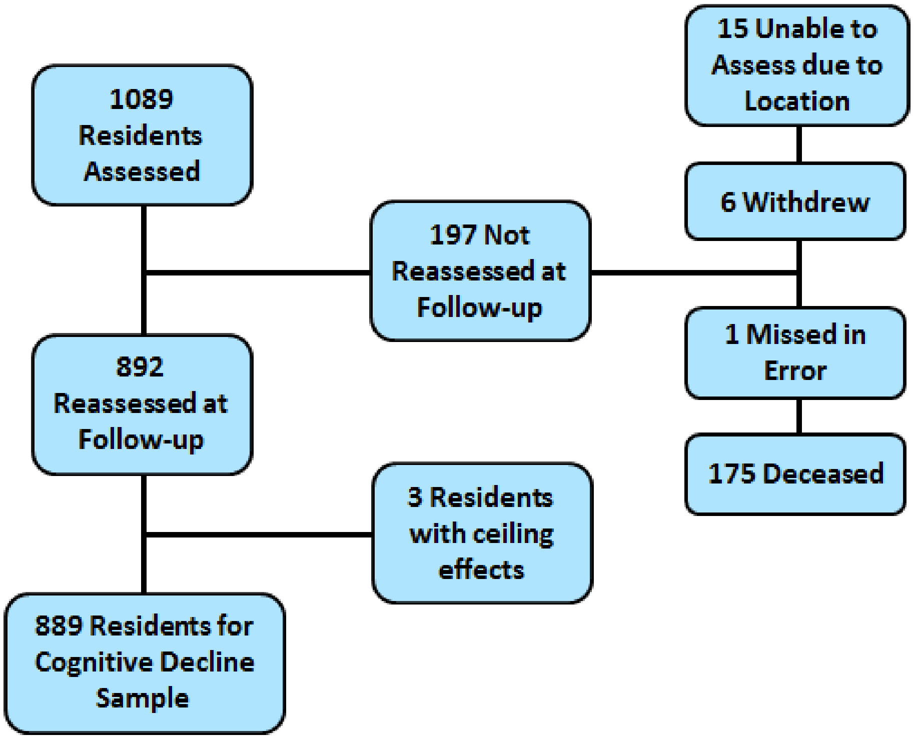
Upon the consent of the resident or the legally appointed decision maker, health service utilization data were obtained from the Alberta Inpatient Discharge Abstract Database and the Ambulatory Care Classification System (ACCS) databases (4,86,182). Information included hospitalizations (all-hospital events during the previous and follow-up year), emergency department visits, and day procedures (37,182). These data were linked with resident- and facility-level data. Coding for relevant linked administrative data variables can be found in Appendix H. Further detail on the hospitalization outcome measure can be found in section 4.3.3.2.

4.2 Analytic Samples

As previously mentioned, two different sample sizes were examined depending on the specific outcome being explored in the analyses. The sample size for the cognitive decline outcome was 889 residents. Of the 1,089 participants assessed at baseline, 892 had a follow-up interRAI-AL assessment completed, regardless of residence location at follow-up. Three participants had a baseline CPS score of 6 and therefore did not have the ability to experience the outcome of interest. These three residents were excluded in analyses due to ceiling effects (Figure 4.2.1a). The final sample size for the cognitive decline outcome was 889. This sample will hereinafter be referred to as the Survived cohort.

The sample size for the time to first-event hospitalization outcome was 1,066 residents. Of the 1,089 participants assessed at baseline in ACCES, 98% (1,069) had linked healthcare utilization data (Figure 4.2.1b) and outcome status was unknown for three residents in this sample. This sample will hereinafter be referred to as the Linked cohort.

Figure 4.2.1a: Generation of Sample for Cognitive Decline Outcome – Survived Cohort[5]



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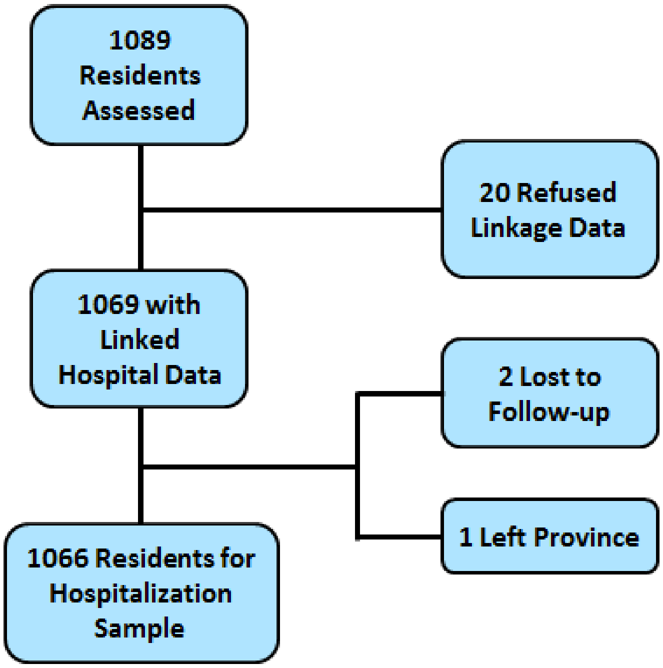
[5] Three residents had ceiling effects in the cognitive decline outcome. Here, residents had a baseline CPS score of 6 and were therefore unable to experience the outcome of interest since they had the most cognitive impairment the CPS score could capture.

Figure 4.2.1b: Generation of Sample for Time to First-Event Hospitalization Outcome – Linked Cohort



4.3 Measures

Resident-level data (derived from the interRAI-AL) were used to assess residents' sociodemographic characteristics, health, functional and cognitive status and social vulnerability. Refer to section 4.3.1 for detailed information on descriptive measures. Refer to section 4.3.2 for more information on the derivation of the SVI. One facility-level factor (derived from the facility survey) was used to assess a facility-level covariate (i.e., health region). Refer to section 4.3.4 for information on covariates. Cognitive decline during 1-year follow-up was ascertained using the baseline and follow-up interRAI-AL assessments. First-event hospitalization during 1-year follow-up was ascertained using linked discharge abstract data. Refer to section 4.3.3 for more information on the derivation of the two outcome measures.

4.3.1 Descriptive Measures

Numerous resident-level variables were used as descriptive measures to describe the overall cohort and to compare residents with and without dementia. These included age, sex, marital status, fatigue, clinically significant depressive symptoms (DRS score), health instability (CHESS score), cognitive function (CPS score), activities of daily living (ADLH score), bladder and bowel incontinence, number of chronic conditions, number of medications, "Do Not Hospitalize" advance directive, number of inpatient hospital admissions in the past year (for Linked cohort only), and number of inpatient hospital and emergency department visits in the past 90 days. Coding for these variables can be found in Appendix H. Many descriptive measures were also used as covariates and therefore there will be some repetition in section 4.3.4 where covariates are discussed. Coding for covariates is found in Appendix I.

Age was coded into quartiles based on sample distribution with the following groups: 65-79, 80-85, 86-89, and ≥90, and sex was coded as a binary variable. Marital status was categorized into a three-level variable including widowed; married or with a partner; and never married, separated, or divorced. Consistent with previous ACCES publications (4,5), fatigue was coded into tertiles as not fatigued; minimal fatigue; and moderate to severe, or unable to commence any normal day-to-day activities.

The Minimum Data Set DRS is used as a clinical screen for depression. It was developed and validated against both the Hamilton Depression Rating Scale and the Cornell Scale for Depression in Dementia (188). It has a score range of 0 to 14 with higher scores indicating a greater number and/or frequency of symptoms. A cut-off point of ≥3 is employed to capture clinically important depressive symptoms (188). The DRS was coded as 0 or 1, with 0 representing no depressive symptoms (score of <3 on DRS scale), and 1 representing clinically important depressive symptoms (score of ≥3 on DRS scale).

The CHESS scale measures health instability and therefore identifies older adults vulnerable to decline in health status. The CHESS scale is a multi-item tool measuring symptoms (vomiting, reduced food/fluid intake, dehydration, unintended weight loss, edema, and shortness of breath), cognitive decline, decline in ADL performance, and declines in end-stage disease. The CHESS scale has been demonstrated to be predictive of hospitalization, LTC placement and mortality (132,189,190). The CHESS scale has also been suggested to act as a frailty measure (191). Scores range from 0 to 5 with higher scores indicating greater health instability. The CHESS scale was coded from 0 to 3, representing categories: stable; mild; mild-moderate; and moderate-high health instability respectively.

The CPS measures five items: comatose status, short-term memory, cognitive skills for daily decision making, making self understood, and eating self-performance. Scores range from 0-6, with higher scores indicating more severe impairment. The CPS has been validated against the Mini-Mental State Examination (MMSE) and the Test for Severe Impairment (TSI) (187,192). Each level on the CPS corresponds to a mean MMSE score (Table 4.3.1) (192). A one-point change on the CPS score indicates a clinically meaningful change in cognition (192). As a descriptive measure, the CPS was coded into tertiles: intact; borderline intact; and mild, moderate or severe impairment.

Table 4.3.1. Cognitive Performance Scale (CPS) Equivalent Scores in the Mini-Mental State Examination (MMSE)

CPS Score	**Intact (0)**	**Borderline (1)**	**Mild Impairment (2)**	**Moderate Impairment (3)**	**Moderately Severe Impairment (4)**	**Severe Impairment (5)**	**Very Severe Impairment (6)**
MMSE							
Mean	24.9	21.9	19.2	15.4	6.9	5.1	0.4
SD	5.1	5.7	5.6	8.0	6.9	5.3	0.9

Table 4.3.1 was adapted from Morris et al., 1994 (192).

The Activities of Daily Living Self-Performance Hierarchy Scale (ADLH) scores overall ADL performance by measuring four abilities: locomotion, eating, toileting, and personal hygiene. Scores range from 0 to 6 with higher scores indicating greater dependence (186). Level 0 represents a person who is independent in all four ADLs. Level 1 represents a person who needs supervision in at least one ADL but is not limited in four ADLs. Level 2 represents a person who requires limited assistance in at least one ADL but does not require extensive assistance in all four ADLs. Level 3 represents a person who requires extensive assistance in at least personal hygiene or toileting but does not require extensive assistance in both eating and locomotion. Level 4 represents a person who requires extensive assistance in both eating and locomotion but is not totally dependent in either. Level 5 represents a person who is totally dependent in eating and/or locomotion. Lastly, level 6 represents a person who is totally dependent in all four ADLs.

The ADLH was coded as a four-level variable. Coding was 0 to 3 with higher scores indicating greater dependence. A code of 0 represents a resident in level 0 of the original ADLH scale. A code of 1 represents a resident in level 1 of the original ADLH scale. A code of 2 represents a resident in level 2 of the original ADLH scale. A code of 3 represents a resident in levels 3-6 of the original ADLH scale.

Bladder incontinence was categorized into a four-level variable (continent; some control, infrequent episodes; occasional incontinence; and frequent episodes, no control), whereas bowel incontinence was categorized into a three-level variable due to smaller cell sizes in the more severe continence impairment categories (continent; some control, infrequent episodes; and occasional incontinence, frequent episodes, and no control).

Comorbidity was ascertained using the sum of 49 possible diagnoses recorded on the interRAI-AL interview. A diagnosis was considered present if it was considered the main reason for the current stay or if it was considered pertinent to the resident's health and care needs. As in previous ACCES publications (4,5), comorbidity was coded into three groups: 0-3, 4-5, and ≥6. Number of medications was ascertained by summing the number of medications recorded in the interRAI-AL assessment. As in previous ACCES publications (4,5), number of medications was coded as follows: 0-6, 7-8, 9-10, and ≥11.

The presence or absence of a "Do Not Hospitalize" advance directive was ascertained using the interRAI-AL assessment, and was coded as present/absent. The number of inpatient hospital admissions within the year prior to baseline was ascertained using the linked health administrative data and was only used in the Linked cohort. Consistent with previous ACCES work (4), the number of inpatient hospitalizations within the year prior to baseline was coded into three groups: 0, 1, or ≥2 hospital admissions. For all cohorts, the number of inpatient hospital admissions within the past 90 days was ascertained using the interRAI-AL assessment. Consistent with previous ACCES work (5), hospitalizations within the past 90 days were coded as 0 or ≥1. The number of emergency department visits in the past 90 days was ascertained using the interRAI-AL assessment and was coded as 0 or ≥1. Lastly, health region was ascertained via the facility survey. Health region used the same coding approach as previous ACCES publications to represent distinct health systems reflecting rural/urban status, community size, services offered, policies, and more (4,5): (a) Calgary (urban); (b) Chinook (mixed urban/rural); (c) David Thompson (rural); (d) Capital (urban); and (e) East Central (rural).

4.3.2 Exposure Measure

Social vulnerability was measured using a modified version of Andrew and colleagues' SVI (10). Modifications were made to the social domains used and the constituent variables of each domain[6]. This index was composed of multiple resident-level characteristics derived from the interRAI-AL assessment (refer to Table 4.3.2 for a shortened version of the SVI; for full table, refer to Appendix G.) Where missing data existed for particular social variables, data from other similar variables on the interRAI-AL were used to determine the score on the missing variable. For example, five participants had missing data for the "positive outlook on life" social variable. Here, five different variables[7] were used to determine what the score on "positive outlook on life" should be.

The social vulnerability domains that were used included: (1) communication to engage

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[6] Six of the possible nine social domains provided by Andrew and colleagues were used in the development of the SVI used in the current investigation. Further, some variables were different from those used by Andrew and colleagues, however they still represented the domain under question. These differences were a result of data availability.

[7] The five variables used to fill in missing data include: finds the meaning in day-to-day life; crying/tearfulness; repetitive health complaints; made negative statements; and repetitive anxious complaints/concerns (non-health related).

in the wider community; (2) living situation; (3) social support; (4) socially oriented activities of daily living; (5) social engagement and leisure activities; and (6) empowerment and life control. Each domain consisted of a varying number of representative social factors. Appendix G provides the coding of each social variable in the SVI.

Each item in the SVI was coded as 0 or 1 to represent the absence or presence of a social deficit, respectively. Where necessary (e.g., items have multiple levels capturing meaningful variation in degree of social deficit), an intermediate score (0.5) was assigned for the mid-level value. A social vulnerability score was assigned to each participant using the sum of their index scores. The SVI included 27 variables and therefore the theoretical range of scores was between 0 and 27, with higher scores indicating greater severity of social vulnerability. The SVI was then transformed onto a ratio scale (with scores ranging from 0-1) by dividing the number of deficits observed to be present over the number of deficits considered. This ratio allowed for greater ease in analyses because 15 residents were missing one of the 27 social variables[8]. The SVI ratio scale was used in all analyses.

The ratio version of the SVI was categorized into tertiles (low social vulnerability; intermediate social vulnerability; and high social vulnerability) based on the distribution within each overall cohort. This categorization was extended to the subgroups stratified by dementia status in order to examine how the prevalence of social vulnerability varied by dementia status.

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[8] Fifteen residents were missing the "level of control person had over decision to move into assisted living" social variable included in the SVI. Their theoretical range of scores was therefore 0-26. However, their SVI scores were also transformed onto a ratio scale for comparison and modelling purposes.

Table 4.3.2. Social Vulnerability Index

Domain	Variables
Communication to engage in the wider community	
	Primary language
	Understanding others
	Hearing
	Vision
Living Situation	
	Marital status
	Room type
Social Support	
	Close to someone in the facility
	Strong and supportive relationship with family
	Visit with a long-standing social relation or family member
	Other interaction with long-standing social relation or family member (e.g., phone, email)
Socially-oriented activities of daily living	
	Phone use – Capacity
	Transportation – Capacity
Social engagement and leisure activities	
	At ease interacting with others
	At ease doing planned/structured activities
	Accepts invitations into most group activities
	Pursues involvement in life of facility
	Initiates interactions with others
	Reacts positively to interactions initiated by others
	Participation in social activities of longstanding interests
	Days outside in last 3 days
	Total hours of exercise or physical activity in last 3 days
	Social Activities Performance vs Involvement
	Exercise or Leisure Activities Performance vs Involvement
Empowerment and life control	
	Consistent positive outlook
	Finds meaning in day-to-day life
	Level of control person had over decision to move into assisted living

4.3.3 Outcome Measures

4.3.3.1 Cognitive Decline

Change in the CPS score (derived from items on the interRAI-AL assessment, as summarized above) from baseline to 1-year follow-up was used to determine cognitive decline. Changes in the CPS score[9] were determined by subtracting each resident's baseline CPS score from their follow-up CPS score [i.e., Time 2 CPS – Time 1 CPS score]. Positive integers indicated cognitive decline. Negative integers indicated cognitive improvement. A calculation of 0 indicated no change in cognition.

Any one-point change in CPS score has been noted to indicate a meaningful change in cognitive function (192). Using the original coding of the CPS (0 to 6), any ≥1 point increase indicated a significant decline in cognition. Cognitive decline, as measured by the CPS change score, was coded as a binary variable. A score of 0 indicated no change (no change on CPS) or an improvement in cognition (decrease of ≥1 point(s) on the CPS) during follow-up. A score of 1 indicated a decline in cognition (increase of ≥1 point(s) on the CPS) during follow-up.

4.3.3.2 Hospitalization

Time to first-event hospitalization over 1-year post-baseline was ascertained through linkage of interRAI-AL data with the Alberta Inpatient Discharge Abstract Database. The date of admission was examined. Only the first-event hospitalization was assessed as opposed to any or total hospitalizations. Analyzing only first-event hospitalization controlled for competing risks (e.g., death or facility transition). It also ensured that the hospitalizations under study were from DAL instead of following an initial transfer out of DAL (i.e., to LTC or another DAL). This allowed conclusions to be drawn about the DAL drivers (i.e., resident and facility characteristics)

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[9] Recall that three residents were excluded from models for this outcome because they had a baseline CPS score of 6 and were therefore unable to experience the outcome of interest.

of hospitalization rather than characteristics of the new location as drivers of hospitalization.

Discharge to LTC or death prior to hospitalization was ascertained using the facility discharge tracking form, family caregiver Discharge Interview, Decedent Interview, and/or the Moves Addendum of the 1-year follow-up assessment. Residents were classified into four groups based on the date of their first event: (1) inpatient hospital admission, (2) LTC admission or death without prior hospital admission, (3) other transitions without prior hospital admission, and (4) no event and remained in DAL at 1-year follow up. Residents were censored on the date of an alternative first-event (i.e., LTC admission, death, or other transition). Residents who did not experience an alternative event were censored on the date of their 1-year follow-up assessment.

4.3.4 Covariates

Relevant resident- and (one) facility-level covariates were selected on the basis of previous literature (4,14,18,19,86,115,152,156,157,193–195) and preliminary descriptive analyses. Characteristics examined included sociodemographic, functional and clinical items available from the interRAI-AL assessment, and previous health care utilization available from linked administrative data. Other covariates were selected based on preliminary data analyses that indicated variables as strongly predictive of both the exposure and outcome of interest. Many covariates were also used as descriptive measures and where applicable, used the same coding approach. Refer to Appendix I for coding of all covariates. Covariates differed slightly by the outcome of interest.

4.3.4.1 Cognitive Decline Outcome Covariates

Based on published literature (18,19,152,157,194,195), and univariate and bivariate findings, covariates selected for the cognitive decline outcome included baseline measures of age, sex, cognitive and functional impairment, anxiolytic use, and health region.

Coding for age, sex, and health region as covariates remained consistent with the approach used for the descriptive analyses (refer to section 4.3.1 for coding approaches). Baseline cognition was found to be significantly associated with social vulnerability and cognitive decline in bivariate analyses. Baseline cognition was coded in two ways to ensure adequate sample sizes for all cells. Cell sizes changed depending on the cohort being analyzed (i.e., the majority of residents with dementia had a CPS score ≥3 and therefore for this cohort, a binary version of the CPS was used). As a binary variable, the CPS was coded as (0) intact or borderline intact; and (1) mild, moderate, and severe impairment. This coding was used in analyses where stratification by dementia status was used. As a three-level variable, the CPS was coded as described for the descriptive analyses (refer to section 4.3.1), that is, as intact; borderline intact; and mild, moderate or severe impairment. This version of CPS was used when analyzing the non-stratified cohort.

Functional impairment was ascertained using the ADLH score as recorded on the interRAI-AL assessment. Functional impairment was coded as a three-level variable in cognitive decline models because cell sizes were relatively smaller when the cohorts were stratified by dementia status and social vulnerability level. Coding was 0-2 with higher scores indicating greater dependence. A code of 0 represents a resident in level 0 of the original scale indicating functional independence. A code of 1 represents someone in levels 1-2 of the original scale indicating supervision is required or limited impairment is present. A code of 2 represents a resident in levels 3+ on the original scale indicating extensive supervision is required or they are functionally dependent.

Lastly, anxiolytic use was ascertained via the interRAI-AL assessment. Coding of anxiolytic use was binary to indicate no use, and use.

4.3.4.2 Hospitalization Outcome Covariates

Based on published literature (4,14,86,115,156,193), and univariate and bivariate findings, covariates selected for the time to first-event hospitalization outcome included baseline measures of age, sex, fatigue, cognitive impairment, health instability (CHESS score), comorbidity, number of medications used, bowel incontinence, frequency of hospitalization in past year, and health region.

Coding for age, sex, health instability (CHESS score), comorbidity, number of medications used, bowel incontinence, frequency of hospitalization in past year, and health region as covariates remained consistent with what was done for these variables as descriptors (refer to section 4.3.1 for coding approaches). Coding for cognitive impairment as a covariate remained consistent with the coding outlined for the cognitive decline analyses (refer to section 4.3.4.1 for the coding approach).

4.3.5 Stratification Variable

Dementia status was used to stratify all analyses. Dementia status was ascertained using the diagnostic pick list on the interRAI-AL tool which included a diagnosis of dementia (including Alzheimer's disease and/or dementia other than Alzheimer's disease). In general, study nurse assessors complete this diagnostic pick list by referring to the resident's medical chart (where available) and/or consulting with health care providers, residents and their family caregivers.

Although the validity of the dementia item on the interRAI-AL has not been specifically evaluated, the validity of the dementia item on the interRAI-home care, -nursing home, and -mental health care instruments has been evaluated to varying degrees. In these settings, the dementia item has been shown to have relatively high sensitivity (e.g., in nursing homes: 0.83

[0.82-0.83]), specificity (e.g., in nursing homes: 0.80 [0.80-0.80]), and positive predictive value (e.g., in nursing homes: 0.51 [0.51-0.52]) (196). The sensitivity, specificity, and positive predictive value of the interRAI-AL dementia diagnosis are likely similar to those observed for the nursing home setting. Research has demonstrated high sensitivity (≥0.70) for recoding dementia and Alzheimer's disease diagnoses on the RAI tools in comparison with acute care discharge abstracts (197). Dementia status (interRAI-AL Section J, Question 1) was coded as 0 or 1, representing the absence and presence of dementia respectively.

4.4 Ethics

Ethics clearance was originally granted from the University of Calgary Conjoint Health Research Ethics Board, the University of Alberta Research Ethics Board, and the University of Lethbridge Human Subject Research Committee. Ethics approval for this specific sub-study was granted from the University of Waterloo, Office of Research Ethics (ORE #21346).

4.5 Analytic Plan

All analyses were conducted using SAS v.9.4 statistical software (SAS Institute Inc., Cary, North Carolina).

4.5.1 Overall and Stratified Analyses

All analyses were completed with the overall cohorts, and then stratified by dementia status. This enabled an exploration of possible differences in the prevalence, correlates, and outcomes of social vulnerability by the presence or absence of dementia among DAL residents. This also enabled an exploration of how the influence of social vulnerability on cognitive decline and hospitalization differed by dementia status. This information can be used to inform screening and clinical practices, as well as how to develop more informed and tailored interventions to the respective populations.

4.5.2 Descriptive and Bivariate Analyses

Univariate and bivariate analyses were conducted to examine the distribution of baseline characteristics for all resident- and facility-level variables of interest among the total analytic cohorts and according to dementia status. Bivariate analyses were further used to assess the distribution of resident- and facility-level variables by exposure and by outcome status separately. All analyses were repeated with stratification by dementia status. Comparing the bivariate analyses for the exposure and for each outcome identified potential covariates to be used in model development. Univariate analyses also allowed for an examination of the prevalence of social vulnerability among the overall cohort and dementia and non-dementia subgroups.

Cross-tabulations and chi-square tests were used to examine associations between categorical variables. Results are displayed in contingency tables. Chi-square tests were used to determine statistical significance set at a significance level of <0.05. T-tests were used to examine the differences in means for continuous variables between two samples (dementia and non-dementia). Specifically, t-tests were used to test for statistical differences between those with and without dementia with regard to mean age, comorbidity and medication number. Satterthwaite approximations were used when the assumption of equal variance was violated. Analysis of variance (ANOVA) tests were used to compare the differences in mean scores across residents' characteristics when there were more than two samples being compared (i.e., when comparing means across the three levels of social vulnerability). Results are displayed in ANOVA tables. Kruskal-Wallis tests were used to compare the differences in mean scores because all continuous variables were not assumed to have a normal distribution.

4.5.3 Multivariable Analyses

When developing the modeling approach for both outcomes, correlations between variables were examined to assess any potential issues of collinearity. Where relatively high correlations were observed between covariates, the covariate with the most significant association with the outcome of interest was included in the final, fully adjusted models (although alternate models varying in covariates retained were also explored).

4.5.3.1 Cognitive Decline among the Survived Cohort

Generalized linear models with a binomial distribution and a logit link function were used to estimate odds ratios of cognitive decline associated with social vulnerability while accounting for covariates and clustering of residents within DAL facilities. Models were created using a forward stepwise function and checked with backward selection. Preliminary covariates were selected based on published literature and bivariate findings. Unadjusted models with only the response and a single predictor variable were run first (i.e., the probability of experiencing cognitive decline over one-year was modeled by age only, then by sex only, and so forth). Age and sex were then added as covariates due to their prominence in the literature and their associations with social vulnerability and cognitive decline. Baseline functional and cognitive impairment were then added to the model. Finally, health region was added to the model. These covariates were all kept in the model because they reduced the QIC value, indicating a better model fit. This model with SVI, age, sex, baseline functional and cognitive impairment, and health region was used as the adjusted model (A).

Covariates were continually added and removed to the adjusted model (A), testing their significance and noting their impact on the QIC value. Among these covariates, baseline depression, hospital use in the past 90 days, comorbidity, number of medications used, and four classes of psychotropic drugs (i.e., antidepressants, anxiolytics, hypnotics and sedatives, and antipsychotics) were examined. With the exception of anxiolytics, all covariates added to the adjusted model (A) were not found to be statistically significant predictors of cognitive decline. Further, their inclusion did not significantly alter the estimates of other covariates, or reduce the QIC value to indicate better model fit. The potential final model for the Survived cohort adjusted for age, sex, baseline functional and cognitive impairment, anxiolytic use, and health region.

This model was then subjected to backward selection. Baseline functional impairment was removed as a covariate because no level of functional impairment was a significant predictor of cognitive decline. The removal of this covariate marginally reduced the QIC value, but provided no change to odd ratio estimates. Because there was no significant change to the model upon removing functional impairment, and because functional impairment is plausibly related to social vulnerability and cognitive decline, it was retained in the model. The final model for the

Survived cohort adjusted for age, sex, baseline functional and cognitive impairment, anxiolytic use, and health region. This model is the adjusted model (B).

4.5.3.2 Cognitive Decline among Residents with and without Dementia

Generalized linear models for the dementia and non-dementia subgroups were built using the same procedures as the model presented above in section 4.5.3.1. Adjusted model (A) – adjusted for age, sex, baseline functional and cognitive impairment, and health region – was the superior model for the dementia subgroup. Adjusted model (B) – adjusted for age, sex, baseline functional and cognitive impairment, anxiolytic use, and health region – was the superior model for the non-dementia subgroup. For comparison purposes between subgroups, adjusted models (A) and (B) were executed and presented for both dementia strata.

4.5.3.3 First-Event Hospitalization, Linked Cohort

Cox proportional hazards models were used to estimate hazard ratios for time to first-event hospitalization[10] associated with residents' SVI while adjusting for relevant covariates and clustering of residents within DAL facilities. As a semi-parametric model, Cox proportional hazards models were appropriate in this investigation because they allowed for statistical analysis when the effects of covariates were known, the distribution of data was unknown, and censoring occurred. Robust sandwich standard errors were used when the assumption of independence was thought to be violated by clustering of residents within facilities (198).

Models were created using a forward stepwise function, and checked using backward selection by removing the least significant covariate one at a time. As noted above, preliminary

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[10] Recall that residents were classified into four groups based on the date of their first event: (1) inpatient hospital admission, (2) LTC admission or death without prior hospital admission, (3) other transitions without prior hospital admission, and (4) no event and remained in DAL at 1-year follow up. Further, residents were censored on the date of an alternative first-event (i.e., LTC admission, death, or other transition), and those who did not experience an alternative event were censored on the date of their 1-year follow-up assessment.

covariates were selected based on published literature (4,14,18,19,86,115,152,156,157,193–195) and bivariate findings. Bivariate models containing only a single predictor variable were tested first (i.e., the probability of first-event hospital admission was modeled by age only, then by sex only, and so forth). Age and sex were then added simultaneously as covariates due to their importance demonstrated in the literature and because of their relevance to social vulnerability and hospitalization. Baseline measures of fatigue, cognitive impairment, depressive symptoms, health instability, comorbidity, number of medications used, frequency of hospitalizations in the past year, bowel incontinence, and health region were then added one-at-a-time to the model. With a few exceptions (see below), covariates that reached a significance level of <0.10 were retained in the model. The adjusted model (A) included baseline measures of age, sex, fatigue, health instability, comorbidity, number of medications used, frequency of hospitalizations in the past year, and health region as covariates.

Although age and sex did not reach a significance level of <0.10, they were retained in the adjusted model due to their importance in model development among a geriatric population. Comorbidity was also retained in adjusted model (A) even though it did not reach a significance level of <0.10. Comorbidity was retained because it often influences the likelihood of experiencing a hospitalization among a geriatric population and is plausibly associated with social vulnerability.

A second model, adjusted model (B), was executed to explore the influence of social vulnerability when comorbidity was removed from the model due to its failure to reach statistical significance. Adjusted model (B) included baseline measures of age, sex, fatigue, health instability, number of medications used, frequency of hospitalizations in the past year, and health region as covariates.

Lastly, the proportional hazards assumption was tested graphically and statistically by adding time-dependent covariates for the primary independent variable of interest – social vulnerability. Graphically, the proportional hazards assumption did seem to be violated; however, the test of interaction contradicted this observation. Given the relatively short follow-up period of one year and the fact that the proportional hazards assumption did not appear to be violated with the statistical test, no further analyses (e.g., by time of follow-up) were explored.

4.5.3.4 First-Event Hospitalization among Residents with and without Dementia

Cox proportional hazards models for the dementia and non-dementia subgroups were constructed using the same procedures as presented above for the total Linked cohort in section 4.5.3.3. Adjusted model (A) included baseline measures of age, sex, fatigue, cognitive impairment, health instability, comorbidity, bowel incontinence, number of medications used, frequency of hospitalizations in past year, and health region as covariates. Again, although comorbidity did not reach statistical significance in the models, it was retained in the adjusted model (A) because comorbidity is plausibly related to social vulnerability and hospitalization.

Another model, adjusted model (B), was executed where comorbidity was excluded from analyses in response to its lack of statistical significance in the model. Adjusted model (B) included baseline measures of age, sex, fatigue, cognitive impairment, health instability, bowel incontinence, number of medications used, frequency of hospitalizations in past year, and health region as covariates.

4.5.4 Sensitivity Analysis

A “jackknife by variables” procedure was used to determine whether associations found[11] were due to the inclusion or exclusion of any single domain in the SVI (199), as done in previous

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[11] Sensitivity analyses were only performed for models that found statistically significant associations.

work (10,18,19). The SVI was reconstructed six times by excluding one complete social domain. Each reconstructed SVI was modeled by each outcome measure while adjusting for their respective covariates and clustering.

The estimates of each new model were compared to the original model to determine whether statistically significant differences were present due to the exclusion of any one social domain[12]. Where the exclusion of any one social domain resulted in a significantly different model when compared to the original model, a new SVI was created by removing one social variable from the respective social domain. Each reconstructed SVI was modeled by each outcome measure while adjusting for their respective covariates and clustering. Again, the estimates of each new model (where a single social variable was removed) were compared to the original model to determine whether statistically significant differences were present due to the exclusion of any one social variable. If a statistically significant difference was found, it was concluded that the excluded variable contributed much of the explained variance in the model. As a result, much of the associations found would be attributed to that social variable.

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[12] A statistically significant difference would be observed if the p-value for the SVI level in question (i.e., intermediate or high) became non-significant (i.e., >0.05).

5.0 Results

5.1 Univariate and Bivariate Descriptive Results

5.1.1 Baseline Resident Characteristics for Full, Survived, and Linked Cohorts[13] (Table 5.1.1)

The Full DAL cohort enrolled in the ACCES study at baseline consisted of 1,089 residents, aged 65+ years. The Full cohort had a mean (SD) age of 84.4 (7.3) years and was predominantly female (76.8%) and widowed (71.4%). An estimated 40.6 percent of residents experienced no fatigue. Nineteen percent of residents had clinically significant depressive symptoms. Slightly fewer than half of residents (46.2%) had stable health as measured on the CHESS scale. An estimated 59.9 percent had mild, moderate, or severe cognitive impairment while 42.0 percent of residents were completely independent in their ADLs. More residents were incontinent of bladder (44.5%) than bowel (12.7%). The Full cohort had a mean (SD) of 4.6 (2.0) chronic conditions and 8.3 (3.7) medications. The majority of residents (89.6%) did not have a "do not hospitalize" advance directive. Most residents were noted as having no hospital admissions (88.4%) or emergency department visits (83.6%) in the 90 days prior to their baseline assessment. The majority of residents resided in an urban setting[14].

The distribution of baseline resident characteristics among the Survived and Linked cohorts were generally comparable to the Full cohort. All three cohorts are shown in Table 5.1.1.

5.1.2 Baseline Resident Characteristics Stratified by Dementia Status, Full Cohort (Table 5.1.2a)

The following provides a description of the distribution of baseline resident characteristics by dementia status for the Full cohort. The distribution of baseline resident

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[13] See Figures 4.1.1 and 4.2.1a-b in Section 4 for details on sample derivation for the Survived and Linked cohorts.
[14] Health region was the only facility-level variable examined.

characteristics stratified by dementia status for the Survived and Linked cohorts can be found in Appendix J (see Tables 5.1.2b and 5.1.2c).

Fifty-eight percent of all DAL residents had a diagnosis of dementia at baseline. Relative to residents without a diagnosis of dementia, those with dementia were significantly older, more likely to be widowed, and to have clinically significant depressive symptoms, cognitive and functional impairment, incontinence (both bladder and bowel), and to have a higher mean number of comorbidities. Residents with dementia were significantly less likely to experience fatigue, be on multiple medications, and have experienced one or more hospital admissions within the 90 days prior to baseline. Further, there was a statistically significant difference between dementia strata and health region[15], but no discernable pattern was found. All other resident characteristics examined at baseline did not differ significantly between residents with and without dementia, including sex, health instability (CHESS score), “do not hospitalize” advance directive, and number of emergency department visits in the past 90 days.

The distribution of baseline resident characteristics among those with and without dementia was similar for the Survived (n=889) and Linked (n=1,066) cohorts (Appendix J, see tables 5.1.2b and 5.1.2c) with one exception. Unlike in the Full cohort, there was a significant difference between dementia strata with regard to health instability (CHESS score) in the Survived cohort, where those with dementia were significantly more likely to have higher health instability compared to those without dementia.

5.1.3 Outcomes

5.1.3.1 Cognitive Decline among Survived DAL Cohort

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[15] Health region was the only facility-level variable examined. Health region represents distinct health systems reflecting rural/urban status, community size, services offered, policies, and more.

Over the one-year follow-up among the Survived DAL cohort (n=889), 42.5% (n=378) experienced cognitive decline defined by ≥1 point increase on the CPS, while 57.5% (n=511) experienced either no change on the CPS or improved cognitive function defined by ≥1 point decrease on the CPS (Figures 5.1.3a-b). Among this latter group, 40.4% (n=359) experienced no change, and 17.1% (n=152) experienced improvement in cognition during follow-up. The combined no change-improved group was used as the comparison group for the cognitive decline analyses.

5.1.3.1.1 Cognitive Decline by Dementia Status

Over the one-year follow-up among the dementia subgroup, 43.7% (n=222/508) experienced cognitive decline defined by ≥1 point increase on the CPS, while 56.3% (n=286/508) experienced no change on the CPS or improved cognitive function defined by ≥1 point decrease on the CPS. Among this latter group, 38.4% (n=195) experienced no change, and 17.9% (n=91) experienced improvement in cognition during follow-up.

Over the one-year follow-up among the non-dementia subgroup, 40.9% (n=156/381) experienced cognitive decline defined by ≥1 point increase on the CPS, while 59.1% (n=225/381) experienced no change on the CPS or improved cognitive function defined by ≥1 point decrease on the CPS. Among this latter group, 43.0% (n=164) experienced no change, and 16.0% (n=61) experienced improvement in cognition during follow-up.

There was no significant difference in the incidence rate of cognitive decline between dementia strata.

5.1.3.2 First-Event Hospitalization among Linked DAL Cohort

Over the one year follow-up in the Linked DAL cohort (n=1,066), 38.7% (n=413) of residents were admitted to an acute care hospital as their first event. Of the remaining cohort, 50.1% (n=534) of residents remained in the DAL facility without experiencing any other event as their first event over one year, 3.3% (n=35) died, 7.5% (n=80) were transferred to LTC, and the remaining 0.4% (n=4) were censored due to loss to follow-up and leaving the province.

5.1.3.2.1 First-Event Hospitalization by Dementia Status

Over the one-year follow-up in the dementia subgroup, 36.1% (n=220/609) of residents were admitted to an acute care hospital as their first event. Of the remaining cohort, 48.9% (n=298/609) of residents remained in the DAL facility without experiencing any other event as their first event over one year, 3.6% (n=22/609) died, 11.2% (n=68/609) were transferred to LTC, and the remaining 0.2% (n=1/609) were censored due to loss to follow-up and leaving the province.

Over the one-year follow-up in the non-dementia subgroup, 42.9% (n=193/457) of residents were admitted to an acute care hospital as their first event. Of the remaining cohort, 51.6% (n=236/457) of residents remained in the DAL facility without experiencing any other event as their first event over one year, 2.8% (n=13/457) died, 2.6% (n=12/457) were transferred to LTC, and the remaining 0.7% (n=3/457) were censored due to loss to follow-up and leaving the province.

There was a statistically significant difference in the incidence rate of first-event hospitalization between dementia strata. Those in the non-dementia subgroup (42.9%) experienced a significantly higher incidence rate of first-event hospitalization as compared to the dementia subgroup (36.1%).

Table 5.1.1. Distribution of Baseline Resident Characteristics, Full, Survived, and Linked Cohorts

	DAL Cohorts		
	Full (n=1,089)	**Survived (n=889)**	**Linked (n=1,066)**
Resident Characteristics [n, (column %), unless otherwise noted]			
Age, yr			
Mean ± SD	84.4±7.3	84.0 ± 7.3	84.4 ± 7.3
Age groups			
65-79	272 (25.0)	238 (26.8)	268 (25.1)
80-85	284 (26.1)	236 (26.5)	279 (26.2)
86-89	248 (22.8)	205 (23.1)	244 (22.9)
≥90	285 (26.2)	210 (23.6)	275 (25.8)
Sex			
Male	254 (23.3)	193 (21.7)	248 (23.4)
Female	835 (76.8)	696 (78.3)	818 (76.7)
Marital status			
Widowed	778 (71.4)	628 (70.6)	761 (71.4)
Married or with a partner	159 (14.6)	125 (14.1)	156 (14.6)
Never married, separated, or divorced	152 (14.0)	136 (15.3)	149 (15.0)
Fatigue			
None	442 (40.6)	391 (44.0)	433 (40.6)
Minimal	470 (43.2)	380 (42.7)	461 (43.3)
Moderate, severe, or unable to commence any normal day-to-day activities	177 (16.2)	118 (13.3)	172 (16.1)
Clinically significant depressive symptoms (DRS score of 3+)			
No	880 (80.8)	724 (81.4)	863 (81.0)
Yes	209 (19.2)	165 (18.6)	203 (19.0)
Health instability (CHESS score)			
Stable (0)	503 (46.2)	434 (48.8)	496 (46.5)
Mild (1)	320 (29.4)	262 (29.5)	312 (29.3)
Mild-moderate (2)	188 (17.2)	137 (15.4)	184 (17.4)
Moderate-high (≥3)	78 (7.2)	56 (6.3)	74 (6.9)
Cognition (CPS score)			
Intact (0)	224 (20.6)	188 (21.1)	223 (20.9)
Borderline intact (1)	213 (19.6)	168 (18.9)	211 (19.8)
Mild, moderate, severe impairment (≥2)	652 (59.9)	533 (60.0)	632 (59.3)
Activities of daily living (ADLH score)			
Independent (0)	458 (42.0)	397 (44.7)	454 (42.6)
Supervision required (1)	189 (17.4)	154 (17.3)	186 (17.5)
Limited impairment (2)	134 (12.3)	106 (11.9)	126 (11.8)
Extensive supervision required or dependent (≥ 3)	308 (28.3)	232 (26.1)	300 (28.1)
Bladder incontinence			
Continent	445 (40.9)	373 (42.0)	436 (40.9)
Some control, infrequent episodes	159 (14.6)	127 (14.3)	156 (14.6)
Occasional incontinence	118 (10.8)	97 (10.9)	114 (10.7)
Frequent episodes, no control	367 (33.7)	292 (32.8)	360 (33.8)

	DAL Cohorts		
	Full (n=1,089)	**Survived (n=889)**	**Linked (n=1,066)**
Bowel incontinence			
Continent	783 (71.9)	658 (74.0)	766 (71.9)
Some control, infrequent episodes	166 (15.2)	130 (14.6)	165 (15.5)
Occasional incontinence, frequent episodes, no control	140 (12.7)	101 (11.4)	135 (12.6)
No. of chronic conditions			
Mean ± SD	4.6±2.0	4.6 ± 2.0	4.7 ± 2.0
No. of chronic conditions			
0-3	333 (30.6)	293 (33.0)	323 (30.3)
4-5	406 (37.3)	325 (36.5)	398 (37.3)
≥6	350 (32.1)	271 (30.5)	345 (32.4)
No. of medications			
Mean ± SD	8.3+3.7	8.2 ± 3.6	8.3 ± 3.7
No. of medications			
0-6	360 (33.0)	301 (33.9)	349 (32.7)
7-8	235 (21.6)	187 (21.0)	232 (21.8)
9-10	220 (20.2)	184 (20.7)	214 (20.1)
≥11	274 (25.2)	217 (24.4)	271 (25.4)
Advance directive: Do not hospitalize			
Yes	113 (10.4)	86 (9.7)	109 (10.2)
No	976 (89.6)	803 (90.3)	957 (89.8)
No. of inpatient hospital admissions in past 90 days			
0	963 (88.4)	798 (89.8)	940 (88.2)
≥1	126 (11.6)	91 (10.2)	126 (11.8)
No. of emergency department visits in past 90 days			
0	910 (83.6)	754 (84.8)	890 (83.5)
≥1	179 (16.4)	135 (15.2)	176 (16.5)
Facility Characteristic			
Health Region			
1 (urban)	311 (28.6)	268 (30.2)	311 (29.2)
2 (mixed urban/rural)	234 (21.5)	170 (19.1)	228 (21.4)
3 (rural)	155 (14.2)	128 (14.4)	153 (14.4)
4 (urban)	281 (25.8)	240 (27.0)	268 (25.1)
5 (rural)	108 (9.9)	83 (9.3)	106 (9.9)

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADLH – Activities of Daily Living Self-Performance Hierarchy Scale

Table 5.1.2a. Distribution of Baseline Resident Characteristics Stratified by Dementia Status, Full Cohort (n=1,089)

	Full DAL Cohort (n=1,089)	
	Non-Dementia	**Dementia**
Resident Characteristics [n, (column %), unless otherwise noted]		
Overall	462 (42.4)	627 (57.6)
Age, yr		
Mean ± SD***	83.37±8.0	85.20±6.7
Age groups**		
65-79	146 (31.6)	126 (20.1)
80-85	104 (22.5)	180 (28.7)
86-89	100 (21.7)	148 (23.6)
≥90	112 (24.2)	173 (27.6)
Sex		
Male	115 (24.9)	139 (22.2)
Female	347 (75.1)	488 (77.8)
Marital status*		
Widowed	319 (69.1)	459 (73.2)
Married or with a partner	62 (13.4)	97 (15.5)
Never married, separated, or divorced	81 (17.5)	71 (11.3)
Fatigue**		
None	156 (33.8)	286 (45.6)
Minimal	229 (49.6)	241 (38.4)
Moderate, severe, or unable to commence any normal day-to-day activities	77 (16.7)	100 (16.0)
Clinically significant depressive symptoms (DRS score of 3+)***		
No	399 (86.4)	481 (76.7)
Yes	63 (13.6)	146 (23.3)
Health instability (CHESS score)		
Stable (0)	208 (45.0)	295 (47.1)
Mild (1)	152 (32.9)	168 (26.8)
Mild-moderate (2)	77 (16.7)	111 (17.7)
Moderate-high (≥3)	25 (5.4)	53 (8.4)
Cognition (CPS score)***		
Intact (0)	190 (41.1)	34 (5.4)
Borderline intact (1)	150 (32.5)	63 (10.1)
Mild, moderate, severe impairment (≥2)	122 (26.4)	530 (84.5)
Activities of daily living (ADL score)***		
Independent (0)	257 (55.6)	201 (32.1)
Supervision required (1)	44 (9.5)	145 (23.1)
Limited impairment (2)	43 (9.3)	91 (14.5)
Extensive supervision required or dependent (≥3)	118 (25.5)	190 (30.3)
Bladder incontinence**		
Continent	208 (45.0)	237 (37.8)
Some control, infrequent episodes	74 (16.0)	85 (13.5)
Occasional incontinence	55 (11.9)	63 (10.1)
Frequent episodes, no control	125 (27.1)	242 (38.6)

	Full DAL Cohort (n=1,089)	
	Non-Dementia	**Dementia**
Bowel incontinence***		
Continent	359 (77.7)	424 (67.6)
Some control, infrequent episodes	66 (14.3)	100 (16.0)
Occasional incontinence, frequent episodes, no control	37 (8.0)	103 (16.4)
No. of chronic conditions		
Mean ± SD**	4.4±1.9	4.8±2.0
No. of chronic conditions		
0-3	152 (32.9)	181 (28.9)
4-5	176 (38.1)	230 (36.7)
≥6	134 (29.0)	216 (34.4)
No. of medications		
Mean ± SD***	9.2±3.6	7.7±3.6
No. of medications***		
0-6	109 (23.6)	251 (40.0)
7-8	94 (20.4)	141 (22.5)
9-10	100 (21.6)	120 (19.2)
≥11	159 (34.4)	115 (18.3)
Advance directive: Do not hospitalize		
Yes	46 (10.0)	67 (10.7)
No	416 (90.0)	560 (89.3)
No. of inpatient hospital admissions in past 90 days**		
0	390 (84.4)	573 (91.4)
≥1	72 (15.6)	54 (8.6)
No. of emergency department visits in past 90 days		
0	390 (84.4)	520 (82.9)
≥1	72 (15.6)	107 (17.1)
Facility Characteristic		
Health Region**		
1 (urban)	145 (31.4)	166 (26.5)
2 (mixed urban/rural)	94 (20.3)	140 (22.3)
3 (rural)	77 (16.7)	78 (12.4)
4 (urban)	96 (20.8)	185 (29.5)
5 (rural)	50 (10.8)	58 (9.3)

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADLH – Activities of Daily Living Self-Performance Hierarchy Scale

* <0.05

**<0.01

***<0.0001

Figure 5.1.3a. Distribution of Baseline and Follow-Up CPS Scores for Survived Cohort (n=889)

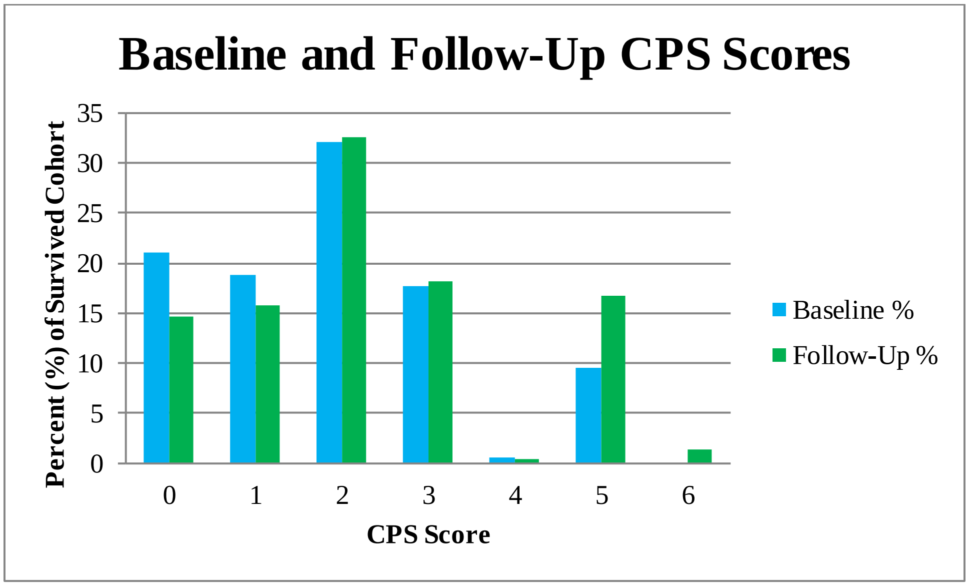
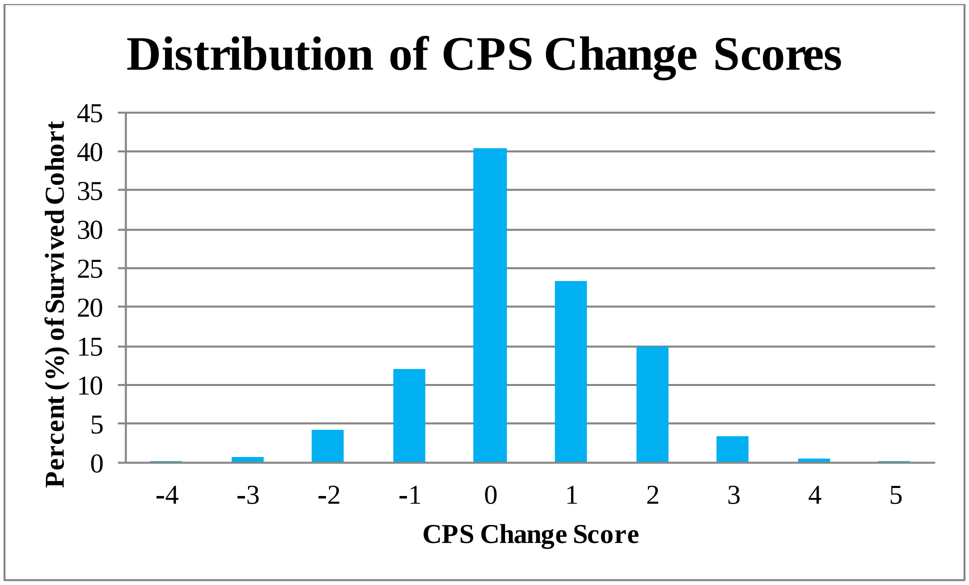


Figure 5.1.3b. Distribution of CPS Change Scores[16] for Survived Cohort (n=889)



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[16] CPS change scores were determined by subtracting each resident's baseline CPS score from their follow-up CPS score [i.e., Time 2 CPS – Time 1 CPS score]. Positive integers indicated cognitive decline. Negative integers indicated cognitive improvement. A calculation of 0 indicated no change in cognition.

5.2 Objective 1

5.2.1 Objective 1a: Estimate the prevalence and correlates of social vulnerability in DAL residents

5.2.1.1 Baseline Social Vulnerability Status, Full, Linked, and Survived Cohorts (Table 5.2.1.1 and Figures 5.2.1.1a-c)

At present there are no established clinical cut-points available to categorize people as having low, intermediate, or high social vulnerability. As an alternative, the derived SVI[17] was categorized into tertiles based on the distribution of data for each cohort (i.e., Full, Survived, and Linked) (Table 5.2.1.1 and Figures 5.2.1.1a-c). As such, in the Full DAL cohort, 33.4% of residents were categorized as having low social vulnerability (SVI score of less than 0.26); 31.2% were categorized as having intermediate social vulnerability (SVI score more than 0.26 and less than or equal to 0.404); and 35.4% were categorized as having high social vulnerability (SVI score greater than 0.404) at baseline. In the Survived cohort, 35.1% of residents were categorized as having low social vulnerability (SVI score of less than or equal to 0.26); 31.9% were categorized as having intermediate social vulnerability (SVI score of more than 0.26 and less than or equal to 0.39); and 33.0% were categorized as having high social vulnerability (SVI score greater than 0.39) at baseline. In the Linked cohort, 33.8% of residents were categorized as having low social vulnerability (SVI score of less than 0.261); 31.4% were categorized as having intermediate social vulnerability (SVI score between 0.261-0.404); and 34.8% were categorized as having high social vulnerability (SVI score greater than 0.404) at baseline.

The mean of the SVI for the Full cohort was 0.36±0.16, the median was 0.33, and the interquartile range was 0.20. The mean of the SVI for the Survived cohort was 0.35±0.15, the

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[17] Recall that the social vulnerability index (SVI) was derived by aggregating multiple resident-level characteristics from the interRAI-AL assessment. The final SVI was composed of six domains and 27 variables. The SVI was then transformed onto a ratio scale from 0-1 by dividing the number of deficits observed to be present over the number of deficits considered. A SVI score was assigned to each participant, with scores closer to 1 indicating more severe social vulnerability. For more details on the SVI, refer to section 4.3.2 and Appendix G.

median was 0.33, and the interquartile range was 0.20. The mean of the SVI for the Linked cohort was 0.36±0.15, the median was 0.33, and the interquartile range was 0.20.

5.2.1.2 Baseline Characteristics by Social Vulnerability Status, for Survived and Linked Cohorts (Table 5.2.1.2a-b)

In both Survived and Linked cohorts, there were statistically significant differences across level of social vulnerability with respect to the distribution of age (mean and groups), fatigue, depressive symptoms, health instability, cognitive and functional impairment, bladder and bowel incontinence, mean number of medications, and health region. Specifically, those with higher levels of social vulnerability were significantly more likely to be older, and to have a larger proportion with moderate or more severe fatigue, clinically significant depressive symptoms, moderate to high health instability, cognitive and functional impairment, and bladder and bowel incontinence. There was no discernable pattern observed between level of social vulnerability and health region. The Linked (but not Survived) cohort was also observed to have a statistically significant difference with respect to mean chronic conditions. As social vulnerability increased, mean number of chronic conditions also increased. Social vulnerability was negatively associated with mean number of medications. There were no significant differences in either Survived or Linked cohorts for sex, marital status, “do not hospitalize” advance directives, inpatient hospital admission in past year, and inpatient hospital or emergency department admissions in the previous 90 days when examined by level of social vulnerability.

The distribution of baseline resident and facility characteristics stratified by social vulnerability level among the Full cohort (Appendix J, see Table 5.2.1.2c) was comparable to that of the Survived and Linked cohorts.

5.2.2 Objective 1b: Estimate the prevalence and correlates of social vulnerability among DAL residents with and without dementia

5.2.2.1 Baseline Social Vulnerability Status Stratified by Dementia, Full, Survived, and Linked Cohorts (Table 5.2.2.1)

Based on the tertile categorization for the overall cohorts, univariate and bivariate statistics were performed for the dementia and non-dementia subgroups. In the Full cohort, dementia subgroup, 25.2%, 28.9%, and 45.9% of residents were categorized as having low, intermediate, and high social vulnerability, respectively. In the non-dementia subgroup, 44.6%, 34.4% and 21.0% of residents were categorized as having low, intermediate, and high social vulnerability, respectively. The difference in the distribution of level of social vulnerability between dementia strata was statistically significant (p<0.0001).

In the Survived cohort, dementia subgroup, 27.8%, 29.5%, and 42.7% of residents were categorized as having low, intermediate, and high social vulnerability, respectively. In the non-dementia subgroup, 44.9%, 35.2%, and 19.9% of residents were categorized as having low, intermediate, and high social vulnerability, respectively. The difference in the distribution of level of social vulnerability between dementia strata was statistically significant (p<0.0001).

In the Linked cohort, dementia subgroup, 25.8%, 29.0%, and 45.2% of residents were categorized as having low, intermediate, and high social vulnerability, respectively. In the non-dementia subgroup, 44.4%, 34.6%, and 21.0% of residents were categorized as having low, intermediate, and high social vulnerability, respectively. The difference in the distribution of level of social vulnerability between dementia strata was statistically significant (p<0.0001).

5.2.2.2 Baseline Characteristics by Social Vulnerability Status Stratified by Dementia, for Survived and Linked Cohorts (Tables 5.2.2.2a-d)

In both Survived and Linked cohorts for the dementia subgroup (see Tables 5.2.2.2a and 5.2.2.2c), there were statistically significant differences across level of social vulnerability with respect to the distribution of mean age and age groups, fatigue, depressive symptoms, health instability, cognitive and functional impairment, bladder and bowel incontinence, number of emergency department visits in the past 90 days, and health region. Those with higher levels of social vulnerability were significantly more likely to be older, experience greater fatigue, depressive symptoms, health instability, cognitive and functional impairment, bladder and bowel incontinence, and number of emergency department visits in the past 90 days. Health region showed no discernable pattern in relation to level of social vulnerability. No significant differences were observed in either cohort for sex, marital status, number of chronic conditions or medications, the presence of "do not hospitalize" advance directives, or number of inpatient hospital admissions in the past 90 days.

The distribution of baseline resident characteristics across social vulnerability level among the dementia subgroup for the Full cohort (Appendix J, Tables 5.2.2.2e) was comparable to those of the Survived and Linked dementia subgroups.

In both Survived and Linked cohorts, for the non-dementia subgroup (see Tables 5.2.2.2b and 5.2.2.2d), there were statistically significant differences across level of social vulnerability with respect to the distribution of depressive symptoms, and cognitive and functional impairment. All three resident characteristics were positively associated with social vulnerability. In the Linked cohort, non-dementia subgroup, health region was also found to be significantly different between levels of social vulnerability, but no discernable pattern was apparent. For the Survived cohort, marital status was found to be significantly different across levels of social vulnerability in the non-dementia subgroup, where residents with high social vulnerability were more likely to be never married, separated, or divorced. For the Linked cohort, fatigue was found to be significantly different across levels of social vulnerability in the non-dementia subgroup, where residents with high social vulnerability were more likely to have moderate or greater fatigue. No significant differences were observed in either cohort for age, sex, health instability, bladder or bowel incontinence, number of chronic conditions or medications, the presence of "do not hospitalize" advance directives, or number of inpatient hospital or emergency department visits in the past 90 days.

The distribution of baseline resident and facility characteristics across social vulnerability levels among residents without dementia for the Full cohort (Appendix J, Tables 5.2.2.2f) was comparable to those of the Survived and Linked non-dementia subgroups.

Table 5.2.1.1. Distribution of the SVI for the Full, Survived, and Linked DAL Cohorts

	DAL Cohort (n,%)		
Social Vulnerability Level§ [n, (column %), unless otherwise noted]	**Full (n=1,089)**[1]	**Survived (n=889)**[2]	**Linked (n=1,066)**[3]
Low social vulnerability	364 (33.4)	312 (35.1)	360 (33.8)
Intermediate social vulnerability	340 (31.2)	284 (31.9)	335 (31.4)
High social vulnerability	385 (35.4)	293 (33.0)	371 (34.8)

Abbreviations: SVI – Social Vulnerability Index; DAL – Designated Assisted Living

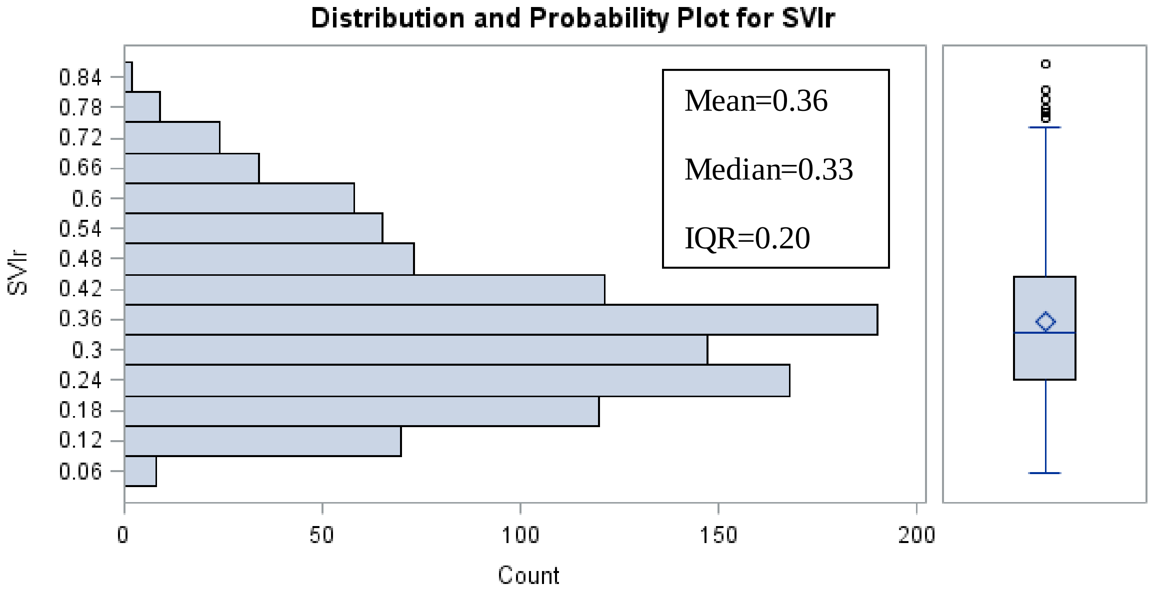
§The social vulnerability tertiles were determined based on the distribution of the social vulnerability index for each respective cohort (i.e., Full, Linked, and Survived).

[1] SVI cut-off scores: low social vulnerability <0.26; intermediate social vulnerability 0.26-0.404; high social vulnerability >0.404 SVI.

[2] SVI cut-off scores: low social vulnerability ≤0.26; intermediate social vulnerability 0.26-0.39; high social vulnerability >0.39.

[3] SVI cut-off scores: low social vulnerability <0.261; intermediate social vulnerability 0.261-0.404; high social vulnerability >0.404.

Figure 5.2.1.1a. Distribution of the SVIr[18] for the Full Cohort



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[18] "SVIr" indicates that the SVI was used as a continuous variable.

Figure 5.2.1.1b. Distribution of the SVIr[19] for the Survived Cohort

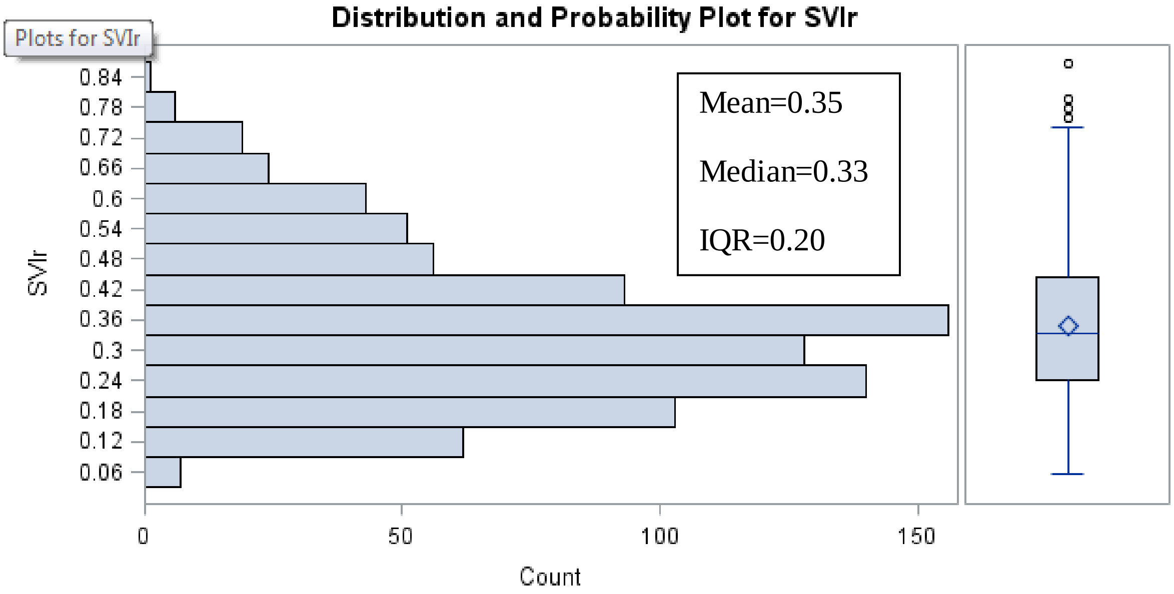
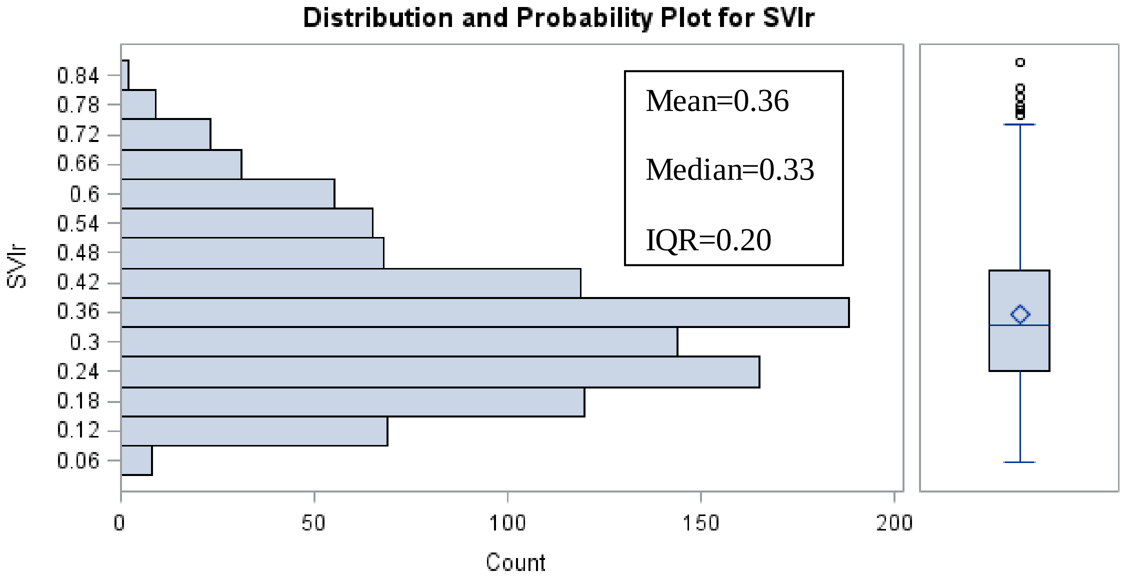


Figure 5.2.1.1c. Distribution of the SVIr[20] for the Linked Cohort



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[19] "SVIr" indicates that the SVI was used as a continuous variable.
[20] "SVIr" indicates that the SVI was used as a continuous variable.

Table 5.2.1.2a. Distribution of Baseline Resident Characteristics by Level of Social Vulnerability[1] for Survived DAL Cohort (n=889)

	Survived Cohort (n=889)		
	Low Social Vulnerability (n=312)	**Intermediate Social Vulnerability** (n=284)	**High Social Vulnerability** (n=293)
Resident Characteristics [n, (column %), unless otherwise noted]			
Age, yr			
Mean ± SD**	82.9 ± 7.6	83.9 ± 7.0	85.1 ± 7.0
Age groups**			
65-79	105 (33.7)	74 (26.1)	59 (20.1)
80-85	70 (22.4)	84 (29.6)	82 (28.0)
86-89	65 (20.8)	69 (24.3)	71 (24.2)
≥90	72 (23.1)	57 (20.1)	81 (27.7)
Sex			
Male	61 (19.6)	74 (26.1)	58 (19.8)
Female	251 (80.5)	210 (73.9)	235 (80.2)
Marital status			
Widowed	209 (67.0)	205 (72.2)	214 (73.0)
Married or with a partner	55 (17.6)	40 (14.1)	30 (10.2)
Never married, separated, or divorced	48 (15.4)	39 (13.7)	49 (15.7)
Fatigue**			
None	151 (48.4)	124 (43.7)	116 (39.6)
Minimal	131 (42.0)	129 (45.4)	120 (41.0)
Moderate, severe, or unable to commence any normal day-to-day activities	30 (9.6)	31 (10.9)	57 (19.4)
Clinically significant depressive symptoms (DRS score of 3+)***			
No	285 (91.4)	242 (85.2)	197 (67.2)
Yes	27 (8.7)	42 (14.8)	96 (32.8)
Health Instability (CHESS)***			
Stable (0)	181 (58.0)	126 (44.4)	127 (43.3)
Mild (1)	90 (28.9)	91 (32.0)	81 (27.7)
Mild-moderate (2)	30 (9.6)	49 (17.3)	58 (19.8)
Moderate-high (≥3)	11 (3.5)	18 (6.3)	27 (9.2)
Cognition (CPS score)***			
Intact (0)	101 (32.4)	63 (22.2)	24 (8.2)
Borderline intact (1)	85 (27.2)	56 (19.7)	27 (9.2)
Mild, moderate, severe impairment (≥2)	126 (40.4)	165 (58.1)	242 (82.6)
Activities of daily living (ADL score)***			
Independent (0)	203 (65.1)	123 (43.3)	71 (24.2)
Supervision required (1)	43 (13.8)	50 (17.6)	61 (20.8)
Limited impairment (2)	29 (9.3)	37 (13.0)	40 (13.7)
Extensive supervision required or dependent (≥ 3)	37 (11.9)	74 (26.1)	121 (41.3)

	Survived Cohort (n=889)		
	Low Social Vulnerability (n=312)	**Intermediate Social Vulnerability** (n=284)	**High Social Vulnerability** (n=293)
Bladder incontinence***			
Continent	158 (50.6)	118 (41.5)	97 (33.1)
Some control, infrequent episodes	46 (14.7)	49 (17.3)	32 (10.9)
Occasional incontinence	32 (10.3)	25 (8.8)	40 (13.7)
Frequent episodes, no control	76 (24.4)	92 (32.4)	124 (42.3)
Bowel incontinence***			
Continent	256 (82.1)	218 (76.8)	184 (62.8)
Some control, infrequent episodes	34 (10.9)	43 (15.1)	53 (18.1)
Occasional incontinence, frequent episodes, no control	22 (7.0)	23 (8.1)	56 (19.1)
No. of chronic conditions			
Mean ± SD	4.4 ± 1.9	4.5 ± 2.0	4.7 ± 2.0
No. of chronic conditions			
0-3	109 (34.9)	98 (34.5)	86 (29.4)
4-5	112 (35.9)	101 (35.6)	112 (38.2)
≥6	91 (29.2)	85 (29.9)	95 (32.4)
No. of medications			
Mean ± SD*	8.6 ± 3.5	8.3 ± 3.8	7.8 ± 3.5
No. of medications			
0-6	92 (29.5)	96 (33.8)	113 (38.6)
7-8	72 (23.1)	54 (19.0)	61 (20.8)
9-10	59 (18.9)	64 (22.5)	61 (20.8)
≥11	89 (28.5)	70 (24.7)	58 (19.8)
Advance directive: Do not hospitalize			
Yes	29 (9.3)	30 (10.6)	27 (9.2)
No	283 (90.7)	254 (89.4)	266 (90.8)
No. of inpatient hospital admissions in past 90 days			
0	280 (89.7)	250 (88.0)	268 (91.5)
≥1	32 (10.3)	34 (12.0)	25 (8.5)
No. of emergency department visits in past 90 days			
0	275 (88.1)	232 (81.7)	247 (84.3)
≥1	37 (11.9)	52 (18.3)	46 (15.7)
Facility Characteristic			
Health Region***			
1 (urban)	118 (37.8)	89 (31.3)	61 (20.8)
2 (mixed urban/rural)	46 (14.7)	54 (19.0)	70 (23.9)
3 (rural)	41 (13.1)	54 (19.0)	33 (11.3)
4 (urban)	81 (26.0)	62 (21.8)	97 (33.1)
5 (rural)	26 (8.3)	25 (8.8)	32 (10.9)

[1] SVI cut-off scores: low social vulnerability ≤0.26; intermediate social vulnerability 0.26-0.39; high social vulnerability >0.39.

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADL – Activities of Daily Living Self-Performance Hierarchy Scale

* <0.05

**<0.01

***<0.0001

Table 5.2.1.2b. Distribution of Baseline Resident Characteristics by Level of Social Vulnerability[1] for Linked DAL Cohort (n=1,066)

	Linked Cohort (n=1,066)		
	Low Social Vulnerability (n=360)	**Intermediate Social Vulnerability** (n=335)	**High Social Vulnerability** (n=371)
Resident Characteristics [n, (column %), unless otherwise noted]			
Age, yr			
Mean ± SD*	83.3 ± 7.7	84.6 ± 7.0	85.2 ± 7.0
Age groups**			
65-79	118 (32.8)	76 (22.7)	74 (20.0)
80-85	78 (21.6)	97 (28.0)	104 (28.0)
86-89	73 (20.3)	80 (23.9)	91 (24.5)
≥90	91 (25.3)	82 (24.4)	102 (27.5)
Sex			
Male	73 (20.3)	88 (26.3)	87 (23.5)
Female	287 (79.7)	247 (73.7)	284 (76.5)
Marital status			
Widowed	248 (68.9)	246 (73.4)	267 (72.0)
Married or with a partner	59 (16.4)	46 (13.7)	51 (13.7)
Never married, separated, or divorced	53 (14.7)	43 (12.8)	53 (14.3)
Fatigue***			
None	159 (44.2)	144 (43.0)	130 (35.0)
Minimal	162 (45.0)	150 (44.8)	149 (40.2)
Moderate, severe, or unable to commence any normal day-to-day activities	39 (10.8)	41 (12.2)	92 (24.8)
Clinically significant depressive symptoms (DRS score of 3+)***			
No	331 (91.9)	287 (85.7)	245 (66.0)
Yes	29 (8.1)	48 (14.3)	126 (34.0)
Health Instability (CHESS)***			
Stable (0)	199 (55.3)	148 (44.2)	149 (40.2)
Mild (1)	104 (28.9)	106 (31.6)	102 (27.5)
Mild-moderate (2)	43 (11.9)	57 (17.0)	84 (22.6)
Moderate-high (≥3)	14 (3.9)	24 (7.2)	36 (9.7)
Cognition (CPS score)***			
Intact (0)	120 (33.3)	74 (22.1)	29 (7.8)
Borderline intact (1)	101 (28.1)	70 (20.9)	40 (10.8)
Mild, moderate, severe impairment (≥2)	139 (38.6)	191 (57.0)	302 (81.4)
Activities of daily living (ADL score)***			
Independent (0)	230 (63.9)	141 (42.1)	83 (22.4)
Supervision required (1)	46 (12.8)	65 (19.4)	75 (20.2)
Limited impairment (2)	36 (10.0)	43 (12.8)	47 (12.7)
Extensive supervision required or dependent (≥ 3)	48 (13.3)	86 (25.7)	166 (44.7)

	Linked Cohort (n=1,066)		
	Low Social Vulnerability (n=360)	**Intermediate Social Vulnerability** (n=335)	**High Social Vulnerability** (n=371)
Bladder incontinence***			
Continent	182 (50.6)	138 (41.2)	116 (31.3)
Some control, infrequent episodes	54 (15.0)	61 (18.2)	41 (11.0)
Occasional incontinence	38 (10.5)	31 (9.3)	45 (12.1)
Frequent episodes, no control	86 (23.9)	105 (31.3)	169 (45.6)
Bowel incontinence***			
Continent	291 (80.8)	256 (76.4)	219 (59.0)
Some control, infrequent episodes	42 (11.7)	51 (15.2)	72 (19.4)
Occasional incontinence, frequent episodes, no control	27 (7.5)	28 (8.4)	80 (21.6)
No. of chronic conditions			
Mean ± SD**	4.5 ± 1.9	4.6 ± 2.0	4.9 ± 2.0
No. of chronic conditions			
0-3	118 (32.8)	112 (33.4)	93 (25.1)
4-5	134 (37.2)	121 (36.1)	143 (38.5)
≥6	108 (30.0)	102 (30.5)	135 (36.4)
No. of medications			
Mean ± SD*	8.7 ± 3.5	8.3 ± 3.9	7.9 ± 3.5
No. of medications			
0-6	101 (28.0)	113 (33.7)	135 (36.4)
7-8	87 (24.2)	65 (19.4)	80 (21.6)
9-10	67 (18.6)	70 (20.9)	77 (20.7)
≥11	105 (29.2)	87 (26.0)	79 (21.3)
Advance directive: Do not hospitalize			
Yes	36 (10.0)	36 (10.7)	37 (10.0)
No	324 (90.0)	299 (89.3)	334 (90.0)
No. of inpatient hospital admissions in past year‖			
0	223 (61.9)	202 (60.3)	238 (64.2)
1	86 (23.9)	80 (23.9)	88 (23.7)
≥2	51 (14.2)	53 (15.8)	45 (12.1)
No. of inpatient hospital admissions in past 90 days			
0	318 (88.3)	291 (86.9)	331 (89.2)
≥1	42 (11.7)	44 (13.1)	40 (10.8)
No. of emergency department visits in past 90 days			
0	312 (86.7)	272 (81.2)	306 (82.5)
≥1	48 (13.3)	63 (18.8)	65 (17.5)
Facility Characteristic			
Health Region***			
1 (urban)	130 (36.1)	108 (32.2)	73 (19.7)
2 (mixed urban/rural)	59 (16.4)	63 (18.8)	106 (28.6)
3 (rural)	49 (13.6)	60 (17.9)	44 (11.8)
4 (urban)	89 (24.7)	71 (21.2)	108 (29.1)
5 (rural)	33 (9.2)	33 (9.9)	40 (10.8)

[1] SVI cut-off scores: low social vulnerability <0.261; intermediate social vulnerability 0.261-0.404; high social vulnerability >0.404.

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADL – Activities of Daily Living Self-Performance Hierarchy Scale

	Linked Cohort (n=1,066)		
	Low Social Vulnerability (n=360)	**Intermediate Social Vulnerability** (n=335)	**High Social Vulnerability** (n=371)

* <0.05
**<0.01
***<0.0001
‖ Recall that the number of inpatient hospital admissions in past year variable is from the linked administrative data and was only used in the Linked cohort. The number of inpatient hospital admissions in past 90 days variable was derived from the interRAI-AL assessment and was used among all cohorts.

Table 5.2.2.1. Distribution of the SVI for the Full, Survived, and Linked Cohorts Stratified by Dementia Status

	DAL Cohort (n,%)					
	Full (n=1,089)[1]		**Survived (n=889)[2]**		**Linked (n=1,066)[3]**	
Social Vulnerability Level§ [n, (column %), unless otherwise noted]						
	Dementia (n=627)	**Non-Dementia (n=462)**	**Dementia (n=508)**	**Non-Dementia (n=381)**	**Dementia (n=609)**	**Non-Dementia (n=457)**
Low social vulnerability	158 (25.2)	206 (44.6)	141 (27.8)	171 (44.9)	157 (25.8)	203 (44.4)
Intermediate social vulnerability	181 (28.9)	159 (34.4)	150 (29.5)	134 (35.2)	177 (29.0)	158 (34.6)
High social vulnerability	288 (45.9)	97 (21.0)	217 (42.7)	76 (19.9)	275 (45.2)	96 (21.0)
p-value	<0.0001		<0.0001		<0.0001	

Abbreviations: SVI – Social Vulnerability Index; DAL – Designated Assisted Living

§The social vulnerability tertiles were determined based on the distribution of the social vulnerability index for each respective cohort (i.e., Full, Linked, and Survived).

[1] SVI cut-off scores: low social vulnerability <0.26; intermediate social vulnerability 0.26-0.404; high social vulnerability >0.404 SVI.

[2] SVI cut-off scores: low social vulnerability ≤0.26; intermediate social vulnerability 0.26-0.39; high social vulnerability >0.39.

[3] SVI cut-off scores: low social vulnerability <0.261; intermediate social vulnerability 0.261-0.404; high social vulnerability >0.404.

Table 5.2.2.2a. Distribution of Baseline Resident-Level Characteristics by Level of Social Vulnerability^1 for Dementia Subgroup, Survived Cohort (n=508)

	Dementia Subgroup, Survived Cohort (n=508)		
	Low Social Vulnerability (n=141)	**Intermediate Social Vulnerability** (n=150)	**High Social Vulnerability** (n=217)
Resident Characteristics [n, (column %), unless otherwise noted]			
Age, yr			
Mean ± SD**	82.9 ± 7.4	84.5 ± 6.5	86.1 ± 6.0
Age groups**			
65-79	49 (34.7)	35 (23.3)	28 (12.9)
80-85	31 (22.0)	50 (33.4)	69 (31.8)
86-89	30 (21.3)	32 (21.3)	58 (26.7)
≥90	31 (22.0)	33 (22.0)	62 (28.6)
Sex			
Male	25 (17.7)	39 (26.0)	38 (17.5)
Female	116 (82.3)	111 (74.0)	179 (82.5)
Marital status			
Widowed	94 (66.7)	111 (74.0)	169 (77.9)
Married or with a partner	26 (18.4)	20 (13.3)	22 (10.1)
Never married, separated, or divorced	21 (14.9)	19 (12.7)	26 (12.0)
Fatigue**			
None	81 (57.5)	76 (50.7)	93 (42.9)
Minimal	48 (34.0)	62 (41.3)	82 (37.8)
Moderate, severe, or unable to commence any normal day-to-day activities	12 (8.5)	12 (8.0)	42 (19.3)
Clinically significant depressive symptoms (DRS score of 3+)***			
No	126 (89.4)	125 (83.3)	144 (66.4)
Yes	15 (10.6)	25 (16.7)	73 (22.6)
Health Instability (CHESS)**			
Stable (0)	89 (63.1)	68 (45.3)	94 (43.3)
Mild (1)	36 (25.5)	42 (28.0)	55 (25.3)
Mild-moderate (2)	12 (8.5)	29 (19.3)	44 (20.3)
Moderate-high (≥3)	4 (2.8)	11 (7.3)	24 (11.1)
Cognition (CPS score)***			
Intact (0)	17 (12.1)	10 (6.7)	2 (0.9)
Borderline intact (1)	31 (22.0)	12 (8.0)	8 (3.7)
Mild, moderate, severe impairment (≥2)	93 (65.9)	128 (85.3)	207 (95.4)
Activities of daily living (ADL score)***			
Independent (0)	79 (56.0)	58 (38.7)	41 (18.9)
Supervision required (1)	30 (21.3)	39 (26.0)	49 (22.6)
Limited impairment (2)	20 (14.2)	21 (14.0)	32 (14.7)
Extensive supervision required or dependent (≥ 3)	12 (8.5)	32 (21.3)	95 (43.8)

	Dementia Subgroup, Survived Cohort (n=508)		
	Low Social Vulnerability (n=141)	**Intermediate Social Vulnerability** (n=150)	**High Social Vulnerability** (n=217)
Bladder incontinence**			
Continent	69 (48.9)	67 (44.7)	64 (29.5)
Some control, infrequent episodes	21 (14.9)	24 (16.0)	21 (9.7)
Occasional incontinence	13 (9.2)	13 (8.7)	30 (13.8)
Frequent episodes, no control	38 (27.0)	46 (30.6)	102 (47.0)
Bowel incontinence***			
Continent	117 (83.0)	115 (76.7)	128 (59.0)
Some control, infrequent episodes	12 (8.5)	25 (16.7)	40 (18.4)
Occasional incontinence, frequent episodes, no control	12 (8.5)	10 (6.6)	49 (22.6)
No. of chronic conditions			
Mean ± SD	4.5 ± 1.9	4.7 ± 2.1	4.7 ± 2.1
No. of chronic conditions			
0-3	48 (34.0)	49 (32.7)	68 (31.3)
4-5	51 (36.2)	53 (35.3)	76 (35.0)
≥6	42 (29.8)	48 (32.0)	73 (33.7)
No. of medications			
Mean ± SD	8.1 ± 3.4	7.7 ± 3.7	7.3 ± 3.4
No. of medications			
0-6	47 (33.3)	63 (42.0)	98 (45.2)
7-8	38 (27.0)	28 (18.7)	45 (20.7)
9-10	25 (17.7)	32 (21.3)	43 (19.8)
≥11	31 (22.0)	27 (18.0)	31 (14.3)
Advance directive: Do not hospitalize			
Yes	14 (9.9)	17 (11.3)	20 (9.2)
No	127 (90.1)	133 (88.7)	197 (90.8)
No. of inpatient hospital admissions in past 90 days			
0	131 (92.9)	139 (92.7)	202 (93.1)
≥1	10 (7.1)	11 (7.3)	15 (6.9)
No. of emergency department visits in past 90 days*			
0	129 (91.5)	121 (80.7)	181 (83.4)
≥1	12 (8.5)	29 (19.3)	36 (16.6)
Facility Characteristic			
Health Region**			
1 (urban)	55 (39.0)	45 (30.0)	45 (30.7)
2 (mixed urban/rural)	22 (15.6)	23 (15.3)	50 (23.1)
3 (rural)	11 (7.8)	30 (20.0)	21 (9.7)
4 (urban)	42 (29.8)	41 (27.3)	76 (35.0)
5 (rural)	11 (7.8)	11 (7.4)	25 (11.5)

[1] SVI cut-off scores: low social vulnerability ≤0.26; intermediate social vulnerability 0.26-0.39; high social vulnerability >0.39.

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADL – Activities of Daily Living Self-Performance Hierarchy Scale

* <0.05

**<0.01

***<0.0001

Table 5.2.2.2b. Distribution of Baseline Resident-Level Characteristics by Level of Social Vulnerability[1] for Non-Dementia Subgroup, Survived Cohort (n=381)

	Non-Dementia Subgroup, Survived Cohort (n=381)		
	Low Social Vulnerability (n=171)	**Intermediate Social Vulnerability** (n=134)	**High Social Vulnerability** (n=76)
Resident Characteristics [n, (column %), unless otherwise noted]			
Age, yr			
Mean ± SD	83.0 ± 7.8	83.2 ± 7.5	82.4 ± 8.8
Age groups			
65-79	56 (32.7)	39 (29.1)	31 (40.8)
80-85	39 (22.8)	34 (25.4)	13 (17.1)
86-89	35 (20.5)	37 (27.6)	13 (17.1)
≥90	41 (24.0)	24 (17.9)	19 (25.0)
Sex			
Male	36 (21.0)	35 (26.1)	20 (26.3)
Female	135 (79.0)	99 (73.9)	56 (73.7)
Marital status*			
Widowed	115 (67.2)	94 (70.2)	45 (59.2)
Married or with a partner	29 (17.0)	20 (14.9)	8 (10.5)
Never married, separated, or divorced	27 (15.8)	20 (14.9)	23 (30.3)
Fatigue			
None	70 (40.9)	48 (35.8)	23 (30.3)
Minimal	83 (48.5)	67 (50.0)	38 (50.0)
Moderate, severe, or unable to commence any normal day-to-day activities	18 (10.5)	19 (14.2)	15 (19.7)
Clinically significant depressive symptoms (DRS score of 3+)***			
No	159 (93.0)	117 (87.3)	53 (69.7)
Yes	12 (7.0)	17 (12.7)	23 (30.3)
Health Instability (CHESS)			
Stable (0)	92 (53.8)	58 (43.3)	33 (43.4)
Mild (1)	54 (31.6)	49 (36.6)	26 (34.2)
Mild-moderate (2)	18 (10.5)	20 (14.9)	14 (18.4)
Moderate-high (≥3)	7 (4.1)	7 (5.2)	3 (4.0)
Cognition (CPS score)**			
Intact (0)	84 (49.1)	53 (39.6)	22 (29.0)
Borderline intact (1)	54 (31.6)	44 (32.8)	19 (25.0)
Mild, moderate, severe impairment (≥2)	33 (19.3)	37 (27.6)	35 (46.0)
Activities of daily living (ADLH score)***			
Independent (0)	124 (72.5)	65 (48.5)	30 (39.5)
Supervision required (1)	13 (7.6)	11 (8.2)	12 (15.8)
Limited impairment (2)	9 (5.3)	16 (11.9)	8 (10.5)
Extensive supervision required or dependent (≥3)	25 (14.6)	42 (31.3)	26 (34.2)

	Non-Dementia Subgroup, Survived Cohort (n=381)		
	Low Social Vulnerability (n=171)	**Intermediate Social Vulnerability** (n=134)	**High Social Vulnerability** (n=76)
Bladder incontinence			
Continent	89 (52.1)	51 (38.1)	33 (43.4)
Some control, infrequent episodes	25 (14.6)	25 (18.7)	11 (14.5)
Occasional incontinence	19 (11.1)	12 (9.0)	10 (13.2)
Frequent episodes, no control	38 (22.2)	46 (34.3)	22 (28.9)
Bowel incontinence			
Continent	139 (81.3)	103 (76.9)	56 (73.7)
Some control, infrequent episodes	22 (12.9)	18 (13.4)	13 (17.1)
Occasional incontinence, frequent episodes, no control	10 (5.8)	13 (9.7)	7 (9.2)
No. of chronic conditions			
Mean ± SD	4.3 ± 1.9	4.4 ± 2.0	4.6 ± 1.7
No. of chronic conditions			
0-3	61 (35.7)	49 (36.6)	18 (23.7)
4-5	61 (35.7)	48 (35.8)	36 (47.4)
≥6	49 (28.6)	37 (27.6)	22 (28.9)
No. of medications			
Mean ± SD	9.1 ± 3.6	9.0 ± 3.7	9.1 ± 3.5
No. of medications			
0-6	45 (26.3)	33 (24.6)	15 (19.7)
7-8	34 (19.9)	26 (19.4)	16 (21.1)
9-10	34 (19.9)	32 (23.9)	18 (23.7)
≥11	58 (33.9)	43 (32.1)	27 (35.5)
Advance directive: Do not hospitalize			
Yes	15 (8.8)	13 (9.7)	7 (9.2)
No	156 (91.2)	121 (90.3)	69 (90.8)
No. of inpatient hospital admissions in past 90 days			
0	149 (87.1)	111 (82.8)	66 (86.8)
≥1	22 (12.9)	23 (17.2)	10 (13.2)
No. of emergency department visits in past 90 days			
0	146 (85.4)	111 (82.8)	66 (86.8)
≥1	25 (14.6)	23 (17.2)	10 (13.2)
Facility Characteristic			
Health Region			
1 (urban)	63 (36.8)	44 (32.8)	16 (21.1)
2 (mixed urban/rural)	24 (14.1)	31 (23.1)	20 (26.3)
3 (rural)	30 (17.5)	24 (17.9)	12 (15.8)
4 (urban)	39 (22.8)	21 (15.7)	21 (27.6)
5 (rural)	15 (8.8)	14 (10.5)	7 (9.2)

[1] SVI cut-off scores: low social vulnerability ≤0.26; intermediate social vulnerability 0.26-0.39; high social vulnerability >0.39.

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADL – Activities of Daily Living Self-Performance Hierarchy Scale

* <0.05

**<0.01

***<0.0001

Table 5.2.2.2c. Distribution of Baseline Resident-Level Characteristics by Level of Social Vulnerability[1] for Dementia Subgroup, Linked Cohort (n=609)

	Dementia Subgroup, Linked Cohort (n=609)		
	Low Social Vulnerability (n=157)	**Intermediate Social Vulnerability** (n=177)	**High Social Vulnerability** (n=275)
Resident Characteristics [n, (column %), unless otherwise noted]			
Age, yr			
Mean ± SD**	83.5 ± 7.2	85.3 ± 6.6	86.0 ± 6.1
Age groups**			
65-79	50 (31.8)	35 (19.8)	38 (13.8)
80-85	34 (21.7)	56 (21.6)	86 (31.3)
86-89	34 (21.7)	39 (22.0)	72 (26.2)
≥90	39 (24.8)	47 (26.6)	79 (28.7)
Sex			
Male	28 (17.8)	45 (25.4)	61 (22.2)
Female	129 (82.2)	132 (74.6)	214 (77.8)
Marital status			
Widowed	107 (68.1)	135 (76.3)	204 (74.2)
Married or with a partner	29 (18.5)	23 (13.0)	43 (15.6)
Never married, separated, or divorced	21 (13.4)	19 (10.7)	28 (10.2)
Fatigue***			
None	85 (54.1)	88 (49.7)	105 (38.2)
Minimal	58 (36.9)	73 (41.2)	105 (38.2)
Moderate, severe, or unable to commence any normal day-to-day activities	14 (8.9)	16 (9.0)	65 (23.6)
Clinically significant depressive symptoms (DRS score of 3+)***			
No	140 (89.2)	149 (84.2)	180 (65.4)
Yes	17 (10.8)	28 (15.8)	95 (34.6)
Health Instability (CHESS)***			
Stable (0)	96 (61.1)	83 (46.9)	110 (40.0)
Mild (1)	41 (26.1)	49 (27.7)	72 (26.2)
Mild-moderate (2)	16 (10.2)	32 (18.1)	60 (21.8)
Moderate-high (≥3)	4 (2.6)	13 (7.3)	33 (12.0)
Cognition (CPS score)***			
Intact (0)	19 (12.1)	12 (6.8)	3 (1.1)
Borderline intact (1)	35 (22.3)	16 (9.0)	12 (4.4)
Mild, moderate, severe impairment (≥2)	103 (65.6)	149 (84.2)	260 (94.5)
Activities of daily living (ADL score)***			
Independent (0)	83 (52.9)	66 (37.3)	49 (17.8)
Supervision required (1)	33 (21.0)	49 (27.7)	61 (22.2)
Limited impairment (2)	25 (15.9)	23 (13.0)	36 (13.1)
Extensive supervision required or dependent (≥3)	16 (10.2)	39 (22.0)	129 (46.9)

Dementia Subgroup, Linked Cohort (n=609)			
	Low Social Vulnerability (n=157)	**Intermediate Social Vulnerability** (n=177)	**High Social Vulnerability** (n=275)
Bladder incontinence***			
Continent	79 (50.3)	78 (44.1)	74 (26.9)
Some control, infrequent episodes	23 (14.7)	31 (17.5)	29 (10.6)
Occasional incontinence	13 (8.3)	15 (8.5)	32 (11.6)
Frequent episodes, no control	42 (26.7)	53 (29.9)	140 (50.9)
Bowel incontinence***			
Continent	127 (80.9)	135 (76.3)	150 (54.6)
Some control, infrequent episodes	16 (10.2)	29 (16.4)	54 (19.6)
Occasional incontinence, frequent episodes, no control	14 (8.9)	13 (7.3)	71 (25.8)
No. of chronic conditions			
Mean ± SD	4.7 ± 1.9	4.7 ± 2.1	5.0 ± 2.1
No. of chronic conditions			
0-3	48 (30.6)	56 (31.6)	69 (25.1)
4-5	59 (37.6)	65 (36.7)	99 (36.0)
≥6	50 (31.8)	56 (31.6)	107 (38.9)
No. of medications			
Mean ± SD	8.2 ± 3.6	7.6 ± 3.8	7.5 ± 3.4
No. of medications			
0-6	52 (33.1)	74 (41.8)	115 (41.8)
7-8	42 (26.8)	36 (20.3)	61 (22.2)
9-10	27 (17.2)	34 (19.2)	54 (19.6)
≥11	36 (22.9)	33 (18.7)	45 (16.4)
Advance directive: Do not hospitalize			
Yes	15 (9.6)	22 (12.4)	26 (9.5)
No	142 (90.4)	155 (87.6)	249 (90.5)
No. of inpatient hospital admissions in past year‖			
0	113 (72.0)	116 (65.5)	184 (66.9)
1	35 (22.3)	42 (23.7)	61 (22.2)
≥2	9 (5.7)	19 (10.7)	30 (10.9)
No. of inpatient hospital admissions in past 90 days			
0	145 (92.4)	161 (91.0)	249 (90.6)
≥1	12 (7.6)	16 (9.0)	26 (9.4)
No. of emergency department visits in past 90 days*			
0	141 (89.8)	142 (80.2)	221 (80.4)
≥1	16 (10.2)	35 (19.8)	54 (19.6)
Facility Characteristic			
Health Region**			
1 (urban)	58 (36.9)	53 (29.9)	55 (20.0)
2 (mixed urban/rural)	28 (17.8)	29 (16.4)	78 (28.4)
3 (rural)	13 (8.3)	33 (18.6)	31 (11.3)
4 (urban)	46 (29.3)	46 (26.0)	82 (29.8)
5 (rural)	12 (7.6)	16 (9.0)	29 (10.5)

[1] SVI cut-off scores: low social vulnerability <0.261; intermediate social vulnerability 0.261-0.404; high social vulnerability >0.404.

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADL – Activities of Daily Living Self-Performance Hierarchy Scale

	Dementia Subgroup, Linked Cohort (n=609)		
	Low Social Vulnerability (n=157)	**Intermediate Social Vulnerability** (n=177)	**High Social Vulnerability** (n=275)

* <0.05

**<0.01

***<0.0001

‖ Recall that the number of inpatient hospital admissions in past year variable is from the linked administrative data and was only used in the Linked cohort. The number of inpatient hospital admissions in past 90 days variable was derived from the interRAI-AL assessment and was used among all cohorts.

Table 5.2.2.2d. Distribution of Baseline Resident-Level Characteristics by Level of Social Vulnerability[1] for Non-Dementia Subgroup, Linked Cohort (n=457)

	Non-Dementia Subgroup, Linked Cohort (n=457)		
	Low Social Vulnerability (n=203)	**Intermediate Social Vulnerability** (n=158)	**High Social Vulnerability** (n=96)
Resident Characteristics [n, (column %), unless otherwise noted]			
Age, yr			
Mean ± SD	83.2 ± 8.1	83.8 ± 7.4	82.9 ± 8.7
Age groups			
65-79	68 (33.5)	41 (26.0)	36 (37.5)
80-85	44 (21.7)	41 (26.0)	18 (18.7)
86-89	39 (19.2)	41 (26.0)	19 (19.8)
≥90	52 (25.6)	35 (22.1)	23 (24.0)
Sex			
Male	45 (22.2)	43 (27.2)	26 (27.1)
Female	158 (77.8)	115 (72.8)	70 (72.9)
Marital status			
Widowed	141 (69.4)	111 (70.2)	63 (65.6)
Married or with a partner	30 (14.8)	23 (14.6)	8 (8.3)
Never married, separated, or divorced	32 (15.8)	24 (15.2)	25 (26.1)
Fatigue*			
None	74 (36.5)	56 (35.4)	25 (26.0)
Minimal	104 (51.2)	77 (48.7)	44 (45.8)
Moderate, severe, or unable to commence any normal day-to-day activities	25 (12.3)	25 (15.8)	27 (28.1)
Clinically significant depressive symptoms (DRS score of 3+)***			
No	191 (94.1)	138 (87.3)	65 (67.7)
Yes	12 (5.9)	20 (12.7)	31 (32.3)
Health Instability (CHESS)			
Stable (0)	103 (50.8)	65 (41.1)	39 (40.6)
Mild (1)	63 (31.0)	57 (36.1)	30 (31.3)
Mild-moderate (2)	27 (13.3)	25 (15.8)	24 (25.0)
Moderate-high (≥3)	10 (4.9)	11 (7.0)	3 (3.1)
Cognition (CPS score)***			
Intact (0)	101 (49.8)	62 (39.2)	26 (27.1)
Borderline intact (1)	66 (32.5)	54 (34.2)	28 (29.2)
Mild, moderate, severe impairment (≥2)	36 (17.7)	42 (26.6)	42 (43.7)
Activities of daily living (ADL score)***			
Independent (0)	147 (72.4)	75 (47.5)	34 (35.4)
Supervision required (1)	13 (6.4)	16 (10.1)	14 (15.6)
Limited impairment (2)	11 (5.4)	20 (12.7)	11 (11.5)
Extensive supervision required or dependent (≥3)	32 (15.8)	47 (29.8)	37 (38.5)

	Non-Dementia Subgroup, Linked Cohort (n=457)		
	Low Social Vulnerability (n=203)	**Intermediate Social Vulnerability** (n=158)	**High Social Vulnerability** (n=96)
Bladder incontinence			
Continent	103 (50.7)	60 (38.0)	42 (43.8)
Some control, infrequent episodes	31 (15.3)	30 (19.0)	12 (12.5)
Occasional incontinence	25 (12.3)	16 (10.1)	13 (13.5)
Frequent episodes, no control	44 (21.7)	52 (32.9)	29 (30.2)
Bowel incontinence			
Continent	164 (80.8)	121 (76.6)	69 (71.9)
Some control, infrequent episodes	26 (12.8)	22 (13.9)	18 (18.7)
Occasional incontinence, frequent episodes, no control	13 (6.4)	15 (9.5)	9 (9.4)
No. of chronic conditions			
Mean ± SD	4.3 ± 1.9	4.4 ± 2.0	4.6 ± 1.8
No. of chronic conditions			
0-3	70 (34.5)	56 (35.4)	24 (25.0)
4-5	75 (36.9)	56 (35.4)	44 (45.8)
≥6	58 (28.6)	46 (29.1)	28 (29.2)
No. of medications			
Mean ± SD	9.1 ± 3.5	9.1 ± 3.8	9.1 ± 3.5
No. of medications			
0-6	49 (24.1)	39 (24.7)	20 (20.8)
7-8	45 (22.2)	29 (18.3)	19 (19.8)
9-10	40 (19.7)	36 (22.8)	23 (24.0)
≥11	69 (34.0)	54 (34.2)	34 (35.4)
Advance directive: Do not hospitalize			
Yes	21 (10.3)	14 (8.9)	11 (11.5)
No	182 (89.7)	144 (91.1)	85 (88.5)
No. of inpatient hospital admissions in past year‖			
0	110 (54.2)	86 (54.4)	54 (56.3)
1	51 (25.1)	38 (24.1)	27 (28.1)
≥2	42 (20.7)	34 (21.5)	15 (15.6)
No. of inpatient hospital admissions in past 90 days			
0	173 (85.2)	130 (82.3)	82 (85.4)
≥1	30 (17.7)	28 (17.7)	14 (14.6)
No. of emergency department visits in past 90 days			
0	171 (84.2)	130 (82.3)	85 (88.5)
≥1	32 (15.8)	28 (17.7)	11 (11.5)
Facility Characteristic			
Health Region*			
1 (urban)	72 (35.5)	55 (34.8)	18 (18.7)
2 (mixed urban/rural)	31 (15.3)	34 (21.5)	28 (29.2)
3 (rural)	36 (17.7)	27 (17.1)	13 (13.5)
4 (urban)	43 (21.2)	25 (15.8)	26 (27.1)
5 (rural)	21 (10.3)	17 (10.8)	11 (11.5)

[1] SVI cut-off scores: low social vulnerability <0.261; intermediate social vulnerability 0.261-0.404; high social vulnerability >0.404.

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADL – Activities of Daily Living Self-Performance Hierarchy Scale

	Non-Dementia Subgroup, Linked Cohort (n=457)		
	Low Social Vulnerability (n=203)	**Intermediate Social Vulnerability** (n=158)	**High Social Vulnerability** (n=96)

* <0.05
**<0.01
***<0.0001
‖ Recall that the number of inpatient hospital admissions in past year variable is from the linked administrative data and was only used in the Linked cohort. The number of inpatient hospital admissions in past 90 days variable was derived from the interRAI-AL assessment and was used among all cohorts.

5.3 Objective 2

5.3.1 Objective 2a: Examine the associations between baseline social vulnerability and subsequent cognitive decline over one year, among DAL residents overall, and stratified by dementia status

Bivariate analyses were completed to determine appropriate covariates for models investigating the association between social vulnerability and subsequent cognitive decline over one year, among DAL residents overall, and those with and without dementia. Tables depicting associations between baseline resident characteristics (and one facility-level variable) and cognitive decline overall and stratified by dementia are found in Appendix J (Tables 5.3.1a-c)[21].

5.3.1.1 Social Vulnerability and Cognitive Decline, Survived Cohort (n=889) (Table 5.3.1.1)

The unadjusted and adjusted odds ratios for cognitive decline during follow-up associated with social vulnerability are presented in Table 5.3.1.1. In adjusted model (A)[22], there was a significantly greater risk for cognitive decline during follow-up observed for residents with intermediate (adj. OR=1.51, 95% CI 1.11-2.07) and high (adj. OR=1.73, 95% CI 1.18-2.53) social vulnerability compared to those with low social vulnerability.

Similarly, in adjusted model B[23], both intermediate and high social vulnerability levels compared to low social vulnerability were associated with a significantly higher odds of cognitive decline during follow-up (adj. OR=1.48, 95% CI 1.08-2.02 and adj. OR=1.74, 95%CI 1.18-2.56, respectively).

5.3.1.1.1 Sensitivity Analyses (Tables 5.3.1.1.1a-b)

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[21] For more information on covariates, refer to section 4.3.4.

[22] Adjusted model (A) controlled for age, sex, baseline functional and cognitive impairment, and health region.

[23] Adjusted model (B) controlled for age, sex, baseline functional and cognitive impairment, anxiolytic use, and health region.

Sensitivity analyses[24] were used to determine whether the inclusion or exclusion of any one social domain or social variable was responsible for the associations found between social vulnerability and cognitive decline. In the cognitive decline sensitivity analysis for the Survived cohort, it was found that removing the Empowerment and Life Control social domain resulted in intermediate social vulnerability no longer being a statistically significant predictor of cognitive decline (Table 5.3.1.1.1a).

When the Empowerment and Life Control social domain was removed from the SVI, intermediate social vulnerability (adj. OR 1.23; 95% CI: 0.93-1.62) was no longer a significant predictor of cognitive decline over one year. However, high social vulnerability (adj. OR 1.43; 95% CI: 1.03-1.97) remained significant.

Further investigation was completed to determine if any one single variable composing the Empowerment and Life Control social domain (Table 5.3.1.1.1b) was responsible for the loss of statistical significance. These analyses revealed that when the "level of control person had over decision to move into assisted living" social variable was removed from the SVI, intermediate social vulnerability in reference to low social vulnerability (adj. OR 1.28; 95% CI: 0.93-1.75) was no longer a significant predictor of cognitive decline over one year. The individual removal of the other two variables captured under the Empowerment and Life Control social domain (i.e., "consistent positive outlook," and "finds meaning in day-to-day life") did not result in social vulnerability to become non-significant.

5.3.1.2 Social Vulnerability and Cognitive Decline Stratified by Dementia Status, Survived, Cohort (Tables 5.3.1.2a-b)

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[24] Sensitivity analyses for the Survived cohort were executed using adjusted model (B).

Among the dementia subgroup (Table 5.3.1.2a), the adjusted model (A)[25] demonstrated that intermediate social vulnerability in comparison with low social vulnerability significantly increased the odds of cognitive decline over one year (OR: 1.92; 95% CI: 1.26-2.93). In the adjusted model (A), high social vulnerability in comparison with low social vulnerability, increased the odds of cognitive decline over one year (OR: 1.68; 95% CI: 0.95-2.98; p=0.0731). In the adjusted model (B)[26], intermediate social vulnerability in comparison with low social vulnerability significantly increased the odds of cognitive decline over one year (OR: 1.89; 95% CI: 1.24-2.89). In the adjusted model (B), high social vulnerability in comparison with low social vulnerability, increased the odds of cognitive decline over one year (OR: 1.69; 95% CI: 0.95-3.00; p=0.0748).

In the non-dementia subgroup (Table 5.3.1.2b), the adjusted model (A)[27] showed that no level of social vulnerability was found to significantly influence the odds of cognitive decline over the one year follow-up. However, high social vulnerability increased the odds of cognitive decline (OR: 1.90; 95% CI: 0.97-3.70; p=0.0608). In the adjusted model (B)[28], high social vulnerability significantly increased the odds of cognitive decline over one year (OR: 2.01; 95% CI: 1.02-3.97) relative to the low social vulnerability group, and intermediate social vulnerability had no significant impact on cognitive decline (OR: 1.33; 95% CI: 0.84-2.10).

5.3.1.2.1 Sensitivity Analyses (Tables 5.3.1.2.1a-b)

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[25] Adjusted model (A) for those with dementia controlled for age, sex, baseline functional and cognitive impairment, and health region.

[26] Adjusted model (B) for those with dementia controlled for age, sex, baseline functional and cognitive impairment, anxiolytic use, and health region.

[27] Adjusted model (A) for those without dementia controlled for age, sex, baseline functional and cognitive impairment, and health region

[28] Adjusted model (B) for those without dementia controlled for age, sex, baseline functional and cognitive impairment, anxiolytic use, and health region.

In the sensitivity analysis[29] for the dementia subgroup, (Table 5.3.1.2.1a) it was found that removing the Socially-Oriented Activities of Daily Living social domain resulted in intermediate social vulnerability no longer having a statistically significant association with cognitive decline (adj. OR 1.49; 95% CI: 0.99-2.24; p=0.0546). It also resulted in a reduced strength of association between high social vulnerability and cognitive decline (adj. OR 1.20; 95% CI: 0.71-2.03).

Further investigation revealed that when the social variables that composed the Socially-Oriented Activities of Daily Living social domain were removed individually (Table 5.3.1.2.1b), no single variable was responsible for all the loss in statistical significance of social vulnerability as a predictor of cognitive decline over one year. When the "capacity to use the phone" social variable was removed from the SVI, intermediate social vulnerability remained statistically significant (adj. OR 2.10; 95% CI: 1.32-3.35), and there was a slightly weaker association between high social vulnerability and cognitive decline (adj. OR 1.52; 95% CI: 0.88-2.64). No significant changes were observed when the "capacity to use transportation" social variable was removed from the SVI. It was only when the entire social domain was removed from the SVI that intermediate and high social vulnerability lost some or all statistical significance, respectively.

In the sensitivity analysis[30] for the non-dementia subgroup, it was found that removing the Empowerment and Life Control social domain (Table 5.3.1.2c) resulted in high social vulnerability (in reference to low social vulnerability) no longer having a statistically significant association with cognitive decline (OR: 1.32; 95% CI: 0.69-2.51). Removing social domains

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[29] Sensitivity analyses for the dementia subgroup, Survived cohort, were executed using the adjusted model (A). Recall that adjusted model (A) was superior to adjusted model (B) in the dementia subgroup.

[30] Sensitivity analyses for the non-dementia subgroup, Survived cohort, were executed using the adjusted model (B).

Communication to Engage in Wider Community, Living Situation, and Social Engagement and Leisure Activities, also reduced the association between high social vulnerability and cognitive decline, but significance levels were <0.10 but >0.05[31].

Further investigation revealed that when the social variables that composed the Empowerment and Life Control social domain were removed (Table 5.3.1.2d), “consistent positive outlook” and “level of control person had over decision to move to assisted living” resulted in high social vulnerability to lose statistical significance at a significance level of <0.05. When “consistent positive outlook” social variable was removed from the SVI, high social vulnerability increased the odds of cognitive decline (OR: 1.81; 95% CI: 0.97-3.38; p=0.0638). When “level of control person had over decision to move to assisted living” social variable was removed from the SVI, high social vulnerability was no longer a significant predictor of cognitive decline (OR: 1.62; 95% CI: 0.81-3.24). When “finds meaning in day-to-day life” social variable was removed from the SVI, high social vulnerability remained a significant predictor of cognitive decline (OR: 1.91; 95% CI: 1.00-3.63).

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[31] Further investigation of the social domains (sensitivity analyses) was only executed for findings where the significance level was increased to ≥0.10. Therefore, further investigation was only completed for the Empowerment and Life Control social domain.

5.3.2 Objective 2b: Examine the associations between baseline social vulnerability and subsequent time to first-event hospitalization over one year, among DAL residents overall, and stratified by dementia status

Bivariate analyses were completed to determine appropriate covariates for models investigating the association between social vulnerability and subsequent first-event hospitalization over 1 year, among DAL residents overall, and those with and without dementia. This was also informed by findings from previous ACCES publications (as noted in section 4.3.4 of Methods)[32]. Tables depicting associations between baseline resident characteristics (and one facility-level variable) and first-event hospitalization overall and stratified by dementia are found in Appendix J (Tables 5.3.2a-c).

5.3.1.1 Social Vulnerability and Time to First-Event Hospitalization, Linked Cohort (n=1,066) (Table 5.3.2.1)

In the adjusted model (A)[33], intermediate social vulnerability in comparison with low social vulnerability, did not significantly increase the risk of first-event hospitalization over one year among older adults in DAL (adj. HR 1.07, 95% CI: 0.83-1.39). High social vulnerability in comparison with low social vulnerability significantly increased the risk of first-event hospitalization over one year (adj. HR 1.25; 95% CI: 1.02-1.52).

In adjusted model (B)[34], intermediate social vulnerability in comparison with low social vulnerability, did not significantly increase the risk of first-event hospitalization over one year among older adults in DAL (adj. HR 1.08, 95% CI: 0.83-1.40). High social vulnerability in comparison with low social vulnerability significantly increased the risk of first-event hospitalization over one year (adj. HR 1.26; 95% CI: 1.02-1.55).

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[32] For more information on covariates, refer to section 4.3.4.

[33] Adjusted model (A) controlled for baseline measures of age, sex, fatigue, health instability, comorbidity, number of medications used, frequency of hospitalizations in the past year, and health region.

[34] Adjusted model (B) repeats adjusted model (A) but excludes comorbidity as a covariate.

5.3.2.1.1 Sensitivity Analysis (Tables 5.3.2.1.1a-c)

Results of the sensitivity analyses demonstrated that social domains Living Situation and Social Support were significant drivers of the associations found between social vulnerability and risk of first-event hospitalization (Table 5.3.2.1.1a). The removal of the Living Situation social domain caused high social vulnerability to become non-significant as a predictor of first-event hospitalization (adj. HR 1.18; 95% CI: 0.96-1.45). The removal of the Social Support social domain also resulted in high social vulnerability to become non-significant at a significance level of <0.05 (adj. HR 1.21; 95% CI: 0.98-1.50; p=0.0708).

Among the social variables used to form the Living Situation social domain (Table 5.3.2.1.1b), “room type” (i.e., private, couples suite, shared family, shared non-family, or shared private) was found to impact the associations found between high social vulnerability and risk of first-event hospitalization. When “room type” was removed from the SVI, high social vulnerability was no longer a significant predictor of first-event hospitalization (adj. HR 1.15; 95% CI: 0.93-1.43). Among the social variables used to form the Social support social domain (Table 5.3.2.1.1c), the removal of “visit with a long-standing social relation or family member” resulted in high social vulnerability to lose its significance in predicting first-event hospitalization (adj. HR 1.19; 95% CI: 0.97-1.46).

5.3.2.2 Social Vulnerability and Time to First-Event Hospitalization, Stratified by Dementia Status, Linked cohort (n=1,066) (Tables 5.3.2.2a-b)

In adjusted models, statistically significant associations between social vulnerability and first-event hospitalization among older DAL residents with dementia were observed (Table 5.3.2.2a). In adjusted model (A)[35], intermediate social vulnerability in comparison with low social vulnerability did not significantly increase the risk of first-event hospitalization over one

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[35] Adjusted model (A) controlled for age, sex, and baseline measures of cognitive impairment, fatigue, health instability, comorbidity, number of medications used, frequency of hospitalizations in past year, bowel incontinence, and health region.

year (adj. HR 1.16; 95% CI: 0.81-1.65). However, high social vulnerability in comparison with low social vulnerability did significantly increase the risk of first-event hospitalization over one year among older DAL residents with dementia (adj. HR 1.46; 95% CI: 1.05-2.05). The hazard ratio associated with high vs. low social vulnerability was slightly higher in adjusted model (B)[36] (adj. HR 1.50; 95% CI: 1.05-2.12) but the difference was not meaningful.

In adjusted models, social vulnerability was not a significant predictor of first-event hospitalization among older DAL residents without dementia (Table 5.3.2.2b). In the adjusted model (A)[37], intermediate social vulnerability and high social vulnerability in comparison with low social vulnerability, were associated with hazards ratios of 1.00 (95% CI: 0.67-1.50) and 1.04 (95% CI: 0.72-1.51), respectively. In the adjusted model (B)[38], intermediate social vulnerability and high social vulnerability in comparison with low social vulnerability, were associated with hazards ratios of 1.00 (95% CI: 0.67-1.51) and 1.07 (95% CI: 0.74-1.55), respectively.

5.3.2.2.1 Sensitivity Analysis (Tables 5.3.2.2.1a-c)

In sensitivity analyses for the dementia subgroup, the removal of the Communication to Engage in Wider Community, and Social Support social domains appeared to alter the social vulnerability risk estimates for first-event hospitalization among DAL residents with dementia (Table 5.3.2.2.1a). When the Communication to Engage in Wider Community social domain was removed from the SVI, high social vulnerability was no longer a significant predictor of first-event hospitalization at a significance level of <0.05, (adj. HR 1.44; 95% CI: 0.99-2.11). When

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[36] Adjusted model (A) controlled for age, sex, and baseline measures of cognitive impairment, fatigue, health instability, comorbidity, number of medications used, frequency of hospitalizations in past year, bowel incontinence, and health region

[37] Adjusted model (A) controlled for age, sex, and baseline measures of cognitive impairment, fatigue, health instability, comorbidity, number of medications used, frequency of hospitalizations in past year, bowel incontinence, and health region.

[38] Adjusted model (B) repeats adjusted model (A) but excludes comorbidity as a covariate.

the Social Support social domain was removed from the SVI, high social vulnerability among residents with dementia was no longer a statistically significant predictor of first-event hospitalization (adj. HR 1.26; 95% CI: 0.85-1.88).

Upon further investigation, no single variable that comprised the Communication to Engage in Wider Community social domain influenced the significance level of high social vulnerability (Table 5.3.2.2.1b). Instead, it was the exclusion of the entire social domain that resulted in this change. Investigating the social variables that comprised the Social Support social domain (Table 5.3.2.2.1c), “visit with a long-standing social relation or family member” and “other interaction with long-standing social relation or family member (e.g., phone, email)” were found to alter the strength of the association between high social vulnerability and risk of first-event hospitalization among DAL residents with dementia. The removal of either social variable resulted in high social vulnerability to lose its statistical significance (adj. HR 1.33; 95% CI: 0.94-1.89 and adj. HR 1.32; 95% CI: 0.93-1.88, respectively).

Table 5.3.1.1. Unadjusted and Adjusted Odds Ratios for Cognitive Decline during 1 Year Follow-up Associated with Baseline Social Vulnerability[1], Survived Cohort (n=889)

	Odds Ratio (95% Confidence Interval)		
	Unadjusted OR (95% CI)	**Adjusted OR (95% CI) Model A‖**	**Adjusted OR (95% CI) Model Bǂ**
Low Social Vulnerability (ref grp) (n=312)	1.00	1.00	1.00
Intermediate Social Vulnerability (n=284)	1.25 (0.94-1.65)	**1.51 (1.11-2.07)**	**1.48 (1.08-2.02)**
High Social Vulnerability (n=293)	1.16 (0.87-1.55)	**1.73 (1.18-2.53)**	**1.74 (1.18-2.56)**

[1] SVI cut-off scores: low social vulnerability ≤0.26; intermediate social vulnerability 0.26-0.39; high social vulnerability >0.39.

‖ Adjusted model (A) controlled for age, sex, baseline cognitive and functional impairment, and health region.

ǂ Adjusted model (B) controlled for age, sex, baseline cognitive and functional impairment, anxiolytic use, and health region.

Bolded values denote p-value <0.05

Table 5.3.1.1.1a. Sensitivity Analysis[1] for Cognitive Decline during 1 Year Follow-up Associated with Baseline Social Vulnerability[2], Survived Cohort (n=889), Removal of Social Domains

	Sensitivity Analysis for OR Cognitive Decline (95% CI)						
	Fully Adjusted B[ǂ]	**Without Communication to engage in wider community**	**Without Living situation**	**Without Social Support**	**Without Socially-oriented activities of daily living**	**Without Social engagement and leisure activities**	**Without Empowerment and life control**
Low Social Vulnerability (ref gp) (n=312)	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Intermediate Social Vulnerability (n=284)	**1.48 (1.08-2.02)**	**1.83 (1.36-2.47)**	**1.57 (1.14-2.16)**	**1.78 (1.25-2.52)**	**1.45 (1.07-1.97)**	**1.83 (1.35-2.46)**	1.23 (0.93-1.62)
High Social Vulnerability (n=293)	**1.74 (1.18-2.56)**	**1.65 (1.13-2.40)**	**1.83 (1.22-2.76)**	**2.29 (1.55-3.38)**	**1.46 (1.02-2.09)**	**1.43 (1.05-1.94)**	**1.43 (1.03-1.97)**

[1] Sensitivity analyses for the Survived cohort were executed using adjusted model (B).

[2] SVI cut-off scores: low social vulnerability ≤0.26; intermediate social vulnerability 0.26-0.39; high social vulnerability >0.39.

ǂ Fully adjusted B models controlled for age, sex, baseline cognition and functional impairment, anxiolytic use, and health region.

Bolded values denote $p<0.05$

Table 5.3.1.1.1b. Sensitivity Analysis[1] for Cognitive Decline during 1 Year Follow-up Associated with Baseline Social Vulnerability[2], Survived Cohort (n=889), Removal of Social Variables from Empowerment and Life Control Social Domain

	Sensitivity Analysis for OR Cognitive Decline (95% CI) for Overall Sample			
	Fully Adjusted Bǂ	**SVI without "consistent positive outlook"**	**SVI without "finds meaning in day-to-day life"**	**SVI without "level of control person had over decision to move into AL"**
Low Social Vulnerability (ref grp) (n=312)	1.00	1.00	1.00	1.00
Intermediate Social Vulnerability (n=284)	**1.48 (1.08-2.02)**	**1.82 (1.34-2.48)**	**1.83 (1.34-2.51)**	1.28 (0.93-1.75)
High Social Vulnerability (n=293)	**1.74 (1.18-2.56)**	**1.72 (1.20-2.47)**	**1.80 (1.25-2.59)**	**1.57 (1.09-2.26)**

[1] Sensitivity analyses for the Survived cohort were executed using adjusted model (B).

[2] SVI cut-off scores: low social vulnerability ≤0.26; intermediate social vulnerability 0.26-0.39; high social vulnerability >0.39.

ǂ Fully adjusted B models controlled for age, sex, baseline cognition and functional impairment, anxiolytic use, and health region.

Bolded values denote p-value <0.05

Table 5.3.1.2a. Unadjusted and Adjusted Odds Ratios for Cognitive Decline during 1 Year Follow-up Associated with Baseline Social Vulnerability[1], Dementia Subgroup, Survived Cohort (n=508)

	Odds Ratio (95% Confidence Interval) Dementia Subgroup		
	Unadjusted OR (95% CI)	**Adjusted OR (95% CI) Model A‖**	**Adjusted OR (95% CI) Model B‡**
Low Social Vulnerability (ref gp) (n=141)	1.00	1.00	1.00
Intermediate Social Vulnerability (n=150)	1.38 (0.89-1.83)	**1.92 (1.26-2.93)**	**1.89 (1.24-2.89)**
High Social Vulnerability (n=217)	1.04 (0.68-1.59)	1.68 (0.95-2.98)∞	1.69 (0.95-3.00)∞

[1] SVI cut-off scores: low social vulnerability ≤0.26; intermediate social vulnerability 0.26-0.39; high social vulnerability >0.39.
‖ adjusted model (A) controlled for age, sex, baseline cognitive and functional impairment, and health region.
‡ adjusted B models control for age, sex, baseline cognition and functional impairment, anxiolytic use, and health region.
Bolded values denote p <0.05
∞ denotes p<0.10

Table 5.3.1.2b. Unadjusted and Adjusted Odds Ratios for Cognitive Decline during 1 Year Follow-up Associated with Baseline Social Vulnerability[1], Non-Dementia Subgroup, Survived Cohort (n=381)

	Odds Ratio (95% Confidence Interval) Non-Dementia Subgroup		
	Unadjusted OR (95% CI)	**Adjusted OR (95% CI) Model A‖**	**Adjusted OR (95% CI) Model B‡**
Low Social Vulnerability (ref gp) (n=171)	1.00	1.00	1.00
Intermediate Social Vulnerability (n=134)	1.21 (0.77-1.91)	1.36 (0.86-2.16)	1.33 (0.84-2.10)
High Social Vulnerability (n=76)	1.31 (0.73-2.34)	1.90 (0.97-3.70)∞	**2.01 (1.02-3.97)**

[1] SVI cut-off scores: low social vulnerability ≤0.26; intermediate social vulnerability 0.26-0.39; high social vulnerability >0.39.
‖ adjusted model (A) controlled for age, sex, baseline cognitive and functional impairment, and health region.
‡ adjusted B models control for age, sex, baseline cognition and functional impairment, anxiolytic use, and health region.
Bolded values denote p-value <0.05
∞ denotes p-value <0.10

Table 5.3.1.2.1a. Sensitivity Analysis[1] for Cognitive Decline during 1 Year Follow-up Associated with Baseline Social Vulnerability[2], Dementia Subgroup, Survived Cohort (n=508), Removal of Social Domains

	Sensitivity Analysis for OR Cognitive Decline (95% CI) for Dementia Subgroup						
	Fully Adjusted A‖	**Without Communication to engage in wider community**	**Without Living situation**	**Without Social Support**	**Without Socially-oriented activities of daily living**	**Without Social engagement and leisure activities**	**Without Empowerment and life control**
Low Social Vulnerability (ref gp) (n=157)	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Intermediate Social Vulnerability (n=177)	**1.92 (1.26-2.93)**	**1.99 (1.23-3.20)**	**2.63 (1.47-4.69)**	**2.02 (1.10-3.71)**	1.49 (0.99-2.24)∞	**2.10 (1.29-3.41)**	**1.83 (1.13-3.00)**
High Social Vulnerability (n=275)	1.68 (0.95-2.98)∞	1.46 (0.84-2.53)	**2.16 (1.10-4.26)**	**2.42 (1.23-4.77)**	1.20 (0.71-2.03)	1.27 (0.74-2.20)	1.67 (0.98-2.86)∞

[1] Sensitivity analyses for the dementia subgroup, Survived cohort were executed using adjusted model (A).

[2] SVI cut-off scores: low social vulnerability ≤0.26; intermediate social vulnerability 0.26-0.39; high social vulnerability >0.39.

‖Adjusted model (A) controlled for age, sex, baseline cognition and functional impairment, and health region.

Bolded values denote $p<0.05$

∞ denotes $p<0.1$

Table 5.3.1.2.1b. Sensitivity Analysis[1] for Cognitive Decline during 1 Year Follow-up Associated with Baseline Social Vulnerability[2], Dementia Subgroup, Survived Cohort (n=508), Removal of Social Variables from Socially-Oriented Activities of Daily Living Social Domain

	Sensitivity Analysis for OR Cognitive Decline (95% CI) for Dementia Subgroup		
	Fully Adjusted A[ǁ]	**SVI without "capacity to use the phone"**	**SVI without "capacity to use transportation"**
Low Social Vulnerability (ref gp) (n=141)	1.00	1.00	1.00
Intermediate Social Vulnerability (n=150)	**1.92 (1.26-2.93)**	**2.10 (1.32-3.35)**	**1.78 (1.19-2.67)**
High Social Vulnerability (n=217)	1.68 (0.95-2.98)[∞]	1.52 (0.88-2.64)	1.62 (0.92-2.85)[∞]

[1] Sensitivity analyses for the dementia subgroup, Survived cohort were executed using adjusted model (A).

[2] SVI cut-off scores: low social vulnerability ≤0.26; intermediate social vulnerability 0.26-0.39; high social vulnerability >0.39.

[ǁ] Adjusted model (A) controlled for age, sex, baseline and cognition and functional impairment, and health region.

Bolded values denote p <0.05

∞ denotes p<0.10

Table 5.3.1.2.1c. Sensitivity Analysis[1] for Cognitive Decline during 1 Year Follow-up Associated with Baseline Social Vulnerability[2], Non-Dementia Subgroup, Survived Cohort (n=381), Removal of Social Domains

	Sensitivity Analysis for OR Cognitive Decline (95% CI) for Non-Dementia Subgroup						
	Fully Adjusted B[ǂ]	**Without Communication to engage in wider community**	**Without Living situation**	**Without Social Support**	**Without Socially-oriented activities of daily living**	**Without Social engagement and leisure activities**	**Without Empowerment and life control**
Low Social Vulnerability (ref gp) (n=171)	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Intermediate Social Vulnerability (n=134)	1.33 (0.84-2.10)	**1.81 (1.09-3.00)**	1.05 (0.67-1.67)	**1.89 (1.17-3.05)**	1.56 (0.98-2.48)[∞]	**1.66 (1.07-2.58)**	0.96 (0.60-1.55)
High Social Vulnerability (n=76)	**2.01 (1.02-3.97)**	1.86 (0.96-3.62)[∞]	1.91 (0.95-3.80)[∞]	**2.23 (1.21-4.12)**	**1.94 (1.08-3.49)**	1.70 (0.95-3.03)[∞]	1.32 (0.69-2.51)

[1] Sensitivity analyses for the non-dementia subgroup, Survived cohort were executed using adjusted model (B).

[2] SVI cut-off scores: low social vulnerability ≤0.26; intermediate social vulnerability 0.26-0.39; high social vulnerability >0.39.

[ǂ] Adjusted model (B) controlled for age, sex, baseline cognition and functional impairment, anxiolytic use, and health region.

Bolded values denote $p<0.05$

∞ denotes $p<0.1$

Table 5.3.1.2.1d. Sensitivity Analysis[1] for Cognitive Decline during 1 Year Follow-up Associated with Baseline Social Vulnerability[2], Non-Dementia Subgroup, Survived Cohort (n=381), Removal of Social Variables from Empowerment and Life Control Social Domain

	Sensitivity Analysis for OR Cognitive Decline (95% CI) for Non-Dementia Subgroup			
	Fully Adjusted Bǂ	**SVI without "consistent positive outlook"**	**SVI without "finds meaning in day-to-day life"**	**SVI without "level of control person had over decision to move into AL"**
Low Social Vulnerability (ref gp) (n=171)	1.00	1.00	1.00	1.00
Intermediate Social Vulnerability (n=134)	1.33 (0.84-2.10)	1.55 (0.97-2.47)∞	1.43 (0.91-2.25)	1.04 (0.62-1.76)
High Social Vulnerability (n=76)	**2.01 (1.02-3.97)**	1.81 (0.97-3.38)∞	**1.91 (1.00-3.63)**	1.62 (0.81-3.24)

[1] Sensitivity analyses for the Survived cohort, non-dementia subgroup, were executed using adjusted model (B).

[2] SVI cut-off scores: low social vulnerability ≤0.26; intermediate social vulnerability 0.26-0.39; high social vulnerability >0.39.

ǂ Fully adjusted B models controlled for age, sex, baseline cognition and functional impairment, anxiolytic use, and health region.

Bolded values denote p-value <0.05

∞ denotes p-value <0.10

Table 5.3.2.1. Unadjusted and Adjusted Hazard Ratios for Time to First-Event Hospitalization during 1 Year Follow-up Associated with Baseline Social Vulnerability[1], Linked Cohort (n=1,066)

Hazard Ratio (95% Confidence Interval)

	Unadjusted HR (95% CI)	**Adjusted HR (95% CI) Model A**[‖]	**Adjusted HR (95% CI) Model B**[ǂ]
Low Social Vulnerability (ref gp) (n=360)	1.00	1.00	1.00
Intermediate Social Vulnerability (n=335)	1.12 (0.88-1.44)	1.07 (0.83-1.39)	1.08 (0.83-1.40)
High Social Vulnerability (n=371)	**1.24 (1.05-1.48)**	**1.25 (1.02-1.52)**	**1.26 (1.02-1.55)**

[1] SVI cut-off scores: low social vulnerability <0.261; intermediate social vulnerability 0.261-0.404; high social vulnerability >0.404.

[‖] Adjusted model (A) controlled for age, sex, fatigue, health instability, comorbidity, number of medications used, frequency of hospitalizations in past year, and health region

[ǂ] Adjusted model (B) repeats adjusted model (A) but excludes comorbidity as a covariate.

Bolded values denote $p<0.05$

Table 5.3.2.1.1a. Sensitivity Analysis[1] for Time to First-Event Hospitalization during 1 Year Follow-up Associated with Baseline Social Vulnerability[2], Linked Cohort (n=1,066), Removal of Social Domains

	HRs for Hospitalization During 1-Year Follow-Up, ACCES-DAL (n=1,066)						
	HRs (95% CI)						
	Fully Adjusted A[ǁ]	**Without Communication to engage in wider community**	**Without Living situation**	**Without Social Support**	**Without Socially-oriented activities of daily living**	**Without Social engagement and leisure activities**	**Without Empowerment and life control**
Low Social Vulnerability (ref gp) (n=360)	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Intermediate Social Vulnerability (n=335)	1.07 (0.83-1.39)	1.15 (0.89-1.50)	1.15 (0.90-1.46)	0.91 (0.70-1.19)	1.18 (0.92-1.51)	1.22 (0.94-1.59)	1.10 (0.84-1.42)
High Social Vulnerability (n=371)	**1.25 (1.02-1.52)**	**1.30 (1.08-1.57)**	1.18 (0.96-1.45)	1.21 (0.98-1.50)[∞]	**1.30 (1.06-1.58)**	**1.29 (1.04-1.60)**	**1.32 (10.6-1.65)**

[1] Sensitivity analyses for the Linked cohort were executed using adjusted model (A).

[2] SVI cut-off scores: low social vulnerability <0.261; intermediate social vulnerability 0.261-0.404; high social vulnerability >0.404.

[ǁ] Adjusted model (A) controlled for age, sex, fatigue, health instability, comorbidity, number of medications used, frequency of hospitalizations in past year, and health region

Bolded values denote p<0.05

∞ denotes p<0.1

Table 5.3.2.1.1b. Sensitivity Analysis[1] for Time to First-Event Hospitalization during 1 Year Follow-up Associated with Baseline Social Vulnerability[2], Linked Cohort (n=1,066), Removal of Social Variables from Living Situation Social Domain

	HRs for Hospitalization During 1-Year Follow-Up, ACCES-DAL (n=1,066)		
	Fully Adjusted A‖	**Without "Marital Status"**	**Without "Room Type"**
Low Social Vulnerability (ref gp) (n=360)	1.00	1.00	1.00
Intermediate Social Vulnerability (n=335)	1.07 (0.83-1.39)	1.10 (0.86-1.41)	1.11 (0.86-1.43)
High Social Vulnerability (n=371)	**1.25 (1.02-1.52)**	**1.24 (1.03-1.49)**	1.15 (0.93-1.43)

[1] Sensitivity analyses for the Linked cohort were executed using adjusted model (A).

[2] SVI cut-off scores: low social vulnerability <0.261; intermediate social vulnerability 0.261-0.404; high social vulnerability >0.404.

‖Adjusted model (A) controlled for age, sex, fatigue, health instability, comorbidity, number of medications used, frequency of hospitalizations in past year, and health region

Bolded values denote p<0.05

∞ denotes p<0.1

Table 5.3.2.1.1c. Sensitivity Analysis[1] for Time to First-Event Hospitalization during 1 Year Follow-up Associated with Baseline Social Vulnerability[2], Linked Cohort (n=1,066), Removal of Social Variables from Social Support Social Domain

	HRs for Hospitalization During 1-Year Follow-Up, ACCES-DAL (n=1,066)					
	Fully Adjusted A‖	**Without "CSF"**	**Without "relfam"**	**Without "visit"**	**Without "phoem"**	**Without "lonely"**
Low Social Vulnerability (ref gp) (n=360)	1.00	1.00	1.00	1.00	1.00	1.00
Intermediate Social Vulnerability (n=335)	1.07 (0.83-1.39)	1.07 (0.87-1.32)	1.08 (0.84-1.40)	1.10 (0.86-1.41)	1.18 (0.91-1.54)	1.26 (0.97-1.62)∞
High Social Vulnerability (n=371)	**1.25 (1.02-1.52)**	**1.29 (1.05-1.59)**	**1.28 (1.04-1.57)**	1.19 (0.97-1.46)	**1.22 (1.00-1.49)**	**1.43 (1.16-1.78)**

[1] Sensitivity analyses for the Linked cohort were executed using adjusted model (A).

[2] SVI cut-off scores: low social vulnerability <0.261; intermediate social vulnerability 0.261-0.404; high social vulnerability >0.404.

‖ Adjusted model (A) controlled for age, sex, fatigue, health instability, comorbidity, number of medications used, frequency of hospitalizations in past year, and health region

Abbreviations: CSF=close to someone in the facility; relfam=strong and supportive relationship with family; visit=visit with a long-standing social relation or family member; phoem=other interaction with long-standing social relation or family member (e.g., phone, email); lonely=says or indicates loneliness.

Bolded values denote p<0.05

∞ denotes p<0.1

Table 5.3.2.2a. Unadjusted and Adjusted Hazard Ratios for Time to First-Event Hospitalization during 1 Year Follow-up Associated with Baseline Social Vulnerability[1], Dementia Subgroup, Linked Cohort (n=609)

	Hazard Ratio (95% Confidence Interval)		
	Unadjusted HR (95% CI)	**Adjusted HR (95% CI) Model A**[‖]	**Adjusted HR (95% CI) Model B**[‡]
Low Social Vulnerability (ref gp) (n=157)	1.00	1.00	1.00
Intermediate Social Vulnerability (n=177)	1.37 (0.99-1.89)[∞]	1.16 (0.81-1.65)	1.16 (0.82-1.64)
High Social Vulnerability (n=275)	**1.66 (1.30-2.14)**	**1.46 (1.05-2.05)**	**1.50 (1.05-2.12)**

[1] SVI cut-off scores: low social vulnerability <0.261; intermediate social vulnerability 0.261-0.404; high social vulnerability >0.404.

[‖] Adjusted model (A) controlled for age, sex, cognitive impairment, fatigue, health instability, comorbidity, number of medications used, frequency of hospitalizations in past year, bowel incontinence, and health region.

[‡]Adjusted model (B) repeats adjusted model (A) but excludes comorbidity as a covariate

Bolded values indicate $p<0.05$

∞ denotes $p<0.1$

Table 5.3.2.2b. Unadjusted and Adjusted Hazard Ratios for Time to First-Event Hospitalization during 1 Year Follow-up Associated with Baseline Social Vulnerability[1], Non-Dementia Subgroup, Linked Cohort (n=457)

	Hazard Ratio (95% Confidence Interval)		
	Unadjusted HR (95% CI)	**Adjusted HR (95% CI) Model A**[‖]	**Adjusted HR (95%CI) Model B**[‡]
Low Social Vulnerability (ref gp) (n=203)	1.00	1.00	1.00
Intermediate Social Vulnerability (n=158)	1.03 (0.69-1.53)	1.00 (0.67-1.50)	1.00 (0.67-1.51)
High Social Vulnerability (n=96)	1.03 (0.73-1.45)	1.04 (0.72-1.51)	1.07 (0.74-1.55)

[1] SVI cut-off scores: low social vulnerability <0.261; intermediate social vulnerability 0.261-0.404; high social vulnerability >0.404.

[‖] Adjusted model (A) controlled for age, sex, cognitive impairment, fatigue, health instability, comorbidity, number of medications used, frequency of hospitalizations in past year, bowel incontinence, and health region.

[‡]Adjusted model (B) repeats adjusted model (A) but excludes comorbidity as a covariate.

Bolded values indicate $p<0.05$

Table 5.3.2.2.1a. Sensitivity Analysis[1] for Time to First-Event Hospitalization during 1 Year Follow-up Associated with Baseline Social Vulnerability[2], Dementia Subgroup, Linked Cohort (n=609), Removal of Social Domains

	HRs for Hospitalization During 1-Year Follow-Up, ACCES-DAL Dementia Subgroup (n=609)						
	HRs (95% CI)						
	Fully Adjusted A‖	**Without Communication to engage in wider community**	**Without Living situation**	**Without Social Support**	**Without Socially-oriented activities of daily living**	**Without Social engagement and leisure activities**	**Without Empowerment and life control**
Low Social Vulnerability (ref gp) (n=157)	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Intermediate Social Vulnerability (n=177)	1.16 (0.81-1.65)	1.22 (0.81-1.85)	1.34 (0.96-1.87)$^{\infty}$	0.96 (0.66-1.41)	1.25 (0.89-1.74)	1.32 (0.89-1.95)	1.13 (0.78-1.64)
High Social Vulnerability (n=275)	**1.46 (1.05-2.05)**	1.44 (0.99-2.11)$^{\infty}$	**1.45 (1.02-2.07)**	1.26 (0.85-1.88)	**1.45 (1.05-2.00)**	**1.49 (1.01-2.20)**	**1.52 (1.12-2.06)**

[1] Sensitivity analyses for the Linked cohort were executed using adjusted model (A).

[2] SVI cut-off scores: low social vulnerability <0.261; intermediate social vulnerability 0.261-0.404; high social vulnerability >0.404.

‖ Adjusted model (A) controlled for age, sex, and baseline measures of cognitive impairment, fatigue, health instability, comorbidity, number of medications used, frequency of hospitalizations in past year, bowel incontinence, and health region.

Bolded values denote $p<0.05$

∞ denotes $p<0.1$

Table 5.3.2.2.1b. Sensitivity Analysis[1] for Time to First-Event Hospitalization during 1 Year Follow-up Associated with Baseline Social Vulnerability[2], Dementia Subgroup, Linked Cohort (n=609), Removal of Social Variables from Communication to Engage in Wider Community Social Domain

	HRs for Hospitalization During 1-Year Follow-Up, ACCES-DAL Dementia Subgroup (n=609)				
	HRs (95% CI)				
Baseline Characteristics [n, (column %), unless otherwise noted]	**Fully Adjusted A**ǁ	**Without "primary language"**	**Without "understanding others"**	**Without "hearing"**	**Without "vision"**
Low Social Vulnerability (ref gp) (n=157)	1.00	1.00	1.00	1.00	1.00
Intermediate Social Vulnerability (n=177)	1.16 (0.81-1.65)	1.14 (0.81-1.62)	1.13 (0.79-1.63)	1.37 (0.95-1.95)∞	1.13 (0.80-1.61)
High Social Vulnerability (n=275)	**1.46 (1.05-2.05)**	**1.49 (1.07-2.09)**	**1.44 (1.03-2.03)**	**1.54 (1.06-2.25)**	**1.43 (1.01-2.01)**

[1] Sensitivity analyses for the Linked cohort were executed using adjusted model (A).

[2] SVI cut-off scores: low social vulnerability <0.261; intermediate social vulnerability 0.261-0.404; high social vulnerability >0.404.

ǁ Adjusted model (A) controlled for age, sex, and baseline measures of cognitive impairment, fatigue, health instability, comorbidity, number of medications used, frequency of hospitalizations in past year, bowel incontinence, and health region.

Bolded values denote $p<0.05$

∞ denotes $p<0.1$

Table 5.3.2.2.1c. Sensitivity Analysis[1] for Time to First-Event Hospitalization during 1 Year Follow-up Associated with Baseline Social Vulnerability[2], Dementia Subgroup, Linked Cohort (n=609), Removal of Social Variables from Social Support Social Domain

	HRs for Hospitalization During 1-Year Follow-Up, ACCES-DAL Dementia Subgroup (n=609)					
	HRs (95% CI)					
	Fully Adjusted A‖	**Without "CSF"**	**Without "relfam"**	**Without "visit"**	**Without "phoem"**	**Without "lonely"**
Low Social Vulnerability (ref gp) (n=157)	1.00	1.00	1.00	1.00	1.00	1.00
Intermediate Social Vulnerability (n=177)	1.16 (0.81-1.65)	1.30 (0.92-1.85)	1.19 (0.83-1.70)	1.22 (0.88-1.69)	1.27 (0.90-1.79)	**1.44 (1.01-2.05)**
High Social Vulnerability (n=275)	**1.46 (1.05-2.05)**	**1.70 (1.19-2.43)**	**1.49 (1.06-2.09)**	1.33 (0.94-1.89)	1.32 (0.93-1.88)	**1.76 (1.24-2.52)**

[1] Sensitivity analyses for the Linked cohort were executed using adjusted model (A).

[2] SVI cut-off scores: low social vulnerability <0.261; intermediate social vulnerability 0.261-0.404; high social vulnerability >0.404.

‖ Adjusted model (A) controlled for age, sex, and baseline measures of cognitive impairment, fatigue, health instability, comorbidity, number of medications used, frequency of hospitalizations in past year, bowel incontinence, and health region.

Abbreviations: CSF=close to someone in the facility; relfam=strong and supportive relationship with family; visit=visit with a long-standing social relation or family member; phoem=other interaction with long-standing social relation or family member (e.g., phone, email); lonely=says or indicates loneliness.

Bolded values denote p<0.05

∞ denotes p<0.1

6.0 Discussion

6.1 Univariate and Bivariate Descriptive Results

6.1.1 Baseline Resident Characteristics

The ACCES DAL cohort used in the current investigation was more impaired than community-based populations (200), less impaired than LTC populations (4,37), and similar to other AL populations (34,92). The distributions of ACCES DAL resident characteristics were similar to two American assisted living studies (34,92). Mean age in the current ACCES investigation (84.4 ± 7.3) was similar to that of the two American studies: 86.6 ± 8.2 (92) and 82.8 ± 9.4 (34). A similar sex distribution was also found between ACCES DAL (76.8% female) and the two American studies: 78.0% female (92), and 77.3% female (34). Marital status and the prevalence of depression and dementia were only measured in the Maryland Assisted Living Study (92). The prevalence of widowhood was similar between samples with 71.4% of ACCES DAL residents and 70% of Maryland AL residents being widowed (92). Further, although the prevalence of dementia observed in the ACCES DAL cohort (57.6%) was less than that observed in the Maryland Assisted Living Study (67.7%) (92), it was more than that reported in a nationally representative AL, American study (42.0%) (103).

6.1.2 Baseline Resident Characteristics Stratified by Dementia Status

About 58% (n=627) of ACCES DAL residents had a diagnosis of dementia compared to 71% (n=691) of ACCES LTC residents (37). Again, the ACCES DAL dementia subgroup used in the current investigation was less impaired than the LTC dementia subgroup examined in a sub-ACCES study (86).

The ACCES DAL dementia subgroup was similar to an American AL study executed by Sloane (193). Both cohorts had similar mean age (DAL: 85.2±6.7; AL: 84.4±6.9), percent female

(DAL: 77.8%; AL: 78.1%) and being widowed (DAL: 73.2%; AL: 73.3%), and had similar rates of cognitive and functional impairment. However the DAL dementia subgroup had greater comorbidity compared to the American AL dementia cohort (DAL: 4.8±2.0; AL: 3.6±2.3) (193). The ACCES DAL non-dementia subgroup was also similar to an American AL study executed by Park (27)[39]. Both cohorts had similar mean age (DAL: 83.4±8.0; AL: 85.3±5.4), and percent female (DAL: 75.1%; AL: 69%) and widowed (DAL: 69.1%; AL: 76%).

A comparison between the two DAL dementia strata showed that the dementia subgroup was significantly older, more likely to be widowed, to experience some degree of fatigue, to have depressive symptoms, to be cognitively and functionally impaired, to have bladder and bowel incontinence, and to have greater comorbidity. These findings suggest that residents with dementia were more physically vulnerable and therefore had fewer personal resources to navigate their environments than residents without dementia. This finding suggests that residents with dementia are in greater need of support from their care partners. An increasing need for support also increases vulnerability physically, psychologically, emotionally, and socially. Unfortunately, there are no policies that dictate dementia-specific training for care staff which may contribute to poor care practices (i.e., missed hygienic practices, abuse, and inappropriate responses to personal expressions) on already vulnerable residents.

Previous findings state that greater perceived competence in dementia care increases the wellbeing of the care provider (201). This positive affect and relationship building translates to better care and better outcomes for the care recipient (202); however, the opposite is also true. In practice, there are concerns that some frontline care providers are not trained to interact and provide care to persons with dementia. Insufficient training may result in poor care and

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[39] Functional and cognitive impairment was not measured as baseline characteristics in this study.

subsequent poor resident outcomes such as further functional and cognitive impairment (and greater vulnerability), hospitalization, and death.

Interestingly, there was no significant difference in level of health instability (CHESS score) between dementia strata. This is interesting because of the significant differences in level of cognitive and functional impairment, fatigue, and depressive symptoms found between dementia strata that are typical of unstable health. Considering these findings simultaneously would suggest that the dementia subgroup was more impaired but had equal health stability (or instability) compared to the non-dementia subgroup. This may suggest that based on health instability, both subgroups had equal opportunity to experience cognitive decline and hospitalization. Although there was no significant difference in the incidence of cognitive decline between dementia strata, a statistically significant difference in first-event hospitalization was observed between dementia strata[40]. This difference would be the result of additional factors other than health instability (CHESS score). A potential influence was social vulnerability.

6.1.3 Outcomes

6.1.3.1 Cognitive Decline

Cognitive decline has been seldom studied as an outcome in the AL setting, but has been studied in both the community and LTC settings. The incidence of cognitive decline over one year observed in the Survived ACCES DAL cohort (n=889) (42.5%) was higher than the incidence reported in a nationally representative Canadian study – Canadian Study of Health and Aging (CSHA). Andrew and colleagues (18) observed that 31.3% of a community-dwelling sample experienced cognitive decline over five years. This difference may be due to the differing

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[40] Recall that significantly more residents without dementia experienced hospitalization as their first-event compared to those with dementia.

methodology used, sample characteristics, and settings. First, the methods used in measuring and defining cognitive decline differed. The current investigation used the CPS score to measure cognition where any ≥1-point change was considered a clinically significant change in cognitive function. Andrew and colleagues used the Modified Mini-Mental State Examination (3MS) to measure cognition where a ≥5-point change in the 3MS signified a meaningful change in cognitive function (18). Although both the CPS and 3MS may capture meaningful cognitive impairment, both measures will vary to some extent in their sensitivity to change and in their specific psychometric properties resulting in differing cognitive decline incidence rates.

Second, samples were different between the current investigation and that of Andrew and colleagues (18). Andrew and colleagues used a community-based sample that had superior physical and cognitive functioning at baseline. This sample should therefore have a reduced risk of cognitive decline compared to a more impaired, DAL population. Further, it is possible that those community-dwelling persons who were at higher risk of cognitive decline at baseline, were transitioned to institutional care (i.e., AL or LTC) or died during follow-up. These participants were not captured in the cognitive decline incidence estimates. In fact, 34.6% (n=1308) of the study sample was lost to follow-up, and 71.1% (n=930) of this was due to death and 23.6% (n=309) was due to institutionalization or a diagnosis of dementia at baseline (18).

In another community-based study, 14.8% of participants experienced cognitive decline over three years, 29.1% over six years, and 37.6% over 12 years (25). Again, the rate of cognitive decline observed in the ACCES DAL cohort was greater than this community-based study. This difference may be due to a host of factors including differences in the measurement of cognitive decline, setting, and sample.

One study directly compared the rates of cognitive decline between AL residents and LTC residents (193). This study demonstrated no significant difference in the rate of cognitive decline between these two settings[41]. Another study found that institutionalization greatly increased the risk of cognitive decline compared to community living (203). This supports the present findings that cognitive decline is greater in AL than in the community.

6.1.3.1.1 Cognitive Decline by Dementia Status

There was no significant difference in the incidence of cognitive decline between dementia strata (dementia subgroup: 43.7%; non-dementia subgroup: 40.9%; p=0.41). This finding was interesting since baseline mild, moderate, and severe cognitive impairment was found to be protective of cognitive decline over one year relative to intact cognition at baseline. Further, borderline intact baseline cognition increased the odds of cognitive decline relative to mild, moderate, and severe cognitive impairment. From these findings, it would be reasonable to project that those without dementia would experience greater cognitive decline than those with dementia since those without dementia had higher baseline cognitive function.

This finding needs to be interpreted with caution because of the methodological issues with the CPS score. As will be noted in the Limitations section (section 7), the CPS is limited in its ability to detect change in cognition. The CPS has a relatively small range compared to more comprehensive global measures of cognition and therefore experiences floor and ceiling effects. The CPS further does not measure all aspects of cognition and therefore may miss important changes in cognitive functioning (146,204–211). Considering this limitation, the dementia subgroup may have in fact experienced greater cognitive decline than the non-dementia subgroup, but the CPS was unable to detect this change due to ceiling effects and its lack of

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[41] No incidence rate was given in this study.

comprehensiveness. Another possibility is that the non-dementia subgroup experienced greater cognitive decline than the dementia subgroup but this change was undetected because the appropriate cognitive domains were not measured in the CPS.

6.1.3.2 First-Event Hospitalization

The annual incidence of first-event hospitalization observed in the Linked ACCES DAL cohort (1,066) (38.9%) was similar to that reported in three American AL studies. Zimmerman and colleagues (14) reported a 12.7% probability of hospitalization over 100 days (46%-51% per year); Hedrick and colleagues (212) reported a 40.2% incidence of one or more hospitalizations annually; and Dobbs and colleagues (213) reported a 33% incidence of any hospitalization.

The annual incidence of first-event hospitalization observed in the current investigation (38.9%) was much higher than that observed in an American state-wide LTC study (9.1%) (156). Although not presented, DAL facilities had lower levels of staffing oversight than LTC facilities and therefore may have been ill-prepared for acute health changes. They may have also simply failed to recognize the need for additional care in order to prevent drastic, life-threatening health changes that warranted a hospitalization

The high rate of hospitalization observed in the current investigation may suggest that the AL setting may be ill-equipped to manage residents with complex care needs despite its philosophy of aging in place.

6.1.3.2.1 First-Event Hospitalization by Dementia Status

Similar rates of hospitalization were observed in those with dementia from DAL (36.1%) and in one AL American study. Sloane and colleagues (193) reported 41.8% of AL residents with dementia being hospitalized over one year.

Comparing the rate of hospitalization among DAL (and AL) residents with dementia (193) and LTC residents with dementia, DAL (and AL) residents were more likely to experience a hospitalization than were LTC residents (86,193). In contrast, community-based studies have demonstrated greater risk of hospitalization among persons with dementia as compared to persons without dementia (72–74,214). These differences in hospitalization rates by setting point to facility-level factors as possible explanations for this trend.

Although dementia has been cited as a protective factor of hospitalization (86,155,156), it seems that this finding may largely relate to those in institutional settings. This observation is likely because an institutional facility like DAL (or LTC) has readily available resources (i.e., professional care, equipment) that can be used to prevent hospitalizations, which are otherwise not available in a private, community-based dwelling. For example, persons with dementia are often more complex with multi-morbidity and are therefore more difficult to manage without appropriate resources (70,215). Further, dementia causes the central nervous system to become more vulnerable to metabolic insults arising from illness, and therefore causes the person to become sicker than if they were otherwise dementia-free (216) (i.e., the same illness is more severe in someone with dementia than in someone without). Again, without proper resources, hospitalization may be the only option for managing acute health changes and chronic medical conditions.

As was seen in the current investigation, DAL residents with dementia were less likely to experience a hospitalization as their first event compared to those without dementia (36.1% v 42.2%). This pattern may be the result of many interrelated processes. For example, closer medical supervision may be paid to residents with dementia. As a consequence, the detection and treatment of acute health changes is accomplished earlier thereby preventing the need for hospitalization (155). Further, staff and family may have greater reluctance to hospitalize co-morbid residents with dementia due to known adverse outcomes (86).

Another explanation for the difference in hospitalization rates among DAL residents with and without dementia is that unlike residents with dementia, residents without dementia are better able to communicate symptoms. Residents without dementia also present with traditional signs and symptoms whereas residents with dementia do not (86). These resident-level factors may more easily prompt accelerated hospitalization among residents without dementia.

Based on the results of the present study and those of published literature (72–74,86,156), it seems that setting is an important variable to consider when evaluating the hospitalization risk difference between those with and without dementia. As demonstrated above, residents with dementia in institutional settings such as AL or LTC facilities are at a reduced risk of hospitalization in comparison with residents without dementia. In contrast, community-dwelling persons with dementia are at an increased risk of hospitalization in comparison with persons without dementia.

6.2 Objective 1

6.2.1 Objective 1a: Estimate the prevalence and correlates of social vulnerability in DAL residents

6.2.1.1 Baseline Social Vulnerability Status

The SVI had a range of 0.0556-0.865 for the overall sample. This range was similar to that reported by Armstrong (0-0.89) in a community-based sample of Japanese men aged 72-93 years (56). It also coincided with Andrew's reports that no person is completely free of all social deficits (10,18). The SVI had a median of 0.33 (IQR 0.204; 0.24, 0.44) which was higher than that reported by Andrew (10) in two nationally-representative, Canadian community-based samples aged ≥65 years with a female majority (60% and 58%). The SVI also had a right-skewed distribution similar to that reported by Armstrong (56), but different to the approximately normal distribution (with slight right-skewing) reported by Andrew earlier (10,18). These slight differences may be due to the setting and population under investigation. As previously described in section 6.1, the present study included DAL residents with greater functional and cognitive deficits and who were therefore more impaired than the community-based samples used by Andrew and colleagues (10,18,56). The differences may also be due to the fact that the overall DAL sample consisted of both residents with and without dementia, whereas the samples studied by Andrew and colleagues did not include persons with dementia (10,18). A more equivalent comparison between the present study and that by Andrew will come from the non-dementia subgroup used here.

6.2.1.2 Baseline Resident and Facility Characteristics by Social Vulnerability

Similar to findings reported by Andrew and Shega (10,19), social vulnerability was associated with increasing age, cognitive and functional impairment, and increasing comorbidity.

The current investigation also found that social vulnerability was significantly associated with fatigue, depressive symptoms, and unstable health.

Persons with high social vulnerability had fewer resources to engage socially. Specifically, those with high social vulnerability were more likely to be fatigued; to experience depressive symptoms, unstable health, and cognitive and functional impairments; and to have a greater number of comorbid conditions. These personal resources (functional and cognitive health) are essential to the maintenance of one's social health. Without the ability to navigate and move about the DAL facility or outside community, the opportunities for social engagement are drastically reduced. Further, if a resident is unable to communicate or act in normative ways due to cognitive impairments (such as in those with dementia) (217), the opportunities for social engagement are again reduced because of miscomprehension or stigma (63). Lastly, psychological illness such as depression impedes social activity and therefore increases the level of social vulnerability. Social vulnerability and physical, cognitive and psychological health are intimately related. The fewer physical, cognitive, and psychological resources a person has, the more likely that individual is to be socially vulnerable.

In contrast to findings reported by Andrew and Shega (10,19), social vulnerability was not more common among females. Although females composed the majority of the current investigation, they were no more likely to experience low, intermediate, or high social vulnerability than males were. Therefore, when devising preventative and treatment interventions for social vulnerability, both males and females should be equally targeted.

Interestingly, social vulnerability was not associated with marital status as it was measured here[42] (see section 4.3.1 for coding approach of marital status); however, it was associated with being married versus not being married in a study by Shega (19). Shega reported that as social vulnerability increases, the likelihood of being married decreases. Further, people who are married have been found to have larger social networks than widows and widowers (130,131). Using an alternative coding approach for marital status[43], a similar relationship was found between marital status and social vulnerability (not shown) – increasing social vulnerability was significantly associated with a lower likelihood of being married or having a significant other.

The coding approach offered for marital status as a 3-level variable in section 4.3.1 was used for descriptive statistics. The alternate coding approach of marital status as a binary variable was used in the SVI.

6.2.2 Objective 1b: Estimate the prevalence and correlates of social vulnerability in DAL residents with and without dementia

6.2.2.1 Baseline Social Vulnerability Status Stratified by Dementia

The non-dementia subgroup had a similar range (0.056-0.865), median (0.278), IQR (IQR 0.185; 0.204, 0.389), and distribution (right-skewed) as that reported previously in section 6.2.1. The comparisons with Armstrong (56) and Andrew (10,18) also remain the same.

The dementia subgroup also had a similar range (0.056-0.815), and distribution as that reported in section 6.2.1 and in the non-dementia subgroup. The comparisons with Armstrong (56) and Andrew (10,18) also remain the same. However, the SVI among the dementia subgroup had a greater median of 0.389 (IQR 0.241; 0.259, 0.500) than that in the non-dementia subgroup

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[42] See section 4.3.1 for coding approach of marital status.

[43] See appendix G in SVI coding approach for alternate approach to coding marital status. Marital status in the SVI was coded as (1) married or has a significant other; (2) never married, widowed, separated or divorced.

and that reported by Andrew (10) in two nationally-representative, Canadian community-based samples aged ≥65 years with a female majority (60% and 58%). This is likely because those with dementia consistently had a higher prevalence of high social vulnerability than residents without dementia in the current investigation, and compared to studies conducted by Andrew and colleagues using community-based samples free of persons with dementia (10,18). Further, the dementia subgroup may have something inherent about them as a result of dementia that puts them at higher risk of social vulnerability as discussed in section 2.1.2.

The prevalence of high social vulnerability was significantly higher in the dementia subgroup compared to the non-dementia subgroup (45.9% v 21.0%). This finding raises important questions concerning the mechanisms that drive this observation. As previously noted, the dementia subgroup was more cognitively and functionally impaired than the non-dementia subgroup. Despite the fact that the majority (69.7%) of residents with dementia were functionally capable to engage socially, this subgroup remained more socially vulnerable than the non-dementia subgroup. A few hypotheses have been developed to explain this phenomenon. The first is that although residents with dementia were relatively unimpaired functionally (as noted above), their physical and cognitive health remained inferior to those without dementia. These minor differences may greatly impact social health. Research has shown that the more physically and cognitively able a person is, the more opportunities available for social interactions (38,39) and therefore the more protected they are from social vulnerability. Due to the negative cognitive and physical implications of dementia, persons with dementia may experience greater difficulty in succeeding in normative social interaction, and therefore may have a higher risk of social vulnerability.

The second hypothesis is that staff members may maintain the misconception that residents with dementia do not benefit from social activity. Staff may believe that because residents with dementia may not remember if they engaged in a social outing or played bingo, these social engagements will not impact their social health – that they do not even have a domain of social health. As a result, staff may neglect to engage residents with dementia leaving them socially vulnerable.

Another possible explanation relates to the potential for prejudice and stigma in terms of how residents with dementia are viewed by staff, co-residents, and family. Such perceptions may result in residents with dementia being excluded from a multitude of facility and community activities, which may in turn increase their risk for social vulnerability. It has been found that staff-resident (12,218–220), resident-resident (202,220–222), and family-resident (42,220,223) relationships are important for resident social health, life satisfaction, and quality of life. One study also demonstrated a protective effect on social skills when interaction with staff was frequent (218). So not only are interactions important with respect to the need for social interaction and connectedness, it is also crucial for the maintenance of social skills. These social skills are the tools that enable an individual to continue to effectively interact socially and are therefore crucial to the prevention of social vulnerability. It is possible that staff, co-residents, and family believe that social interaction is unimportant for residents with dementia and therefore do not provide them with opportunities to do so. Without these interactions, residents, especially those with dementia, may become socially isolated and socially vulnerable.

Lastly, staff may put greater emphasis on physical health than on social health whether due to policies, time restrictions or teachings (i.e., medical model of care). Other possibilities include staffing availability and resource allotment. Although an activity director may be present, if the resources required to plan and implement social activities are not available, then the presence of an activity director is rendered null. Further, if the activity director was not trained in recreation programming for residents with dementia, then their programming may be ineffective. These are all possible explanations to support the observation that residents with dementia were more socially vulnerable than residents without dementia.

6.2.2.2 Baseline Resident and Facility Characteristics by Social Vulnerability Status Stratified by Dementia

Many similarities were observed between dementia strata and the associations found between resident- and facility-level (i.e., health region)[44] factors and social vulnerability (compare tables 5.2.2.2a and 5.2.2.2b; and 5.2.2.2c and 5.2.2.2d). In the dementia subgroups, resident and facility-level factors that were statistically significant predictors of social vulnerability included age, fatigue, depressive symptoms, health instability, cognitive and functional impairment, bladder and bowel incontinence, number of emergency department visits in the past 90 days, and health region. All variables except health region (which had no discernable pattern) showed positive relationships with social vulnerability. Although health region[45] did not have a discernable pattern here, further research may be completed to determine what components of health region drive the associations found.

In the non-dementia subgroups, resident and facility-level factors that were statistically significant predictors of social vulnerability included marital status (Survived cohort only), fatigue (Linked cohort only), depressive symptoms, cognitive and functional impairment, and health region (Linked cohort only). The difference in significant associations between resident

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[44] Health region was the only facility-level variable used because it represents a high level systems- and facility-level variable. Health region encompasses many of the other facility-level variables such as rural or urban status, the services available to residents, community size, and governance.

[45] Health region represents distinct health systems reflecting rural/urban status, community size, services offered, policies, and more.

and facility-level factors and social vulnerability among the non-dementia subgroups may be the result of differing sample sizes[46]. Again, all variables except health region (which had no discernable pattern) showed positive relationships with social vulnerability. Specifically, for marital status, high social vulnerability (in relation to intermediate and low social vulnerability) was related to a reduced likelihood of being married or having a partner, and a greater likelihood of being widowed, never married, separated, or divorced.

These observations give greater insight into social vulnerability. For example, DAL populations with and without dementia have common variables associated with social vulnerability. This means that certain interventions can be created that are effective in alleviating or preventing social vulnerability among DAL residents, regardless of dementia status. Second, those variables remain relatively stable across samples (i.e., Survived and Linked cohorts). As a result, interventions may be generalizable to other DAL settings. Third, a greater number of variables are associated with social vulnerability in DAL populations with dementia. This may assist in our understanding as to why DAL residents with dementia were found to have a higher prevalence of high social vulnerability compared to those without dementia. The greater number of risk factors available (not necessarily present) means that there is greater opportunity to become burdened by those risk factors (i.e., it is more likely that you will have one risk factor in a total of 100 possibilities, than it is to have one out of two possibilities). Stated in a different way, some of the observed associations with social vulnerability in the dementia subgroup may be due to chance and therefore require further investigation.

This study may also support the use of social vulnerability in predicting CPS score among residents with dementia. For example, in the Survived dementia subgroup, 85.3% and

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[46] See section 4.2 for a description of the analytic samples.

95.4% of residents with intermediate and high social vulnerability respectively, had a CPS score of ≥2. This finding does not extend to the non-dementia subgroup. Similarly, bladder and bowel incontinence were only significantly associated with social vulnerability among DAL dementia populations. It is possible that residents with dementia who have bladder and/or bowel incontinence are not as consciously aware when they have an accident (maybe due to reduced sensations) and therefore do not clean up right away. In response, fellow residents shun and avoid residents with dementia in this state resulting in further isolation and social vulnerability.

It is also relevant to comment on the variables that were not associated with social vulnerability. In the Survived and Linked dementia subgroups, sex, marital status, number of comorbidities, number of medications, the presence of a "do not hospitalize" advance directive, and the number of hospitalizations in the past 90 days were not significantly associated with social vulnerability.

In the Survived and Linked non-dementia subgroups, age, sex, health instability, bladder and bowel incontinence, number of comorbidities, number of medications, the presence of a "do not hospitalize" advance directive, and the number of hospitalizations and emergency department visits in the past 90 days were not significantly associated with social vulnerability. In the Survived non-dementia subgroup, and the Linked non-dementia subgroup, fatigue and health region, and marital status respectively were additional variables that were not significantly associated with social vulnerability.

The finding that age was not significantly associated with social vulnerability among the non-dementia subgroups is in contrast to reports offered by Andrew and colleagues (10,18,19) who similarly studied samples free of dementia. There may be a true association with age and social vulnerability among the non-dementia subgroups; however, as a result of small sample sizes, this association was undetected.

Some of the variables that were associated with social vulnerability among the dementia subgroups were not associated with social vulnerability among the non-dementia subgroups. It may therefore be that the presence of dementia magnifies the impairments present (i.e., resident-level factors: age, fatigue, health instability, and bladder and bowel incontinence) and subsequently renders them to become significantly associated with social vulnerability. The mechanisms through which this magnification occurs are unknown and require further investigation.

Acknowledging the factors that are not associated with social vulnerability common to specific DAL populations will inform future interventions that work to alleviate or prevent social vulnerability. In these interventions, the variables listed above would not be included as risk factors to be reduced among DAL residents.

6.3 Objective 2

The consequences associated with social vulnerability and social factors are increasingly being investigated. Studies have found positive associations with social vulnerability and social factors and increased risk of mortality, cognitive decline, hospitalization, frailty, pain, disability, nursing home placement, poor cardiovascular, neuroendocrine and immune functioning, and dementia (4–7,10,17,18,43,44,55,86,224), and negatively with general wellbeing, and quality of life (38,49,202). These associations have been found in various populations including community-based, AL, and LTC samples, as well as in men and women, in Canada, the US, and Europe, and in cross-sectional and longitudinal studies. Although sparse, some of this research has been conducted with a dementia focus (7,43,86). The present research added to this area of inquiry, investigating the influence of social vulnerability in a general DAL setting, as well as in a DAL cohort stratified by dementia.

6.3.1 Objective 2a: Examine the associations between baseline measures of social vulnerability and subsequent cognitive decline over one year, among DAL residents overall, and stratified by dementia status

6.3.1.1 Social Vulnerability and Cognitive Decline, Survived Cohort (n=889)

Our findings indicate that social vulnerability increases the odds of cognitive decline over one year among older DAL residents. Further, our findings indicate a possible dose-response relationship between social vulnerability and odds of cognitive decline. These findings are consistent with previous observations reported by Andrew and colleagues (18). Our findings are also in agreement with published literature that used more simplified approaches to measuring social vulnerability and its influence on cognitive decline (25,47,206,211,225,226).

Studies using simplified approaches to social vulnerability were conducted using community-based samples. Bassuk (25) revealed that social disengagement increased the risk of cognitive decline over 3, 6, and 12 years among older (≥65 years) Americans. Another 12-year longitudinal study demonstrated that both interpersonal activity within larger social networks and emotional social support independently reduced the odds of cognitive decline among older (≥50 years) Americans (226). The MacArthur Studies of Successful Aging also found that greater emotional social support was a predictor of better cognitive function over 7.5 years among high functioning adults aged 70-79 years (211). Zunzunegui (47) demonstrated an increased probability of cognitive decline (measured by orientation and memory) over four years among Spanish community-dwelling older adults aged ≥65 years who had poor social connections, social disengagement, and infrequent social activity participation. Barnes (206) explored the influence of social resources (i.e., social networks and social engagement) among non-Hispanic African Americans and Whites aged ≥65 years, and found that persons with greater social resources had a reduced risk of cognitive decline over an average of 5.3 years. Further, Béland (225) found a protective effect on cognitive decline through high family and non-family ties, and social integration among Spanish community-dwelling older adults aged ≥65 years.

6.3.1.1.1 Sensitivity Analyses

The sensitivity analyses showed that the Empowerment and Life Control social domain contributed largely to the observed associations. When the Empowerment and Life Control social domain was removed from the SVI, both intermediate and high social vulnerability in comparison to low social vulnerability became statistically non-significant predictors of cognitive decline over one year among older DAL residents.

Upon further investigation, it was found that only the removal of the "level of control person had over decision to move into assisted living" social variable from the Empowerment and Life Control social domain, affected the association between social vulnerability and cognitive decline. Interestingly, only intermediate social vulnerability was affected by the removal of the "level of control person had over decision to move into assisted living" social variable. These findings indicate that the "level of control person had over decision to move into assisted living" social variable contributed much to the association found between intermediate social vulnerability (in reference to low social vulnerability) and cognitive decline over one year. The finding that the level of control a person has to self-direct is an important contributor to the relationships between social vulnerability and cognitive decline, is consistent with a finding reported by Burge (220). Burge found that having control over the decision to move to AL increased perceptions of positive staff relationships and assistance (220). Staveley (227) also found that little control in the decision to relocate created much stress, and Heisler (228) found that it increased the risk of experiencing declines in health and wellbeing. In contrast, however, Street (202) found that the control a person had over the transition to AL did not affect wellbeing. Considering these conflicting findings, further investigation is warranted to determine whether the level of autonomy exercised in the decision to relocate to AL truly affects health-related outcomes.

6.3.1.2 Social Vulnerability and Cognitive Decline Stratified by Dementia Status, Survived, Cohort

To our knowledge, this is one of the first investigations of the association between social vulnerability and cognitive decline using a sample stratified by dementia. Our findings indicate that social vulnerability is predictive of cognitive decline over one year among DAL residents with and without dementia. Among DAL residents with dementia, intermediate social vulnerability was predictive of cognitive decline over one year; whereas high social vulnerability tended to increase the odds of cognitive decline but did not reach statistical significance at a significance level of <0.05. Among DAL residents without dementia, high (but not intermediate) social vulnerability (in reference to low social vulnerability) was predictive of cognitive decline over one year.

Interestingly, the odds ratio of cognitive decline reported here for the non-dementia subgroup (OR: 2.01; 95% CI: 1.02-3.97) was much greater than that reported by Andrew who also used a dementia-free population (OR: 1.36; 95% CI: 1.06 to 1.74) (18). The difference in magnitude of association may be the result of methodological differences. Specifically, Andrew used a community-based sample, whereas the current study used a sample from DAL; the methods used to measure cognitive decline differed (Andrew used the 3MS whereas the CPS was used here); and follow-up times also differed (Andrew used five years, and one year was used here). These methodological differences may explain the difference in odds ratios estimates.

However, the finding that high social vulnerability was predictive of cognitive decline among DAL residents without dementia may actually be spurious. As noted by Stoykova (53), a poor social network index is only associated with cognitive decline in persons with dementia; not in persons without dementia. She demonstrated that if participants with clinical and preclinical dementia are included in analyses of social vulnerability and cognitive decline, that significant associations result that may actually be spurious. When those with prodromal and clinical dementia were excluded from analyses, no significant associations were observed. It was noted that the prodromal effects of dementia may greatly contribute to findings supporting a significant influence of social vulnerability on cognitive decline when investigating a sample without dementia. These findings occur because those with prodromal dementia were not excluded because of insufficient follow-up time. It is possible that many of the residents included in the non-dementia subgroup had preclinical dementia that resulted in spurious findings.

The failure to observe a statistically significant association between high social vulnerability and cognitive decline among the dementia subgroup may be the result of covariance between social vulnerability and the dementia process. As previously noted, one of the first symptoms of dementia is social withdrawal (43,226,229,230). This collinearity could have obscured findings to the extent that high social vulnerability was not associated with cognitive decline among the dementia subgroup.

The lack of statistical significance observed for high and intermediate social vulnerability among the dementia and non-dementia subgroups respectively, may be a consequence of small sample sizes. Stratifying by dementia and then dividing by level of social vulnerability greatly reduced cell sizes and power, and may have therefore contributed to spurious associations.

Another possible explanation for the nonsignificant results found in this study is the short follow-up period of one year. The time required to experience and capture clinically meaningful cognitive decline may require more than one year among DAL residents with and without dementia. In previous research investigating social vulnerability as a predictor of cognitive decline, longer follow-up periods were examined (e.g., 5 and 8 years) (18). Other longitudinal investigations of the influence of various social variables on cognitive decline have used follow-up periods of 4 (47), 5 (224), 7 (225), and 12 years (204). All studies demonstrated statistically significant associations between their respective social variable(s) and cognitive decline over time. Due to these findings, it may be concluded that this sub-study of ACCES used an insufficiently long follow-up period that would allow us to find statistically significant results with respect to the association between high and intermediate social vulnerability and cognitive decline among residents with and without dementia respectively.

Alternatively, the finding that intermediate social vulnerability was not a significant predictor of cognitive decline among DAL residents without dementia may be a true association. It is possible that only the most severe state of social vulnerability is predictive of cognitive decline among DAL residents without dementia. This finding would be consistent with those found by Andrew and colleagues stating that the greater SVI score, the greater risk for adverse health outcomes (10,17,18,55).

6.3.1.2.1 Sensitivity Analyses

The sensitivity analyses showed that the Socially-Oriented Activities of Daily Living social domain contributed much to the observed associations in the dementia subgroup. Removing the Socially-Oriented Activities of Daily Living social domain from the SVI resulted in intermediate social vulnerability (in reference to low social vulnerability) as a predictor of cognitive decline to become non-significant. Upon further investigation, no single variable that composed the Socially-Oriented Activities of Daily Living social domain was responsible for the non-significant relationship.

This finding may indicate that the Socially-Oriented Activities of Daily Living social domain is a significant driver of the association between social vulnerability and cognitive decline over one year among DAL residents with dementia. The capacity to use the phone and transportation is a considerable avenue for outside engagement. Without the capacity to use the phone and transportation, a DAL resident would be quite confined to the DAL facility without any connection to the outside community and past relationships. These external relationships are particularly important in DAL residents with (and without) dementia because they instill familiarity a connection to a past life (27,231). Receiving social stimulation from a variety of sources may also be essential to the maintenance of cognition rather than participating in a greater frequency of the same, few activities (232). Without a connection to the surrounding community, DAL residents would be engaged in a smaller variety of activities that may increase their risk for cognitive decline.

This finding further suggests that only the combination of the social variables that make up the Socially-Oriented Activities of Daily Living social domain affect the association between intermediate social vulnerability (in reference to low social vulnerability) and cognitive decline over one year among DAL residents with dementia. This finding may indicate that using simplified versions of social vulnerability, as has been done by many (25,47,206,211,225,226), may not be comprehensive enough to detect important associations between social vulnerability and certain outcomes. Rather, a composite measure including multiple variables may be needed to detect these associations.

The sensitivity analysis conducted for the non-dementia subgroup found that Communication to Engage in Wider Community, Living Situation, Social Engagement and Leisure Activities, and Empowerment and Life Control social domains all greatly contributed to the association found between social vulnerability and cognitive decline. However, due to small sample size, it is likely that only the Empowerment and Life Control social domain truly impacted this association[47].

Upon further investigation, it was found that the individual removal of "consistent positive outlook" and "level of control person had over decision to move into AL" social variables contributed largely to the association found. However, due to small sample size, it is likely that only the "level of control person had over decision to move into AL" social variable truly impacted this association. Similar conclusions may be drawn here as discussed in section 6.3.1.1.1. Additionally, most individuals possess autonomy all throughout their adult lives. Losing autonomy late in life and being consciously aware of this fact is likely to impact a person's feelings of self-worth, personhood, and sense of purpose. These strong negative psychological affective states would likely produce stress that negatively influences cardiovascular health, which subsequently would work to affect cognition. An alternative mechanism may be that these negative affective states discourage health promoting behaviours that then contribute to poor cardiovascular health and subsequent cognitive decline.

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[47] Further investigation was only conducted for the Empowerment and Life Control social domain.

The fact that the “level of control person had over decision to move into AL” was a significant driver of the associations found between intermediate and high social vulnerability and cognitive decline among the full and non-dementia subgroups respectively, may suggest that this social variable is a proxy measure for vulnerability. It may be that this social variable represents elements of many other variables included in the SVI. For example, as the level of autonomy declines, the capacity to use the telephone or transportation may also decline. Other functional abilities such as hearing and vision, may also decline. Further, engaging with others and participating in social and leisure activities may also be reduced due to functional and cognitive impairments reflected in the loss of autonomy.

6.3.2 Objective 2b: Examine the associations between baseline measures of social vulnerability and subsequent time to first-event hospitalization over one year, among DAL residents overall, and stratified by dementia status

6.3.2.1 Cox Proportional Hazards Models: Social Vulnerability and Time to First-Event Hospitalization (n=1,066)

The findings indicate that high social vulnerability increases the risk of hospitalization among older DAL residents. Few studies have examined the link between social vulnerability and hospitalization. However, our findings are consistent with a previous ACCES study using a less comprehensive measure of social vulnerability (4). Specifically, Hogan and colleagues (4) found that low strength of social relationships (in reference to moderate - high strength) among DAL residents was significantly associated with hospitalization over one year. Further, this same study found that DAL residents with little to no time involved in activities (in reference to most time involved in activities) were significantly more likely to be hospitalized during the one year follow-up (4).

Interestingly, only high social vulnerability was a significant predictor of hospitalization. This observation is supported by findings from Andrew and colleagues that demonstrated greater social vulnerability corresponds with greater risk of negative outcomes (10,17,18,55). This same finding has been highlighted here in analyses conducted for social vulnerability and cognitive decline among DAL residents overall and residents without dementia. There may also be a threshold effect for social vulnerability where a certain social vulnerability level (or number of deficits) must be attained before negative outcomes occur.

6.3.2.1.1 Sensitivity Analyses

The sensitivity analyses suggested that the Living Situation and Social Support social domains were significant drivers of the associations observed between social vulnerability and risk of first-event hospitalization. The removal of either social domain resulted in high social vulnerability (in reference to low social vulnerability) to lose its statistical significance.

Upon further investigation of the Living Situation social domain, it was revealed that only the removal of the "room type" social variable influenced the association between high social vulnerability and risk of first-event hospitalization. This finding suggests that the "room type" social variable was largely responsible for the association found between high social vulnerability and risk of first-event hospitalization. The finding that non-kin room sharing significantly influenced the associations found is consistent with Street (202), Kane (233), and Lidz's (234) findings that suggest non-kin room sharing as a significant predictor of reduced wellbeing and life satisfaction. Poor life satisfaction may produce chronic stress, mood disorders, and cardiovascular diseases which are risk factors for hospitalization (4,164).

Greater examination into the constituent variables of the Social Support social domain revealed that only the removal of "visit with a long-standing social relation or family member" resulted in a non-significant association to be observed between high social vulnerability and first-event hospitalization. This finding suggests that the “visit with a long-standing social relation or family member” social variable was a great contributor to the association observed between high social vulnerability and first-event hospitalization. It may be that the stress associated with minimal contact with old friends may be of great importance in the examination of hospitalization risk. This could be due to greater feelings of loneliness or disconnectedness with a previous life and greater community. These negative affective states may result in disrupted physiological processes (such as immune response or neuroendocrine activity) that stimulate the need for greater, emergency care offered in hospital. Another explanation could be that the health-promoting behaviours encouraged by the long-standing social relation or family member are no longer being reinforced. As a result, functional and cognitive health may deteriorate to an extent that warrants a hospitalization.

6.3.2.2 Social Vulnerability and Time to First-Event Hospitalization, Stratified by Dementia Status

Our findings indicated that DAL residents with dementia who have high social vulnerability are at a greater risk of first-event hospitalization over one year. Among DAL residents without dementia, however, social vulnerability did not influence the risk of first-event hospitalization over one year.

The finding that those with dementia are at greater risk of hospitalization is consistent with another ACCES study using a less comprehensive measure of social vulnerability (86). Maxwell and colleagues (86) found that among DAL residents with dementia, those with low strength of social relationships were at an increased risk of hospitalization over one year. Our findings are also in line with research demonstrating positive associations with greater social participation and longer time to discharge from AL settings (5,82).

Social vulnerability may predict hospitalization among residents with dementia because of their non-normative forms of communication (217). Firstly, persons with dementia present with non-normative signs and symptoms of disease. Without the ability to clearly communicate and someone to clearly understand that communication, conditions would likely become exacerbated and require more extensive, emergency care in hospital. Secondly, due to stigma, residents with dementia may become ostracized from the DAL community by residents without dementia. Without a sense of belonging or identity, psychological distress may lead to physical manifestations, including the emergence of new health conditions or the exacerbation of existing symptoms and disorders. These new and exacerbated conditions may warrant hospitalization.

Alternatively, residents without dementia more commonly exhibit stronger communication abilities that allow them to more easily convey disease-related discomfort and form strong social relationships. As a result, DAL residents without dementia would receive appropriate, timely care that would avert hospitalization. Further, they would more likely feel a strong sense of community and identity that would therefore reduce the likelihood of psychological distress leading to physical manifestations that result in hospitalization.

The finding that social vulnerability was not associated with risk of first-event hospitalization among DAL residents without dementia may therefore be real. If it is a true finding, it would be supported by discussions given by Stoykova (53) (as discussed in section 6.3.1.2). However, there is the possibility that this finding is spurious. If false, it would likely be due to small sample size (as described in section 6.3.1.2).

Lastly, hospitalization may also be influenced by social vulnerability among DAL residents with dementia because of personal expressions. Sometimes, DAL residents with dementia may be hospitalized as a result of unmanageable personal expressions (235). Social needs (such as social interaction, company, and activities) have been cited as one of the most prevalent unmet needs that result in personal expressions among community-dwellers and LTC residents with dementia (236–239). As a result, social vulnerability could greatly increase the frequency and severity of personal expressions among DAL residents with dementia. In DAL settings, where resources are not as intensive as LTC, fewer resources are available to support these expressions. In consequence, DAL residents with dementia may be sent to hospital for re-assessment of medication with social vulnerability being the underlying factor.

6.3.2.2.1 Sensitivity Analyses

In the sensitivity analyses, it was observed that the removal of either Communication to Engage in Wider Community or Social Support social domains largely drove the associations found between social vulnerability and first-event hospitalization. Upon further investigation, no single social variable that composed the Communication to Engage in Wider Community social domain was responsible for the loss in statistical significance. This is in support of a finding by Yamada (240) who reported that it was only when a LTC resident (mean age 83.3 years) had dual sensory impairment (as opposed to single sensory impairment) did they experience a negative health-related outcome (i.e., cognitive decline). Perhaps if both the “hearing” and “vision” social variables were simultaneously removed in the sensitivity analysis, the association between social vulnerability and hospitalization would become non-significant. This analysis was not performed.

Instead, it was only when all variables from the Communication to Engage in Wider Community social domain were removed, did the association between social vulnerability and hospitalization become non-significant. This finding is in line with the proposed mechanisms given above in section 6.3.2.2. The strong influence of communication abilities used to convey symptoms of disease and develop relationships and a sense of community, is important in the exacerbation of disease and manifestation of personal expressions that warrant hospitalization.

Further examination of the constituent variables of the Social Support social domain revealed that the exclusion of either “visit with a long-standing social relation or family member” or “other interaction with long-standing social relation or family member (e.g., phone, email)” social variables resulted in high social vulnerability as a predictor of first-event hospitalization to become non-significant. This would suggest that these two variables were important in producing the observations found between high social vulnerability and first-event hospitalization. Again, multiple interrelated mechanisms may be responsible for these findings similar to the ones proposed in section 6.3.2.1.1. Taking a greater dementia focus, these two social variables represent social contact with the community outside of the DAL setting. It is therefore possible that limiting social interaction to DAL relationships and activities (that may be new to the resident) inhibits social health and therefore causes psychological distress. Psychological and physiological health are synergistic where adverse status in one influences adverse status in the other. Therefore, it is likely that when a resident with dementia becomes psychologically distressed, their physical health deteriorates to an extent that warrants a hospitalization.

Interestingly, the Social Support social domain was also found to be a significant driver of the associations found in the overall Linked cohort (section 6.3.2.1.1). It is therefore likely that social support is an influential domain when considering the risk of hospitalization among DAL residents and specifically in those with dementia.

All sensitivity analyses found that the removal of a single social domain or social variable resulted in the relationships between social vulnerability and their respective outcome (cognitive decline or first-event hospitalization) to change. These findings do not support the notion and principle asserted by Andrew and colleagues that no single domain or variable drives the relationships found using the SVI (10). This contradiction may be the result of study sample and setting differences as discussed in section 6.3.1.2 (i.e., DAL vs community-dwelling sample, follow-up period, and outcome under investigation).

7.0 Study Strengths and Limitations

The present study had several strengths. There was a relatively large sample size captured by the ACCES study with a relatively high response rate (72%) and minimal loss to follow-up. The opportunity to link the comprehensive resident-level data available from the interRAI-AL assessments with provincial administrative health data was also an important strength, particularly for the longitudinal analyses of time to first-event hospitalization. The data collection process was prospective in nature and therefore allowed for inferences into temporal relationships. As a result of the above, the data were comprehensive with appropriate measures of relevant variables, allowing for in-depth investigations of critical research questions.

Robust calculations using survival analyses were also able to be calculated. As a result, all uncensored participants' data contributed to the calculation of each event's hazard ratio. These hazard ratio estimates are more robust than linear or logistic regression estimates because participant data were not lost over time. Additionally, using first-event outcomes ensured that hospitalization events were related to processes in the DAL facility rather than competing risks such as transitions to LTC. Further, the ascertainment of hospitalization was a strength of this study. All hospitalizations in Alberta were captured and as such, only one resident was missed in this outcome because their hospitalization event occurred outside of the province.

In the present study, the interRAI data were collected by trained research nurses, using a multidisciplinary approach, which included accessing and verifying information from multiple sources. Objective data and standardized data collection processes reduce the likelihood of recall and reporting bias often present in subjective data. Further, these data represent the first attempt to analyze AL in Canada and were executed in Alberta. Alberta served as an excellent study setting because of its leadership role in examining the role of AL within Canada (4) and the amendments to healthcare policies that resulted in a shift from nursing home to AL care (33,88,113).

It is also important to note possible study limitations. The present study had a non-response rate of 28% among eligible residents. Further, one DAL facility refused participation and as a result, those residents (who may have exhibited different or unique characteristics) were not approached for study participation. Consequently, the findings reported for the DAL cohort included in ACCES may not be generalizable to other DAL settings. However, age and sex distributions among non-participants and participants were similar (182), and all eligible participants were approached for study participation. As a result, the risk of selection bias was reduced.

Although the original sample size for each cohort was large (i.e., Survived n=889, Linked n=1,066), cell sizes became small as more specific analyses were executed. Each sample was stratified by dementia and further divided by social vulnerability level. This caused the effective sample sizes to become small (e.g., Survived, non-dementia subgroup with high social vulnerability n=76). The potential for insufficient power was therefore present which could have resulted in non-significant associations to be observed, where true associations existed.

As ACCES included residents of designated (publicly-subsidized) AL beds, the findings may also have limited generalizability to private AL settings across Alberta or nationally. However, there remain similarities across AL settings that differentiate them from other care facilities (i.e., nursing home, community care, long-term care facilities), leading to the conclusion that some cautious generalization may be appropriate. The study sample also came from both rural and urban settings, and included participants of varying socioeconomic status levels. These study sample characteristics increased the generalizability of findings.

The assumption that baseline social vulnerability remained stable over one year may also be a limitation of this study. Social circumstances can change rapidly and drastically in care settings and in older age (241–243). For example, widowhood and a reduced social network are common occurrences in older age that greatly influence social circumstances. Further, cognitive and functional limitations increase with age that limit the opportunities for social engagement. Although the assumption that social vulnerability was made for one year in the current investigation, it is less drastic when compared to other studies that assumed stable social vulnerability levels over 3, 6, 12, (25) or 20-year follow-ups (53).

Another limitation of data collection is the possibility of interviewer bias in the hospitalization outcome. This bias would likely have been non-differential misclassification and bias results towards the null. Contrary to the cognitive decline outcome, the hospitalization outcome was objectively defined and therefore could not be influenced by an investigator. The risk of these biases was reduced by the fact that all research nurses used a standardized assessment instrument that has undergone some reliability and validity testing. Research nurses were also trained in data collection using standardized data collection protocols.

ACCES data collection was completed between 2006 and 2009. Due to ALF policy changes since this time, results may not be generalizable to the present environment. Though facilities may currently be implementing stronger social policies, current research dictates otherwise (4,5,86) and thus this research will likely remain applicable. Further, the risk factors of social vulnerability remain, just as smoking remains a risk factor for lung cancer regardless of its elimination.

Another potential limitation of this study relates to the ascertainment of dementia diagnosis. Dementia status was ascertained through the interRAI-AL interview. A diagnosis of dementia was determined via medical charts, and confirmed by staff or family. The possibility of a misdiagnosis of dementia is also an issue because many of the signs and symptoms of dementia are common to other conditions (244). For example, major depressive disorder in older adults is characterized by memory loss and often mistaken for dementia (245).

Secondly, dementia is often preceded by cognitive decline. In fact, dementia has a long prodromal phase of ~10 years, where the first symptom, coincidentally, is social withdrawal (43,226,229,230). Therefore, participants who may not have a diagnosis of dementia may be in the preclinical phases of the disease, but inappropriately categorized as free of dementia. This may have caused spurious associations to be found among the non-dementia subgroups. Ideally, a study investigating the aforementioned research questions would benefit from a follow-up period of >10 years as suggested by Stoykova (53). With this limitation in mind, the significant associations found in the non-dementia subgroup (i.e., social vulnerability and odds of cognitive decline) may actually be spurious and caused by the inclusion of residents with preclinical dementia in the non-dementia subgroups.

Several strengths and limitations of the SVI need to be considered. First, unlike more simplified versions of social vulnerability where variables are examined in isolation (25,47,206,211,225,226), the SVI includes multiple social domains and variables. The comprehensive nature of the SVI allows a more accurate study of social health because it more closely mimics lived experiences of older adults. The SVI takes into account the multiple, complex interactions between social domains that are otherwise unaccounted for in more simplified versions (25,47,206,211,225,226). However, in some instances, the sensitivity analyses demonstrated that when examining specific outcomes in specific populations, that a more simplified version of social vulnerability may be appropriate. For example, when analysing the association between high social vulnerability and hospitalization among the dementia subgroup, it was found the Living Situation social domain contributed much to the observed statistically significant association. This finding would suggest that utilizing the variables that compose the Living Situation social domain, may be sufficient to find a statistically significant association between high social vulnerability and hospitalization among DAL residents with dementia. Conversely, it may be argued that if the comprehensive approach to measuring social vulnerability was not taken, statistically significant associations between social vulnerability and cognitive decline and hospitalization may not have been observed. Different social domains and social variables were found to be significant drivers in the sensitivity analyses depending on the outcome and subgroup under investigation. It was therefore important to use this comprehensive approach to social vulnerability.

A disadvantage to using an index composed of many variables (like the SVI), is that it may complicate interpretations due to the many complex interrelationships of the constituent variables. Despite this complexity, it is important to understand that a person's life is made up of numerous complex interrelations and attempting to separate these relationships may provide inaccurate findings. Although, an argument may be made against this because the sensitivity analyses presented in the current investigation note that in some instances, one domain or variable may be largely responsible for the associations found. However, if analyses were not conducted using the SVI, and instead used a simpler measure to detect social vulnerability, associations between social vulnerability and the relevant outcomes may not have been found.

Theoretically, the SVI used in the current investigation is complete. The creation of the SVI was anchored in the principles described by Andrew and colleagues (10). Further, the selection of social variables was based on published literature demonstrating associations between individual social variables and health outcomes, thereby supporting content validity (18). However, as a new measure, the SVI has limited established validity and reliability, particularly among older adults with dementia. The validity of the SVI has only been established in community-dwelling samples, and its reliability has not been tested (10). The present study was the first to apply the SVI to an AL-context and therefore its validity and reliability in this context are unknown. However, it is believed that the application of the SVI to an AL-context would be appropriate (10). Social health remains an important domain of wellbeing no matter age or geographical setting (246). Further, the basic principles of the SVI outlined by Andrew (10) were upheld in the current research. As such, the applicability, utility, and functionality of the SVI to capture the social health domain of wellbeing in an AL setting compared to a community setting, should not be reduced.

The cognitive decline outcome measure also has some strengths and limitations. The CPS has been validated against the MMSE and the TSI (187,192). Despite preliminary data regarding its validity and reliability as a cognitive screening tool, the CPS may have several limitations. First, the CPS is most often used as a measure of cognition as a covariate, rather than as a response variable. Instead of assessing cognition longitudinally with the CPS, most researchers implement a battery of neuropsychological tests that more accurately represent global cognition (146,204–211). These tests often measure five cognitive domains including (1) episodic memory; (2) semantic memory; (3) working memory; (4) perceptual speed; and (5) visuospatial ability. These tests are then often aggregated to form a comprehensive composite measure representing global cognition. On the other hand, the CPS measure only includes items that assess short-term memory, long-term memory, procedural memory, decision making ability, and the ability to make self understood. In contrast to a composite measure of global cognition, the CPS omits many important aspects of cognition. As a consequence, clinically meaningful changes in cognition may not be captured by the CPS because the CPS does not have the content to detect these changes. Consequently, the results of this study may be underestimated. For example, the associations found may have been biased towards the null, and non-significant findings may actually be significant.

Another limitation of the CPS is that it has a relatively small range of possible scores, especially compared to the MMSE (0-30) (247), the 3MS (0-100) (248), and the composite global cognition measures (e.g., 0-89) (211). The small range increases the likelihood of floor and ceiling effects indicated by a participant’s inability to move along the continuum of the scale. For example, if a participant has a CPS score of 6, they do not have the ability to experience the outcome of interest (i.e., cognition decline) because the CPS’s highest score is 6. With a larger possible range of scores, such as on the MMSE, 3MS, or a global cognitive composite measure, the likelihood of experiencing floor and ceiling effects is far less (205,206). In order to minimize ceiling effects, we excluded participants with baseline CPS scores of 6 for the outcome investigating cognitive decline versus no change or improved.

Recently, an updated version of the CPS, termed the CPS2, was published (249). This updated measure expands the score range from 0 to 6, to a range of 0 to 8. By increasing the range of possible scores, this new scoring system likely reduces the probability of floor and ceiling effects evident in the original CPS. It may also more accurately distinguish between levels of cognitive impairment and therefore may be more sensitive to change in cognitive performance.

Despite the positive changes to the CPS, the CPS2 was not used in the current investigation for a few reasons. First and foremost, the CPS2 was published after most of the primary analyses were completed. Future work to explore this new measure relative to the original CPS would be interesting. The CPS2 was also not used because the original CPS and the CPS2 are highly correlated (r=0.93) (249) indicating that they measure essentially the same thing. Further, the correlation coefficient with the MMSE for the CPS and CPS2 are also very similar (r=-0.72 vs r=-0.75). Although the CPS2 has a higher correlation with the MMSE, the difference is small and does not outweigh the limitations of the CPS2.

A major limitation of the CPS2 is the items used in its derivation. The items used to derive the original CPS measure include short-term memory, making oneself understood by others, cognitive decision-making ability, eating performance (procedural memory), and comatose status. Comparatively, the items used to derive the CPS2 include short-term memory, cognitive decision-making ability, expressive communication (making oneself understood by others and understanding others), procedural memory, and two instrumental activities of daily living (ability to manage finances, and ability to manage medications) (249).

The items in the original CPS measure are much more applicable to the AL context than those in the CPS2. Specifically, in the CPS2, the instrumental activities of daily living were measured based on performance rather than capacity. This is inappropriate because residents may very well have the capacity to perform these instrumental activities of daily living but do not actually exhibit them. However, in order to score positively on the CPS2, one must exhibit these instrumental activities of daily living. As a result, persons who are capable of managing finances or medications may be categorized as unable and therefore cognitively impaired. For example, many AL facilities have policies on medication management. As such, medication management is often included in the services provided in AL regardless of whether the resident requires this service. Further, the ability to manage finances may not be applicable to residents of AL. Oftentimes the power of attorney of a resident is responsible for the management of finances. Additionally, important sex differences are present in the current cohort of older adults. Women, who compose the majority of the older adult population, seldom managed finances – this was the man's domestic duty. As a consequence, the "ability to manage finances" variable is not applicable to the majority of older women. As a result of the above reasons, the CPS2 was not adopted in the current investigation.

Despite these limitations, this study has offered many insights into the associations between social vulnerability and cognitive decline and time to first-event hospitalization.

8.0 Future Directions

The present investigation highlights several opportunities for future research and possible intervention. An important area of research would be to investigate possible interactions between age and social vulnerability, as well as sex and social vulnerability, in relation to odds of cognitive decline and risk of hospitalization.

Another area of research would be to investigate the mechanisms that act to cause residents with dementia to be more socially vulnerable than residents without dementia. As discussed in sections 2.1.2 and 6.2.2, external contributors may include the actions of staff, co-residents, and family. These actions often originate from learned misinformation and can therefore be unlearned. Further research should explore interventions used to better educate care partners and co-residents about dementia in general, and the importance of social health to their wellbeing. Through accurate information, stigma may be reduced and the inclusion of residents with dementia in social-related activities may increase.

More broadly, policy changes may target lifelong education about social vulnerability and dementia. Policies may also be developed for the mandatory installation and budgetary support of Social Activities Directors in all AL facilities. A greater number of activities has been found to be associated with more residents being awake, engaged, and fewer episodes of agitation (126). In the aim to reduce cognitive and functional impairments among older adults, there would likely be a more advantageous cost-to-benefit ratio for investments into social health. Equipment to support social health is less expensive than medical equipment, and more importantly, no pharmaceuticals are required in supporting social health. In fact, some medications may be discontinued as social health improves. Investing in social health may even prevent and/or delay declines in physical and cognitive health. Further, social interventions may be as simple as listening to music, working in a garden, or playing board games.

Institutionally, creative design of AL facilities (and LTC facilities more broadly) may be developed and implemented that encourage greater opportunities for socialization. Expanding on this, communities can commit to designing cities that are age-friendly so as to enable (rather than disable) their residents. This way, people of all ages and functional and cognitive capabilities are able to navigate through their surroundings. As a result, the opportunities for social interaction may increase. A key example of enabling greater community participation is snow and ice removal. Oftentimes, older adults become imprisoned in their residence because sidewalks and roads have not been plowed and de-iced.

Clinically, social vulnerability clearly affects medical outcomes such as cognition, hospitalization, pain, frailty, disability, mortality, and more (10,18,19,55). A future direction may be the exploration of additional clinical outcomes such as influenza susceptibility, length of hospital stay, or the influence on prognosis of congestive heart failure. Additionally, it would be advantageous to begin explorations of social vulnerability in a range of populations and settings. For example, social vulnerability has not been explored in LTC populations. Further, social vulnerability can be explored in AL facilities in other provinces across Canada, and among younger age groups (i.e., middle age and young adult hood). A lifespan approach may also be used where the social vulnerability status of individuals is followed for decades and analysed in relation to specific outcomes.

9.0 Conclusion

Much research has been executed on social vulnerability among older adults in the past decade. The current investigation used a more comprehensive definition of social vulnerability and revealed many patterns and associations. Social vulnerability is common among older DAL residents with and without dementia. Residents with dementia are more likely to experience social vulnerability, and greater severity levels of social vulnerability as compared to residents without dementia. Overall, social vulnerability was found to influence cognitive decline among DAL residents overall, and among DAL residents with and without dementia. Social vulnerability was also found to influence first-event hospitalization among DAL residents overall, and among DAL residents with dementia, but not among DAL residents without dementia. These observations may express the importance of social health in abating symptom progression that contributes to cognitive decline (250) and hospitalization among DAL residents with dementia. Further, different social domains and variables were found to drive the associations found depending on the subgroup and outcome under investigation. As highlighted in section 8.0, social vulnerability is a growing field of research that may take on many new exciting directions.

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Appendices

APPENDIX A: Comparison of Assisted Living Facilities across the Canadian Provinces

	Assisted living facility definition	**Main Legislation**	**Ancillary Legislation**	**Lexicon/Parameters of Care**
British Columbia	A premise or part of a premise that is not a community care facility, that is (a) designated by the Lieutenant Governor in Council, or (b) in which hospitality and housing services and between 1 and 2 prescribed services are provided to $\geq$3 adults unrelated by blood or marriage to the operator (251).	Community Care and Assisted Living Act and Adult Care Regulations Only addresses health and safety issues	Residential Tenancy Act	*Lesser care* = supportive housing; provides housing and some hospitality services (e.g., meals, laundry, housekeeping, social and recreational activities, emergency response). *More care* = assisted living; provides housing, and hospitality and personal assistance services (e.g., ADL, medication management, rehabilitation, therapeutic diets, finances, behavioural programs). *Most care* = residential care facility/complex care/institutional care/long-term care.
Alberta	AL is known as supportive living and is recognized as the transition between home and facility living. Supportive living is divided into four levels based on resident need and services offered: Level 1 (Residential Living); Level 2 (Lodge Living); Level 3 (Assisted Living); Level 4 (Enhanced Assisted Living). Level 1 represents those with the lowest needs and facilities with the least services offered, and Level 4 represents residents with the most needs and facilities with the most services offered.	The Nursing Homes Act, the Nursing Homes General Regulation, the Nursing Homes and Operation regulation, the Social Care Facilities Licensing Act The role of the government in accommodation services (i.e., meals, laundry, housekeeping) is supervised by the Alberta Seniors and Community Supports Publically funded healthcare services and the Continuing Care Health Services Standards are supervised by Alberta Health and Wellness	Social Housing Accommodation Regulation, Protection for Persons in Care Act	*Lesser care* = housing, hospitality, and support services that are supplied by the facility or coordinated by an outside party. Services included in rent or that are available for purchase vary by facility. *Most care* = nursing homes/facility living; provides housing, meals, facility, personal, nursing, and life enrichment services, therapeutic diets, and medication management.
Saskatchewan	3 options: privately owned and operated "personal care homes" (PCH); assisted living under the	Does not have specific assisted living legislation. Personal Care Homes Act,	Housing and Special-Care Homes Act,	*Lesser care* = assisted living; offers five services for fee: one meal/day, laundry, personal response services for unscheduled

	Saskatchewan Assisted Living Services (SALS) Program; and "enriched" assisted/retirement living	Personal Care Homes Regulations, 1996,	Special-Care Homes Rates Regulations, and Housing and Special-Care Homes Regulations	needs, housekeeping, and coordination of services and activities; publically subsidized for persons of low income. *More care* = personal care homes; provide supervision or assistance with personal care; privately owned and operated. *Most care* = special care homes (SCH); nursing-type facilities; publically-subsidized.
Manitoba	5 housing options: (1) Manitoba Housing Authority Senior 55 Plus Apartments/Elderly Persons Housing (EPH) – for low-income seniors; (2) Assisted Living Facilities (ALF) – privately owned and operated (no government regulation); (3) Supportive Housing (SH) – Regional Health Authority (RHA) is partner; (4) Companion Care – similar to SH but only in Winnipeg and the senior lives in the care provider's home; (5) Personal Care Homes (PCH) – nursing and personal care services are provided, and RHA is partner	Many housing options with little governance: Personal Care Homes Standards Regulation, Personal Care Services Insurance and Administrative Regulation	Protection for Persons in Care Act, Social Services Administration Act, Residential Care Facilities Licensing Regulations	*Lesser care* = EPH and ALF; support services available (i.e., meals, housekeeping, laundry, transportation). *More care* = SH and Companion Care; 24-hr supervision and personal support. *Most care* = Personal Care Home; provides personal care and nursing services.
Ontario	Largely private businesses that provide housing, support and personal care services. Assisted living-type housing is located in retirement homes	No specific legislation for assisted living facilities. Residential Tenancies Act, Long-Term Care Act, Home Care and Community Services Act	Provision of Community Services	*Lesser care* = Home support services; provide personal care and support services; services are allocated based on need and many will privately pay for more care *More care* = Supportive housing; provide personal support services (i.e., scheduled and unscheduled needs, housekeeping). Retirement homes; for-profit fee-for-service business, regulated by Ontario Retirement Communities Association. Assisted Living; unregulated, houses persons with disabilities *Most care* = Nursing Homes; provide 24-hr nursing care and supervision, government funded and regulated
Quebec	Residences for the elderly (RPPA)	An Act respecting Health Services and Social Services, Regulation respecting the	None	*Lesser care* = RPPA; provide at least one of the following: meals, housekeeping, leisure activities, bathing or dressing, transportation,

		conditions for obtaining a certificate of compliance for a residence for the elderly		nursing care, security or surveillance. House higher-care needs people than they were intended for.
Nova Scotia	A residential care facility (RCF) includes a community-based residential facility in which residents who are not related by blood to the operator, receive supervisory care.	Homes for Special Care Act and its Regulations	Protection for Persons in Care Act	*Lesser care* = Community-based options, and ALF/Enriched Living. ALF are for-profit facilities for persons who seek housing and minimal support. It includes housing where the individual or the person they are living with, are able to direct their own care and make informed, voluntary decisions. All ADLs are met through services provided by the facility ***More care* = RCF; provide supervision and limited help with personal care** *Most care* = Nursing Homes/Homes for the Aged; provide personal and nursing care 24/7
New Brunswick	Special Care Homes (SCH) and Community Residences (CR) are classified into 3 groups: a home (<3 residents), a residence (3-9 residents), and a residential centre (≥10 residents)	Family Services Act, Community Placement Residential Facilities Regulation, Standards and Procedures for Adult Residential Facilities	None	SCH and CR both provide non-nursing support and 24hr supervision. SCH are usually private and most appropriate for residents who need at most, assistance with mobility, and who require supervision or assistance with personal care or ADLs 24/7. CR are usually not-for profit and more closely resemble nursing homes where clients need more assistance and supervision due to physical, mental, or cognitive health conditions.
Prince Edward Island	Community Care Facilities (CCF) provide assisted living services	Community Care Facilities and Nursing Home Act, General Regulations (does not set standards that greatly differ from those imposed on nursing homes). Must have ≥5 residents to be regulated	None	*Lesser care* = CCF; private facilities, provide personal services (i.e., meals, housekeeping, assistance with hygiene). *Most care* = Nursing homes/manors; provide accommodation, supervision, personal care, and medical and nursing services 24/7. Public and private facilities
Newfoundland and Labrador	Personal Care Homes (PCH) /Supportive Care Facilities/Community Care Residences Special Care Homes/Community	Health and Community Services Act (must have ≥5 residents)	None	*Lesser care* = PCH; provide minimal assistance with ADLs and supervised care, may provide meals and social activities *Most care* = Nursing Homes; provide accommodation and 24/7 supervision,

	Health Centres/Nursing Homes			personal care, and medical and nursing services; may also provide rehabilitative pharmaceutical, and pastoral care services.

	Funding	Staffing Indicators	Entry/Exit Criteria
British Columbia	From RHA, mix of public and private. BC Housing funds low-income ALF. Residents pay 70% of their after-tax income	Must be adequate to support hospitality and personal service needs. Staff providing personal services must have a home support/care aide certification. A supervising pharmacist on a medication and safety advisory committee must oversee medication safety in the facility	Private pay settings govern their own entry criteria. If the resident is in need of subsidies, an interview is conducted by a case manager. In order to reside in ALF, the resident must be able to make decisions themselves unless they are living with someone who can make decisions for them. If a resident requires >2 prescribed services, they are discharged from ALF. When care needs surpass the abilities of the facility or the resident can no longer make their own decisions, an exit plan is created in collaboration with the resident, family, support networks, physician, and health authority case manager.
Alberta	Fees are set by the facility and are on an "unbundled" system where the resident pays the accommodation costs and the government pays the health costs. Government will also support low-income residents	At least 1 staff member must be present at all times who is trained in emergency first aid. All employees, service providers, and volunteers must have criminal record checks	Supportive Living facilities formulate their own eligibility criteria. Systems and policies are in place concerning move-in, orientation, fees, optional personal services, price increases, dispute resolution process, and exit criteria. Residents must be assessed for safety, ability, and suitability by the operator. Residents whose needs surpass what can be accommodated are discharged based on criteria given upon entry into the facility.
Saskatchewan	SALS are subsidized by the government. Residents pay for optional services. PCHs are private and costs vary. Residents of SCHs pay an income-tested	In PCHs, care must be provided to the resident based on need. This care is delivered by the appropriate healthcare professional or someone trained by the healthcare professional. Facilities with 21-30 residents must have ≥1 staff ≥5days/wk.	Residents of SALS must be low-income. Residents of PCH have a care plan created within the first 7 days of residency and reassessed every 2 years. Upon entry, each resident is given an admittance agreement containing information on care, payment, and conditions of residency. If the resident's needs surpass what can be accommodated by the

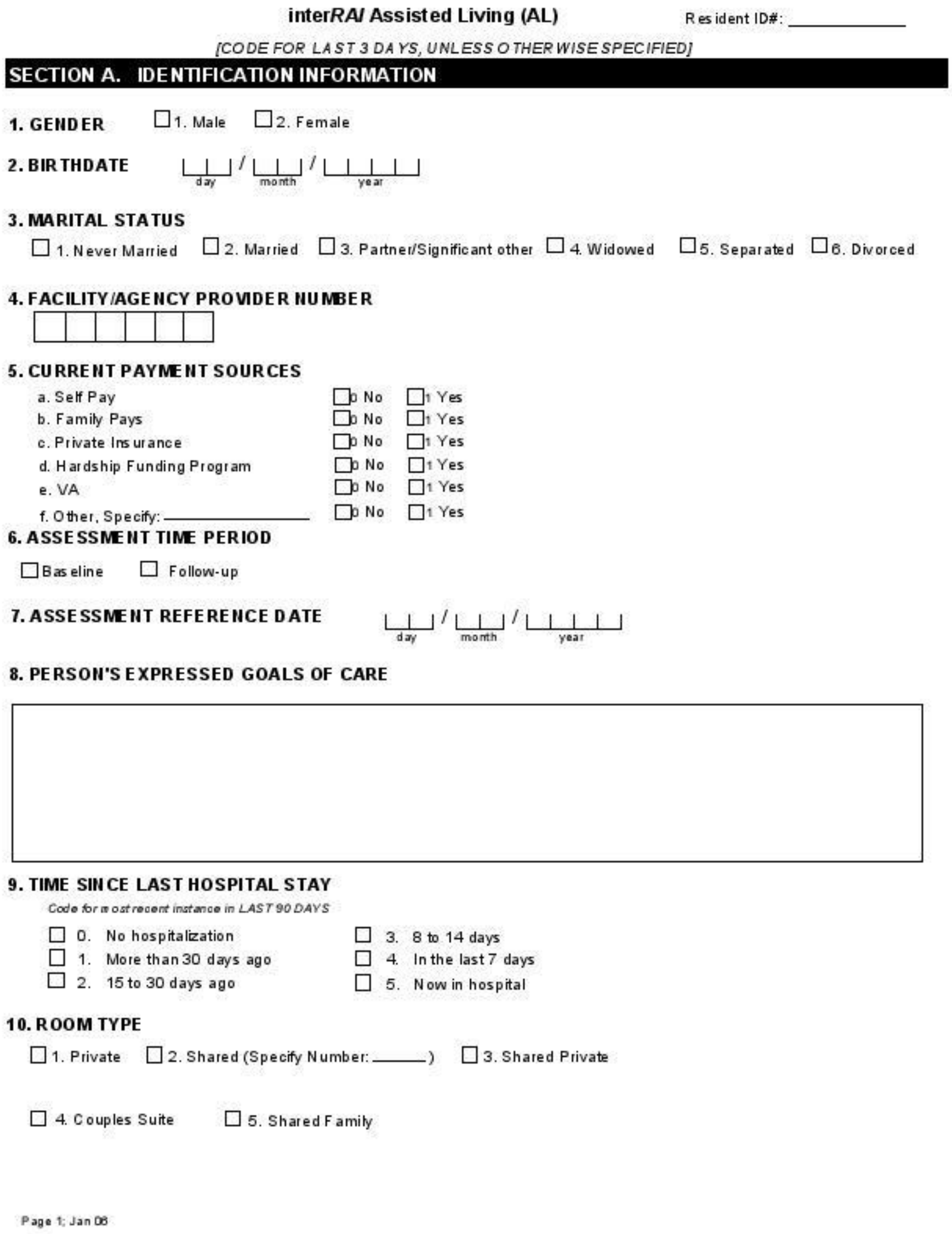
	charge based on annual income plus interest earned.	PCH staff are present 24/7, have a criminal record check.	facility through an assessment, the resident will be discharged. The resident may also leave if: they want to; or they no longer need assistance.
Manitoba	Residents of EPH pay 25% of gross income for studio apartment and 27% for one-bedroom apartment. Residents of SH pay rent and the RHA pays for health staff. PCH are subsidized but rate depends on income.	No staffing indicator legislation for EPH, ALF, SH, or Companion Care.	In EPH, residents must meet a certain age and income. ALF set their own entry criteria. Entry into SH or PCH must come from a long-term care/home care case coordinator of the RHA. Upon entry to any facility, the resident must be given their bill of rights, mission and philosophy, methods in which the resident can participate in their own care, and information on policies. No legislation is present for discharge.
Ontario	CCAC-approved services are free. SH is funded by the Ontario MOHLTC where residents pay rent (based on income) and some services are free. Retirement homes are private pay.	ORCA requires facilities to give a written orientation program for all new staff, a staff development program, and a continuing education program. Staff must also be trained in resident abuse and neglect, mechanical lifts, and food-handling and infection control (for staff that handle food). A Care Home Information Package (CHIP) is given to each resident before signing tenancy agreements that includes information on qualifications of staff and minimum staffing levels.	CCAC performs a needs assessment along with a list of available home care, homes, services, and long-term care facilities in Ontario. Homes have their own entry criteria. Tenants may terminate tenancy by given 30 days written notice. The home may discharge a tenant if their needs are too high or low for the facility.
Quebec	RPPA is private pay.	RPPAs must have ≥1 employee who has training in transferring patients, standard first aid, and CPR on the premises 24/7.	Quebec’s residential tenancy law regulates contracts for entry into RPPAs. It requires the resident give 3 months’ notice when terminating tenancy.
Nova Scotia	Funding is “unbundled.” AL is private pay and Enriched housing is supported by the	RCF have services provided by a medical advisor. A resident’s original family physician may continue to supply care.	A functional assessment is completed for each potential resident and is then referred to the most appropriate level of care. A first bed policy exists.

	Department of Community Services, Housing Services branch.		Potential residents must be physically and mentally stable, free of serious behavioural problems and substance abuse, and not in acute withdrawal. As needs change, assessments are completed to determine the level of care required when needs change. The resident must then re-apply to the appropriate care facility.
New Brunswick	When unable to pay, the government helps to pay for services based on an income test	SCH staff must have graduated from 1 of home support worker; health care aid; special care worker; human services; or nursing assistant program. A ratio of 10:1 residents to staff is mandatory (2 volunteers may replace 1 staff	Potential SCH and nursing home residents are evaluated with the same comprehensive test and referred accordingly. A first bed policy exists. Residents being discharged must be given 15 days' notice.
Prince Edward Island	CCFs are private and the resident pays all. When a resident cannot pay, they may receive financial aid under the Social Assistance Act.	CCFs must have sufficient staff present to evacuate all residents in case of fire. If a CCF does not have a Registered Nurse present, all staff must have first-aid with at least one member able to perform CPR.	The resident and CCF determine whether the facility is an appropriate home for the resident based on a care needs assessment.
Newfoundland and Labrador	PCH are private pay with subsidies available based on need.	No standards have been defined for staff qualifications in PCH.	PCH have a single entry system under each regional board. As long as resident needs are able to be met in the PCH, the resident will not be discharged.

RHA – Regional Health Authority; ALF – Assisted Living Facilities; CCAC – Community Care Access Centre; SH – Supportive Housing; MOHLTC – Ministry of Health and Long-Term Care

Key similarities to note: ALF in Alberta and Nova Scotia are based on an "unbundled" system. In an "unbundled" system, the costs of accommodation and support services are separated. In Alberta, the resident pays accommodation fees and the government generally pays for healthcare fees. Alberta, Manitoba, and Nova Scotia all employ the Protection for Persons Care Act that stipulates definitions and procedures concerning abuse and neglect such as reporting, investigations, and penalties. Further, like British Columbia, Ontario, New Brunswick, Prince Edward Island, and Newfoundland and Labrador, the Albertan government supports low-income residents (33).

APPENDIX B: InterRAI-AL Assessment



inter*RAI* Assisted Living (AL)

Resident ID#: ____________

[CODE FOR LAST 3 DAYS, UNLESS OTHERWISE SPECIFIED]

SECTION A. IDENTIFICATION INFORMATION

1. GENDER ☐1. Male ☐2. Female

2. BIRTHDATE ___ ___ / ___ ___ / ___ ___ ___ ___
day / month / year

3. MARITAL STATUS

☐ 1. Never Married ☐ 2. Married ☐ 3. Partner/Significant other ☐ 4. Widowed ☐5. Separated ☐6. Divorced

4. FACILITY/AGENCY PROVIDER NUMBER

☐☐☐☐☐☐

5. CURRENT PAYMENT SOURCES

a. Self Pay	☐0 No	☐1 Yes
b. Family Pays	☐0 No	☐1 Yes
c. Private Insurance	☐0 No	☐1 Yes
d. Hardship Funding Program	☐0 No	☐1 Yes
e. VA	☐0 No	☐1 Yes
f. Other, Specify: ____________	☐0 No	☐1 Yes

6. ASSESSMENT TIME PERIOD

☐Baseline ☐ Follow-up

7. ASSESSMENT REFERENCE DATE ___ ___ / ___ ___ / ___ ___ ___ ___
day / month / year

8. PERSON'S EXPRESSED GOALS OF CARE

9. TIME SINCE LAST HOSPITAL STAY

Code for most recent instance in LAST 90 DAYS

☐ 0. No hospitalization
☐ 1. More than 30 days ago
☐ 2. 15 to 30 days ago
☐ 3. 8 to 14 days
☐ 4. In the last 7 days
☐ 5. Now in hospital

10. ROOM TYPE

☐1. Private ☐2. Shared (Specify Number: ______) ☐3. Shared Private

☐ 4. Couples Suite ☐ 5. Shared Family

Page 1; Jan 08

SECTION B. INTAKE AND INITIAL HISTORY

Complete at Admission / First Assessment only

1. LEVEL OF CONTROL PERSON HAD OVER DECISION TO MOVE INTO ASSISTED LIVING

☐ 0. Complete ☐ 1. Some Control ☐ 2. Little or no control ☐ 8. Could not (would not) respond

2. DATE STAY BEGAN

Date original stay began in this facility; do not include readmission date.

|__|__| / |__|__| / |__|__|__|__|
day month year

3. ETHNICITY/RACE

a. White ☐0 No ☐1 Yes
b. Black ☐0 No ☐1 Yes
c. Chinese ☐0 No ☐1 Yes
d. Asian ☐0 No ☐1 Yes
e. Aboriginal origin ☐0 No ☐1 Yes
f. Other (Specifiy) ________________

ABORIGINAL ORIGIN
g. Parent's origin is Inuit, Metis or North American Indian ☐0 No ☐1 Yes

4. PRIMARY LANGUAGE

☐ 1. English ☐ 2. French ☐ 3. Other ____________________

5. RESIDENTIAL LIVING STATUS PRIOR TO INITIAL ADMISSION (to this facility)

☐ 1. Private home / apartment / rented room
☐ 2. Board and care or designated assisted living
☐ 3. Private assisted living
☐ 4. Mental health residence - e.g., psychiatric group home
☐ 5. Setting for persons with intellectual disability
☐ 6. Psychiatric hospital or unit
☐ 7. Homeless (with or without shelter)
☐ 8. Long-term care facility (nursing home)
☐ 9. Rehabilitation hospital / unit
☐ 10. Hospice facility / palliative care unit
☐ 11. Acute care hospital
☐ 12. Correctional facility
☐ 13. Respite
☐ 14. IT Bed or Community Support Bed
☐ 15. RCTP / Enhanced transition bed
☐ 16. Other

6. USUAL LIVING ARRANGEMENT PRIOR TO ENTRY (to this facility)

☐ 1. Alone
☐ 2. With spouse / partner only
☐ 3. With spouse / partner and other(s)
☐ 4. With child (not spouse/partner)
☐ 5. With parent(s) or guardian(s)
☐ 6. With sibling(s)
☐ 7. With other relatives
☐ 8. With non-relative(s)

7. RESIDENTIAL HISTORY OVER LAST 5 YEARS

Code for all settings person lived in during 5 years prior to assessment reference date [item A7]

a. Long-term care facility—e.g., nursing home ☐0 No ☐1 Yes
b. Board and care home or designated assisted living ☐0 No ☐1 Yes
c. Private assisted living ☐0 No ☐1 Yes
d. Mental health residence—e.g., psychiatric group home ☐0 No ☐1 Yes
e. Psychiatric hospital or unit ☐0 No ☐1 Yes
f. Setting for persons with intellectual disability ☐0 No ☐1 Yes

8. MENTAL HEALTH RECORD INDICATES HISTORY OF MENTAL ILLNESS OR INTELLECTUAL DISABILITY

☐0 No ☐1 Yes

SECTION C. PSYCHOSOCIAL WELL-BEING

1. INITIATIVE AND INVOLVEMENT

[Note: Ask person, direct care staff and family, if available]

0. Not present
1. Present but not exhibited in last 3 days
2. Exhibited on 1-2 of last 3 days
3. Exhibited daily in last 3 days

☐ a. At ease interacting with others
☐ b. At ease doing planned or structured activities
☐ c. Accepts invitation(s) into most group activities
☐ d. Pursues involvement in life of facility—e.g., makes or keeps friends; involved in group activities; responds positively to new activities; assists at religious services
☐ e. Initiates interaction(s) with others
☐ f. Reacts positively to interactions initiated by others
☐ g. Adjusts easily to change in routine

2. STRENGTHS

a. Close to someone in the facility (person or staff) ☐ 0 No ☐ 1 Yes
b. Consistent positive outlook ☐ 0 No ☐ 1 Yes
c. Finds the meaning in day-to-day life ☐ 0 No ☐ 1 Yes
d. Strong and supportive relationship with family ☐ 0 No ☐ 1 Yes

3. SOCIAL RELATIONSHIPS AND INTERACTION

0. Never
1. More than 30 days ago
2. 8 to 30 days ago
3. 4 to 7 days ago
4. In last 3 days
8. Unable to determine

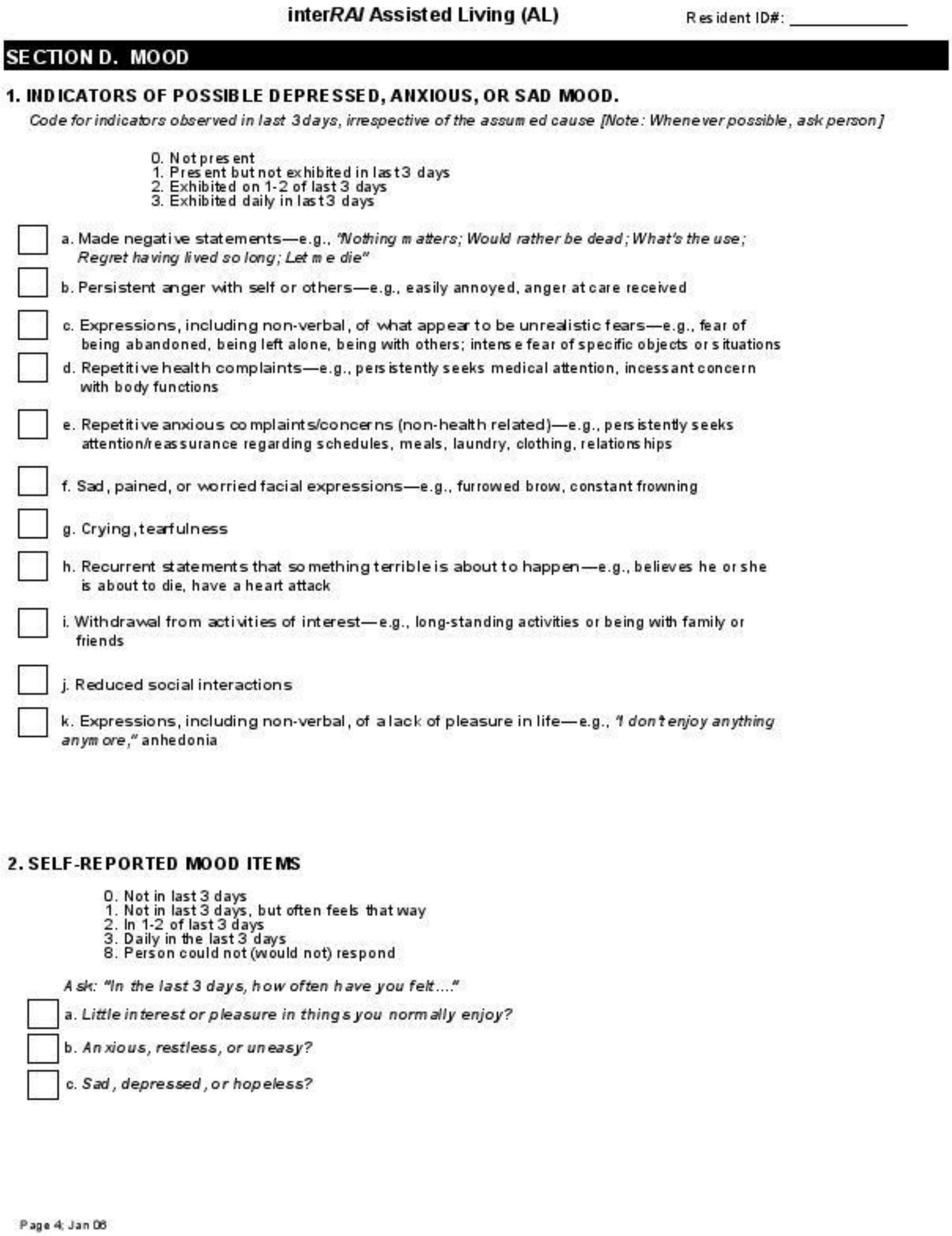
☐ a. Participation in social activities of longstanding interests
☐ b. Visit with a long-standing social relation or family member
☐ c. Other interaction with long-standing social relation/family member—e.g., telephone, e-mail
☐ d. Openly expresses conflict or anger with family

4. UNSETTLED RELATIONSHIPS

a. Conflict with or repeated criticism of staff ☐ 0 No ☐ 1 Yes
b. Conflict with or repeated criticism of roommate ☐ 0 No ☐ 1 Yes
c. Conflict with or repeated criticism of person other than roommate ☐ 0 No ☐ 1 Yes
d. Staff report persistent frustration in dealing with person ☐ 0 No ☐ 1 Yes
e. Says or indicates that he/she feels lonely ☐ 0 No ☐ 1 Yes
f. Expresses sadness over recent loss ☐ 0 No ☐ 1 Yes

5. MAJOR LIFE STRESSORS IN LAST 90 DAYS—*e.g., episode of severe personal illness; death or severe illness of close family member or friend; loss of home; major loss of income/assets; victim of crime such as robbery or assault; loss of driving license or car*

☐ 0 No ☐ 1 Yes



inter*RAI* Assisted Living (AL)

Resident ID#: ____________

SECTION D. MOOD

1. INDICATORS OF POSSIBLE DEPRESSED, ANXIOUS, OR SAD MOOD.

Code for indicators observed in last 3 days, irrespective of the assumed cause [Note: Whenever possible, ask person]

0. Not present
1. Present but not exhibited in last 3 days
2. Exhibited on 1-2 of last 3 days
3. Exhibited daily in last 3 days

☐ a. Made negative statements—e.g., *"Nothing matters; Would rather be dead; What's the use; Regret having lived so long; Let me die"*

☐ b. Persistent anger with self or others—e.g., easily annoyed, anger at care received

☐ c. Expressions, including non-verbal, of what appear to be unrealistic fears—e.g., fear of being abandoned, being left alone, being with others; intense fear of specific objects or situations

☐ d. Repetitive health complaints—e.g., persistently seeks medical attention, incessant concern with body functions

☐ e. Repetitive anxious complaints/concerns (non-health related)—e.g., persistently seeks attention/reassurance regarding schedules, meals, laundry, clothing, relationships

☐ f. Sad, pained, or worried facial expressions—e.g., furrowed brow, constant frowning

☐ g. Crying, tearfulness

☐ h. Recurrent statements that something terrible is about to happen—e.g., believes he or she is about to die, have a heart attack

☐ i. Withdrawal from activities of interest—e.g., long-standing activities or being with family or friends

☐ j. Reduced social interactions

☐ k. Expressions, including non-verbal, of a lack of pleasure in life—e.g., *"I don't enjoy anything anymore,"* anhedonia

2. SELF-REPORTED MOOD ITEMS

0. Not in last 3 days
1. Not in last 3 days, but often feels that way
2. In 1-2 of last 3 days
3. Daily in the last 3 days
8. Person could not (would not) respond

Ask: "In the last 3 days, how often have you felt...."

☐ a. *Little interest or pleasure in things you normally enjoy?*

☐ b. *Anxious, restless, or uneasy?*

☐ c. *Sad, depressed, or hopeless?*

Page 4; Jan 06

inter*RAI* Assisted Living (AL) Resident ID#: ____________

SECTION E. ACTIVITIES

1. PREFERRED ACTIVITY SETTING

a. Own room / apartment	☐ 0 No	☐ 1 Yes
b. Day / activity room	☐ 0 No	☐ 1 Yes
c. Outdoors	☐ 0 No	☐ 1 Yes
d. Away from facility	☐ 0 No	☐ 1 Yes

2. AVERAGE TIME INVOLVED IN ACTIVITIES

[Note: When awake and not receiving treatments or ADL care]

☐ 0. Most—more than 2/3 of time
☐ 1. Some—from 1/3 - 2/3 of time
☐ 2. Little—less than 1/3 of time
☐ 3. None

3. ACTIVITY PREFERENCE AND INVOLVEMENT

Note: Preference — 0. No 1. Yes
Involvement — 0. not involved 1. in last 3 days 2. regular, but not last 3 days

Pref.	*Inv.*	*Item*
		.......a. Cards, games, puzzles, bingo
		.......b. Collecting
		.......c. Computer activity
		.......d. Conversation or talking on the phone
		.......e. Crafts or arts
		.......f. Discussing / reminiscing about life
		.......g. Educational courses, meetings
		.......h. Feeding or watching birds
		.......i. Genealogy
		.......j. Helping others
		.......k. Music or singing
		.......l. Pets
		.......m. Reading, writing or crossword puzzles
		.......n. Spiritual or religious activities
		.......o. Volunteering
		.......p. Watching TV or listening to radio

Note: Frequency — Indicate how many times in the past 2 weeks
Duration — Average amount of time per session in hours / minutes

Pref.	*Inv.*	*q. *Exercise or Leisure Activities:*	*Frequency* (in last 2 weeks)	*Duration* (avg. per session)
		..........1. Aquasize / swimming..................		
		..........2. Bowling..		
		..........3. Dancing..		
		..........4. Exercise bike / treadmill.............		
		..........5. Exercise program, stretching, or strengthening		
		..........6. Floor curling / Lawn bowling......		
		..........7. Gardening or plants....................		
		..........8. Household chores.....................		
		..........9. Shuffleboard / pool.....................		
		.........10. Tai chi / yoga............................		
		.........11. Trips, shopping, functions..........		
		.........12. Walking / wheeling indoors.......		
		.........13. Walking / wheeling outdoors......		

4. PREFERS CHANGE IN TIMES ACTIVITIES ARE OFFERED ☐ 0 No ☐ 1 Yes

5. PREFERS CHANGE IN LOCATION OF ACTIVITIES ☐ 0 No ☐ 1 Yes

interRAI Assisted Living (AL) Resident ID#: ____________

SECTION F. COGNITION

1. COGNITIVE SKILLS FOR DAILY DECISION MAKING

Making decisions regarding tasks of daily life—e.g., when to get up or have meals, which clothes to wear or activities to do

☐ 0. *Independent*—Decisions consistent, reasonable, and safe

☐ 1. *Modified Independence*—Some difficulty in new situations only

☐ 2. *Minimally impaired*—In specific recurring situations, decisions become poor or unsafe; cues/supervision necessary at those times

☐ 3. *Moderately impaired*—Decisions consistently poor or unsafe; cues/supervision required at all times

☐ 4. *Severely impaired*—Never or rarely makes decisions

☐ 5. *No discernable consciousness, coma [SKIP TO SECTION H]*

2. MEMORY/RECALL ABILITY

Code for recall of what was learned or known

a. Short-term memory OK—Seems / appears to recall after 5 minutes	☐ 0 Yes, memory OK	☐ 1 Memory Problem
b. Procedural memory OK—Can perform all or almost all steps in a multitask sequence without cues	☐ 0 Yes, memory OK	☐ 1 Memory Problem
c. Situational memory OK—Both: recognizes caregivers' names / faces frequently encountered AND knows location of places regularly visited (e.g., bedroom, dining room)	☐ 0 Yes, memory OK	☐ 1 Memory Problem

3. PERIODIC DISORDERED THINKING OR AWARENESS

[Note: Accurate assessment requires conversations with staff, family or others who have direct knowledge of the person's behavior over this time]

0. Behavior not present
1. Behavior present, consistent with usual functioning
2. Behavior present, appears different from usual functioning (e.g., new onset or worsening; different from a few weeks ago

☐ a. Easily distracted—e.g., episodes of difficulty paying attention; gets sidetracked

☐ b. Episodes of disorganized speech—e.g., speech is nonsensical, irrelevant, or rambling from subject to subject; loses train of thought

☐ c. Mental function varies over the course of the day—e.g., sometimes better, sometimes worse

4. ACUTE CHANGE IN MENTAL STATUS FROM PERSON'S USUAL FUNCTIONING

e.g., restlessness, lethargy, difficult to arouse, altered environmental perception

☐ 0 No ☐ 1 Yes

5. CHANGE IN DECISION MAKING AS COMPARED TO 90 DAYS AGO (OR SINCE LAST ASSESSMENT)

☐ 0. Improved
☐ 1. No change
☐ 2. Declined
☐ 8. Uncertain

Page 6; Jan 06

SECTION G. COMMUNICATION AND VISION

1. MAKING SELF UNDERSTOOD (Expression)

Expressing information content—both verbal and nonverbal

☐ 0. *Understood*—Expresses ideas without difficulty
☐ 1. *Usually understood*—Difficulty finding words or finishing thoughts BUT if given time, little or no prompting required.
☐ 2. *Often understood*—Difficulty finding words or finishing thoughts AND prompting usually required
☐ 3. *Sometimes understood*—Ability is limited to making concrete requests
☐ 4. *Rarely or never understood*

2. ABILITY TO UNDERSTAND OTHERS (Comprehension)

Understanding verbal information content (however able; with hearing appliance normally used)

☐ 0. *Understands*—Clear comprehension
☐ 1. *Usually understands*—Misses some part / intent of message BUT comprehends most conversation
☐ 2. *Often understands*—Misses some part / intent of message BUT with repetition or explanation can often comprehend conversation
☐ 3. *Sometimes understands*—Responds adequately to simple, direct communication only
☐ 4. *Rarely or never understands*

3. HEARING

Ability to hear (with hearing appliance normally used)

☐ 0. *Adequate*—No difficulty in normal conversation, social interaction, listening to TV
☐ 1. *Minimal difficulty*—Difficulty in some environments (e.g., when person speaks softly or is more than 6 feet [2 meters] away)
☐ 2. *Moderate difficulty*—Problem hearing normal conversation, requires quiet setting to hear well
☐ 3. *Severe difficulty*—Difficulty in all situations (e.g., speaker has to talk loudly or speak very slowly; or person reports that all speech is mumbled)
☐ 4. *No hearing*

4. VISION

Ability to see in adequate light (with glasses or with other visual appliance normally used)

☐ 0. *Adequate*—Sees fine detail, including regular print in newspapers/books
☐ 1. *Minimal difficulty*—Sees large print, but not regular print in newspapers/books
☐ 2. *Moderate difficulty*—Limited vision; not able to see newspaper headlines, but can identify objects
☐ 3. *Severe difficulty*—Object identification in question, but eyes appear to follow objects; sees only light, colors or shapes
☐ 4. *No vision*

SECTION H. FUNCTIONAL STATUS

1. IADL SELF PERFORMANCE AND CAPACITY

Code for PERFORMANCE in routine activities around the home or in the community during the LAST 3 DAYS.

Code for CAPACITY based on presumed ability to carry out activity as independently as possible. This will require "speculation" by the assessor.

0. Independent - No help, set-up, or supervision
1. Set-up help only
2. Supervision - Oversight/cuing
3. Limited assistance - Help on some occasions
4. Extensive assistance - Help throughout task, but performs 50% or more of task on own
5. Maximal assistance - Help throughout task, but performs less than 50% of task on own
6. Total dependence - Full performance by others during entire period
8. Activity did not occur - During entire period [do not use this code in scoring CAPACITY]

PERFORMANCE	CAPACITY		
☐	☐	a. Meal preparation	How meals are prepared (e.g., planning meals, assembling ingredients, cooking, setting out food and utensils)
☐	☐	b. Ordinary housework	How ordinary work around the house is performed (e.g., doing dishes, dusting, making bed, tidying up, laundry)
☐	☐	c. Managing finances	How bills are paid, checkbook is balanced, household expenses are budgeted, credit card account is monitored.
☐	☐	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. Stairs	How full flight of stairs is managed (12 - 14 stairs)
☐	☐	g. Shopping	How shopping is performed for food and household items (e.g., selecting items, paying money) - EXCLUDE TRANSPORTATION.
☐	☐	h. Transportation	How travels by public transportation (navigating system, paying fare) or driving self (including getting out of house, into and out of vehicles)

2. ADL SELF-PERFORMANCE

Code for PERFORMANCE over full 24 hour periods, considering all occurrences of the activity IN LAST 3 DAYS.

[Note: For ALL ADLs, if less than 3 episodes over the 3-day time frame, see manual for scoring instructions]

0. Independent - No assistance, set-up, or supervision in any episode
1. Independent, Set-up help only - Article or device provided or placed within reach but no episode with supervision or physical assistance
2. Supervision - Oversight/cuing (no hands on)
3. Limited assistance - Guided maneuvering of limbs (non weight-bearing)
4. Extensive assistance - Weight-bearing support by one helper where person still performs 50% or more of subtasks
5. Maximal assistance - Weight-bearing support by 2+ helpers -OR- Weight-bearing support for more than 50% of subtasks
6. Total dependence - Full performance by others in all episodes
8. Activity did not occur - During entire period

PERFORMANCE		
☐	a. Bathing	How takes full-body bath or shower. Includes how transfers in and out of tub or shower AND how each part of body is bathed: arms, upper and lower legs, chest, abdomen, perineal area-EXCLUDE WASHING OF BACK AND HAIR
☐	b. Personal hygiene	How manages personal hygiene, including combing hair, brushing teeth, shaving, applying make-up, washing and drying face and hands-EXCLUDE BATHS AND SHOWERS.
☐	c. Dressing upper body	How dresses and undresses (street clothes, underwear) above the waist, including prostheses, orthotics, fasteners, pullovers, etc.
☐	d. Dressing lower body	How dresses and undresses (street clothes, underwear) from the waist down, including prostheses, orthotics, belts, pants, skirts, shoes, fasteners, etc.
☐	e. Walking	How walks between locations on same floor indoors
☐	f. Locomotion	How moves between locations on same floor (walking or wheeling). If in wheelchair, self-sufficiency once in chair
☐	g. Transfer toilet	How moves on and off toilet or commode
☐	h. Toilet use	How uses the toilet room (or commode, bedpan, urinal), cleanses self after toilet use or incontinent episodes(s), changes pad, manages ostomy or catheter, adjusts clothes-EXCLUDE TRANSFER ON AND OFF TOILET
☐	i. Bed mobility	How moves to and from lying position, turns side to side, and positions body while in bed
☐	j. Eating	How eats and drinks (regardless of skill). Includes intake of nourishment by other means (e.g., tube feeding, total parenteral nutrition)

SECTION H. FUNCTIONAL STATUS Continued

3. LOCOMOTION / WALKING

a. **Primary mode of locomotion**

☐ 0. Walking, no assistive device
☐ 1. Walking, uses assistive device—e.g., cane, walker, crutch, pushing wheelchair
☐ 2. Wheelchair, scooter
☐ 3. Bedbound

b. **Distance wheeled self**

Farthest distance wheeled self at one time in the LAST 3 DAYS
(includes independent use of motorized wheelchair)

☐ 0. Wheeled by others
☐ 1. Less than 15 feet (under 5 meters)
☐ 2. 15-149 feet (5-49 meters)
☐ 3. 150-299 feet (50-99 meters)
☐ 4. 300+ feet (100+ meters)
☐ 8. Did not use wheelchair

c. **Distance walked**—Farthest distance walked at one time without sitting down in the LAST 3 DAYS
(with support as needed)

☐ 0. Did not walk
☐ 1. Less than 15 feet (under 5 meters)
☐ 2. 15-149 feet (5-49 meters)
☐ 3. 150-299 feet (50-99 meters)
☐ 4. 300+ feet (100+ meters)
☐ 5. 1/2 mile or more (1+ kilometers)

4. ACTIVITY LEVEL

a. Total hours of exercise or physical activity in LAST 3 DAYS - e.g., walking

☐ 0. None
☐ 1. Less than one hour
☐ 2. 1-2 hours
☐ 3. 3-4 hours
☐ 4. More than 4 hours

b. In the LAST 3 DAYS, number of days went out of the house or building in which he / she lives
(no matter how short the period)

☐ 0. No days out
☐ 1. Did not go out in last 3 days, but usually goes out over a 3-day period
☐ 2. 1-2 days
☐ 3. 3 days

SECTION H. FUNCTIONAL STATUS Continued

5. PHYSICAL FUNCTION IMPROVEMENT POTENTIAL

a. Person believes he / she is capable of improved performance in physical function

☐ 0 No ☐ 1 Yes

b. Care professional believes person is capable of improved performance in physical function

☐ 0 No ☐ 1 Yes

6. CHANGE IN ADL STATUS AS COMPARED TO 90 DAYS AGO, OR SINCE LAST ASSESSMENT IF LESS THAN 90 DAYS AGO

☐ 0. Improved
☐ 1. No change
☐ 2. Declined
☐ 3. Uncertain

7. DRIVING

a. Drove car (vehicle) in the LAST 90 DAYS

☐ 0 No ☐ 1 Yes

b. If drove in LAST 90 DAYS, assessor is aware that someone has suggested that person limits OR stops driving

☐ 0 No, or does not drive ☐ 1 Yes

SECTION I. CONTINENCE

1. BLADDER CONTINENCE

☐ 0. *Continent*—Complete control; DOES NOT USE any type of catheter or other urinary collection device
☐ 1. *Control with any catheter or ostomy over last 3 days*
☐ 2. *Infrequently incontinent*—Not incontinent over last 3 days, but does have incontinent episodes
☐ 3. *Occasionally incontinent*—Less than daily
☐ 4. *Frequently incontinent*—Daily, but some control present
☐ 5. *Incontinent*—No control present
☐ 8. *Did not occur*—No urine output from bladder in last 3 days

2. URINARY COLLECTION DEVICE (Exclude pads / briefs)

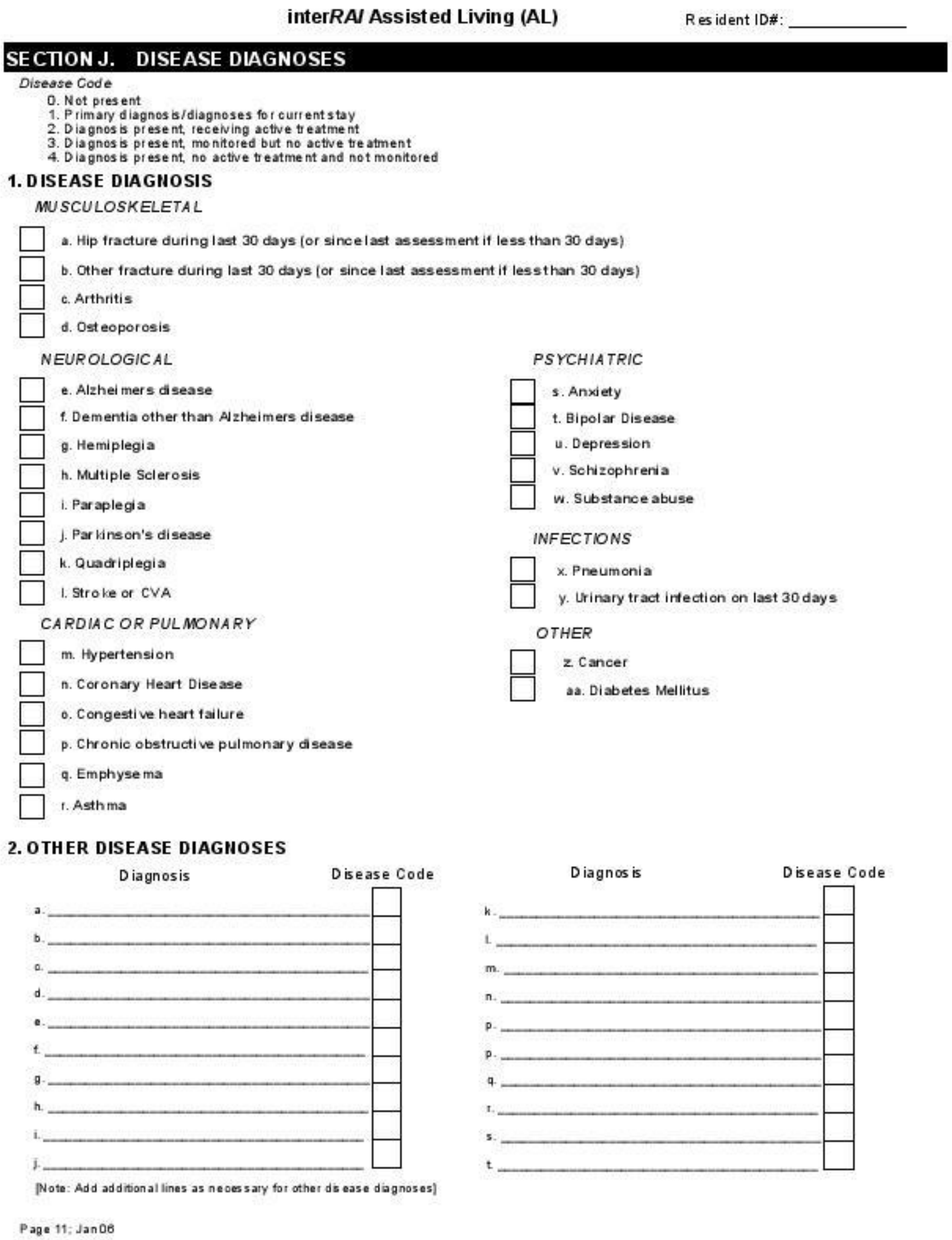
☐ 0. None
☐ 1. Condom catheter
☐ 2. Indwelling catheter
☐ 3. Cystostomy, nephrostomy, ureterostomy

3. BOWEL CONTINENCE

☐ 0. *Continent*—Complete control; DOES NOT USE any type of ostomy device
☐ 1. *Control with ostomy*—Control with ostomy device over last 3 days
☐ 2. *Infrequently incontinent*—Not incontinent over last 3 days, but does have incontinent episodes
☐ 3. *Occasionally incontinent*—Less than daily
☐ 4. *Frequently incontinent*—Daily, but some control present
☐ 5. *Incontinent*—No control present
☐ 8. *Did not occur*—No bowel movement in the last 3 days

4. PADS OR BRIEFS WORN

☐ 0 No ☐ 1 Yes



inter*RAI* Assisted Living (AL) Resident ID#: ____________

SECTION J. DISEASE DIAGNOSES

Disease Code

0. Not present
1. Primary diagnosis/diagnoses for current stay
2. Diagnosis present, receiving active treatment
3. Diagnosis present, monitored but no active treatment
4. Diagnosis present, no active treatment and not monitored

1. DISEASE DIAGNOSIS

MUSCULOSKELETAL

☐ a. Hip fracture during last 30 days (or since last assessment if less than 30 days)
☐ b. Other fracture during last 30 days (or since last assessment if less than 30 days)
☐ c. Arthritis
☐ d. Osteoporosis

NEUROLOGICAL

☐ e. Alzheimers disease
☐ f. Dementia other than Alzheimers disease
☐ g. Hemiplegia
☐ h. Multiple Sclerosis
☐ i. Paraplegia
☐ j. Parkinson's disease
☐ k. Quadriplegia
☐ l. Stroke or CVA

CARDIAC OR PULMONARY

☐ m. Hypertension
☐ n. Coronary Heart Disease
☐ o. Congestive heart failure
☐ p. Chronic obstructive pulmonary disease
☐ q. Emphysema
☐ r. Asthma

PSYCHIATRIC

☐ s. Anxiety
☐ t. Bipolar Disease
☐ u. Depression
☐ v. Schizophrenia
☐ w. Substance abuse

INFECTIONS

☐ x. Pneumonia
☐ y. Urinary tract infection on last 30 days

OTHER

☐ z. Cancer
☐ aa. Diabetes Mellitus

2. OTHER DISEASE DIAGNOSES

Diagnosis — Disease Code

a. ______________________________ ☐
b. ______________________________ ☐
c. ______________________________ ☐
d. ______________________________ ☐
e. ______________________________ ☐
f. ______________________________ ☐
g. ______________________________ ☐
h. ______________________________ ☐
i. ______________________________ ☐
j. ______________________________ ☐

Diagnosis — Disease Code

k. ______________________________ ☐
l. ______________________________ ☐
m. ______________________________ ☐
n. ______________________________ ☐
p. ______________________________ ☐
p. ______________________________ ☐
q. ______________________________ ☐
r. ______________________________ ☐
s. ______________________________ ☐
t. ______________________________ ☐

[Note: Add additional lines as necessary for other disease diagnoses]

Page 11; Jan06

SECTION K. HEALTH CONDITIONS

1. FALLS

☐ 0. No fall in last 90 days
☐ 1. No fall in last 30 days, but fell 31-90 days ago
☐ 2. One fall in last 30 days
☐ 3. Two or more falls in last 30 days

2. PROBLEM FREQUENCY

Code for presence in last 3 days

0. Not present
1. Present but not exhibited in last 3 days
2. Exhibited on 1 of last 3 days
3. Exhibited on 2 of last 3 days
4. Exhibited daily in last 3 days

BALANCE

☐ a. Difficult or unable to move to standing position unassisted
☐ b. Difficult or unable to turn around and face the opposite direction when standing
☐ c. Dizziness
☐ d. Unsteady gait

CARDIAC OR PULMONARY

☐ e. Chest pain
☐ f. Difficulty clearing airway secretions

PSYCHIATRIC

☐ g. Abnormal thought process—e.g., loosening of associations, blocking, flight of ideas, tangentiality, circumstantiality
☐ h. Delusions—Fixed false beliefs
☐ i. Hallucinations—False sensory perceptions

NEUROLOGICAL

☐ j. Aphasia

GI STATUS

☐ k. Acid reflux—Regurgitation of acid from stomach to throat
☐ l. Constipation—No bowel movement in 3 days or difficult passage of hard stool
☐ m. Diarrhea
☐ n. Vomiting

SLEEP PROBLEMS

☐ o. Difficulty falling asleep or staying asleep; waking up too early; restlessness; non-restful sleep
☐ p. Too much sleep—Excessive amount of sleep that interferes with person's normal functioning

OTHER

☐ q. Aspiration
☐ r. Fever
☐ s. GI or GU bleeding
☐ t. Peripheral edema

3. DYSPNEA (Shortness of breath)

☐ 0. Absence of symptom
☐ 1. Absent at rest, but present when performed moderate activities
☐ 2. Absent at rest, but present when performed normal day-to-day activities
☐ 3. Present at rest

4. FATIGUE—Inability to complete normal daily activities (e.g., ADLs, IADLs), in last 3 days

a. *FATIGUE*

☐ 0. None
☐ 1. Minimal—Diminished energy but completes normal day-to-day activities
☐ 2. Moderate—Due to diminished energy, UNABLE TO FINISH normal day-to-day activities
☐ 3. Severe—Due to diminished energy, UNABLE TO START SOME normal day-to-day activities
☐ 4. Unable to commence any normal day-to-day activities—Due to diminished energy

b. *SELF-REPORTED FATIGUE*

In the <u>past month</u>, on average, have you been:

1. Feeling unusually tired during the day?	☐ 0 No	☐ 1 Yes	☐ 8 Person could not (would not) respond
2. Feeling unusually weak?	☐ 0 No	☐ 1 Yes	☐ 8 Person could not (would not) respond
3. Feeling an unusually low energy level?	☐ 0 No	☐ 1 Yes	☐ 8 Person could not (would not) respond

SECTION K. HEALTH CONDITIONS Continued

5. PAIN SYMPTOMS

[Note - Always ask the person about pain frequency, intensity, and control. Observe person and ask others who are in contract with the person]

a. Frequency with which person complains or shows evidence of pain (including grimacing, teeth clenching, moaning, withdrawal when touched, or other non-verbal signs suggesting pain)
- ☐ 0. No pain
- ☐ 1. Present but not exhibited in last 3 days
- ☐ 2. Exhibited on 1-2 of last 3 days
- ☐ 3. Exhibited daily in last 3 days

b. Intensity of highest level of pain present
- ☐ 0. No pain
- ☐ 1. Mild
- ☐ 2. Moderate
- ☐ 3. Severe
- ☐ 4. Times when pain is horrible or excruciating

c. Consistency of pain
- ☐ 0. No pain
- ☐ 1. Single episode during last 3 days
- ☐ 2. Intermittent
- ☐ 3. Constant

d. Breakthrough pain—Times in last 3 days when person experienced sudden, acute flare-ups of pain

☐ 0 No ☐ 1 Yes

e. Pain control—*Adequacy of current therapeutic regimen to control pain (from person's point of view)*
- ☐ 0. No issue of pain
- ☐ 1. Pain intensity acceptable to person; no treatment regimen or no changes in regimen required
- ☐ 2. Controlled adequately by therapeutic regimen
- ☐ 3. Controlled when therapeutic regimen followed, but not always followed as ordered
- ☐ 4. Therapeutic regimen followed, but pain control not adequate
- ☐ 5. No therapeutic regimen being followed for pain; pain not adequately controlled

6. INSTABILITY OF CONDITIONS

a. Conditions or diseases make cognitive, ADL, mood or behavior patterns unstable (fluctuating, precarious, or deteriorating) ☐ 0 No ☐ 1 Yes

b. Experiencing an acute episode, or a flare-up of a recurrent or chronic problem ☐ 0 No ☐ 1 Yes

c. End-stage disease, 6 or fewer months to live ☐ 0 No ☐ 1 Yes

7. SELF-REPORTED HEALTH

Ask: "In general, how would you rate your health?"
- ☐ 0. Excellent
- ☐ 1. Good
- ☐ 2. Fair
- ☐ 3. Poor
- ☐ 8. Could not (would not) respond

8. TOBACCO AND ALCOHOL

a. Smokes tobacco daily
- ☐ 0. No
- ☐ 1. Not in LAST 3 DAYS, but is usually a daily smoker
- ☐ 2. Yes

b. Alcohol—Highest number of drinks in any "single sitting" in LAST 14 DAYS
- ☐ 0. None
- ☐ 1. 1
- ☐ 2. 2-4
- ☐ 3. 5 or more

SECTION L. BEHAVIOR SYMPTOMS

1. POTENTIAL RISK TO SELF OR OTHERS

Code for most recent occurrence
- 0. Never
- 1. Any instance or attempt before last 12 months
- 2. Any instance or attempt in last 12 months
- 3. Instance or attempt in last 7 days
- 4. Instance or attempt in last 3 days

☐ a. Elopement attempts or threats

☐ b. Dangerous, non-violent behavior—e.g., falling asleep while smoking

SECTION L. BEHAVIORAL SYMPTOMS Continued

2. BEHAVIORAL SYMPTOMS

0. Not present
1. Present but not exhibited in last 3 days
2. Exhibited on 1-2 of last 3 days
3. Exhibited daily in last 3 days

☐ a. **Wandering**—Moved with no rational purpose, seemingly oblivious to needs or safety
☐ b. **Verbal abuse**—Others were threatened, screamed at, cursed at
☐ c. **Physical abuse**—Others were hit, shoved, scratched, sexually abused
☐ d. **Socially inappropriate or disruptive behavior**—Made disruptive sounds or noises, screamed, smeared/threw feces, hoarded, rummaged through other's belongings
☐ e. **Inappropriate public sexual behavior or public disrobing**
☐ f. **Resists care**—Resisted taking medications/injections, ADL assistance, or eating
☐ g. **Intimidation of others or threatened violence**—e.g., threatening gestures or stance with no physical contact, shouting angrily, throwing furniture, explicit threats of violence

3. NUMBER OF LIFETIME PSYCHIATRIC ADMISSIONS

☐ 0. None
☐ 1. 1-3
☐ 2. 4-5
☐ 3. 6 or more

SECTION M. SKIN CONDITION

1. MOST SEVERE PRESSURE ULCER

☐ 0. No pressure ulcer
☐ 1. Any area of persistent skin redness
☐ 2. Partial loss of skin layers
☐ 3. Deep craters in the skin
☐ 4. Breaks in skin exposing muscle or bone
☐ 5. Not codeable, e.g., necrotic eschar predominant

2. PRIOR PRESSURE ULCER

☐ 0 No ☐ 1 Yes

3. PRESENCE OF SKIN ULCER OTHER THAN PRESSURE ULCER—e.g., venous ulcer, arterial ulcer, mixed venous-arterial ulcer, diabetic foot ulcer

☐ 0 No ☐ 1 Yes

4. MAJOR SKIN PROBLEMS—e.g., lesions, 2nd or 3rd degree burns, healing surgical wounds

☐ 0 No ☐ 1 Yes

5. SKIN TEARS OR CUTS—Other than surgery

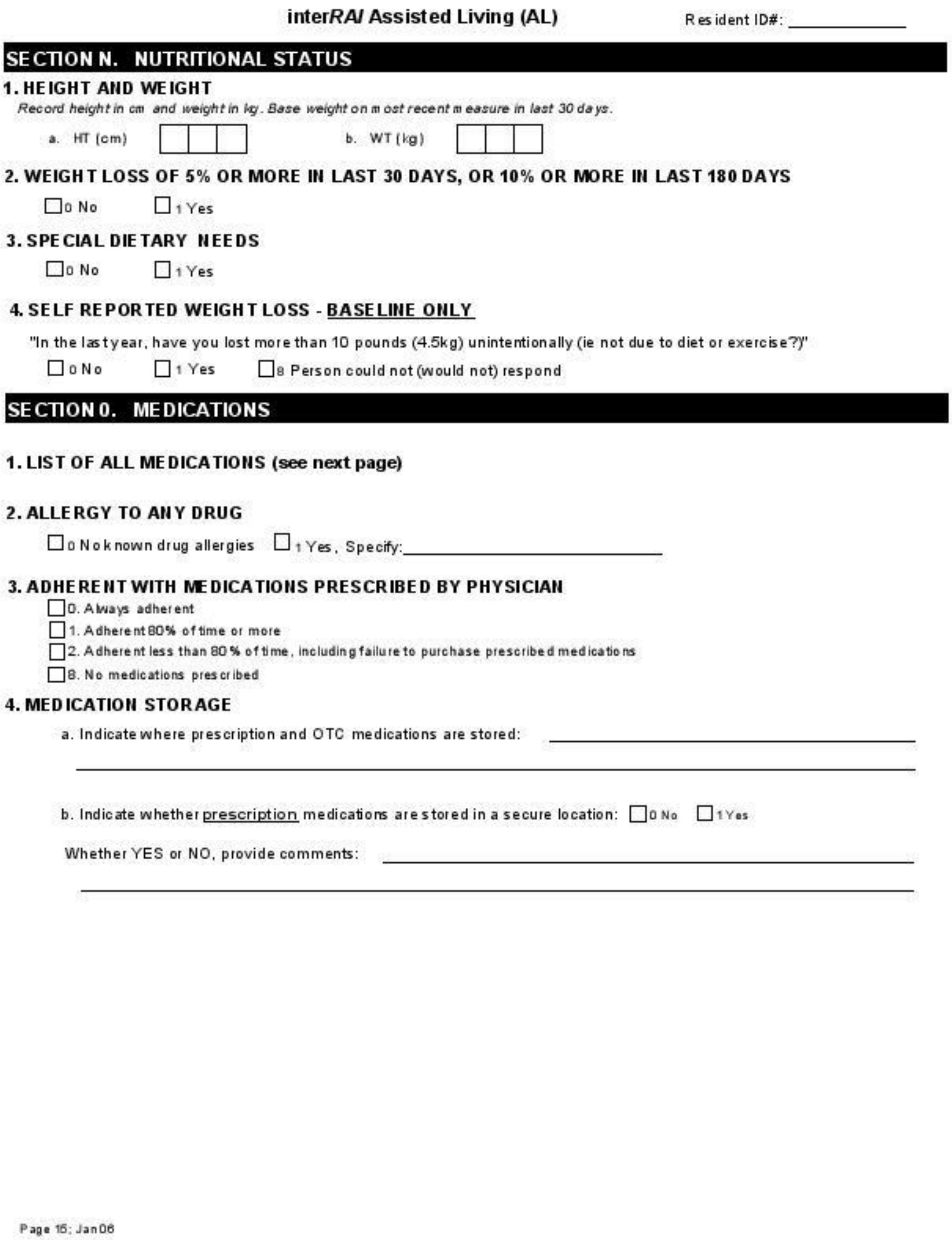
☐ 0 No ☐ 1 Yes

6. OTHER SKIN CONDITIONS OR CHANGES IN SKIN CONDITION—e.g., bruises, rashes, itching, mottling, herpes zoster, intertrigo, eczema

☐ 0 No ☐ 1 Yes

7. FOOT PROBLEMS—e.g., bunions, hammer toes, overlapping toes, structural problems, infections, ulcers

☐ 0. No foot problems
☐ 1. Foot problems, no limitation in walking
☐ 2. Foot problems limit walking
☐ 3. Foot problems prevent walking
☐ 4. Foot problems, does not walk for other reasons



inter*RAI* Assisted Living (AL) Resident ID#: ____________

SECTION N. NUTRITIONAL STATUS

1. HEIGHT AND WEIGHT

Record height in cm and weight in kg. Base weight on most recent measure in last 30 days.

a. HT (cm) ☐☐☐ b. WT (kg) ☐☐☐

2. WEIGHT LOSS OF 5% OR MORE IN LAST 30 DAYS, OR 10% OR MORE IN LAST 180 DAYS

☐ 0 No ☐ 1 Yes

3. SPECIAL DIETARY NEEDS

☐ 0 No ☐ 1 Yes

4. SELF REPORTED WEIGHT LOSS - BASELINE ONLY

"In the last year, have you lost more than 10 pounds (4.5kg) unintentionally (ie not due to diet or exercise?)"

☐ 0 No ☐ 1 Yes ☐ 8 Person could not (would not) respond

SECTION 0. MEDICATIONS

1. LIST OF ALL MEDICATIONS (see next page)

2. ALLERGY TO ANY DRUG

☐ 0 No known drug allergies ☐ 1 Yes, Specify:____________________________

3. ADHERENT WITH MEDICATIONS PRESCRIBED BY PHYSICIAN

☐ 0. Always adherent
☐ 1. Adherent 80% of time or more
☐ 2. Adherent less than 80% of time, including failure to purchase prescribed medications
☐ 8. No medications prescribed

4. MEDICATION STORAGE

a. Indicate where prescription and OTC medications are stored: ______________________________

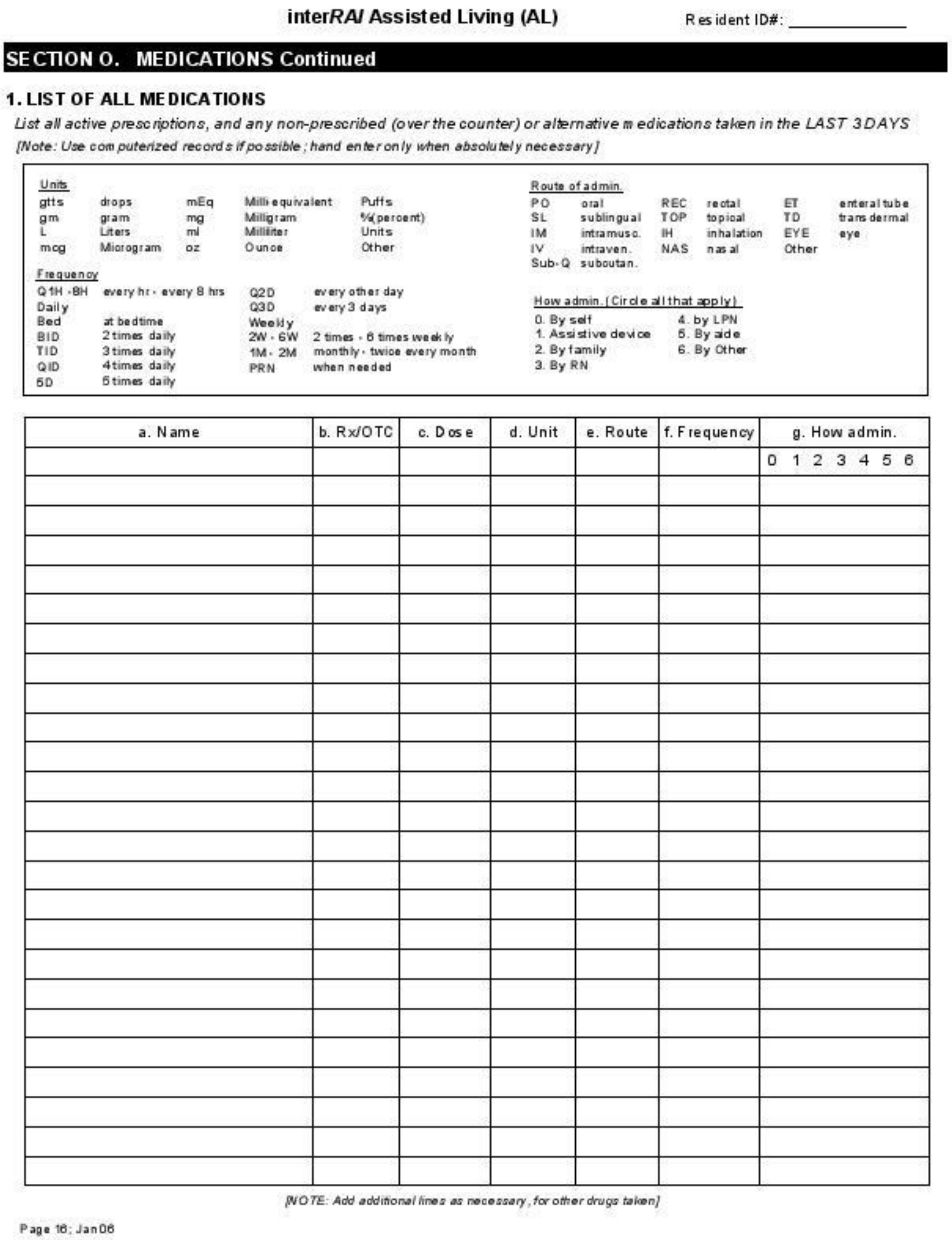
____

b. Indicate whether prescription medications are stored in a secure location: ☐ 0 No ☐ 1 Yes

Whether YES or NO, provide comments: ______________________________

____

Page 15; Jan 06



inter*RAI* Assisted Living (AL)

Resident ID#: ____________

SECTION O. MEDICATIONS Continued

1. LIST OF ALL MEDICATIONS

List all active prescriptions, and any non-prescribed (over the counter) or alternative medications taken in the LAST 3 DAYS

[Note: Use computerized records if possible; hand enter only when absolutely necessary]

Units

gtts	drops	mEq	Milli equivalent	Puffs
gm	gram	mg	Milligram	%(percent)
L	Liters	ml	Milliliter	Units
mcg	Microgram	oz	Ounce	Other

Frequency

Q1H - 8H	every hr - every 8 hrs	Q2D	every other day
Daily		Q3D	every 3 days
Bed	at bedtime	Weekly	
BID	2 times daily	2W - 6W	2 times - 6 times weekly
TID	3 times daily	1M - 2M	monthly - twice every month
QID	4 times daily	PRN	when needed
5D	5 times daily		

Route of admin.

PO	oral	REC	rectal	ET	enteral tube
SL	sublingual	TOP	topical	TD	trans dermal
IM	intramusc.	IH	inhalation	EYE	eye
IV	intraven.	NAS	nasal	Other	
Sub-Q	subcutan.				

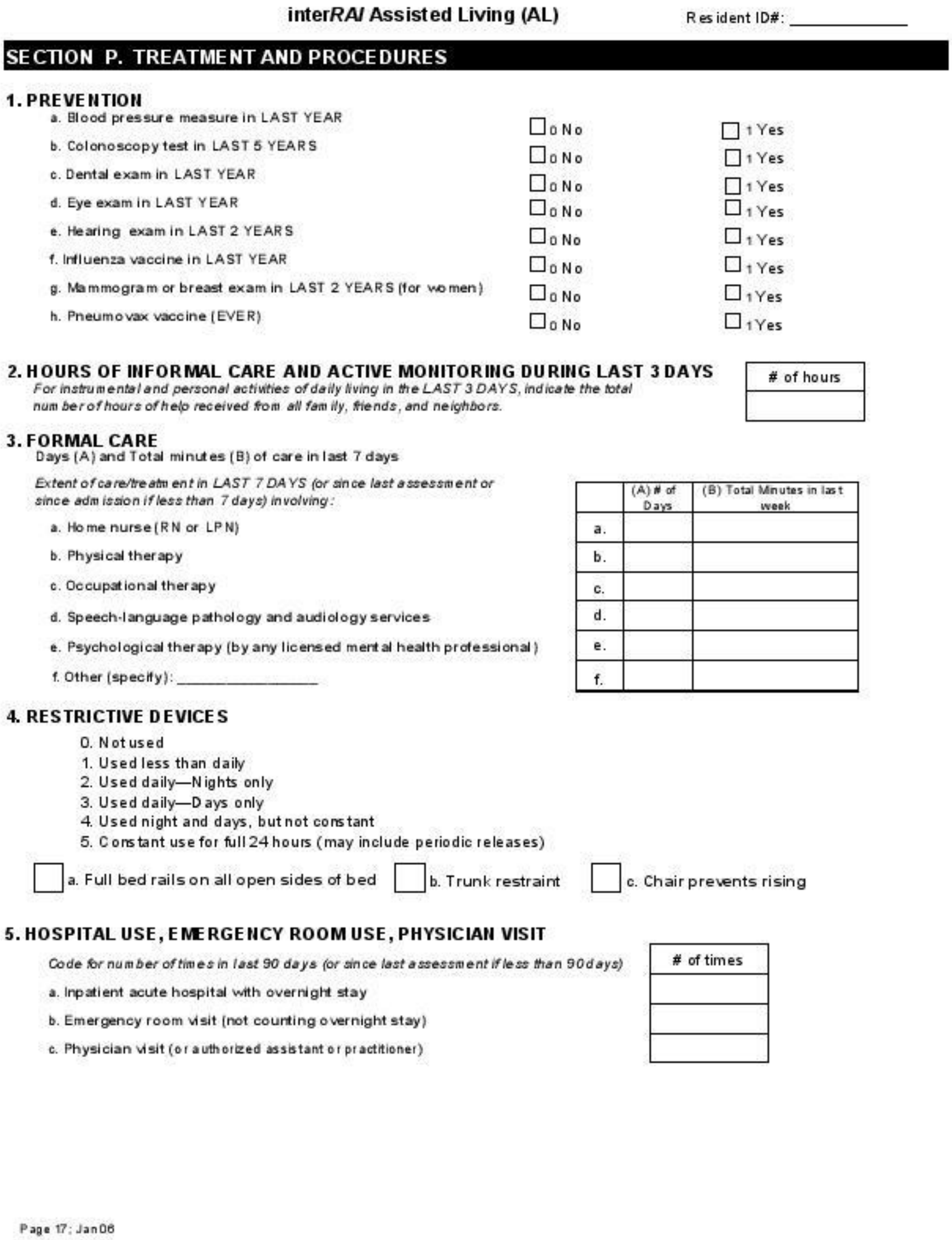
How admin. (Circle all that apply)

0. By self
1. Assistive device
2. By family
3. By RN
4. by LPN
5. By aide
6. By Other

a. Name	b. Rx/OTC	c. Dose	d. Unit	e. Route	f. Frequency	g. How admin.
						0 1 2 3 4 5 6

[NOTE: Add additional lines as necessary, for other drugs taken]

Page 16; Jan06



inter*RAI* Assisted Living (AL) Resident ID#: ____________

SECTION P. TREATMENT AND PROCEDURES

1. PREVENTION

a. Blood pressure measure in LAST YEAR	☐ 0 No	☐ 1 Yes
b. Colonoscopy test in LAST 5 YEARS	☐ 0 No	☐ 1 Yes
c. Dental exam in LAST YEAR	☐ 0 No	☐ 1 Yes
d. Eye exam in LAST YEAR	☐ 0 No	☐ 1 Yes
e. Hearing exam in LAST 2 YEARS	☐ 0 No	☐ 1 Yes
f. Influenza vaccine in LAST YEAR	☐ 0 No	☐ 1 Yes
g. Mammogram or breast exam in LAST 2 YEARS (for women)	☐ 0 No	☐ 1 Yes
h. Pneumovax vaccine (EVER)	☐ 0 No	☐ 1 Yes

2. HOURS OF INFORMAL CARE AND ACTIVE MONITORING DURING LAST 3 DAYS

For instrumental and personal activities of daily living in the LAST 3 DAYS, indicate the total number of hours of help received from all family, friends, and neighbors.

# of hours

3. FORMAL CARE

Days (A) and Total minutes (B) of care in last 7 days

Extent of care/treatment in LAST 7 DAYS (or since last assessment or since admission if less than 7 days) involving:

a. Home nurse (RN or LPN)

b. Physical therapy

c. Occupational therapy

d. Speech-language pathology and audiology services

e. Psychological therapy (by any licensed mental health professional)

f. Other (specify): ________________

	(A) # of Days	(B) Total Minutes in last week
a.		
b.		
c.		
d.		
e.		
f.		

4. RESTRICTIVE DEVICES

0. Not used
1. Used less than daily
2. Used daily—Nights only
3. Used daily—Days only
4. Used night and days, but not constant
5. Constant use for full 24 hours (may include periodic releases)

☐ a. Full bed rails on all open sides of bed ☐ b. Trunk restraint ☐ c. Chair prevents rising

5. HOSPITAL USE, EMERGENCY ROOM USE, PHYSICIAN VISIT

Code for number of times in last 90 days (or since last assessment if less than 90 days)

	# of times
a. Inpatient acute hospital with overnight stay	
b. Emergency room visit (not counting overnight stay)	
c. Physician visit (or authorized assistant or practitioner)	

Page 17: Jan06

SECTION P. TREATMENT AND PROCEDURES Continued

6. ASSISTANCE PROVIDED IN THE LAST 3 DAYS
(Check all that apply)

No Help Needed	Family Provided	Facility Staff Provided	Outside Agency Provided	
☐	☐	☐	☐	a. Assistance with medication
☐	☐	☐	☐	b. Assistance with any ADL
☐	☐	☐	☐	c. Incontinence care
☐	☐	☐	☐	d. Meal delivery to room
☐	☐	☐	☐	e. Nursing care or services
☐	☐	☐	☐	f. Any therapy (PT, OT, Speech)
☐	☐	☐	☐	g. Transportation to health care

SECTION Q. RESPONSIBILITY AND DIRECTIVES

1. NEGOTIATED RISK CONTRACT
Code for whether negotiated/managed risk contract on file

☐ 0 No ☐ 1 Yes

2. RESPONSIBILITY / LEGAL GUARDIAN

		YES		
	No	On File	On Site	Off Site
a. Legal guardian	☐	☐	☐	☐
b. Other legal oversight	☐	☐	☐	☐
c. Durable power of attorney/health care	☐	☐	☐	☐
d. Durable power of attorney/financial	☐	☐	☐	☐
e. Family member responsible	☐	☐	☐	☐

3. ADVANCE DIRECTIVE

a. Advance directives for not resuscitating	☐	☐	☐	☐
b. Advance directives for not intubating	☐	☐	☐	☐
c. Advance directives for not hospitalizing	☐	☐	☐	☐
d. Advance directives for not tube feeding	☐	☐	☐	☐
e. Advance directives for medication restriction	☐	☐	☐	☐

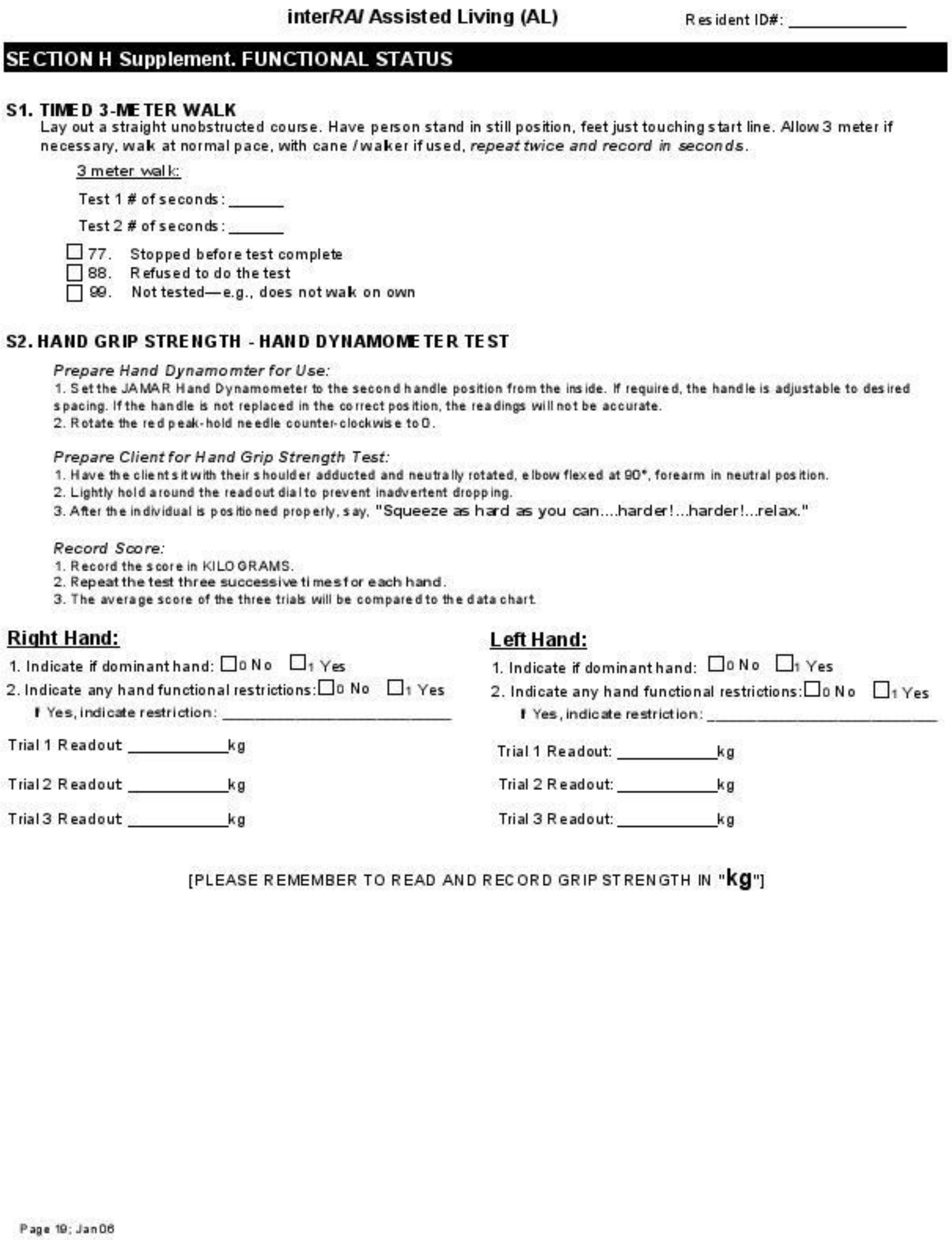
SECTION R. ASSESSMENT INFORMATION

1. Signature of person coordinating/completing the assessment: ______________________________

2. Assessor ID#: __________

3. Date Assessment signed as complete:

|__|__| / |__|__| / |__|__|__|__|
day month year



inter*RAI* Assisted Living (AL) Resident ID#: ____________

SECTION H Supplement. FUNCTIONAL STATUS

S1. TIMED 3-METER WALK

Lay out a straight unobstructed course. Have person stand in still position, feet just touching start line. Allow 3 meter if necessary, walk at normal pace, with cane / walker if used, *repeat twice and record in seconds.*

<u>3 meter walk:</u>

Test 1 # of seconds: ______

Test 2 # of seconds: ______

☐ 77. Stopped before test complete
☐ 88. Refused to do the test
☐ 99. Not tested—e.g., does not walk on own

S2. HAND GRIP STRENGTH - HAND DYNAMOMETER TEST

Prepare Hand Dynamomter for Use:
1. Set the JAMAR Hand Dynamometer to the second handle position from the inside. If required, the handle is adjustable to desired spacing. If the handle is not replaced in the correct position, the readings will not be accurate.
2. Rotate the red peak-hold needle counter-clockwise to 0.

Prepare Client for Hand Grip Strength Test:
1. Have the client sit with their shoulder adducted and neutrally rotated, elbow flexed at 90*, forearm in neutral position.
2. Lightly hold around the readout dial to prevent inadvertent dropping.
3. After the individual is positioned properly, say, "Squeeze as hard as you can....harder!...harder!...relax."

Record Score:
1. Record the score in KILOGRAMS.
2. Repeat the test three successive times for each hand.
3. The average score of the three trials will be compared to the data chart.

<u>Right Hand:</u>

1. Indicate if dominant hand: ☐0 No ☐1 Yes
2. Indicate any hand functional restrictions: ☐0 No ☐1 Yes
If Yes, indicate restriction: __________________________

Trial 1 Readout ___________kg

Trial 2 Readout ___________kg

Trial 3 Readout ___________kg

<u>Left Hand:</u>

1. Indicate if dominant hand: ☐0 No ☐1 Yes
2. Indicate any hand functional restrictions: ☐0 No ☐1 Yes
If Yes, indicate restriction: __________________________

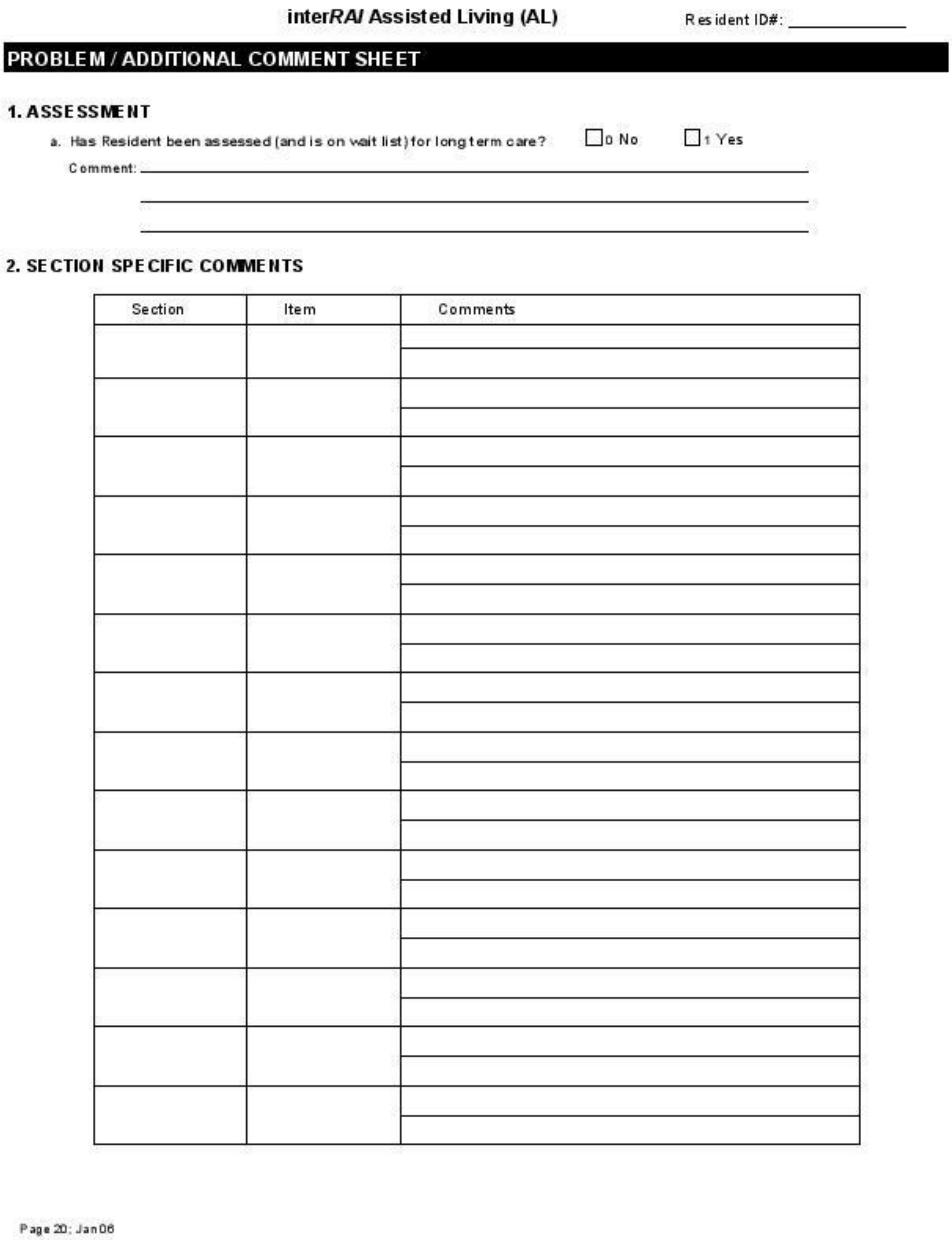
Trial 1 Readout: ___________kg

Trial 2 Readout: ___________kg

Trial 3 Readout: ___________kg

[PLEASE REMEMBER TO READ AND RECORD GRIP STRENGTH IN "**kg**"]

Page 19; Jan06



inter*RAI* Assisted Living (AL)

Resident ID#: ____________

PROBLEM / ADDITIONAL COMMENT SHEET

1. ASSESSMENT

a. Has Resident been assessed (and is on wait list) for long term care? ☐0 No ☐1 Yes

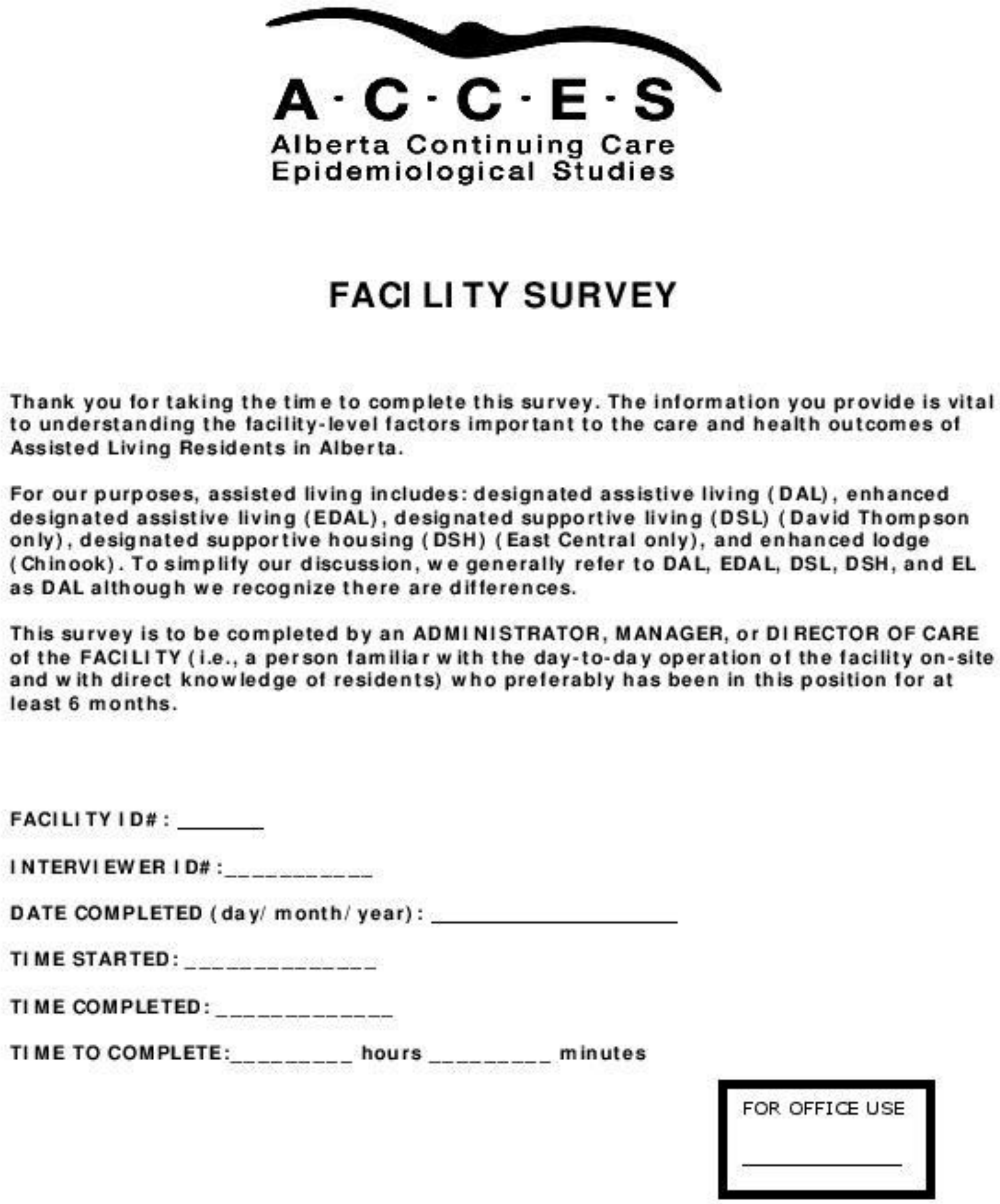
Comment: ____________________

2. SECTION SPECIFIC COMMENTS

Section	Item	Comments

Page 20: Jan06

APPENDIX C: Facility Survey



A·C·C·E·S

Alberta Continuing Care
Epidemiological Studies

FACILITY SURVEY

Thank you for taking the time to complete this survey. The information you provide is vital to understanding the facility-level factors important to the care and health outcomes of Assisted Living Residents in Alberta.

For our purposes, assisted living includes: designated assistive living (DAL), enhanced designated assistive living (EDAL), designated supportive living (DSL) (David Thompson only), designated supportive housing (DSH) (East Central only), and enhanced lodge (Chinook). To simplify our discussion, we generally refer to DAL, EDAL, DSL, DSH, and EL as DAL although we recognize there are differences.

This survey is to be completed by an ADMINISTRATOR, MANAGER, or DIRECTOR OF CARE of the FACILITY (i.e., a person familiar with the day-to-day operation of the facility on-site and with direct knowledge of residents) who preferably has been in this position for at least 6 months.

FACILITY ID#: _______

INTERVIEWER ID#:___________

DATE COMPLETED (day/month/year): ____________________

TIME STARTED: ______________

TIME COMPLETED: _____________

TIME TO COMPLETE:_________ hours _________ minutes

FOR OFFICE USE

____

A. YOUR BACKGROUND

To start with, we would like you to answer some questions about your background. This will be followed by questions pertaining specifically to your facility.

1. What position(s) do you hold in this facility? CIRCLE ALL THAT APPLY

Operator/Owner	1
Executive Director/Administrator	2
Manager/Assistant Director	3
Supervisor-in-charge/Director of Care	4
Other (Specify:________________________)	5

2. How long have you been in this position at this facility? (IF <1 YEAR, INDICATE # OF MONTHS.)

Years .... ________

Months .... ________

3. Do any of the following professional qualifications apply to you? CIRCLE ALL THAT APPLY

MBA (Masters of Business Administration)	1
RN/BScN/BN (Registered Nurse/Bachelor of Science in Nursing/Bachelor of Nursing)	2
MN (Masters of Nursing)	3
MSW (Masters of Social Work)	4
MPH/MSPH (Master's in Public Health; Health Administration)	5
Other (Specify:____________________)	6
None of the Above	7

4. At any time prior to your current position at this facility, did you work in the health care sector, as an administrator/ supervisor, or as direct care staff?

No	0
Yes	1

IF YES, **in what capacity?** ________________________________

B. FACILITY OWNERSHIP and SIZE

WE WILL REFER TO DAL/ EDAL/ DSL/ DSH/ EL SPACES/ BEDS AS DAL for ease of discussion.

5. Is this facility owned/ operated as/ by:

Private-for-profit	1
Private non-profit/ Voluntary	2
RHA	3
Other	4

(SPECIFY : ____________________)

6. Is this facility part of a multi-facility system or chain of facilities?

No	0
Yes – part of chain of Assisted Living Facilities	1
Yes – part of chain of Assisted Living and Long Term/Continuing Care Facilities	2

A. What is the name of the parent organization/ multi-facility system? _______________

7. How long has this facility been in operation? ______ years ______ months (if < 1year)

8. How many DAL/ EDAL/ DSL/ DSH/ EL spaces/ beds does this facility have now and how many are currently occupied? Is this the same as when our study nurses did our assessments? When were these spaces first available (month/ year)?

	CURRENTLY		**At time of Assessments**		**MONTH/ YEAR**
TYPE	**# Available**	**# Occupied**	**# Available**	**# Occupied**	**OPENED**
DAL	______	______	______	______	________
EDAL	______	______	______	______	________
DSL	______	______	______	______	________
DSH	______	______	______	______	________
EL	______	______	______	______	________

9. Are your DAL spaces/ beds: (A unit may be a floor, a wing, a separate building)

a. All in one unit for DAL residents only 1

b. All in one unit with a mix of DAL and other types of residents 2

# of DAL residents _______ # of other residents__________

c. In more than one unit but each unit is for DAL residents only 3

	# of DAL residents		# of DAL residents
Unit #1	____________	Unit #2	____________
Unit #3	____________	Unit #4	____________

d. In more than one unit with a mix of DAL and other types of residents 4

	# DAL	#other		# DAL	#other
Unit #1	____	____	Unit #2	____	____
Unit #3	____	____	Unit #4	____	____

10. How many of your DAL spaces/ beds are designated as Alzheimer's/ Dementia spaces (e.g. safe living unit, locked unit)?

Total Spaces (on all units): __________ Total # by Unit: Unit #1: _______ Unit #2: _______

Unit #3: _______ Unit #4: _______

11. Do you have a waiting list for DAL?

No 0

Yes ....1 **How many are currently on list?**__________

Don't know 7

12. In addition to DAL, does this facility provide various levels of care or housing at the same location (e.g., private assisted living, long term / continuing care (nursing home), acute care and/ or independent living)?

No ....0 **(GO TO Q. 13)**

Yes 1

A. In addition to your DAL spaces/ beds, which of the following types/ levels of care are provided? IF OFFERED, **how many beds/ spaces are currently available and occupied?** CIRCLE ALL THAT APPLY

Type/ Level of Care	# Beds Available	# Beds Occupied
1. **Independent Living/ Independent Apartments**	______	______
2. **Lodge (EXCLUDES ENHANCED LODGE)**	______	______
3. **Private Assisted Living (PAL)**	______	______
4. **Alzheimer's/ Dementia Special Care Unit in a Residential Care section of facility (e.g. safe living, dementia spaces, locked unit) (EXCLUDES DAL/ EDAL/ DSL/ DSH/ EL)**	______	______
5. **Alzheimer's/ Dementia Special Care Unit in a Licensed Long Term Care/ Continuing Care section**	______	______
6. **Licensed Long Term Care/ Continuing Care**	______	______
7. **Rehabilitation Hospital/ Subacute Care Unit**	______	______
8. **Other** (Specify: ________________________)	______	______

C. STAFFING

OUR NEXT QUESTIONS FOCUS ON STAFFING FOR DAL RESIDENTS ONLY. WE REALIZE THAT THIS MAY BE DIFFICULT GIVEN THE STAFFING ARRANGEMENTS YOU MIGHT HAVE.

THE FIRST SET OF QUESTIONS FOCUS ON THE PERSONAL CARE ATTENDANTS (PCAs). *This includes staff who provide direct resident care and does NOT include staff whose only duties are housekeeping, cooking, maintenance, or administration/clerical.*

13. Do you have 24-hour PCA coverage on-site for your DAL residents?

No 0

IF NO, **what hours are not covered?** ______________

Yes 1

14. **Do these PCAs perform tasks other than personal care, such as laundry, housekeeping, preparing of meals, or recreational activities with DAL residents?**

No 0

Yes 1

IF YES, **please specify the other tasks provided by aides/ PCAs:**

____

15. **Are the PCAs working with DAL residents:**

	NO	YES	DEPENDS
a. **Facility staff**	0	1	2 ____________
b. **Home care/ regional staff**	0	1	2 ____________
c. **Contracted through another agency**	0	1	2 ____________

16. **Do you have regular shifts for the PCAs for the DAL residents? This includes PCAs on staff, from Home Care, and Contract/ Consultant PCAs.**

No 0
IF NO, **what time is allocated and how?** ________________________________

____**(GO TO Q. 18)**

Yes 1

Both 2

17. **What shifts do the PCAs work in DAL? (ASK SEPARATELY FOR EACH UNIT/ FLOOR)**
(SPECIFY IF ONLY ON CERTAIN DAYS OF THE WEEK, eg. weekends only)
How many PCAs are there per shift as part of your staff complement in DAL?
How many PCAs worked these shifts last week? ***probe whether any hours/ shifts short-staffed***
How many of these PCAs were your staff, contracted through another agency, or from home care?

			# of PCAs			
Day(s) of Week	**Time Period**	**COMPLEMENT Total**	**Total**	**LAST WEEK Staff**	**Contract**	**HC**
____	Shift 1 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 2 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 3 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 4 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 5 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 6 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 7 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 8 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 9 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 10 (Time __:__ to __:__)	____	____	____	____	____

18. **During the last week**, did you have PCAs working but not on shifts? If yes, how many PCAs worked and how many hours of care were provided?

Type of PCA	# of PCAs	Total Hours of Non-shift PCA Care Last Week
PCA on Staff		
PCA (Home Care)		
PCA (Contract/ Consultant)		

19. What is your approved FTE of PCA staff for DAL only? __________________ Don't know

20. What is your approved PCA staff to DAL resident ratio? _______________ Don't know

21. What do you estimate to be your rate of turnover among PCAs, on an annual basis?

_________ percent Don't know

Any **additional** comments regarding PCA staff?

____

____

THE NEXT QUESTIONS FOCUS ON LICENSED PRACTICAL NURSES (LPNs).

22. Do you have 24-hour LPN coverage **on-site** for your DAL residents?

No 0

IF NO, what hours are not covered? ______________

Yes 1

23. Do you have LPN coverage **on-call** for your DAL residents?

No 0

Yes 1

IF YES, what time period is covered? (e.g. 24/7, evenings, weekends)

____

IF YES, do LPNs generally come to facility or deal with issues by phone? If come to facility, how far do the LPNs have to travel (distance and time)?

____

24. Are the LPNs working with DAL residents:

	NO	YES	DEPENDS
a. Facility staff	0	1	2 __________
b. Home care/ regional staff	0	1	2 __________
c. Contracted through another agency	0	1	2 __________

25. Do the LPNs perform the following tasks in DAL?

	NO	YES	DEPENDS
a. Direct nursing care	0	1	2 ________
b. Asssessment	0	1	2 ________
c. Case management	0	1	2 ________
d. Staff education	0	1	2 ________
e. Supervision of PCAs	0	1	2 ________

f. Other (SPECIFY) ____

____

26. Do you have regular shifts for the LPNs for the DAL residents? This includes LPNs on staff, from Home Care, and Contract/ Consultant LPNs.

No 0
IF NO, what time is allocated and how? ________________________________
____(GO TO Q. 28)

Yes 1

Both 2

27. What shifts do the LPNs work in DAL? (LIST SEPARATELY FOR EACH UNIT/ FLOOR AND SPECIFY IF ONLY ON CERTAIN DAYS OF THE WEEK, eg. weekends only)
How many LPNs are there per shift as part of your staff complement in DAL?
How many LPNs worked these shifts last week? *probe whether any hours/ shifts short-staffed*
How many LPNs were your staff, contracted through another agency, or from home care?

			# of LPNs LAST WEEK			
Day(s) of Week	Time Period	COMPLEMENT Total	Total	Staff	Contract	HC
____	Shift 1 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 2 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 3 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 4 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 5 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 6 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 7 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 8 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 9 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 10 (Time __:__ to __:__)	____	____	____	____	____

28. During the last week, how many LPNs did you have working but not on shifts? How many hours of care were provided?

Type of LPN	# of LPNs	Total Hours of Non-shift LPN Care Last Week
LPN on Staff		
LPN (Home Care)		
LPN (Contract/ Consultant)		

29. What is your approved FTE of LPN staff for DAL only? ________________ Don't know

30. What is your approved LPN staff to DAL resident ratio? ______________ Don't know

31. What do you estimate to be your rate of turnover among these LPNs on an annual basis?

_______ percent Don't know

Any additional comments regarding LPN staff?

____

____

THE NEXT QUESTIONS FOCUS ON REGISTERED NURSES.

32. Do you have 24-hour RN coverage on-site for your DAL residents?

No 0

IF NO, what hours are not covered by an on-site RN? __________

Yes 1

33. Do you have RN coverage on-call for your DAL residents?

No 0

Yes 1

IF YES, what time period is covered? (e.g. 24/7, evenings, weekends)

____

IF YES, do RNs generally come to facility or deal with issues by phone? If come to facility, how far do the RNs have to travel (distance and time)?

____

34. Are the RNs working with DAL residents:

	NO	YES	DEPENDS
a. Facility staff	0	1	2 __________
b. Home care/ regional staff	0	1	2 __________
c. Contracted through another agency	0	1	2 __________

35. Do the RNs perform the following tasks in DAL?

	NO	YES	DEPENDS
a. Direct nursing care	0	1	2 ________
b. Asssessment	0	1	2 ________
c. Case management	0	1	2 ________
d. Staff education	0	1	2 ________
e. Supervision of PCAs/ LPNs	0	1	2 ________

f. Other (SPECIFY) ____

36. Do you have regular shifts for the RNs with the DAL residents? This includes RNs on staff; RNs from Home Care; and Contract/ Consultant RNs.

No 0
IF NO, what time is allocated and how? ______________________________
____(GO TO Q. 38)
Yes 1
Both 2

37. What shifts do the RNs work in DAL? (LIST SEPARATELY FOR EACH UNIT/ FLOOR AND SPECIFY IF ONLY ON CERTAIN DAYS OF THE WEEK, eg. weekends only)
How many RNs are there per shift as part of your staff complement in DAL?
How many RNs worked these shifts last week?
How many of these RNs were your staff, contracted through another agency, or from home care?

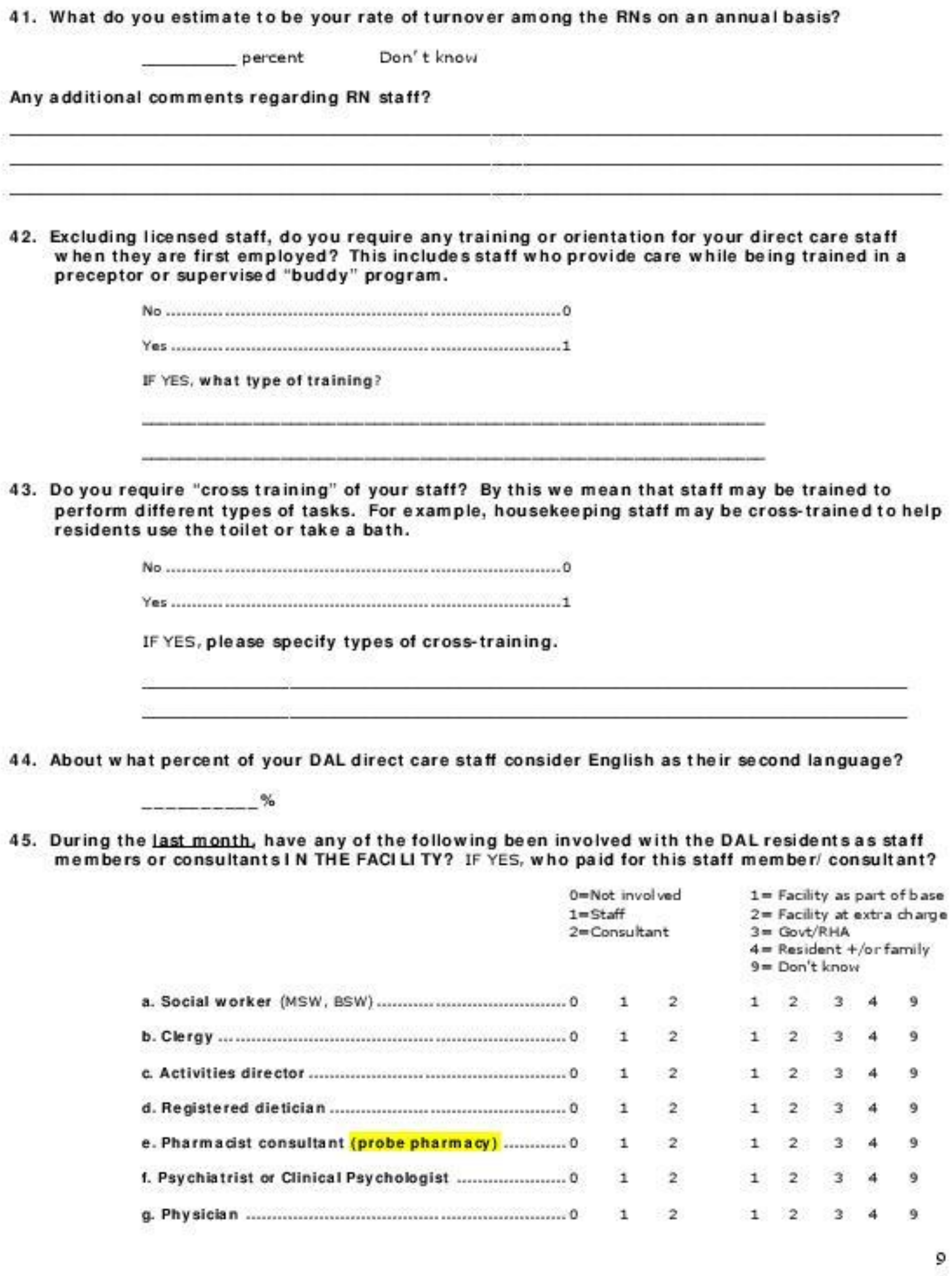
Day of Week	Time Period	COMPLEMENT Total	# of RNs LAST WEEK Total	Staff	Contract	HC
____	Shift 1 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 2 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 3 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 4 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 5 (Time __:__ to __:__)	____	____	____	____	____
____	Shift 6 (Time __:__ to __:__)	____	____	____	____	____

38. <u>During the last week</u>, how many RNs did you have working but not on shifts? How many hours of care were provided?

Type of RN	# of RNs	Total Hours of Non-shift RN Care Last Week
RN on Staff		
RN (Home Care)		
RN (Contract/ Consultant)		

39. What, if any, is your approved FTE of RN staff for DAL only? _________________ Don't know

40. What, if any, is your approved RN staff to DAL resident ratio? ______________ Don't know



41. What do you estimate to be your rate of turnover among the RNs on an annual basis?

_________ percent Don't know

Any additional comments regarding RN staff?

____

____

____

42. Excluding licensed staff, do you require any training or orientation for your direct care staff when they are first employed? This includes staff who provide care while being trained in a preceptor or supervised "buddy" program.

No 0

Yes 1

IF YES, **what type of training**?

____

____

43. Do you require "cross training" of your staff? By this we mean that staff may be trained to perform different types of tasks. For example, housekeeping staff may be cross-trained to help residents use the toilet or take a bath.

No 0

Yes 1

IF YES, **please specify types of cross-training.**

____

____

44. About what percent of your DAL direct care staff consider English as their second language?

_________%

45. During the <u>last month</u>, have any of the following been involved with the DAL residents as staff members or consultants IN THE FACILITY? IF YES, **who paid for this staff member/ consultant?**

	0=Not involved 1=Staff 2=Consultant			1= Facility as part of base 2= Facility at extra charge 3= Govt/RHA 4= Resident +/or family 9= Don't know				
a. Social worker (MSW, BSW)	0	1	2	1	2	3	4	9
b. Clergy	0	1	2	1	2	3	4	9
c. Activities director	0	1	2	1	2	3	4	9
d. Registered dietician	0	1	2	1	2	3	4	9
e. Pharmacist consultant (probe pharmacy)	0	1	2	1	2	3	4	9
f. Psychiatrist or Clinical Psychologist	0	1	2	1	2	3	4	9
g. Physician	0	1	2	1	2	3	4	9

9

46. Is there a Physician/ General Practitioner (GP) affiliated with the facility?

No .... 0 **(GO TO Q. 47)**

Yes .... 1 **How many?** ____________

A. Does he/ she have an office on site?

No 0

Yes 1

B. Are DAL residents required to change from their own personal Physician/ GP to the Facility Physician/ GP?

No 0

Yes 1

47. Which of the following factors, if any, currently present a <u>challenge to adequate staffing</u> for the DAL residents in your facility?

		NO	YES	
A.	Ability to recruit staff	0	1	→ **What type?** PCAs LPNs RNs
B.	Ability to retain staff	0	1	→ **What type?** PCAs LPNs RNs
C.	Need for new equipment	0	1	
D.	Physical space design	0	1	
E.	Unfunded operating and benefit expense increase	0	1	
F.	Need for more approved staff in budget	0	1	→ **What type?** PCAs LPNs RNs
G.	Need for changes in role of staff	0	1	→ **Clarify:** ________________
H.	Increasing care needs for residents	0	1	
I.	Other (SPECIFY)	0	1	

____

____

IF MORE THAN ONE CHALLENGE, **WHICH CHALLENGE DO YOU SEE AS HIGHEST PRIORITY? WHY?**

____

____

48. When you experience staff shortages, what staffing options are available to cover shifts? (PROBE: DOC/ Unit manager fills in, contract with private agency, etc).

____

____

____

D. FACILITY SERVICES & POLICIES

Our next questions focus on facility services and policies. PLEASE NOTE THAT THESE QUESTIONS RELATE TO YOUR DAL/EDAL/DSL/DSH/EL RESIDENTS ONLY. Again, we will refer to all these residents as DAL residents.

49. During the last week, who <u>administered prescription medications</u> to the DAL residents in your facility? This includes all the types of persons who performed this task at any time or on any shift, including weekends. CIRCLE ALL THAT APPLY.

All DAL residents take their own prescription medicines 01

Some DAL residents take their own prescription medicines 02

Registered nurse (RN) 03

LPN (Licensed Practical Nurse) 04

Personal Care Attendant 05

Administrator/Assistant Director/Manager (Not a Licensed Nurse).........06

Other (SPECIFY) ________________________________

50. During the last week, who was responsible for <u>storing and securing prescription medications</u>? This includes all the types of persons who performed this task at any time or on any shift, including weekends, during the last week. CIRCLE ALL THAT APPLY.

All DAL residents store their own prescription medicines 01

Some DAL residents store their own prescription medicines 02

Registered nurse (RN) 03

LPN (Licensed Practical Nurse) 04

Personal care attendant..05

Administrator/Assistant Director/Manager (Not a Licensed Nurse).........06

Other (SPECIFY) ________________________________

51. Are all prescription medications kept in a secured location?

No 0

Yes 1

Whether No or Yes, Please Clarify and Explain (**DESCRIBE SECURED LOCATION AND PROBE FOR SPECIFICS, i.e. PRNs, Topicals, Narcotics, Injections, etc.**):

____

____

52. At what times are meals served or scheduled for the DAL residents?

Breakfast	___:___ to ___:___	No set schedule	Meal not served
Lunch	___:___ to ___:___	No set schedule	Meal not served
Dinner	___:___ to ___:___	No set schedule	Meal not served

53. Is there a common dining area for DAL residents?

No 0

Yes 1

A. Are the DAL residents expected to walk/ wheel themselves to the dining area?

No 0

Yes 1

54. Does the facility meet any special dietary requirements of DAL residents (e.g., diabetic?)

No 0

Yes 1

IF YES, **SPECIFY** requirements that can be met:

____

____

55. Does the facility meet any special dietary preferences of DAL residents (e.g., snacks, no potatoes, cultural)?

No 0

Yes 1

IF YES, **SPECIFY** preferences that can be met:

____

____

56. Does the facility provide options for DAL residents to:

	NO	YES		NO	YES
a. **Store food in their rooms**	0	1	→ In a fridge?	NO	YES
b. **Cook/ prepare food in their rooms**	0	1	→ In a microwave?	NO	YES
			→ On a stovetop?	NO	YES
c. **Have facility meals delivered to their rooms**	0	1			
d. **Have non-facility meals delivered to their rooms**	0	1			

57. Can DAL residents bring their own personal furniture to the facility?

No .... 0 (**GO TO Q. 58**)

Yes 1

A. How much furniture may they bring? CIRCLE RESPONSE THAT BEST DESCRIBE SITUATION.

Furnish their entire room/apartment 1

Bring a few personal items, such as pictures, and some furniture, such as chair, lamp 2

Bring only small personal items, such as photos, bedspread, small lamp 3

58. Can DAL residents physically change their room by:

	NO	YES
a. **Painting their rooms**	0	1
b. **Wallpapering**	0	1
c. **Changing the locks**	0	1

59. Can DAL residents bring pets to live at the facility in their room or apartment?

No ....0 (GO TO Q. 60)

Yes 1

A. Which of the following may a resident keep?

	No	Yes	Depends
i. **A dog**	0	1	2 → ______________
ii. **A cat**	0	1	2 → ______________
iii. **A fish or fish tank**	0	1	2 → ______________
iv. **A pet bird**	0	1	2 → ______________

v. **Other** (Specify)____

B. Is there an extra charge for keeping a pet?

No 0

Yes ....1 → Charge per month? _________

C. If a resident becomes too ill or disabled to care for the pet, will facility staff provide basic care (e.g., feeding the pet, walking the dog)?

No 0

Yes 1

60. Does the facility have any animals or pets that belong to the facility (e.g., a pet dog, bird, cat) that residents can play with or enjoy?

No 0

Yes 1

61. Does the facility allow for visiting pets?

No 0

Yes 1

62. Does the facility provide on-site options for guests to spend the night?

No 0

Yes 1

IF YES, **In a separate room?** .... No 0 YES 1 → **Cost?** _______

IF YES, **In a resident's room?** .... No 0 YES 1 → **Cost?** _______

63. Does the facility have any spousal suites (i.e., shared accommodations for couples)?

No 0

Yes 1

IF YES, **# of units available** ________ **# currently occupied by spouses** ________

64. **Are there times when the facility may restrict hours for visiting?**

No 0
Yes (Specify: ___________________________)...........1

A. **Are there restrictions on how visitors can enter the building (i.e., a secured entrance?)**

No 0
Yes (Specify: ___________________________)...........1

65. **Is there a dress code for residents when they use open/common areas (e.g., cannot wear sleeping garments when coming to meals)?**

No 0
Yes (Specify: ___________________________)...........1

66. **What outside amenities are available to your DAL residents?**

a. **Picnic area**	0	1
b. **Garden**	0	1
c. **Chairs in inner courtyard/backyard**	0	1
d. **Chairs at front door**	0	1
e. **Other** (Specify: ___________________________)	0	1

67. **IF HAVE A DEMENTIA COTTAGE/LOCKED UNIT, is there a secure outside area for the residents of a dementia cottage/locked unit/safe unit to use?**

No 0
Yes ....1 → **Circle:** Fence solid See-through Both

68. **Our next questions focus on services that the facility may <u>regularly</u> offer for DAL residents. We have already talked about some of these services. For each service, I will ask:**

A. **Does the facility regularly offer the service? *"Regularly" means <u>not</u> on an ad hoc basis or for only one special resident.* (IF NO, Go to next service)**

B. **Is the service provided directly by your staff as part of the basic monthly fee or for an extra charge (and how much)?**

C. **Is the service arranged by the facility with an outside agency as part of the basic monthly fee or for an extra charge (and how much)?**
By "arranging" we mean that you might have a formal contract with the agency; or the facility may take some responsibility for helping the resident identify needs, contacting an agency/provider and monitoring the performance of the provider.

D. **Any comments on the service?**

	No	Yes, Provided 1-Part of Base Fee 2-Extra Charge	Yes, Arranged 1-Part of Base Fee 2-Extra Charge	Comments
Housekeeping/Cleaning	0	1 2 $	1 2 $	
Personal laundry	0	1 2 $	1 2 $	
Towels, bedding laundry	0	1 2 $	1 2 $	

	No	Yes, Provided 1-Part of Base Fee 2-Extra Charge	Yes, Arranged 1-Part of Base Fee 2-Extra Charge	Comments
Meals/ food - Breakfast	0	1 2 $	1 2 $	
- Lunch	0	1 2 $	1 2 $	
- Dinner	0	1 2 $	1 2 $	
- Snacks	0	1 2 $	1 2 $	
Special diets (e.g., diabetic, low salt)	0	1 2 $	1 2 $	
Escort to meals	0	1 2 $	1 2 $	
Meal delivered to Resident's room	0	1 2 $	1 2 $	
Assistance with bathing	0	1 2 $	1 2 $	
Assistance with dressing	0	1 2 $	1 2 $	
Hair care (brushing, shampooing, etc)	0	1 2 $	1 2 $	
Assistance with locomotion (walking/ wheeling)	0	1 2 $	1 2 $	
Assistance with toileting	0	1 2 $	1 2 $	
Incontinence supplies	0	1 2 $	1 2 $	
Administration of medications	0	1 2 $	1 2 $	
Nursing care (blood pressure, dressings)	0	1 2 $	1 2 $	
Oral care (teeth)	0	1 2 $	1 2 $	
Physiotherapy - in facility	0	1 2 $	1 2 $	
- out of facility	0	N/A	1 2 $	
Occupational therapy - in facility	0	1 2 $	1 2 $	
- out of facility	0	N/A	1 2 $	
Speech/ lang therapy - in facility	0	1 2 $	1 2 $	
- out of facility	0	N/A	1 2 $	
Foot care/ podiatry - in facility	0	1 2 $	1 2 $	
- out of facility	0	N/A	1 2 $	
Mental hlth/ psych couns - in facility	0	1 2 $	1 2 $	
- out of facility	0	N/A	1 2 $	

	No	Yes, Provided 1-Part of Base Fee 2-Extra Charge	Yes, Arranged 1-Part of Base Fee 2-Extra Charge	Comments
Social wk/ clergy couns - in facility	0	1 2 $	1 2 $	
- out of facility	0	N/A	1 2 $	
Sitter/ companion	0	1 2 $	1 2 $	
Respite care away from facility	0	N/A	1 2 $	
Transportation to medical/ dental appts	0	1 2 $	1 2 $	
Transportation to social activities	0	1 2 $	1 2 $	
Planned recreational activities	0	1 2 $	1 2 $	
Exercise/ health program/ wellness program	0	1 2 $	1 2 $	
Day program off site	0	N/A	1 2 $	
Personal response system	0	1 2 $	1 2 $	
Other Service Specify: _____________	0	1 2 $	1 2 $	
Other Service Specify: _____________	0	1 2 $	1 2 $	
Other Service Specify: _____________	0	1 2 $	1 2 $	

69. For DAL residents in this facility, what is the lowest and highest monthly base rate?

Lowest monthly base rate .... $ _________

Highest monthly base rate .... $ _________

70. What factors, if any, are associated with variations in your monthly charge?

No variations 0

Yes, variations in monthly charge due to: 1

Specify: ____

____

71. Is there anything else you would like to mention about your monthly rate or the services you provide?

____

____

Our next questions relate to some of the usual practices and policies at your facility.

72. What is your usual practice if a resident becomes ill and requires temporary or longer term nursing/ professional care? (e.g., manage resident with existing staff; arrange and pay for extra nursing staff; arrange for extra nursing staff but charge resident/ family; consult with family; transfer/ discharge resident to ER/ hospital, continuing care facility etc.)

A. With a short-term illness (e.g., ≤14 days)? ***Probe if differs by acuity of illness***

____

____

____

B. With a longer-term illness (e.g., > 14 days)? ***Probe if differs by acuity of illness***

____

____

____

73. Are your DAL staff certified to perform CPR?

No 0

Yes 1

IF YES, **Specify:** ______________________________

74. Under what conditions would a DAL resident be sent to a local emergency room?

____

____

____

75. The Health Region and/ or particular facilities may have policies regarding the types of residents that can be cared for in DALs. (NOTE: IF IT DEPENDS, RECORD CIRCUMSTANCES).

	Able to admit someone who…			Able to retain a resident who develops this condition?		
	No	**Yes**	**Depends**	**No**	**Yes**	**Depends**
a. is bedfast (confined to bed)?	0	1	2	0	1	2
b. is chairfast (confined to a chair in his/ her room 22+ hours per day)?	0	1	2	0	1	2
c. uses a wheelchair to get around inside?	0	1	2	0	1	2
d. uses scooters/ mechanized wheelchairs?	0	1	2	0	1	2
e. needs 1-person assistance with transfers from bed to chair or wheelchair?	0	1	2	0	1	2
f. needs 2-person transfers?	0	1	2	0	1	2

	Able to admit someone who...			Able to retain a resident who develops this condition?		
	No	Yes	Depends	No	Yes	Depends
g. needs mechanical lift?	0	1	2	0	1	2
h. has a recent history of psychiatric hospitalization (mental illness) (e.g., within last 5 years)?	0	1	2	0	1	2
i. wanders?	0	1	2	0	1	2
j. is an elopement risk?	0	1	2	0	1	2
k. engages in verbally aggressive behavior?	0	1	2	0	1	2
l. engages in physically aggressive behavior?	0	1	2	0	1	2
m. engages in socially inappropriate behavior (e.g., screaming, repeated verbalizations, rummaging, disrobing)?	0	1	2	0	1	2
n. resists nursing care or ADL care (e.g., bathing, taking medication)?	0	1	2	0	1	2
o. has severe memory or judgment problems?	0	1	2	0	1	2
p. lacks bladder control but can manage own incontinence supplies (i.e., wears and changes own pad or adult diapers)?	0	1	2	0	1	2
q. lacks bladder control and needs help managing incontinence (e.g., someone helps change pads, bed linens)?	0	1	2	0	1	2
r. lacks bowel control but can manage own incontinence supplies?	0	1	2	0	1	2
s. lacks bowel control and can not manage own incontinence supplies?	0	1	2	0	1	2
t. requires assistance with feeding?	0	1	2	0	1	2
u. requires tube feeding?	0	1	2	0	1	2
v. who has insufficient funds to cover the base fee (i.e. requires hardship funding)?	0	1	2	0	1	2
w. refuses services you believe he/ she needs?	0	1	2	0	1	2
x. Is there any other condition you don't admit or retain? (DESCRIBE) ____________________________ ____________________________	0	1	2	0	1	2
y. Any other? (DESCRIBE) ____________________________ ____________________________	0	1	2	0	1	2
z. Any other? (DESCRIBE) ____________________________ ____________________________	0	1	2	0	1	2

76. What do you see as the major challenges facing DAL in this region for management, staff, residents, families, and the regional health authority?

a. Residents ____

____

____

b. Family ____

____

____

c. Staff ____

____

____

d. Management ____

____

____

e. RHA ____

____

____

77. What do you see as the major strengths of DAL in this region for management, staff, residents, families, and the regional health authority?

a. Residents ____

____

____

b. Family ____

____

____

c. Staff ____

____

____

d. Management ____

____

____

e. RHA ____

____

____

78. What changes would you like to see in DAL over the next 3 years?

____

____

____

____

79. Is there anything else you would like to tell us about DAL?

____

____

____

____

Thank You!

Thank you for your time, effort and patience in answering these questions. We greatly appreciate your support of the ACCES Study. The information you have provided is essential for improving our understanding of the facility-level factors important to the quality of care and health of DAL Residents in Alberta. We may need to call you at a later date if we have any questions. If you think of anything else we should know about your facility, please call us.

FOR INTERVIEWER:

Copies received of:

☐ Admission agreement

☐ Brochures/information material distributed to residents/families at admission

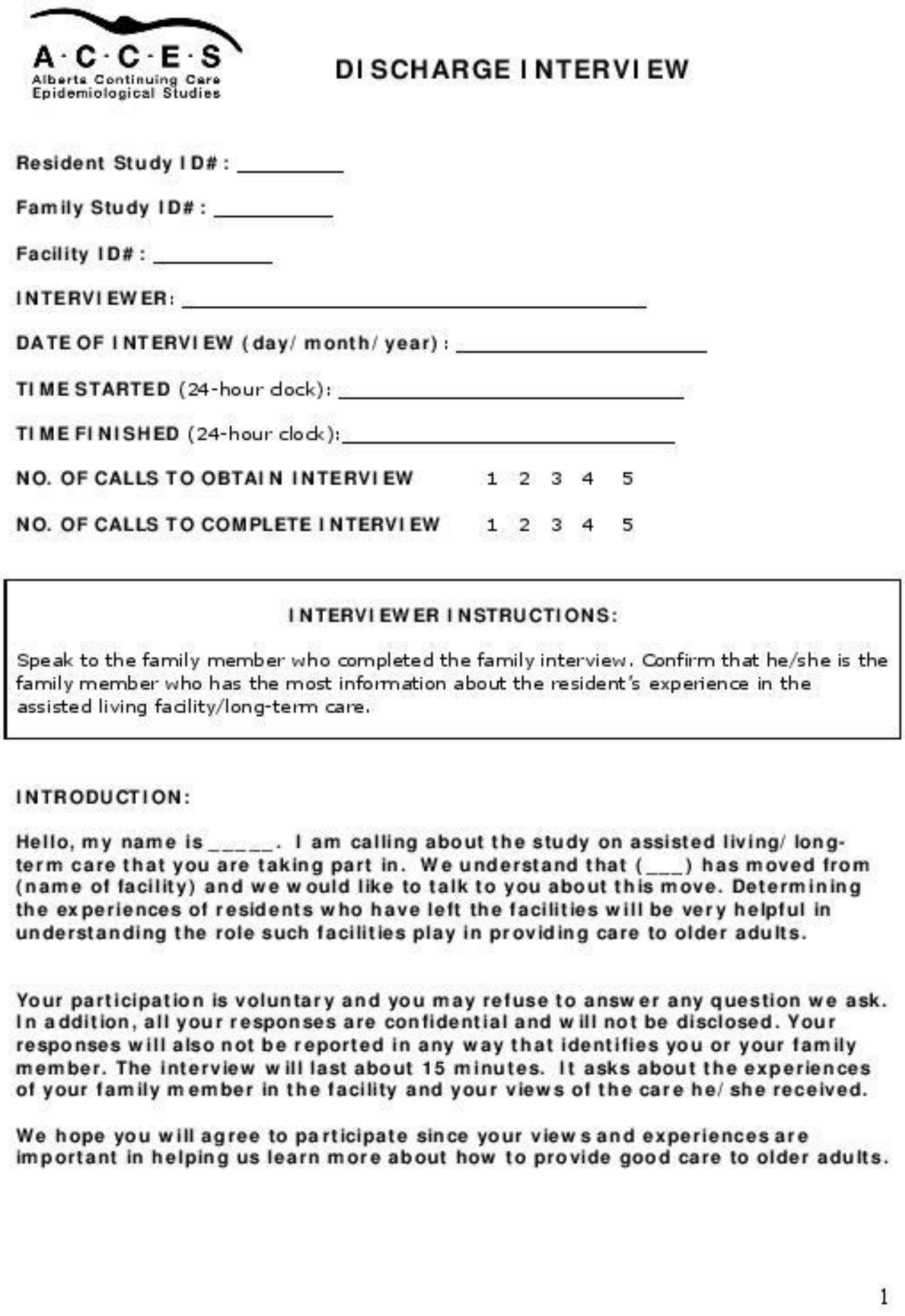
☐ Floor plans

☐ Sample activity schedule

Problems Sheet/Interviewer Notes and Comments

Item	Comments

APPENDIX D: Discharge Interview



A·C·C·E·S
Alberta Continuing Care
Epidemiological Studies

DISCHARGE INTERVIEW

Resident Study ID#: __________

Family Study ID#: __________

Facility ID#: __________

INTERVIEWER: ______________________________________

DATE OF INTERVIEW (day/ month/ year): ____________________

TIME STARTED (24-hour clock): ____________________________

TIME FINISHED (24-hour clock): ____________________________

NO. OF CALLS TO OBTAIN INTERVIEW	1	2	3	4	5
NO. OF CALLS TO COMPLETE INTERVIEW	1	2	3	4	5

INTERVIEWER INSTRUCTIONS:

Speak to the family member who completed the family interview. Confirm that he/she is the family member who has the most information about the resident's experience in the assisted living facility/long-term care.

INTRODUCTION:

Hello, my name is _____. I am calling about the study on assisted living/ long-term care that you are taking part in. We understand that (____) has moved from (name of facility) and we would like to talk to you about this move. Determining the experiences of residents who have left the facilities will be very helpful in understanding the role such facilities play in providing care to older adults.

Your participation is voluntary and you may refuse to answer any question we ask. In addition, all your responses are confidential and will not be disclosed. Your responses will also not be reported in any way that identifies you or your family member. The interview will last about 15 minutes. It asks about the experiences of your family member in the facility and your views of the care he/ she received.

We hope you will agree to participate since your views and experiences are important in helping us learn more about how to provide good care to older adults.

1. **What is your relationship to (_________)? CAN FILL OUT FROM FAMILY INTERVIEW ON FILE.**

01 Wife
02 Husband
03 Daughter
04 Son
05 Daughter-in-law
06 Son-in-law
07 Sister
08 Brother
09 Sister-in-law
10 Brother-in-law
11 Niece
12 Nephew
13 Niece-in-law
14 Nephew-in-law
15 Niece's children
16 Nephew's children
17 Granddaughter
18 Grandson
19 Great granddaughter
20 Great grandson
21 Father
22 Mother
23 Cousin
24 Friend
25 Neighbour
26 Volunteer
27 Other _____________

2. **In the month prior to (__) moving from (name of facility), how often did you visit at the facility?**

1 Daily
2 Several times a week (3 or more times) but not daily
3 1-2 times a week
4 2-3 times a month
5 Once a month
6 Not at all
7 R 8 DK

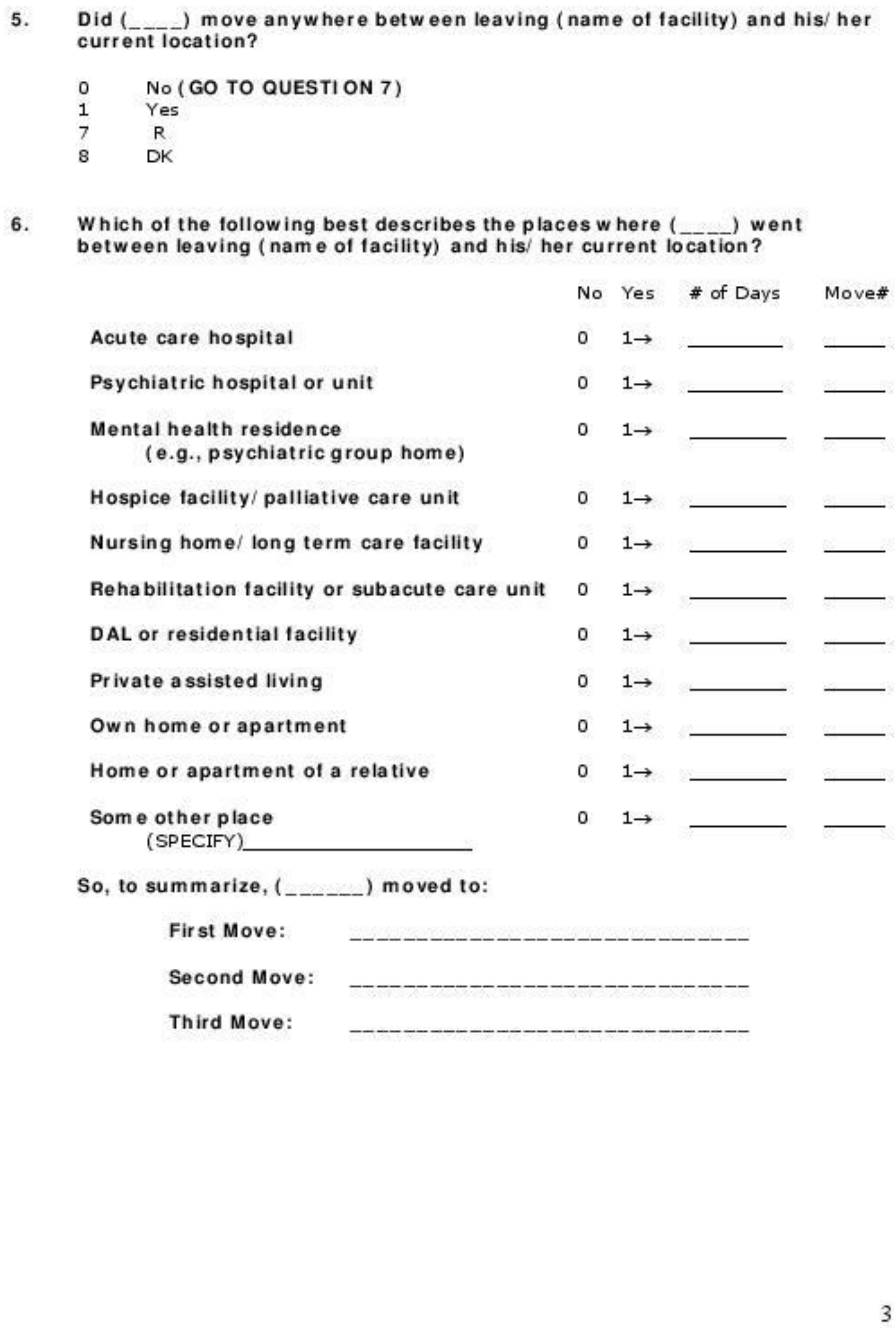
3. **On what date did (____) leave (name of facility)?** ____/____/_________
DD/MM/YR

4. **A. Which of the following best describes the place where (____) is currently staying?**

01 **Acute care hospital**
02 **Psychiatric hospital or unit**
03 **Mental health residence (e.g., psychiatric group home)**
04 **Hospice facility / palliative care unit**
05 **Nursing home/ long term care facility**
06 **Rehabilitation facility or subacute care unit**
07 **Designated assisted living or residential facility**
08 **Private assisted living**
09 **Own home or apartment**
10 **Home or apartment of a relative**
11 **Some other place** (SPECIFY)______________
77 R
88 DK

B. How long has (_____) been at (<u>ABOVE</u>)?

__________ (#of days)



5. **Did (____) move anywhere between leaving (name of facility) and his/ her current location?**

0 No (**GO TO QUESTION 7**)
1 Yes
7 R
8 DK

6. **Which of the following best describes the places where (____) went between leaving (name of facility) and his/ her current location?**

	No	Yes	# of Days	Move#
Acute care hospital	0	1→	________	_____
Psychiatric hospital or unit	0	1→	________	_____
Mental health residence (e.g., psychiatric group home)	0	1→	________	_____
Hospice facility/ palliative care unit	0	1→	________	_____
Nursing home/ long term care facility	0	1→	________	_____
Rehabilitation facility or subacute care unit	0	1→	________	_____
DAL or residential facility	0	1→	________	_____
Private assisted living	0	1→	________	_____
Own home or apartment	0	1→	________	_____
Home or apartment of a relative	0	1→	________	_____
Some other place (SPECIFY)____________________	0	1→	________	_____

So, to summarize, (______) moved to:

First Move: ____________________________
Second Move: ____________________________
Third Move: ____________________________

7. **Please tell me which of the following statements describe the reasons (_____) left (name of facility).** (CIRCLE ALL THAT APPLY).

No	Yes	
0	1	**Required hospital care** Probe:______________________________
0	1	***IF MOVE FROM DAL*: Needed nursing home care** **IF MOVE FROM LTC: Needed a different type of nursing home care** Probe:______________________________
0	1	**Required more care than the facility could provide** Probe:______________________________
0	1	**Preferred location closer to family or friends** Probe:______________________________
0	1	**Exhausted his/ her resources and had to leave because of money** Probe:______________________________
0	1	**Dissatisfaction with the quality of care** Probe:______________________________
0	1	**Dissatisfaction with the price or charges** Probe:______________________________
0	1	**Dissatisfaction with some other aspect of the facility** Probe (Specify Aspect):______________________________
0	1	**It was the facility's request for unknown reason** Probe:______________________________

Is there any other reason not mentioned here?

(SPECIFY)______________________________

77 R 88 DK

8. **Which of the following best describes the decision to leave the facility? Would you say the decision was:**

01 **Mainly the resident's decision**
02 **Mainly the family's decision**
03 **Mainly a physician's decision**
04 **Mainly the facility's decision**
05 **Mainly a joint decision**
If JOINT, Who? (CIRCLE ALL THAT APPLY)

Resident   Family   Physician   Facility

77 R
88 DK

9. **All in all, how much control did you have over the decision for (__) to move from this facility? How much control did (___) have?**

	Family	Resident
Complete or almost complete control	1	1
Some control	2	2
Little or no control	3	3
REFUSED	7	7
DK	8	8

Now I want you to think about (______)'s situation at the time of his/ her move from (NAME OF FACILITY).

10. **I want to ask you about how (______) was able to manage his/ her daily life at the time of the move. I will mention a number of common daily activities, and for each, I want you to say if (______) was able to manage this without help, with some help, or whether he/ she could not do it at all, that is, someone has to do this for him / her. Some of these questions may not have applied to (______), but to be consistent, we must ask them of everyone.**

If the respondent has difficulty in selecting the appropriate response category, read the examples in parentheses below each option. Only use these if help is required, or if you feel that the respondent has not understood the response options.

At the time of the move,

a. **Could (______) eat . . .**

1	2	3	4	5	8
without any help	some help from device ONLY	some help from person ONLY	some help from person & device	unable to do it	DK

5

b. **Could (______) dress and undress . . .**

1	2	3	4	5	8
without any help (pick out clothes, dress, undress)	some help from device ONLY (zipper pulls)	some help from person ONLY	some help from person & device	unable to do it	DK

c. **Could (______) take care of his/ her own appearance, for example, combing his/ her hair and (for men) shaving . . .**

1	2	3	4	5	8
without any help	some help from device ONLY	some help from person ONLY	some help from person & device	unable to do it	DK

d. **Could (______) walk . . .**

1	2	3	4	5	8
without any help (except a cane)	some help from device ONLY (walker, crutches or a chair)	some help from person ONLY	some help from person & device	unable to do it	DK

At the time of the move,

e. **Could (______) get in and out of bed . . .**

1	2	3	4	5	8
without any help	some help from device ONLY (any type lift)	some help from person ONLY	some help from person & device	unable to do it	DK

f. **Could (______) take a bath or shower . . .**

1	2	3	4	5	8
without any help	some help from device ONLY (shower seat hand held shower)	some help from person ONLY	some help from person & device	unable to do it	DK

g. **Could (______) go to the bathroom or commode . . .**

1	2	3	4	5	8
without any help	some help from device ONLY (raised toilet seat, walker)	some help from person ONLY	some help from person & device	unable to do it	DK

h. **Could (______) take his/ her own medicine . . .**

1	2	3	4	5	8
without any help (in the right doses at the right time)	some help from device ONLY (pill counter)	some help from person ONLY (someone prepares it and reminds him/her to take it)	some help from person & device	unable to do it	DK

11. **The following questions relate to (___)'s behaviour and memory. These may not be relevant to him/ her but we ask these of everybody in order to be consistent. Again, I am referring to how (__) was at the time of his/ her move from (NAME OF FACILITY)**

At the time of the move,

A. Did he/ she have difficulty remembering recent events, e.g., when he/ she last saw you or what happened the day before?

0 No difficulty 7 R
1 Slight difficulty 8 DK
2 Great difficulty
6 NA Specify: ______________________________

B. Did he/ she forget what has been said and repeat the same question over and over?

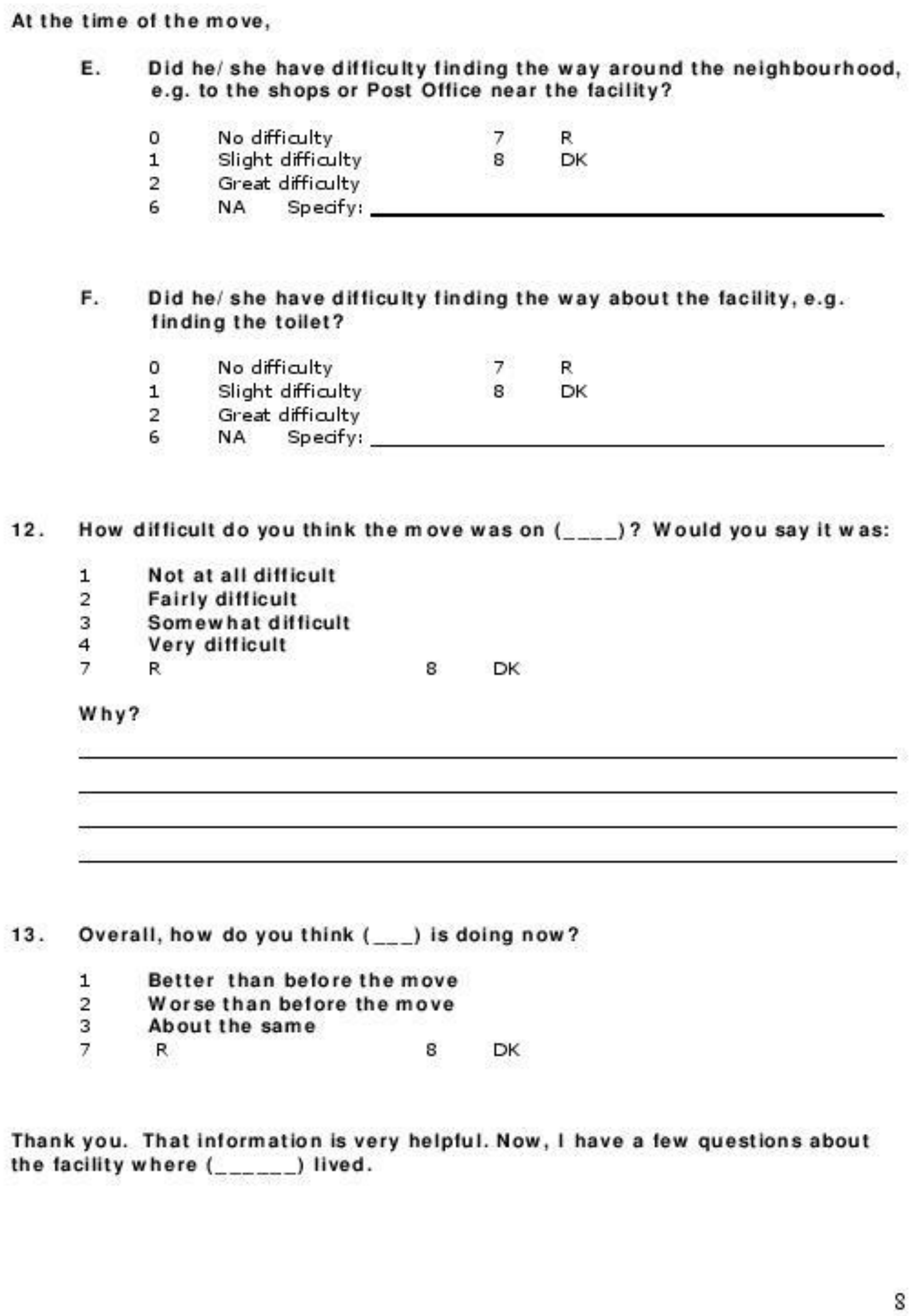
0 No 1 Yes 7 R 8 DK
6 NA Specify: ______________________________

C. Did he/ she have difficulty interpreting surroundings, e.g. knowing where he/ she is or discriminating between different types of people, such as doctors, visitors, relatives?

0 No difficulty 7 R
1 Slight difficulty 8 DK
2 Great difficulty
6 NA Specify: ______________________________

D. Did he/ she have difficulty remembering short lists of items, e.g. shopping?

0 No difficulty 7 R
1 Slight difficulty 8 DK
2 Great difficulty
6 NA Specify: ______________________________



At the time of the move,

E. **Did he/ she have difficulty finding the way around the neighbourhood, e.g. to the shops or Post Office near the facility?**

0	No difficulty	7	R
1	Slight difficulty	8	DK
2	Great difficulty		
6	NA Specify: ______		

F. **Did he/ she have difficulty finding the way about the facility, e.g. finding the toilet?**

0	No difficulty	7	R
1	Slight difficulty	8	DK
2	Great difficulty		
6	NA Specify: ______		

12. **How difficult do you think the move was on (____)? Would you say it was:**

1 **Not at all difficult**
2 **Fairly difficult**
3 **Somewhat difficult**
4 **Very difficult**
7 R 8 DK

Why?

______
______
______
______

13. **Overall, how do you think (___) is doing now?**

1 **Better than before the move**
2 **Worse than before the move**
3 **About the same**
7 R 8 DK

Thank you. That information is very helpful. Now, I have a few questions about the facility where (______) lived.

14. When (_____) entered (name of facility), did someone discuss with you the conditions under which he/ she would be asked to leave or what care needs it will not be able to accommodate?

0 No 7 R 8 DK
1 Yes →

Which of the following statements best describes the facility's policies about discharge?

1 **Very unclear – what the facility promised and what it actually did were very different**
2 **Unclear – you didn't know what to expect because the terms were very vague**
3 **Adequate – you had a general idea of what to expect**
4 **Very clear – facility policies were clear, and the facility lived up to what it promised**
7 R 8 DK

15. Which of the following statements best describes your feelings about the length of your relative's stay in (name of facility)?

1 **Wish he/ she had left sooner *(IF MOVE FROM DAL*: for example to go to a nursing home)**
2 **Wish he/ she had been able to stay there longer**
3 **Left at just the right time**
7 R 8 DK

16. Did you have any knowledge about the charges at (name of facility)?

0 No **(GO TO QUESTION 19)**
1 Yes
7 R 8 DK

17. Did you find that the charges at (___) increased at a faster rate than you expected or that there were additional, unexpected charges, over and above the monthly rate?

0 No
1 Yes
7 R 8 DK

18. Using any number on a scale from 0 to 10, with 0 being the worst and 10 being the best, how would you rate the facility's performance in terms of meeting your expectations about how much it would cost on a monthly basis?

________ Score (0-10) 77 R 88 DK

19. **Using any number on a scale from 0 to 10, with 0 being the worst and 10 being the best, how would you rate the facility's performance in terms of meeting your relative's need for assistance or care?**

<u>2 weeks prior to leaving the facility</u>? ____ Score (0-10) 77 R 88 DK

<u>During his/her entire stay at the facility</u>? ____ Score (0-10) 77 R 88 DK

20. **Was (feature) better, worse, or about the same as you expected at (name of facility)?**

	BETTER	WORSE	AS EXPECTED	R	DK
The accommodation	1	2	3	7	8
The price	1	2	3	7	8
The activities	1	2	3	7	8
The transportation that was offered	1	2	3	7	8
The staff (quality and number)	1	2	3	7	8
The availability of services or assistance (___) needed	1	2	3	7	8

21. **Overall, which of the following statements best describes your feelings about (___)'s experience at (name of facility). Would you say it was:**

1 **Better than you expected**
2 **Worse than you expected**
3 **About the same as you expected**
7 R 8 DK

22. **For the last question, you can answer definitely no, probably no, probably yes, or definitely yes. Would you recommend this facility to others?**

1 DEFINITELY NO
2 PROBABLY NO
3 PROBABLY YES
4 DEFINITELY YES
7 R 8 DK

Is there anything else you would like to tell us about (____) or about yourself?

____

____

____

____

____

Thank you. [IF NOW IN ANOTHER DAL OR IN LTC] We would still like you and (_____) to continue to be involved in the study. We will be contacting at follow-up.

Interviewer Comments/Notes:

APPENDIX E: Decedent Interview

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Epidemiological Studies

DECEDENT INTERVIEW

Resident Study ID#: __________

Family Study ID#: ___________

Facility ID#: ___________

INTERVIEWER: ____

DATE OF INTERVIEW (day/month/year): ________________________

TIME STARTED (24-hour clock): _________________________________

TIME FINISHED (24-hour clock):_______________________________

NO. OF CALLS TO OBTAIN INTERVIEW 1 2 3 4 5

NO. OF CALLS TO COMPLETE INTERVIEW 1 2 3 4 5

INTERVIEWER INSTRUCTIONS:

Speak to the family member who completed the family interview. Confirm that he/she is the family member who has the most information about the resident's experience in the assisted living facility/long-term care facility.

INTRODUCTION:

Hello, my name is ___. I am calling about the study on assisted living/long-term care that you and your family member (__) were taking part in. We understand that (__) has passed away and we wish to express our deepest sympathy on his/her passing. We are most grateful for the assistance you have already provided to our study and we hope that you will continue to participate since your views and experiences are important in helping us learn more about how best to provide quality care to older adults. As part of our study follow-up, we would like to talk with your briefly about (______)'s passing and his/her health and life prior to death. We understand this may be a difficult time. Is this a good time to talk or would you prefer if I called back at a later date?

YES: _____
NO: _____, **please call back on** ___________________________
NO: _____, **not interested in responding to the interview**

Your participation is voluntary and you may refuse to answer any question we ask. In addition, all your responses are confidential and will not be disclosed. Your responses will also not be reported in any way that identifies you or your family member. The interview will last about 10 minutes or less.

1

1. **What is your relationship to (_________)? CAN FILL OUT FROM FAMILY INTERVIEW ON FILE.**

01 Wife
02 Husband
03 Daughter
04 Son
05 Daughter-in-law
06 Son-in-law
07 Sister
08 Brother
09 Sister-in-law
10 Brother-in-law
11 Niece
12 Nephew
13 Niece-in-law
14 Nephew-in-law
15 Niece's children
16 Nephew's children
17 Granddaughter
18 Grandson
19 Great granddaughter
20 Great grandson
21 Father
22 Mother
23 Cousin
24 Friend
25 Neighbour
26 Volunteer
27 Other _____________

To begin, I have a few questions about (___)'s death. (NOTE: THE INTERVIEWER WILL DECIDE HOW TO ASK THE QUESTIONS ON CAUSE AND DATE OF DEATH. WE SUGGEST THE FOLLOWING PHRASES):

2. **When did he/she die?**

Date of Death: ____/____/______/ (DD/MM/YYYY)

77 77 7777 R
88 88 8888 DK

3. **What did he/she die of?**

Cause(s) of Death: ____________________

____

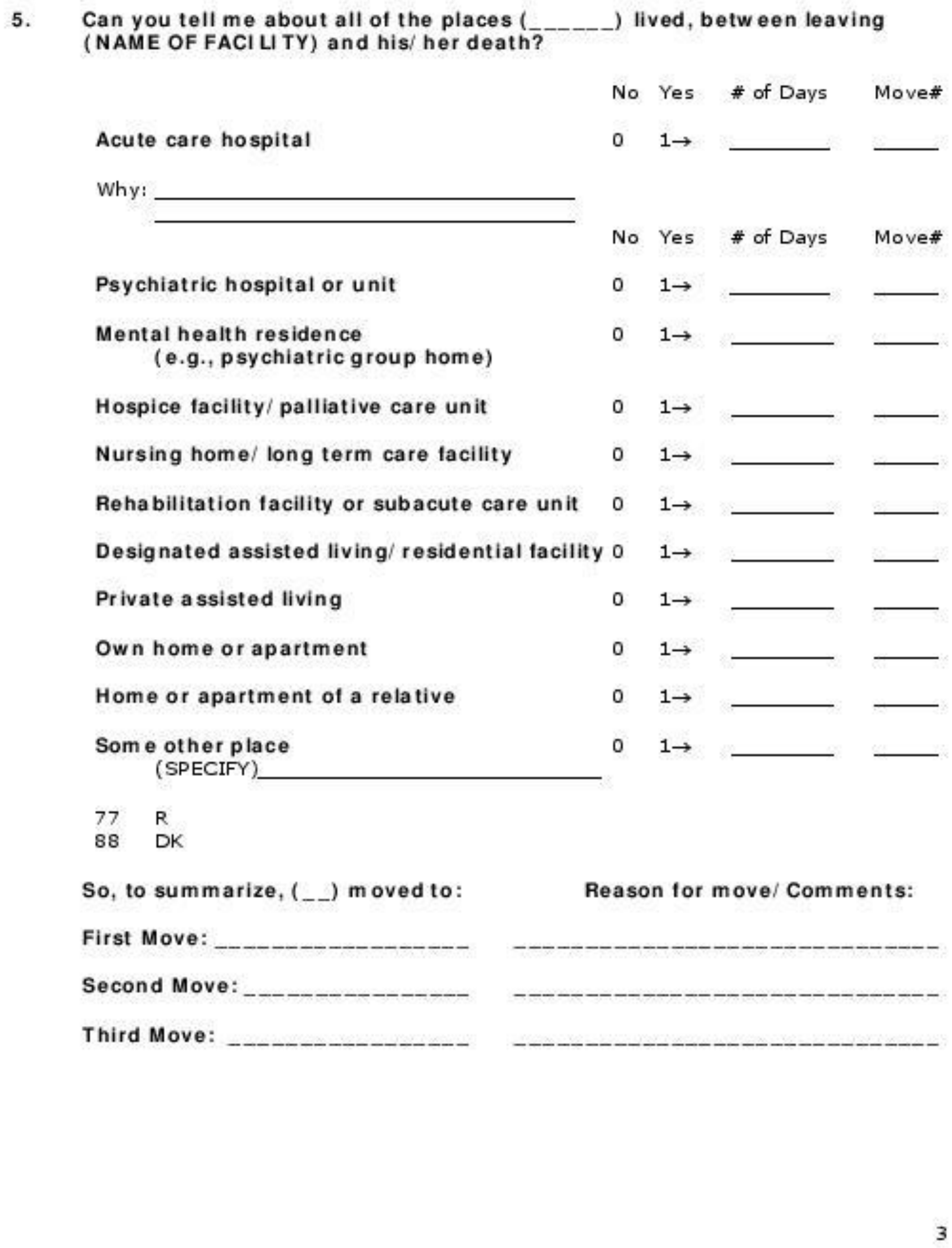
____

____

7777 R
8888 DK

4. **When we last saw (___), he/she was living at (name of facility). Was he/she still living there up to the time of death?**

0 No
1 Yes **(GO TO QUESTION 6)**
7 R **(GO TO QUESTION 6)**
8 DK **(GO TO QUESTION 6)**



5. **Can you tell me about all of the places (______) lived, between leaving (NAME OF FACILITY) and his/ her death?**

	No	Yes	# of Days	Move#
Acute care hospital	0	1→	________	_____

Why: ________________________________

____

	No	Yes	# of Days	Move#
Psychiatric hospital or unit	0	1→	________	_____
Mental health residence (e.g., psychiatric group home)	0	1→	________	_____
Hospice facility/ palliative care unit	0	1→	________	_____
Nursing home/ long term care facility	0	1→	________	_____
Rehabilitation facility or subacute care unit	0	1→	________	_____
Designated assisted living/ residential facility	0	1→	________	_____
Private assisted living	0	1→	________	_____
Own home or apartment	0	1→	________	_____
Home or apartment of a relative	0	1→	________	_____
Some other place (SPECIFY)________________________	0	1→	________	_____

77 R
88 DK

So, to summarize, (__) moved to:	**Reason for move/ Comments:**
First Move: _________________	____________________________
Second Move: _______________	____________________________
Third Move: ________________	____________________________

Now I want you to think about (______)'s situation in the month prior to his/her death. The reason we are asking these questions is because we want to know how (______) changed since the last time we talked to you.

6. **First, I want to ask you about how (______) was able to manage his/her daily life. I will mention a number of common daily activities, and for each, I want you to say if (______) was able to manage this without help, with some help, or whether he/she could not do it at all, that is, someone has to do this for him/her. Some of these questions may not have applied to (______), but to be consistent, we must ask them of everyone.**

If the respondent has difficulty in selecting the appropriate response category, read the examples in parentheses below each option. Only use these if help is required, or if you feel that the respondent has not understood the response options.

In the month prior to his/her death,

a. **Could (______) eat . . .**

1	2	3	4	5	8
without any help	some help from device ONLY	some help from person ONLY	some help from person & device	unable to do it	DK

b. **Could (______) dress and undress . . .**

1	2	3	4	5	8
without any help (pick out clothes, dress, undress)	some help from device ONLY (zipper pulls)	some help from person ONLY	some help from person & device	unable to do it	DK

c. **Could (______) take care of his/her own appearance, for example, combing his/her hair and (for men) shaving . . .**

1	2	3	4	5	8
without any help	some help from device ONLY	some help from person ONLY	some help from person & device	unable to do it	DK

d. **Could (______) walk . . .**

1	2	3	4	5	8
without any help (except a cane)	some help from device ONLY (walker, crutches or a chair)	some help from person ONLY	some help from person & device	unable to do it	DK

In the month prior to death,

e. **Could (______) get in and out of bed . . .**

1	2	3	4	5	8
without any help	some help from device ONLY (any type lift)	some help from person ONLY	some help from person & device	unable to do it	DK

f. **Could (______) take a bath or shower . . .**

1	2	3	4	5	8
without any help	some help from device ONLY (shower seat hand held shower)	some help from person ONLY	some help from person & device	unable to do it	DK

g. **Could (______) go to the bathroom or commode . . .**

1	2	3	4	5	8
without any help	some help from device ONLY (raised toilet seat, walker)	some help from person ONLY	some help from person & device	unable to do it	DK

h. **Could (______) take his/ her own medicine . . .**

1	2	3	4	5	8
without any help (in the right doses at the right time)	some help from device ONLY (pill counter)	some help from person ONLY (someone prepares it and reminds him/her to take it)	some help from person & device	unable to do it	DK

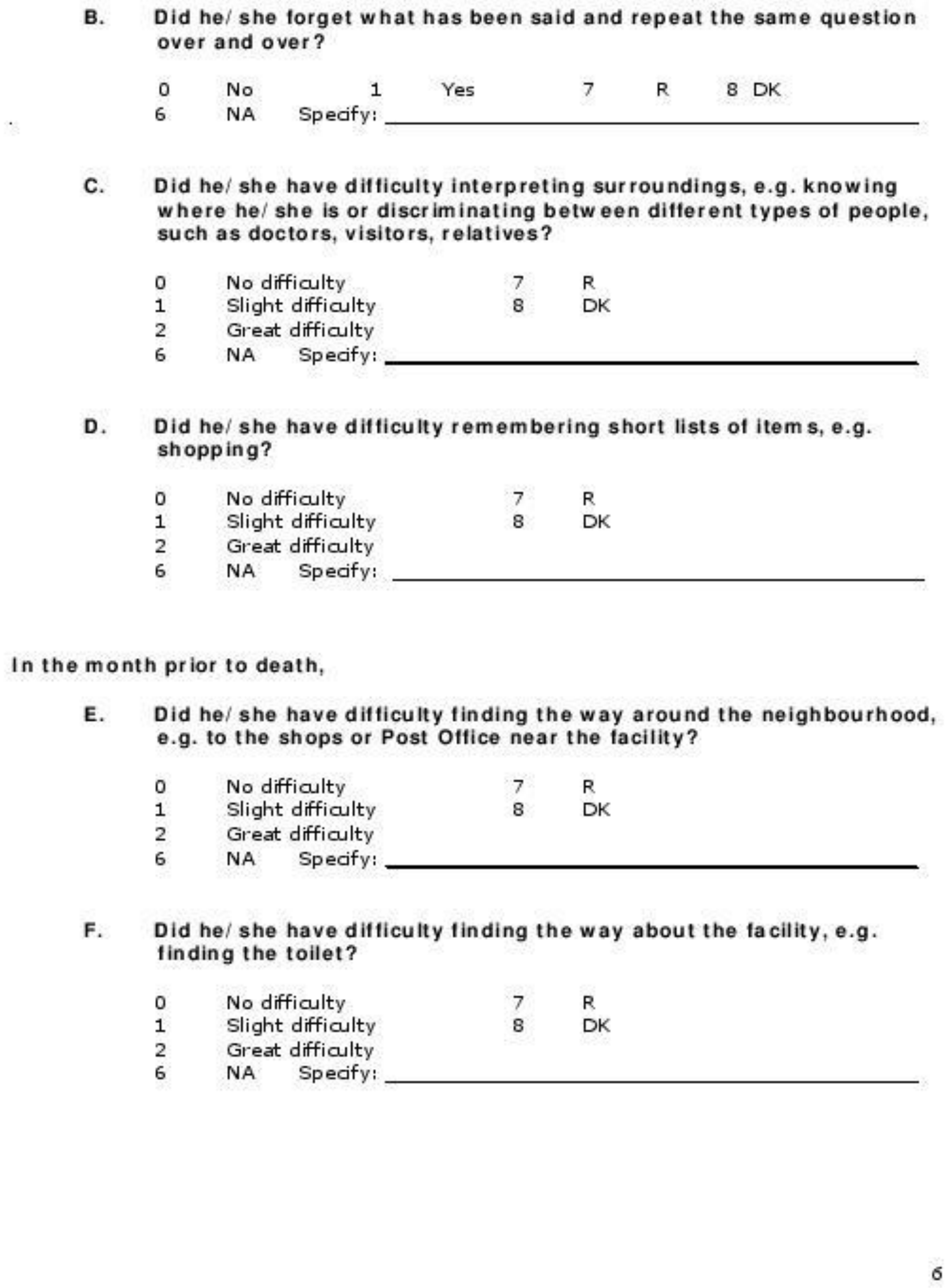
7. **The following questions relate to (___)'s behaviour and memory, in the month prior to his/ her death. These may not be relevant, but we ask these of everybody in order to be consistent.**

In the month prior to his/ her death,

A. **Did he/ she have difficulty remembering recent events, e.g., when he/ she last saw you or what happened the day before?**

0	No difficulty	7	R
1	Slight difficulty	8	DK
2	Great difficulty		
6	NA Specify: ________________________		

5



B. **Did he/she forget what has been said and repeat the same question over and over?**

0 No 1 Yes 7 R 8 DK
6 NA Specify: ______________________

C. **Did he/she have difficulty interpreting surroundings, e.g. knowing where he/she is or discriminating between different types of people, such as doctors, visitors, relatives?**

0 No difficulty 7 R
1 Slight difficulty 8 DK
2 Great difficulty
6 NA Specify: ______________________

D. **Did he/she have difficulty remembering short lists of items, e.g. shopping?**

0 No difficulty 7 R
1 Slight difficulty 8 DK
2 Great difficulty
6 NA Specify: ______________________

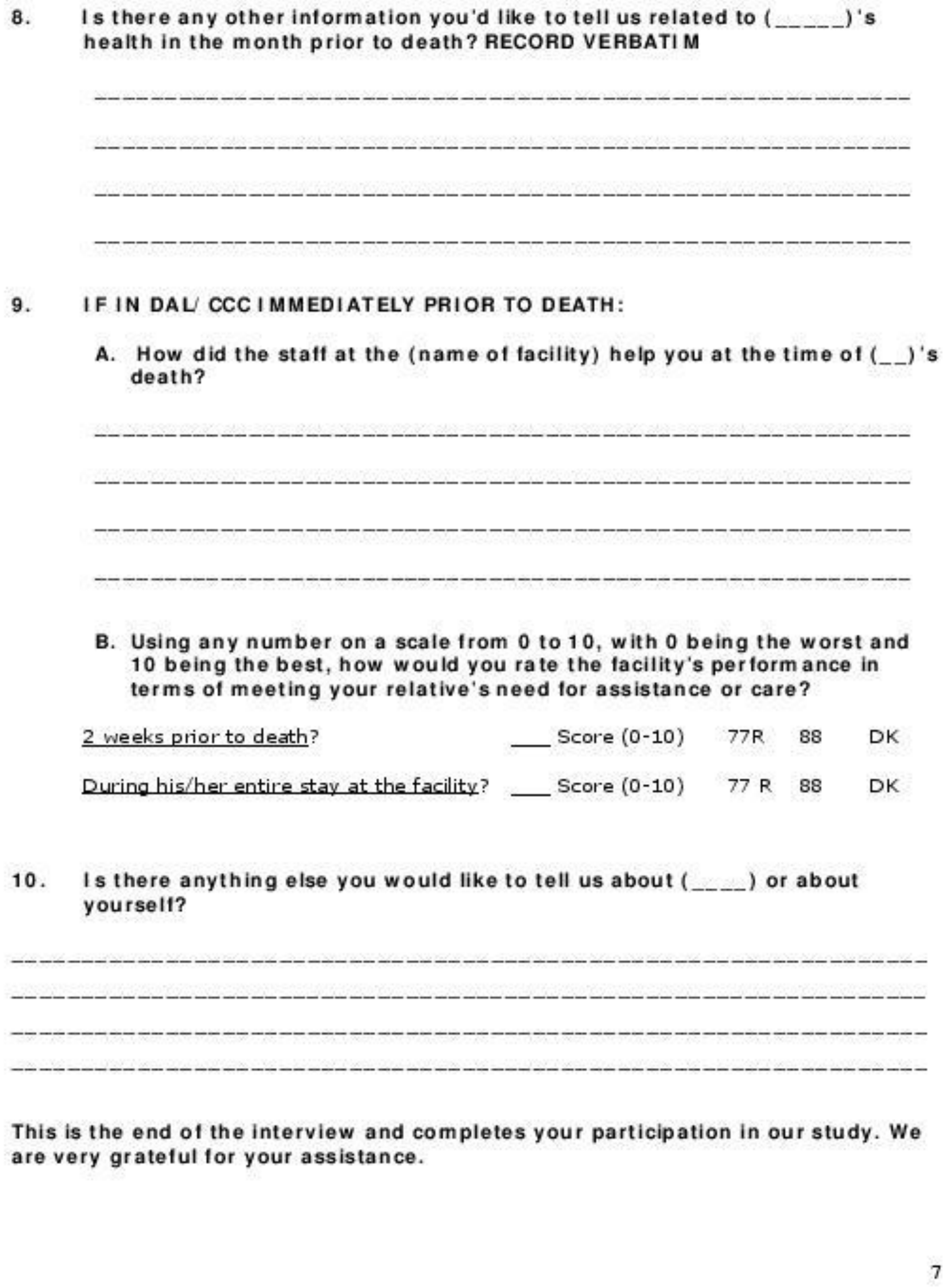
In the month prior to death,

E. **Did he/she have difficulty finding the way around the neighbourhood, e.g. to the shops or Post Office near the facility?**

0 No difficulty 7 R
1 Slight difficulty 8 DK
2 Great difficulty
6 NA Specify: ______________________

F. **Did he/she have difficulty finding the way about the facility, e.g. finding the toilet?**

0 No difficulty 7 R
1 Slight difficulty 8 DK
2 Great difficulty
6 NA Specify: ______________________



8. **Is there any other information you'd like to tell us related to (_____)'s health in the month prior to death? RECORD VERBATIM**

____

____

____

____

9. **IF IN DAL/ CCC IMMEDIATELY PRIOR TO DEATH:**

A. How did the staff at the (name of facility) help you at the time of (__)'s death?

____

____

____

____

B. Using any number on a scale from 0 to 10, with 0 being the worst and 10 being the best, how would you rate the facility's performance in terms of meeting your relative's need for assistance or care?

2 weeks prior to death? ____ Score (0-10) 77R 88 DK

During his/her entire stay at the facility? ____ Score (0-10) 77 R 88 DK

10. **Is there anything else you would like to tell us about (____) or about yourself?**

____

____

____

____

This is the end of the interview and completes your participation in our study. We are very grateful for your assistance.

Interviewer Comments/Notes:

APPENDIX F: Moves Addendum

FAMILY ID# ____________

When we first saw (_____), he/she was living at (name of DAL). We know that he/she is now living at (name of new location). Could you please tell me where (_____) has lived since s/he was at (name of initial DAL)? I'd like to begin with that location and go from there. Please mention any hospital stays.

When did (___) leave (name of DAL at initial interview)? _ _ /_ _ /_ _ _ _ (DD/MM/YYYY)

1st Location after (name of DAL at initial interview):

____

a. Type

01	Acute care hospital
02	Psychiatric hospital or unit
03	Hospice facility / palliative care unit
04	Nursing home/long term care facility
05	Rehabilitation facility/subacute care unit
06	Designated assisted living or residential facility
07	Private assisted living
08	Own home or apartment
09	Home or apartment of a relative
10	Some other place (SPECIFY)______________
77	R 88 DK

b. Resided there from __/_ _/_ _ _ _ (DD/MM/YYYY)
to __/_ _/_ _ _ _ (DD/MM/YYYY)
Approximate length ____ days weeks months
(CIRCLE TIME PERIOD)

c. Reason for the move:

No Yes (CIRCLE ALL THAT ARE MENTIONED)

0	1	Required hospital care
0	1	Needed nursing home care
0	1	Required more care than the facility could provide
0	1	Preferred location closer to family or friends
0	1	Exhausted his/her resources and had to leave because of money
0	1	Dissatisfaction with the quality of care
0	1	Dissatisfaction with the price or charges
0	1	Dissatisfaction with some other aspect of the facility
0	1	It was the facility's request for unknown reason

Other (Specify): ___________________________________

____

2nd Location after (name of DAL at initial interview):

____

a. Type

01	Acute care hospital
02	Psychiatric hospital or unit
03	Hospice facility / palliative care unit
04	Nursing home/long term care facility
05	Rehabilitation facility/subacute care unit
06	Designated assisted living or residential facility
07	Private assisted living
08	Own home or apartment
09	Home or apartment of a relative
10	Some other place (SPECIFY)______________
77	R 88 DK

b. Resided there from __/_ _/_ _ _ _ (DD/MM/YYYY)
to __/_ _/_ _ _ _ (DD/MM/YYYY)
Approximate length ____ days weeks months
(CIRCLE TIME PERIOD)

c. Reason for the move:

No Yes (CIRCLE ALL THAT ARE MENTIONED)

0	1	Required hospital care
0	1	Needed nursing home care
0	1	Required more care than the facility could provide
0	1	Preferred location closer to family or friends
0	1	Exhausted his/her resources and had to leave because of money
0	1	Dissatisfaction with the quality of care
0	1	Dissatisfaction with the price or charges
0	1	Dissatisfaction with some other aspect of the facility
0	1	It was the facility's request for unknown reason

Other (Specify): ___________________________________

____

FAMILY ID# ____________

3rd Location after (name of DAL at initial interview):
____

a. Type

01 Acute care hospital
02 Psychiatric hospital or unit
03 Hospice facility / palliative care unit
04 Nursing home/long term care facility
05 Rehabilitation facility/subacute care unit
06 Designated assisted living or residential facility
07 Private assisted living
08 Own home or apartment
09 Home or apartment of a relative
10 Some other place (SPECIFY)_____________
77 R 88 DK

b. Resided there from __/_ _/_ _ _ _ (DD/MM/YYYY)
to __/_ _/_ _ _ _ (DD/MM/YYYY)

Approximate length ____ **days weeks months**
(CIRCLE TIME PERIOD)

c. Reason for the move:

No Yes (CIRCLE ALL THAT ARE MENTIONED)

0 1 Required hospital care
0 1 Needed nursing home care
0 1 Required more care than the facility could provide
0 1 Preferred location closer to family or friends
0 1 Exhausted his/her resources and had to leave because of money
0 1 Dissatisfaction with the quality of care
0 1 Dissatisfaction with the price or charges
0 1 Dissatisfaction with some other aspect of the facility
0 1 It was the facility's request for unknown reason

Other (Specify): ______________________________

____

4th Location after (name of DAL at initial interview):
____

a. Type

01 Acute care hospital
02 Psychiatric hospital or unit
03 Hospice facility / palliative care unit
04 Nursing home/long term care facility
05 Rehabilitation facility/subacute care unit
06 Designated assisted living or residential facility
07 Private assisted living
08 Own home or apartment
09 Home or apartment of a relative
10 Some other place (SPECIFY)_____________
77 R 88 DK

b. Resided there from __/_ _/_ _ _ _ (DD/MM/YYYY)
to __/_ _/_ _ _ _ (DD/MM/YYYY)

Approximate length ____ **days weeks months**
(CIRCLE TIME PERIOD)

c. Reason for the move:

No Yes (CIRCLE ALL THAT ARE MENTIONED)

0 1 Required hospital care
0 1 Needed nursing home care
0 1 Required more care than the facility could provide
0 1 Preferred location closer to family or friends
0 1 Exhausted his/her resources and had to leave because of money
0 1 Dissatisfaction with the quality of care
0 1 Dissatisfaction with the price or charges
0 1 Dissatisfaction with some other aspect of the facility
0 1 It was the facility's request for unknown reason

Other (Specify): ______________________________

____

5th Location after (name of DAL at initial interview):

____

a. Type

01	Acute care hospital
02	Psychiatric hospital or unit
03	Hospice facility / palliative care unit
04	Nursing home/long term care facility
05	Rehabilitation facility/subacute care unit
06	Designated assisted living or residential facility
07	Private assisted living
08	Own home or apartment
09	Home or apartment of a relative
10	Some other place (SPECIFY)______________
77	R
88	DK

b. Resided there from __/_ _/_ _ _ _ (DD/MM/YYYY)
to __/_ _/_ _ _ _ (DD/MM/YYYY)

Approximate length ____ **days weeks months**
(CIRCLE TIME PERIOD)

c. Reason for the move:

No	**Yes**	**(CIRCLE ALL THAT ARE MENTIONED)**
0	1	Required hospital care
0	1	Needed nursing home care
0	1	Required more care than the facility could provide
0	1	Preferred location closer to family or friends
0	1	Exhausted his/her resources and had to leave because of money
0	1	Dissatisfaction with the quality of care
0	1	Dissatisfaction with the price or charges
0	1	Dissatisfaction with some other aspect of the facility
0	1	It was the facility's request for unknown reason

Other (Specify): ________________________________

____

6th Location after (name of DAL at initial interview):

____

a. Type

01	Acute care hospital
02	Psychiatric hospital or unit
03	Hospice facility / palliative care unit
04	Nursing home/long term care facility
05	Rehabilitation facility/subacute care unit
06	Designated assisted living or residential facility
07	Private assisted living
08	Own home or apartment
09	Home or apartment of a relative
10	Some other place (SPECIFY)______________
77	R
88	DK

b. Resided there from __/_ _/_ _ _ _ (DD/MM/YYYY)
to __/_ _/_ _ _ _ (DD/MM/YYYY)

Approximate length ____ **days weeks months**
(CIRCLE TIME PERIOD)

c. Reason for the move:

No	**Yes**	**(CIRCLE ALL THAT ARE MENTIONED)**
0	1	Required hospital care
0	1	Needed nursing home care
0	1	Required more care than the facility could provide
0	1	Preferred location closer to family or friends
0	1	Exhausted his/her resources and had to leave because of money
0	1	Dissatisfaction with the quality of care
0	1	Dissatisfaction with the price or charges
0	1	Dissatisfaction with some other aspect of the facility
0	1	It was the facility's request for unknown reason

Other (Specify): ________________________________

____

NOTE: IF MORE THAN 6 LOCATIONS, CONTINUE RECORDING ON SEPARATE SHEETS UNITL AT CURRENT LOCATION

APPENDIX G: Social Vulnerability Index Coding Approach

Domain	**Social Variable**	**Item Number**	**Variable Code**	**Numerical Coding**	**New Name**
Communication to engage in wider community					CEWC
	Primary language	Section B, Question 4	B4		lang
	English or French			0	
	Other			1	
	Understanding others	Section G, Question 2	G2		und
	Always understands			0	
	Usually understands			0.5	
	Often, sometimes, rarely, or never understands			1	
	Hearing	Section G, Question 3	G3		hear
	Adequate			0	
	Minimal difficulty			0.5	
	Moderate or severe difficulty or no hearing			1	
	Vision	Section G, Question 4	G4		vision
	Adequate			0	
	Minimal difficulty			0.5	
	Moderate or severe difficulty or no vision			1	
Living situation					LivSit
	Marital status	Section A, Question 3	A3		mar
	Married or has a significant other			0	
	Never married, widowed, separated, or divorced			1	
	Room type	Section A, Question	A10		room

		10			
		Private, couples suite, or shared family		0	
		Shared or shared private		1	
Social support					SocSup
	Close to someone in the facility	Section C, Question 2a	C2A		CSF
		Close to someone		0	
		Not close to someone		1	
	Strong and supportive relationship with family	Section C, Question 2d	C2D		relfam
		Has a strong supportive relationship with family		0	
		Does not have a strong supportive relationship with family		1	
	Visit with a long-standing social relation or family member	Section C, Question 3b	C3B		visit
		Had visit in ≤7days prior		0	
		If a score was given “unable to determine,” the new variable “visit” was coded as 0.5 because if well-informed staff/family could not determine the score of the variable, then it was not readily apparent it occurred		0.5	
		Had a visit 8+days ago or never		1	
	Other interaction with long-standing social relation or family member (e.g., phone, email)	Section C, Question 3c	C3C		phoem
		Used phone/email in ≤7days prior		0	
		Used phone/email 8+days ago or never		1	
	Says or indicates loneliness	Section C, Question 4e	C4E		lonely
		Not lonely		0	
		Lonely		1	

Socially-oriented activities of daily living					SOADL
	Phone use – Capacity	Section H, Question 1e	H1E2_DAL		phonec
		Generally independent (independent/set-up help only/supervision)		0	
		Limited assistance		0.5	
		Generally dependent (extensive/maximal assistance/total dependence)		1	
	Transportation – Capacity	Section H, Question 1h	H1H2_DAL		transc
		Generally independent (independent/set-up help only/supervision)		0	
		Limited assistance		0.5	
		Generally dependent (extensive/maximal assistance/total dependence)		1	
Social engagement and leisure activities					SELA
	At ease interacting with others	Section C, Question 1a	C1A		easeint
		At ease in last 3 days or present but not exhibited in last 3 days		0	
		Not present		1	
	At ease doing planned/structured activities	Section C, Question 1b	C1B		easeplan
		At ease in last 3 days or present but not exhibited in last 3 days		0	
		Not present		1	
	Accepts invitations into most group activities	Section C, Question 1c	C1C		accepinvit
		At ease in last 3 days or present but not exhibited in last 3 days		0	
		Not present		1	
	Pursues involvement in	Section	C1D		involv

	life of facility	C, Question 1d			
		At ease in last 3 days or present but not exhibited in last 3 days		0	
		Not present		1	
	Initiates interactions with others	Section C, Question 1e	C1E		invit
		At ease in last 3 days or present but not exhibited in last 3 days		0	
		Not present		1	
	Reacts positively to interactions initiated by others	Section C, Question 1f	C1F		posint
		At ease in last 3 days or present but not exhibited in last 3 days		0	
		Not present		1	
	Participation in social activities of longstanding interests	Section C, Question 3a	C3A		partlong
		Present ≤7 days ago		0	
		Present in 8+days ago or never		1	
	Days outside in last 3 days	Section H, Question 4b	H4B		out3
		Out in last 3 days or usually does		0	
		Does not go out		1	
	Total hours of exercise or physical activity in last 3 days	Section H, Question 4a	H4A		PA3
		Does physical activity 1-2hr or more in last 3 days		0	
		Does physical activity <1hr in last 3 days		1	
	Social Activities Performance vs Involvement	Section E, Question 3	E3a-p		SAPI2
		No incongruences between preference and involvement scores		0	
		Incongruence between preference		0.5	

		and involvement scores for 1-2 activities			
		Incongruence between preference and involvement scores for 3+ activities		1	
	Exercise or Leisure Activities Performance vs Involvement	Section E, Question 3	E3 1-13		LAPI2
		No incongruences between preference and involvement scores		0	
		Incongruence between preference and involvement scores for 1-2 activities		0.5	
		Incongruence between preference and involvement scores for 3+ activities		1	
Empowerment and life control					EMP
	Consistent positive outlook	Section C, Question 2b	C2B		poso
		Yes		0	
		No		1	
	Finds meaning in day-to-day life	Section C, Question 2c	C2C		meaning
		Yes		0	
		No		1	
	Level of control person had over decision to move into assisted living	Section B, Question 1	B1		control
		Complete control		0	
		Some control		0.5	
		Little or no control		1	

APPENDIX H: Coding employed for descriptive variables

Characteristic	Item Number	Variable Code	Numerical Coding	New Name
Age	InterRAI-AL: Section A, Questions 2 and 7	age		age_4cat
	65-79		0	
	80-85		1	
	86-89		2	
	≥ 90		3	
Sex	InterRAI-AL: Section A, Question 1	A1		
	Male		0	
	Female		1	
Marital Status	InterRAI-AL: Section A, Question 3	A3		marcov
	Widowed		0	
	Married or with a partner		1	
	Never married, separated, or divorced		2	
Fatigue	InterRAI-AL: Section K, Question 4A	K4A		fatigue
	None		0	
	Minimal		1	
	Moderate, Severe, or unable to commence any normal day-to-day activities		2	
Depressive Symptoms (DRS score)	InterRAI-AL	drs		
	No (<3)		0	
	Yes (≥3)		1	
Health Instability (CHESS)	InterRAI-AL	chess		chess2
	Stable (0)		0	
	Mild (1)		1	
	Mild-moderate (2)		2	
	Moderate-high (≥3)		3	
Cognition (CPS score)	InterRAI-AL	sCPS		cog3
	Intact (0)		0	
	Borderline intact (1)		1	
	Mild, moderate, and severe impairment (≥ 2)		2	
Activities of Daily	InterRAI-AL	sADLH		ADL2

Living (ADL score) – Functional Impairment^				
	Independent (0)		0	
	Supervision required (1)		1	
	Limited impairment (2)		2	
	Extensive supervision required or dependent (≥ 3)		3	
Bladder Incontinence	InterRAI-AL: Section I, Question 1	I1		blad
	Continent		0	
	Some control, infrequent episodes		1	
	Occasional incontinence		2	
	Frequent episodes, no control		3	
Bowel Incontinence	InterRAI-AL: Section I, Question 3	I3		bowel
	Continent		0	
	Some control, infrequent episodes		1	
	Occasional incontinence, frequent episodes, no control		2	
No. of Chronic Conditions	InterRAI-AL: Section J, Questions 1 and 2	morbid2		morbid3
	0-3		0	
	4 or 5		1	
	≥ 6		2	
No. of Medications	InterRAI-AL: Section O, Question 1	mednum		mednumcov
	0-6		0	
	7 or 8		1	
	9 or 10		2	
	≥ 11		3	
Advance Directive: Do Not Hospitalize	InterRAI-AL: Section Q, Question 3C	dnh Q3C_NO Q3C_ON_FILE Q3C_ON_SITE Q3C_OFF_SITE		DirDNH
	Yes (on-file, on-site, off-site)		0	
	No		1	
No. of Inpatient Admissions to Hospital in last 90 days	InterRAI-AL: Section P, Question 5A	P5A		hospnum

	0		0	
	1+		1	
No. of Inpatient Admissions to Hospital in past Year	Linked Administrative Data	iphospb4g		
	0		0	
	1		1	
	2+		2	
No of Emergency Department Visits in last month	InterRAI-AL: Section P, Question 5B	P5B		ERvisit
	0		0	
	1+		1	

APPENDIX I: Coding employed for key covariates

Characteristic	Item Number	Variable Code	Numerical Coding	New Name
Age	InterRAI-AL: Section A, Questions 2 and 7	age		age_4cat
	65-79		0	
	80-85		1	
	86-89		2	
	≥ 90		3	
Sex	InterRAI-AL: Section A, Question 1	A1		
	Male		0	
	Female		1	
Fatigue	InterRAI-AL: Section K, Question 4A	K4A		fatigue
	None		0	
	Minimal		1	
	Moderate to severe, or unable to commence any normal day-to-day activities		2	
Health Instability (CHESS)	InterRAI-AL	chess		chess2
	Stable (0)		0	
	Mild (1)		1	
	Mild-moderate (2)		2	
	Moderate-high (≥3)		3	
Cognition (CPS score)[48]	InterRAI-AL	sCPS		cog3
	Intact (0)		0	
	Borderline intact (1)		1	
	Mild, moderate, and severe impairment (≥ 2)		2	
Cognition (CPS score)[49]	InterRAI-AL	sCPS		cog4
	Intact or borderline intact (0-1)		0	
	Mild, moderate, and severe impairment (≥ 2)		1	
Activities of Daily Living (ADLH score) – Functional Impairment^	InterRAI-AL	sADLH		ADL3
	Independent (0)		0	
	Supervision required or limited impairment (1-2)		1	

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[48] 3-level CPS covariate was used for non-stratified models.

[49] Binary CPS covariate was used for models stratified by dementia status.

	Extensive supervision required or dependent (≥ 3)		2	
Bowel Incontinence	InterRAI-AL: Section I, Question 3	I3		bowel
	Continent		0	
	Some control, infrequent episodes		1	
	Occasional incontinence, frequent episodes, no control		2	
No. of Chronic Conditions	InterRAI-AL: Section J, Questions 1 and 2	morbid2		morbid3
	0-3		0	
	4 or 5		1	
	≥ 6		2	
No. of Medications	InterRAI-AL: Section O, Question 1	mednum		mednumcov
	0-6		0	
	7 or 8		1	
	9 or 10		2	
	≥ 11		3	
No. of Inpatient Admissions to Hospital in past Year		iphospb4g		
	0		0	
	1		1	
	2+		2	
No of Emergency Department Visits in last month	InterRAI-AL: Section P, Question 5B	P5B		ERvisit
Facility Characteristic				
Health Region	Facility Survey	region		
	Calgary (urban)		1	
	Chinook (mixed urban/rural)		2	
	DTHR (rural)		3	
	Capital (urban)		4	
	East Central (rural)		5	
Medication Classes				
	InterRAI-AL: Section O, Question 1			
Antipsychotics		antipsych		antipsych2
	No antipsychotics		0	
	1+ antipsychotics		1	
Anxiolytics		anxiolytics		anxiolytics2

	No anxiolytics		0	
	1+ anxiolytics		1	
Hypnotics and Sedatives		hypn_sed		hypn_sed2
	No hypnotics or sedatives		0	
	1+ hypnotic and/or sedative		1	
Antidepressants		antidepress		antidepress2
	No antidepressants		0	
	1+ antidepressants		1	

^ADLH: A code of 0 represents a person in level 0 of the original ADLH scale. A code of 1 represents a person in level 1 of the original ADLH scale. A code of 2 represents a person in level 2 of the original ADLH scale. A code of 3 represents a person in levels 3-6 of the original ADLH scale.

APPENDIX J: Additional Results Tables

Table 5.1.2b. Baseline Resident Characteristics Stratified by Dementia Status, Survived Cohort (n=889)

	Survived Cohort (n=889)	
	No Dementia	**Dementia**
Resident Characteristics [n, (column %), unless otherwise noted]		
Overall	381 (42.9)	508 (57.1)
Age, yr		
Mean ± SD**	82.9 ± 7.9	84.7 ± 6.7
Age groups**		
65-79	126 (33.1)	112 (22.1)
80-85	86 (22.6)	150 (29.5)
86-89	85 (22.3)	120 (23.6)
≥90	84 (22.0)	126 (24.8)
Sex		
Male	91 (23.9)	102 (20.1)
Female	290 (76.1)	406 (79.9)
Marital status*		
Widowed	254 (66.7)	374 (73.6)
Married or with a partner	57 (14.9)	68 (13.4)
Never married, separated, or divorced	70 (18.4)	66 (13.0)
Fatigue**		
None	141 (37.0)	250 (48.1)
Minimal	188 (49.3)	192 (37.8)
Moderate, severe, or unable to commence any normal day-to-day activities	52 (13.7)	66 (13.1)
Clinically significant depressive symptoms (DRS score of 3+)**		
No	329 (86.4)	395 (77.8)
Yes	52 (13.6)	113 (22.2)
Health Instability (CHESS)*		
Stable (0)	183 (48.0)	251 (49.4)
Mild (1)	129 (33.9)	133 (26.2)
Mild-moderate (2)	52 (13.6)	85 (16.7)
Moderate-high (≥3)	17 (4.5)	39 (7.7)
Cognition (CPS score)***		
Intact (0)	159 (41.7)	29 (5.7)
Borderline intact (1)	117 (30.7)	51 (10.0)
Mild, moderate, severe impairment (≥2)	105 (27.6)	428 (84.3)
Activities of daily living (ADL score)***		
Independent (0)	219 (57.5)	178 (35.0)
Supervision required (1)	36 (9.4)	118 (23.2)
Limited impairment (2)	33 (8.7)	73 (14.4)
Extensive supervision required or dependent (≥ 3)	93 (24.4)	139 (27.4)
Bladder incontinence*		
Continent	173 (45.4)	200 (39.4)
Some control, infrequent episodes	61 (16.0)	66 (13.0)
Occasional incontinence	41 (10.8)	56 (11.0)
Frequent episodes, no control	106 (27.8)	186 (36.6)

	Survived Cohort (n=889)	
	No Dementia	**Dementia**
Bowel incontinence*		
Continent	298 (78.2)	360 (70.9)
Some control, infrequent episodes	53 (13.9)	77 (15.1)
Occasional incontinence, frequent episodes, no control	30 (7.9)	71 (14.0)
No. of chronic conditions		
Mean ± SD*	4.4 ± 1.9	4.7 ± 2.0
No. of chronic conditions		
0-3	128 (33.6)	165 (32.5)
4-5	145 (38.1)	180 (35.4)
≥6	108 (28.3)	163 (32.1)
No. of medications		
Mean ± SD***	9.0 ± 3.6	7.6 ± 3.5
No. of medications***		
0-6	93 (24.4)	208 (40.9)
7-8	76 (19.9)	111 (21.9)
9-10	84 (22.1)	100 (19.7)
≥11	128 (33.6)	89 (17.5)
Advance directive: Do not hospitalize		
Yes	35 (9.2)	51 (10.0)
No	346 (90.8)	457 (90.0)
No. of inpatient hospital admissions in past 90 days**		
0	326 (85.6)	472 (92.9)
≥1	55 (14.4)	36 (7.1)
No. of emergency department visits in past 90 days		
0	323 (84.8)	431 (84.8)
≥1	58 (15.2)	77 (15.2)
Facility Characteristic		
Health Region*		
1 (urban)	123 (32.3)	145 (28.5)
2 (mixed urban/rural)	75 (19.7)	95 (18.7)
3 (rural)	66 (17.3)	62 (12.2)
4 (urban)	81 (21.3)	159 (31.3)
5 (rural)	36 (9.4)	47 (9.3)

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADL – Activities of Daily Living Self-Performance Hierarchy Scale

* <0.05

**<0.01

***<0.0001

Table 5.1.2c. Baseline Resident Characteristics Stratified by Dementia Status, Linked Cohort (n=1,066)

	Linked Cohort (n=1,066)	
	No Dementia	**Dementia**
Resident Characteristics [n, (column %), unless otherwise noted]		
Overall	457 (42.9)	609 (57.1)
Age, yr		
Mean ± SD***	83.4 ± 7.9	85.2 ± 6.6
Age groups**		
65-79	145 (31.7)	123 (20.2)
80-85	103 (22.5)	176 (28.9)
86-89	99 (21.7)	145 (23.8)
≥90	110 (24.1)	165 (27.1)
Sex		
Male	114 (24.9)	134 (22.0)
Female	343 (75.1)	475 (78.0)
Marital status**		
Widowed	315 (68.9)	446 (73.2)
Married or with a partner	61 (13.4)	95 (15.6)
Never married, separated, or divorced	81 (17.7)	68 (11.2)
Fatigue**		
None	155 (33.9)	278 (45.7)
Minimal	225 (49.2)	236 (38.7)
Moderate, severe, or unable to commence any normal day-to-day activities	77 (16.9)	95 (15.6)
Clinically significant depressive symptoms (DRS score of 3+)**		
No	394 (86.2)	469 (77.0)
Yes	63 (13.8)	140 (23.0)
Health instability (CHESS)		
Stable (0)	207 (45.3)	289 (47.5)
Mild (1)	150 (32.8)	162 (26.6)
Mild-moderate (2)	76 (16.6)	108 (17.7)
Moderate-high (≥3)	24 (5.3)	50 (8.2)
Cognition (CPS score)***		
Intact (0)	189 (41.4)	34 (5.6)
Borderline intact (1)	148 (32.4)	63 (10.3)
Mild, moderate, severe impairment (≥2)	120 (26.2)	512 (84.1)
Activities of daily living (ADL score)***		
Independent (0)	256 (56.0)	198 (32.5)
Supervision required (1)	43 (9.4)	143 (23.5)
Limited impairment (2)	42 (9.2)	84 (13.8)
Extensive supervision required or dependent (≥ 3)	116 (25.4)	184 (30.2)
Bladder incontinence**		
Continent	205 (44.9)	231 (37.9)
Some control, infrequent episodes	73 (16.0)	83 (13.6)
Occasional incontinence	54 (11.8)	60 (9.9)
Frequent episodes, no control	125 (27.3)	235 (38.6)

	Linked Cohort (n=1,066)	
	No Dementia	**Dementia**
Bowel incontinence**		
Continent	354 (77.5)	412 (67.7)
Some control, infrequent episodes	66 (14.4)	99 (16.3)
Occasional incontinence, frequent episodes, no control	37 (8.1)	98 (16.1)
No. of chronic conditions		
Mean ± SD**	4.4 ± 1.9	4.8 ± 2.0
No. of chronic conditions		
0-3	150 (32.8)	173 (28.4)
4-5	175 (38.3)	223 (36.6)
≥6	132 (28.9)	213 (25.0)
No. of medications		
Mean ± SD***	9.1 ± 3.6	7.7 ± 3.6
No. of medications***		
0-6	108 (23.6)	241 (39.6)
7-8	93 (20.3)	139 (22.8)
9-10	99 (21.7)	115 (18.9)
≥11	157 (34.4)	114 (18.7)
Advance directive: Do not hospitalize		
Yes	46 (10.1)	63 (10.3)
No	411 (89.9)	546 (89.7)
No. of inpatient hospital admissions in past year‖***		
0	250 (54.7)	413 (67.8)
1	116 (25.4)	138 (22.7)
≥2	91 (19.9)	58 (9.5)
No. of inpatient hospital admissions in past 90 days**		
0	385 (84.3)	555 (91.1)
≥1	72 (15.7)	54 (8.9)
No. of emergency department visits in past 90 days		
0	386 (84.5)	504 (82.8)
≥1	71 (15.5)	105 (17.2)
Facility Characteristic		
Health Region*		
1 (urban)	145 (31.7)	166 (27.2)
2 (mixed urban/rural)	93 (20.4)	135 (22.2)
3 (rural)	76 (16.6)	77 (12.6)
4 (urban)	94 (20.6)	174 (28.6)
5 (rural)	49 (10.7)	57 (9.4)

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADL – Activities of Daily Living Self-Performance Hierarchy Scale

* <0.05

**<0.01

***<0.0001

‖ Recall that the number of inpatient hospital admissions in past year variable is from the linked administrative data and was only used in the Linked cohort. The number of inpatient hospital admissions in past 90 days variable was derived from the interRAI-AL assessment and was used among all cohorts.

Table 5.2.1.2c. Baseline Resident Characteristics by Social Vulnerability Status, for Full Cohort (n=1,089)

	Full Overall Cohort (n=1,089)		
	Low Social Vulnerability (n=364)	**Intermediate Social Vulnerability** (n=340)	**High Social Vulnerability** (n=385)
Resident Characteristics [n, (column %), unless otherwise noted]			
Age, yr			
Mean ± SD**	83.3 ± 7.7	84.6 ± 7.1	85.4 ± 7.0
Age Groups**			
65-79	120 (33.0)	78 (23.0)	74 (19.2)
80-85	78 (21.4)	99 (29.1)	107 (27.8)
86-89	74 (20.3)	80 (23.5)	94 (24.4)
≥90	92 (25.3)	83 (24.4)	110 (28.6)
Sex			
Male	74 (20.3)	90 (26.5)	90 (23.4)
Female	290 (79.7)	250 (73.5)	295 (76.6)
Marital status			
Widowed (0)	250 (68.7)	249 (73.2)	279 (72.5)
Married or with a partner (1)	61 (16.8)	47 (13.8)	51 (13.8)
Never married, separated, or divorced (2)	53 (14.5)	44 (12.9)	55 (14.29)
Fatigue***			
None	160 (44.0)	146 (42.9)	136 (35.3)
Minimal	165 (45.3)	153 (45.0)	152 (39.5)
Moderate, severe, or unable to commence any normal day-to-day activities	39 (10.7)	41 (12.1)	97 (25.2)
Clinically significant depressive symptoms (DRS score of 3+)***			
No	335 (92.0)	289 (85.0)	256 (66.5)
Yes	29 (8.0)	51 (15.0)	129 (33.5)
Health Instability (CHESS)***			
Stable (0)	200 (55.0)	150 (44.1)	153 (39.7)
Mild (1)	106 (29.1)	109 (32.1)	105 (27.3)
Mild-moderate (2)	43 (11.8)	57 (16.8)	88 (22.9)
Moderate-high (≥3)	15 (4.1)	24 (7.0)	39 (10.1)
Cognition (CPS score)***			
Intact (0)	121 (33.2)	74 (21.8)	29 (7.5)
Borderline intact (1)	101 (27.8)	71 (20.9)	41 (10.7)
Mild, moderate, severe impairment (≥2)	142 (39.0)	195 (57.3)	315 (81.8)
Activities of daily living (ADL score)***			
Independent (0)	232 (63.7)	143 (42.1)	83 (21.6)
Supervision required (1)	46 (12.6)	67 (19.7)	76 (19.7)
Limited impairment (2)	37 (10.2)	44 (12.9)	53 (13.8)
Extensive supervision required or dependent (≥ 3)	49 (13.5)	86 (25.3)	173 (44.9)

	Full Overall Cohort (n=1,089)		
	Low Social Vulnerability (n=364)	**Intermediate Social Vulnerability** (n=340)	**High Social Vulnerability** (n=385)
Bladder incontinence***			
Continent	184 (50.6)	141 (41.5)	120 (31.2)
Some control, infrequent episodes	55 (15.1)	61 (17.9)	43 (11.2)
Occasional incontinence	39 (10.7)	32 (9.4)	47 (12.2)
Frequent episodes, no control	86 (23.6)	106 (31.2)	175 (45.4)
Bowel incontinence***			
Continent	295 (81.0)	261 (76.8)	227 (59.0)
Some control, infrequent episodes	42 (11.6)	51 (15.0)	73 (19.0)
Occasional incontinence, frequent episodes, no control	27 (7.4)	28 (8.2)	85 (22.0)
No. of chronic conditions			
Mean ± SD*	4.5 ± 1.9	4.5 ± 2.0	4.9 ± 2.0
No. of chronic condition			
0-3	121 (33.2)	114 (33.5)	98 (25.5)
4-5	135 (37.1)	122 (35.9)	149 (38.7)
≥6	108 (29.7)	104 (30.6)	138 (35.8)
No. of medications			
Mean ± SD*	8.7 ± 3.5	8.3 ± 3.9	7.9 ± 3.6
No. of medication			
0-6	102 (28.0)	116 (34.1)	142 (36.9)
7-8	87 (23.9)	67 (19.7)	81 (21.0)
9-10	69 (19.0)	70 (20.6)	81 (21.0)
≥11	106 (29.1)	87 (25.6)	81 (21.0)
Advance directive: Do not hospitalize			
Yes	36 (9.9)	37 (10.9)	40 (10.4)
No	328 (90.1)	303 (89.1)	345 (89.6)
No. of inpatient hospital admissions in past 90 days			
0	322 (88.5)	296 (87.1)	345 (89.6)
≥1	42 (11.5)	44 (12.9)	40 (10.4)
No. of emergency department visits in past 90 days			
0	316 (86.8)	276 (81.2)	318 (82.6)
≥1	48 (13.2)	64 (18.8)	67 (17.4)
Facility Characteristic			
Health Region***			
1 (urban)	130 (35.7)	108 (31.8)	73 (19.0)
2 (mixed urban/rural)	60 (16.5)	64 (18.8)	110 (28.6)
3 (rural)	49 (13.5)	61 (17.9)	45 (11.7)
4 (urban)	91 (25.0)	74 (21.8)	116 (30.1)
5 (rural)	34 (9.3)	33 (9.7)	41 (10.6)

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADL – Activities of Daily Living Self-Performance Hierarchy Scale

* <0.05

**<0.01

***<0.0001

Table 5.2.2.2e. Baseline Resident Characteristics by Social Vulnerability Status, Dementia Subgroup, Full Cohort (n=627)

	Full Cohort, Dementia Subgroup (n=627)		
	Low Social Vulnerability (n=158)	**Intermediate Social Vulnerability** (n=181)	**High Social Vulnerability** (n=288)
Resident Characteristics [n, (column %), unless otherwise noted]			
Age, yr			
Mean ± SD**	83.3 ± 7.4	85.3 ± 6.7	86.2 ± 6.1
Age groups**			
65-79	51 (32.3)	37 (20.4)	38 (13.2)
80-85	34 (21.5)	57 (31.5)	89 (30.9)
86-89	34 (21.5)	39 (21.6)	75 (26.0)
≥90	39 (23.7)	48 (26.5)	86 (29.9)
Sex			
Male	28 (17.7)	47 (26.0)	64 (22.2)
Female	130 (82.3)	134 (74.0)	224 (78.8)
Marital status			
Widowed (0)	107 (67.7)	137 (75.7)	215 (74.7)
Married or with a partner (1)	30 (19.0)	24 (13.3)	43 (14.9)
Never married, separated, or divorced (2)	21 (13.4)	20 (11.0)	30 (10.4)
Fatigue***			
None	85 (53.8)	90 (49.7)	111 (38.5)
Minimal	59 (37.3)	75 (41.4)	107 (37.2)
Moderate, severe, or unable to commence any normal day-to-day activities	14 (8.9)	16 (8.8)	70 (24.3)
Clinically significant depressive symptoms (DRS score of 3+)***			
No	141 (89.2)	150 (82.9)	190 (66.0)
Yes	17 (10.8)	31 (17.1)	98 (34.0)
Health Instability (CHESS)***			
Stable (0)	96 (60.8)	85 (47.0)	114 (39.6)
Mild (1)	42 (26.6)	51 (28.2)	75 (26.0)
Mild-moderate (2)	16 (10.1)	32 (17.7)	63 (21.9)
Moderate-high (≥3)	4 (2.5)	13 (7.2)	36 (12.5)
Cognition (CPS score)***			
Intact (0)	19 (12.0)	12 (6.6)	3 (1.0)
Borderline intact (1)	35 (22.2)	16 (8.9)	12 (4.2)
Mild, moderate, severe impairment (≥2)	104 (65.8)	153 (84.5)	273 (94.8)
Activities of daily living (ADL score)***			
Independent (0)	84 (53.2)	68 (37.6)	49 (17.0)
Supervision required (1)	33 (20.9)	50 (27.6)	62 (21.5)
Limited impairment (2)	25 (15.8)	24 (13.3)	42 (14.6)
Extensive supervision required or dependent (≥ 3)	15 (10.1)	39 (21.5)	135 (46.9)

	Full Cohort, Dementia Subgroup (n=627)		
	Low Social Vulnerability (n=158)	**Intermediate Social Vulnerability** (n=181)	**High Social Vulnerability** (n=288)
Bladder incontinence***			
Continent	79 (50.0)	80 (44.2)	78 (27.1)
Some control, infrequent episodes	24 (15.2)	31 (17.1)	30 (10.4)
Occasional incontinence	13 (8.2)	16 (8.8)	34 (11.8)
Frequent episodes, no control	42 (26.6)	54 (29.8)	146 (50.7)
Bowel incontinence***			
Continent	128 (81.0)	139 (76.8)	157 (54.5)
Some control, infrequent episodes	16 (10.1)	29 (16.0)	55 (19.1)
Occasional incontinence, frequent episodes, no control	14 (8.9)	13 (7.2)	76 (26.4)
No. of chronic conditions			
Mean ± SD	4.7 ± 1.9	4.7 ± 2.1	5.0 ± 2.1
No. of chronic conditions			
0-3	49 (31.0)	58 (32.0)	74 (25.7)
4-5	59 (37.3)	66 (36.5)	105 (36.5)
≥6	50 (31.7)	57 (31.5)	109 (37.8)
No. of medications			
Mean ± SD	8.2 ± 3.5	7.5 ± 3.8	7.5 ± 3.4
No. of medications			
0-6	52 (32.9)	77 (42.5)	122 (42.4)
7-8	42 (26.6)	37 (20.4)	62 (21.5)
9-10	28 (17.7)	34 (18.8)	58 (20.1)
≥11	36 (22.8)	33 (18.2)	46 (16.0)
Advance directive: Do not hospitalize			
Yes	15 (9.5)	23 (12.7)	29 (10.1)
No	143 (90.5)	158 (87.3)	259 (89.9)
No. of inpatient hospital admissions in past 90 days			
0	146 (92.4)	165 (91.2)	262 (91.0)
≥1	12 (7.6)	16 (8.8)	26 (9.0)
No. of emergency department visits in past 90 days*			
0	142 (89.9)	146 (80.7)	232 (80.6)
≥1	16 (10.1)	35 (19.3)	56 (19.4)
Facility Characteristic			
Health Region**			
1 (urban)	58 (36.7)	53 (29.3)	55 (19.1)
2 (mixed urban/rural)	28 (17.7)	30 (16.6)	82 (28.5)
3 (rural)	13 (8.2)	33 (18.2)	32 (11.1)
4 (urban)	47 (29.8)	49 (27.1)	89 (30.9)
5 (rural)	12 (7.6)	16 (8.8)	30 (10.4)

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADL – Activities of Daily Living Self-Performance Hierarchy Scale

* <0.05

**<0.01

***<0.0001

Table 5.2.2.2f. Baseline Resident Characteristics by Social Vulnerability Status, Non-Dementia Subgroup, Full Cohort (n=462)

	Full Cohort, Non-Dementia Subgroup (n=462)		
	Low Social Vulnerability (n=206)	**Intermediate Social Vulnerability** (n=159)	**High Social Vulnerability** (n=97)
Resident Characteristics [n, (column %), unless otherwise noted]			
Age, yr			
Mean ± SD	83.3 ± 8.0	83.8 ± 7.4	82.9 ± 8.7
Age groups			
65-79	69 (33.5)	41 (25.8)	36 (37.1)
80-85	44 (21.4)	42 (26.4)	18 (15.6)
86-89	40 (19.4)	41 (25.8)	19 (19.6)
≥90	53 (25.7)	35 (22.0)	24 (24.7)
Sex			
Male	46 (22.3)	43 (27.0)	26 (26.8)
Female	160 (77.7)	116 (73.0)	71 (73.2)
Marital status			
Widowed	143 (69.4)	112 (70.4)	64 (66.0)
Married or with a partner	31 (15.1)	23 (14.5)	8 (8.2)
Never married, separated, or divorced	32 (15.5)	24 (15.1)	25 (25.8)
Fatigue*			
None	75 (36.4)	56 (35.2)	25 (25.8)
Minimal	106 (51.5)	78 (49.1)	45 (46.4)
Moderate, severe, or unable to commence any normal day-to-day activities	25 (12.1)	25 (15.7)	27 (27.8)
Clinically significant depressive symptoms (DRS score of 3+)***			
No	194 (94.2)	139 (87.4)	66 (68.0)
Yes	12 (5.8)	20 (12.6)	31 (32.0)
Health Instability (CHESS)			
Stable (0)	104 (50.5)	65 (40.9)	39 (40.2)
Mild (1)	64 (31.1)	58 (36.5)	30 (30.9)
Mild-moderate (2)	27 (13.1)	25 (15.7)	25 (25.8)
Moderate-high (≥3)	11 (5.3)	11 (6.9)	3 (3.1)
Cognition (CPS score)***			
Intact (0)	102 (49.5)	62 (39.0)	26 (26.8)
Borderline intact (1)	66 (32.0)	55 (34.6)	29 (29.9)
Mild, moderate, severe impairment (≥2)	38 (18.5)	42 (26.4)	42 (43.3)
Activities of daily living (ADL score)***			
Independent (0)	148 (71.9)	75 (47.2)	34 (35.1)
Supervision required (1)	13 (6.3)	17 (10.7)	14 (14.4)
Limited impairment (2)	12 (5.8)	20 (12.6)	11 (11.3)
Extensive supervision required or dependent (≥ 3)	33 (16.0)	47 (29.6)	38 (39.2)

Bladder incontinence

	Full Cohort, Non-Dementia Subgroup (n=462)		
	Low Social Vulnerability (n=206)	**Intermediate Social Vulnerability** (n=159)	**High Social Vulnerability** (n=97)
Continent	105 (51.0)	61 (38.4)	42 (43.3)
Some control, infrequent episodes	31 (15.0)	30 (18.9)	13 (13.4)
Occasional incontinence	26 (12.6)	16 (10.0)	13 (13.4)
Frequent episodes, no control	44 (21.4)	52 (32.7)	29 (29.9)
Bowel incontinence			
Continent	167 (81.1)	122 (76.7)	70 (72.2)
Some control, infrequent episodes	26 (12.6)	22 (12.8)	18 (18.5)
Occasional incontinence, frequent episodes, no control	13 (6.3)	15 (9.4)	9 (9.3)
No. of chronic conditions			
Mean ± SD	4.3 ± 1.9	4.4 ± 2.0	4.6 ± 1.8
No. of chronic conditions			
0-3	72 (34.9)	56 (35.2)	24 (24.7)
4-5	76 (36.9)	56 (35.2)	44 (45.4)
≥6	58 (28.2)	47 (29.6)	29 (29.9)
No. of medications			
Mean ± SD	9.1 ± 3.5	9.1 ± 3.8	9.2 ± 3.6
No. of medications			
0-6	50 (24.3)	39 (24.5)	20 (20.6)
7-8	45 (21.8)	30 (18.9)	19 (19.6)
9-10	41 (19.9)	36 (22.6)	23 (23.7)
≥11	70 (34.0)	54 (34.0)	35 (36.1)
Advance directive: Do not hospitalize			
Yes	21 (10.2)	14 (8.8)	11 (11.3)
No	185 (89.8)	145 (91.2)	86 (88.7)
No. of inpatient hospital admissions in past 90 days			
0	176 (85.4)	131 (82.4)	83 (85.6)
≥1	30 (14.6)	28 (17.6)	14 (14.4)
No. of emergency department visits in last 90 days			
0	174 (84.5)	130 (81.8)	86 (88.7)
≥1	32 (15.5)	29 (18.2)	11 (11.3)
Facility Characteristic			
Health Region*			
1 (urban)	72 (34.9)	55 (34.6)	18 (18.6)
2 (mixed urban/rural)	32 (15.5)	34 (21.4)	28 (28.9)
3 (rural)	36 (17.5)	28 (17.6)	13 (13.4)
4 (urban)	44 (21.4)	25 (15.7)	27 (27.8)
5 (rural)	22 (10.7)	17 (10.7)	11 (11.3)

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADL – Activities of Daily Living Self-Performance Hierarchy Scale

* <0.05

**<0.01

***<0.0001

Table 5.3.1a. Baseline Resident and Facility Characteristics by Outcome Status (Cognitive Decline vs No Change or Improved), Survived Cohort (n=889)

	Survived Cohort (n=889)		
	Overall	**No Change or Improved**	**Declined**
Baseline Characteristics [n, (column %), unless otherwise noted]			
Overall	889 (100)	511 (57.5)	378 (42.5)
Age, yr			
Mean ± SD	84.0 ± 7.3	83.6 ± 7.2	84.4 ± 7.4
Age groups			
65-79	238 (26.8)	145 (28.4)	93 (24.6)
80-85	236 (26.5)	131 (25.6)	105 (27.8)
86-89	205 (23.1)	123 (24.1)	82 (21.7)
≥90	210 (23.6)	112 (21.9)	98 (25.9)
Sex			
Male	193 (21.7)	110 (21.5)	83 (22.0)
Female	696 (78.3)	401 (78.5)	295 (78.0)
Marital status			
Widowed (0)	628 (70.6)	357 (69.9)	271 (71.7)
Married or with a partner (1)	125 (14.1)	81 (15.8)	44 (11.6)
Never married, separated, or divorced (2)	136 (15.3)	73 (14.3)	63 (16.7)
Fatigue			
None	391 (44.0)	217 (42.5)	174 (46.0)
Minimal	380 (42.7)	214 (41.9)	166 (43.9)
Moderate, severe, or unable to commence any normal day-to-day activities	118 (13.3)	80 (15.6)	38 (10.1)
Clinically significant depressive symptoms (DRS score of 3+)			
No	724 (81.4)	414 (81.0)	310 (82.0)
Yes	165 (18.6)	97 (19.0)	68 (18.0)
Health Instability (CHESS)			
Stable (0)	434 (48.8)	241 (47.2)	193 (51.0)
Mild (1)	262 (29.5)	149 (29.1)	113 (29.9)
Mild-moderate (2)	137 (15.4)	88 (17.2)	49 (13.0)
Moderate-high (≥3)	56 (6.3)	33 (6.5)	23 (6.1)
Cognition (CPS score)***			
Intact (0)	188 (21.1)	87 (17.0)	101 (26.7)
Borderline intact (1)	168 (18.9)	74 (14.5)	94 (24.9)
Mild, moderate, severe impairment (≥2)	533 (60.0)	350 (68.5)	183 (48.4)
Activities of daily living (ADLH score)			
Independent (0)	397 (44.7)	222 (43.4)	175 (46.3)
Supervision required (1)	154 (17.3)	92 (18.0)	62 (16.4)
Limited impairment (2)	106 (11.9)	57 (11.2)	49 (13.0)
Extensive supervision required or dependent (≥3)	232 (26.1)	140 (27.4)	92 (24.3)
Bladder incontinence			
Continent	373 (42.0)	223 (43.6)	150 (39.7)
Some control, infrequent episodes	127 (14.3)	71 (13.9)	56 (14.8)
Occasional incontinence	97 (10.9)	51 (10.0)	46 (12.2)
Frequent episodes, no control	292 (32.8)	166 (32.5)	126 (33.3)

	Survived Cohort (n=889)		
	Overall	**No Change or Improved**	**Declined**
Bowel incontinence			
Continent	658 (74.0)	384 (75.2)	274 (72.5)
Some control, infrequent episodes	130 (14.6)	70 (13.7)	60 (15.9)
Occasional incontinence, frequent episodes, no control	101 (11.4)	57 (11.1)	44 (11.6)
No. of chronic conditions			
Mean ± SD	4.6 ± 2.0	4.6 ± 2.0	4.4 ± 1.9
No. of chronic conditions			
0-3	293 (33.0)	163 (21.9)	130 (34.4)
4-5	325 (36.5)	183 (35.8)	142 (37.6)
≥6	271 (30.5)	165 (32.3)	106 (28.0)
No. of medications			
Mean ± SD	8.2 ± 3.6	8.4 ± 3.7	8.0 ± 3.5
No. of medications			
0-6	301 (33.9)	166 (32.5)	135 (35.7)
7-8	187 (21.0)	98 (19.2)	89 (23.5)
9-10	184 (20.7)	115 (22.5)	69 (18.3)
≥11	217 (24.4)	132 (25.8)	85 (22.5)
Antipsychotics			
0	651 (73.2)	368 (72.0)	283 (74.9)
1+	238 (26.8)	143 (28.0)	95 (25.1)
Anxiolytics (p=0.0517)			
0	798 (89.8)	450 (88.1)	348 (92.1)
1+	91 (10.2)	61 (11.9)	30 (7.9)
Hypnotics and sedatives			
0	701 (78.9)	404 (79.1)	297 (78.6)
1+	188 (21.1)	107 (20.9)	81 (21.4)
Antidepressants			
0	493 (55.5)	279 (54.6)	214 (56.6)
1+	396 (44.5)	232 (45.4)	164 (43.4)
Advance directive: Do not hospitalize			
Yes	86 (9.7)	55 (10.8)	31 (8.2)
No	803 (90.3)	456 (89.2)	347 (91.8)
No. of inpatient hospital admissions in past 90 days			
0	798 (89.8)	463 (90.6)	335 (88.6)
≥1	91 (10.2)	48 (9.4)	43 (11.4)
No. of emergency department visits in past 90 days			
0	754 (84.8)	439 (85.9)	315 (83.3)
≥1	135 (15.2)	72 (14.1)	63 (16.7)
Facility Characteristic			
Health Region***			
1 (urban)	268 (30.2)	117 (22.9)	151 (39.9)
2 (mixed urban/rural)	170 (19.1)	108 (21.1)	62 (16.4)
3 (rural)	128 (14.4)	89 (17.4)	39 (10.3)
4 (urban)	240 (27.0)	160 (31.3)	80 (21.2)
5 (rural)	83 (9.3)	37 (7.2)	46 (12.2)

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADLH – Activities of Daily Living Self-Performance Hierarchy Scale

* <0.05

	Survived Cohort (n=889)		
	Overall	**No Change or Improved**	**Declined**

**<0.01

***<0.0001

Table 5.3.1b. Baseline Resident and Facility Characteristics by Outcome Status (Cognitive Decline vs No Change or Improved), Dementia Subgroup, Survived Cohort (n=508)

	Survived Cohort, Dementia Subgroup (n=508)		
	Overall	**Stayed the Same or Improved**	**Declined**
Baseline Characteristics [n, (column %), unless otherwise noted]			
Overall	508 (100)	286 (56.3)	222 (43.7)
Age, yr			
Mean ± SD	84.7 ± 6.7	84.3 ± 6.9	85.3 ± 6.5
Age groups			
65-79	112 (22.1)	69 (24.1)	43 (19.4)
80-85	150 (29.5)	80 (28.0)	70 (31.5)
86-89	120 (23.6)	70 (24.5)	50 (22.5)
≥90	126 (24.8)	67 (23.4)	59 (26.6)
Sex			
Male	102 (20.1)	55 (19.2)	47 (21.2)
Female	406 (79.9)	231 (80.8)	175 (78.8)
Marital status			
Widowed (0)	374 (73.6)	212 (74.1)	162 (73.0)
Married or with a partner (1)	68 (13.4)	44 (15.4)	24 (10.8)
Never married, separated, or divorced (2)	66 (13.0)	30 (10.5)	36 (16.2)
Fatigue			
None	250 (49.2)	134 (46.8)	116 (52.3)
Minimal	192 (37.8)	106 (37.1)	86 (38.7)
Moderate, severe, or unable to commence any normal day-to-day activities	66 (13.0)	46 (16.1)	20 (9.0)
Clinically significant depressive symptoms (DRS score of 3+)			
No	395 (77.8)	221 (77.3)	174 (78.4)
Yes	113 (22.2)	65 (22.7)	48 (21.6)
Health Instability (CHESS)			
Stable (0)	251 (49.4)	133 (46.5)	118 (53.1)
Mild (1)	133 (26.2)	75 (26.2)	58 (26.1)
Mild-moderate (2)	85 (16.7)	54 (18.9)	31 (14.0)
Moderate-high (≥3)	39 (7.7)	24 (8.4)	15 (6.8)
Cognition (CPS score)***			
Intact (0)	29 (5.7)	8 (2.8)	21 (9.5)
Borderline intact (1)	51 (10.0)	9 (3.1)	42 (18.9)
Mild, moderate, severe impairment (≥2)	428 (84.3)	269 (94.1)	159 (71.6)
Activities of daily living (ADLH score)			
Independent (0)	178 (35.0)	92 (32.2)	86 (38.7)
Supervision required (1)	118 (23.2)	68 (23.8)	50 (22.5)
Limited impairment (2)	73 (14.4)	44 (15.4)	29 (13.1)
Extensive supervision required or dependent (≥ 3)	139 (27.4)	82 (28.7)	57 (25.7)
Bladder incontinence			
Continent	200 (39.4)	111 (38.8)	89 (40.1)
Some control, infrequent episodes	66 (13.0)	38 (13.3)	28 (12.6)
Occasional incontinence	56 (11.0)	33 (11.5)	23 (10.4)
Frequent episodes, no control	186 (36.6)	104 (36.4)	82 (36.9)
Bowel incontinence			

	Survived Cohort, Dementia Subgroup (n=508)		
	Overall	**Stayed the Same or Improved**	**Declined**
Continent	360 (70.9)	204 (71.3)	156 (70.3)
Some control, infrequent episodes	77 (15.1)	40 (14.0)	37 (16.7)
Occasional incontinence, frequent episodes, no control	71 (14.0)	42 (14.7)	29 (13.0)
No. of chronic conditions			
Mean ± SD	4.7 ± 2.0	4.8 ± 2.1	4.5 ± 1.9
No. of chronic conditions groups			
0-3	165 (32.5)	86 (30.1)	79 (35.6)
4-5	180 (35.4)	100 (35.0)	80 (36.0)
≥6	163 (32.1)	100 (35.0)	63 (28.4)
No. of medications			
Mean ± SD	7.6 ± 3.5	7.9 ± 3.7	7.3 ± 3.2
No. of medications groups			
0-6	208 (40.9)	113 (39.5)	95 (42.8)
7-8	111 (21.9)	56 (19.6)	55 (24.8)
9-10	100 (19.7)	58 (20.3)	42 (18.9)
≥11	89 (17.5)	59 (20.6)	30 (13.5)
Antipsychotics			
0	323 (63.6)	172 (60.1)	151 (68.0)
1+	185 (36.4)	114 (39.9)	71 (32.0)
Anxiolytics			
0	473 (93.1)	265 (92.7)	208 (93.7)
1+	35 (6.9)	21 (7.3)	14 (6.3)
Hypnotics and Sedatives			
0	420 (82.7)	238 (56.7)	182 (82.0)
1+	88 (17.3)	48 (16.8)	40 (18.0)
Antidepressants			
0	279 (54.9)	158 (55.2)	121 (54.5)
1+	229 (45.1)	128 (44.8)	101 (45.5)
Advance directive: Do not hospitalize			
Yes	51 (10.0)	32 (11.2)	19 (8.6)
No	457 (90.0)	254 (88.8)	203 (91.4)
No. of inpatient hospital admissions in past 90 days			
0	472 (92.9)	266 (93.0)	206 (92.8)
≥1	36 (7.1)	20 (7.0)	16 (7.2)
No. of emergency department visits in past 90 days			
0	431 (84.8)	246 (86.0)	185 (83.3)
≥1	77 (15.2)	40 (14.0)	37 (16.7)
Facility Characteristic			
Health Region**			
1 (urban)	145 (28.5)	62 (21.7)	83 (37.4)
2 (mixed urban/rural)	95 (18.7)	61 (21.3)	34 (15.3)
3 (rural)	62 (12.2)	43 (15.0)	19 (8.6)
4 (urban)	159 (31.3)	99 (34.6)	60 (27.0)
5 (rural)	47 (9.3)	21 (7.3)	26 (11.7)

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADLH – Activities of Daily Living Self-Performance Hierarchy Scale

* <0.05

**<0.01

Survived Cohort, Dementia Subgroup (n=508)

	Overall	**Stayed the Same or Improved**	**Declined**

***<0.0001

Table 5.3.1c. Baseline Resident and Facility Characteristics by Outcome Status (Cognitive Decline vs No Change or Improved), Non-Dementia Subgroup, Survived Cohort (n=381)

	Survived Cohort, Non-Dementia Subgroup (n=381)		
	Overall	**Stayed the Same or Improved**	**Declined**
Baseline Characteristics [n, (column %), unless otherwise noted]			
Overall	381 (100)	225 (59.1)	156 (40.9)
Age, yr			
Mean ± SD	82.9 ± 7.9	82.7 ± 7.5	83.3 ± 8.4
Age groups			
65-79	126 (33.1)	76 (33.8)	50 (32.1)
80-85	86 (22.6)	51 (22.7)	35 (22.4)
86-89	85 (22.3)	53 (23.5)	32 (20.5)
≥90	84 (22.0)	45 (20.0)	39 (25.0)
Sex			
Male	91 (23.9)	55 (24.4)	36 (23.1)
Female	290 (76.1)	170 (75.6)	120 (76.9)
Marital status			
Widowed (0)	254 (66.7)	145 (64.4)	109 (69.9)
Married or with a partner (1)	57 (14.9)	37 (16.4)	20 (12.8)
Never married, separated, or divorced (2)	70 (18.4)	43 (19.1)	27 (17.3)
Fatigue			
None	141 (37.0)	83 (36.9)	58 (37.2)
Minimal	188 (49.3)	108 (48.0)	80 (51.3)
Moderate, severe, or unable to commence any normal day-to-day activities	52 (13.7)	34 (15.1)	18 (11.5)
Clinically significant depressive symptoms (DRS score of 3+)			
No	329 (86.4)	193 (85.8)	136 (87.2)
Yes	52 (13.6)	32 (14.2)	20 (12.8)
Health Instability (CHESS)			
Stable (0)	183 (48.0)	108 (48.0)	75 (48.1)
Mild (1)	129 (33.9)	74 (32.9)	55 (35.3)
Mild-moderate (2)	52 (13.6)	34 (15.1)	18 (11.5)
Moderate-high (≥3)	17 (4.5)	9 (4.0)	8 (5.1)
Cognition (CPS score)***			
Intact (0)	159 (41.7)	79 (35.1)	80 (51.3)
Borderline intact (1)	117 (30.7)	65 (28.9)	52 (33.3)
Mild, moderate, severe impairment (≥2)	105 (27.6)	81 (36.0)	24 (15.4)
Activities of daily living (ADL score)			
Independent (0)	219 (57.5)	130 (57.8)	89 (57.1)
Supervision required (1)	36 (9.4)	24 (10.7)	12 (7.7)
Limited impairment (2)	33 (8.7)	13 (5.8)	20 (12.8)
Extensive supervision required or dependent (≥ 3)	93 (24.4)	58 (25.8)	35 (22.4)
Bladder incontinence			
Continent	173 (45.4)	112 (49.8)	61 (39.1)
Some control, infrequent episodes	61 (16.0)	33 (14.7)	28 (18.0)
Occasional incontinence	41 (10.8)	18 (8.0)	23 (14.7)
Frequent episodes, no control	106 (27.8)	62 (27.5)	44 (28.2)

	Survived Cohort, Non-Dementia Subgroup (n=381)		
	Overall	**Stayed the Same or Improved**	**Declined**
Bowel incontinence			
Continent	298 (78.2)	180 (80.0)	118 (75.6)
Some control, infrequent episodes	53 (13.9)	30 (13.3)	23 (14.7)
Occasional incontinence, frequent episodes, no control	30 (7.9)	15 (6.7)	15 (9.6)
No. of chronic conditions			
Mean ± SD	4.4 ± 1.9	4.4 ± 1.9	4.4 ± 1.9
No. of chronic conditions groups			
0-3	128 (33.6)	77 (34.2)	51 (32.7)
4-5	145 (38.1)	83 (36.9)	62 (39.7)
≥6	108 (28.3)	65 (28.9)	43 (27.6)
No. of medications			
Mean ± SD	9.0 ± 3.6	9.1 ± 3.5	8.9 ± 3.7
No. of medications groups			
0-6	93 (24.4)	53 (23.6)	40 (25.6)
7-8	76 (19.9)	42 (18.7)	34 (21.8)
9-10	84 (22.1)	57 (25.3)	27 (17.3)
≥11	128 (33.6)	73 (32.4)	55 (35.3)
Antipsychotics			
0	328 (86.1)	196 (87.1)	132 (84.6)
1+	53 (13.9)	29 (12.9)	24 (15.4)
Anxiolytics*			
0	325 (85.3)	185 (82.2)	140 (89.7)
1+	56 (14.7)	40 (17.8)	16 (10.3)
Hypnotics and Sedatives			
0	281 (73.8)	166 (73.8)	115 (73.7)
1+	100 (26.2)	59 (26.2)	41 (26.3)
Antidepressants			
0	214 (56.2)	121 (53.8)	93 (59.6)
1+	167 (43.8)	104 (46.2)	63 (40.4)
Advance directive: Do not hospitalize			
Yes	35 (9.2)	23 (10.2)	12 (7.7)
No	346 (90.8)	202 (89.8)	144 (92.3)
No. of inpatient hospital admissions in past 90 days			
0	326 (85.6)	197 (87.6)	129 (82.7)
≥1	55 (14.4)	28 (12.4)	27 (17.3)
No. of emergency department visits in past 90 days			
0	323 (84.8)	193 (85.8)	130 (83.3)
≥1	58 (15.2)	32 (14.2)	26 (16.7)
Facility Characteristic			
Health Region***			
1 (urban)	123 (32.3)	55 (24.4)	68 (43.6)
2 (mixed urban/rural)	75 (19.7)	47 (20.9)	28 (18.0)
3 (rural)	66 (17.3)	46 (20.4)	20 (12.8)
4 (urban)	81 (21.3)	61 (27.1)	20 (12.8)
5 (rural)	36 (9.4)	16 (7.1)	20 (12.8)

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADLH – Activities of Daily Living Self-Performance Hierarchy Scale

* <0.05

**<0.01

	Survived Cohort, Non-Dementia Subgroup (n=381)		
	Overall	**Stayed the Same or Improved**	**Declined**

***<0.0001

Table 5.3.2a. Baseline Resident and Facility Characteristics by Outcome Status (First-Event Hospitalization), Linked Cohort (n=1,066)

	Linked Cohort (n=1,066)$^{\psi}$			
	Overall	**Hospital**	**LTC or Death**	**Still in DAL**
Resident Characteristics [n, (column %), unless otherwise noted]				
Overall	1066 (100)	413 (38.9)	115 (10.8)	534 (50.3)
Age, yr				
Mean ± SD	84.4 ± 7.3	84.7 ± 7.1	85.6 ± 6.6	83.9 ± 7.5
Age groups				
65-79	268 (25.1)	97 (23.5)	22 (19.1)	146 (27.3)
80-85	279 (26.2)	109 (26.4)	28 (24.4)	141 (26.4)
86-89	244 (22.9)	93 (22.5)	32 (27.8)	119 (22.3)
≥90	275 (25.8)	114 (27.6)	33 (28.7)	128 (24.0)
Sex				
Male	248 (23.4)	101 (24.5)	29 (25.2)	116 (21.7)
Female	818 (76.7)	312 (75.5)	86 (74.8)	418 (78.3)
Marital status				
Widowed	761 (71.4)	293 (70.9)	82 (71.3)	383 (71.7)
Married or with a partner	156 (14.6)	63 (15.3)	20 (17.4)	73 (13.7)
Never married, separated, or divorced	149 (15.0)	57 (13.8)	13 (11.3)	78 (14.6)
Fatigue***				
None	430 (40.5)	147 (35.6)	37 (32.2)	246 (46.1)
Minimal	460 (43.3)	181 (43.8)	46 (40.0)	233 (43.6)
Moderate, severe, or unable to commence any normal day-to-day activities	172 (16.2)	85 (20.6)	32 (27.8)	55 (10.3)
Clinically significant depressive symptoms (DRS score of 3+)**				
No	863 (81.0)	338 (81.8)	80 (69.6)	442 (82.8)
Yes	203 (19.0)	75 (18.2)	35 (30.4)	92 (17.2)
Health instability (CHESS)***				
Stable (0)	496 (46.5)	165 (39.9)	40 (34.8)	288 (53.9)
Mild (1)	312 (29.3)	137 (33.2)	31 (26.9)	144 (27.0)
Mild-moderate (2)	184 (17.4)	74 (17.9)	24 (20.9)	86 (16.1)
Moderate-high (≥3)	74 (6.9)	37 (9.0)	20 (17.4)	16 (3.0)
Cognition (CPS score)***				
Intact (0)	223 (20.9)	98 (23.7)	8 (7.0)	114 (21.3)
Borderline intact (1)	211 (19.8)	82 (19.9)	15 (13.0)	114 (21.3)
Mild, moderate, severe impairment (≥2)	632 (59.3)	233 (56.4)	92 (80.0)	306 (57.3)
Activities of daily living (ADLH score)***				
Independent (0)	454 (42.6)	179 (43.3)	13 (11.3)	260 (48.7)
Supervision required (1)	186 (17.5)	62 (15.0)	26 (22.6)	97 (18.2)
Limited impairment (2)	126 (11.8)	42 (10.2)	21 (18.2)	63 (11.8)
Extensive supervision required or dependent (≥ 3)	300 (28.1)	130 (31.5)	55 (47.8)	114 (21.3)

	Linked Cohort (n=1,066)Ψ			
	Overall	**Hospital**	**LTC or Death**	**Still in DAL**
Bladder incontinence***				
Continent	436 (40.9)	168 (40.7)	27 (23.5)	239 (44.7)
Some control, infrequent episodes	156 (14.6)	64 (15.5)	12 (10.4)	80 (15.0)
Occasional incontinence	114 (10.7)	48 (11.6)	11 (9.6)	55 (10.3)
Frequent episodes, no control	360 (33.8)	133 (32.2)	65 (56.5)	160 (30.0)
Bowel incontinence***				
Continent	766 (71.9)	290 (70.2)	66 (57.4)	407 (76.2)
Some control, infrequent episodes	165 (15.5)	74 (17.9)	16 (13.9)	74 (13.9)
Occasional incontinence, frequent episodes, no control	135 (12.6)	49 (11.9)	33 (28.7)	53 (9.9)
No. of chronic conditions				
Mean ± SD**	4.7 ± 2.0	4.8 ± 2.0	4.9 ± 2.1	4.4 ± 1.9
No. of chronic conditions*				
0-3	323 (30.3)	107 (25.9)	30 (26.1)	185 (34.6)
4-5	398 (37.3)	155 (37.5)	45 (39.1)	197 (36.9)
≥6	345 (32.4)	151 (36.6)	40 (34.8)	152 (28.5)
No. of medications				
Mean ± SD***	8.3 ± 3.7	9.1 ± 3.8	8.5 ± 3.6	7.7 ± 3.5
No. of medications**				
0-6	349 (32.7)	106 (25.7)	36 (31.3)	206 (38.6)
7-8	232 (21.8)	88 (21.3)	31 (26.9)	113 (21.2)
9-10	214 (20.1)	87 (21.1)	20 (17.4)	105 (19.6)
≥11	271 (25.4)	132 (32.9)	28 (24.4)	110 (20.6)
Advance directive: Do not hospitalize				
Yes	109 (10.2)	42 (10.2)	11 (9.6)	54 (10.1)
No	957 (89.8)	371 (89.8)	104 (90.4)	480 (89.9)
No. of inpatient hospital admissions in past Year***				
0	661 (62.2)	228 (55.2)	75 (65.2)	358 (67.0)
1	252 (23.7)	100 (24.2)	23 (20.0)	129 (24.2)
2+	149 (14.1)	85 (20.6)	17 (14.8)	47 (8.8)
No. of emergency department visits in past 90 days**				
0	890 (83.5)	327 (79.2)	90 (78.3)	470 (88.0)
≥1	176 (16.5)	86 (20.8)	25 (21.7)	64 (12.0)
Facility Characteristic				
Health Region*				
1 (urban)	311 (29.2)	111 (26.9)	30 (26.1)	169 (31.6)
2 (mixed urban/rural)	228 (21.4)	82 (19.9)	31 (27.0)	114 (21.4)
3 (rural)	153 (14.4)	78 (18.9)	12 (10.4)	63 (11.8)
4 (urban)	268 (25.1)	96 (23.2)	27 (23.5)	144 (27.0)
5 (rural)	106 (9.9)	46 (11.1)	15 (13.0)	44 (8.2)

Ψ Four residents (0.4% of the cohort) had other outcomes (censored at date of first discharge from DAL) and were omitted from the comparisons.

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADLH – Activities of Daily Living Self-Performance Hierarchy Scale

* <0.05

**<0.01

***<0.0001

Table 5.3.2b. Baseline Resident and Facility Characteristics by Outcome Status (Hospitalized as First Event), Dementia Subgroup, Linked Cohort (n=609)

	Linked Cohort, Dementia Subgroup (n=609)$^{\psi}$			
	Overall	**Hospital**	**LTC or Death**	**Still in DAL**
Resident Characteristics [n, (column %), unless otherwise noted]				
Overall	609 (100)	220 (36.2)	90 (14.8)	298 (49.0)
Age, yr				
Mean ± SD	85.2 ± 6.6	85.7 ± 6.0	85.9 ± 6.4	84.6 ± 7.0
Age groups				
65-79	123 (20.2)	39 (17.7)	15 (16.7)	68 (22.8)
80-85	176 (28.9)	65 (29.6)	24 (26.7)	87 (29.2)
86-89	145 (23.8)	50 (22.7)	23 (25.5)	72 (24.2)
≥90	165 (27.1)	66 (30.0)	28 (31.1)	71 (23.8)
Sex				
Male	134 (22.0)	55 (25.0)	22 (24.4)	56 (18.8)
Female	475 (78.0)	165 (75.0)	68 (75.6)	242 (81.2)
Marital status				
Widowed	446 (73.2)	160 (72.7)	66 (73.3)	220 (73.8)
Married or with a partner	95 (15.6)	37 (16.8)	17 (18.9)	41 (13.8)
Never married, separated, or divorced	68 (11.2)	23 (10.5)	7 (7.8)	37 (12.4)
Fatigue***				
None	277 (45.6)	86 (39.1)	32 (35.6)	159 (53.4)
Minimal	236 (38.8)	92 (41.8)	32 (35.6)	112 (37.6)
Moderate, severe, or unable to commence any normal day-to-day activities	95 (15.6)	42 (19.1)	26 (28.9)	27 (9.0)
Clinically significant depressive symptoms (DRS score of 3+)				
No	469 (77.0)	169 (76.8)	61 (67.8)	238 (79.9)
Yes	140 (23.0)	51 (23.2)	29 (32.2)	60 (20.1)
Health instability (CHESS)***				
Stable (0)	289 (47.5)	88 (40.0)	34 (37.8)	166 (55.7)
Mild (1)	162 (26.6)	69 (31.4)	20 (22.2)	73 (24.5)
Mild-moderate (2)	108 (17.7)	41 (18.6)	19 (21.1)	48 (16.1)
Moderate-high (≥3)	50 (8.2)	22 (10.0)	17 (18.9)	11 (3.7)
Cognition (CPS score)*				
Intact (0)	34 (5.6)	16 (7.3)	4 (4.4)	13 (4.4)
Borderline intact (1)	63 (10.3)	16 (7.3)	5 (5.6)	42 (14.1)
Mild, moderate, severe impairment (≥2)	512 (84.1)	188 (85.4)	81 (90.0)	243 (81.5)
Activities of daily living (ADL score)***				
Independent (0)	198 (32.5)	68 (30.9)	10 (11.1)	119 (39.9)
Supervision required (1)	143 (23.5)	49 (22.3)	21 (23.3)	73 (24.5)
Limited impairment (2)	84 (13.8)	26 (11.8)	14 (15.6)	44 (14.8)
Extensive supervision required or dependent (≥ 3)	184 (30.2)	77 (35.0)	45 (50.0)	62 (20.8)

	Linked Cohort, Dementia Subgroup (n=609)Ψ			
	Overall	**Hospital**	**LTC or Death**	**Still in DAL**
Bladder incontinence***				
Continent	231 (37.9)	78 (35.4)	19 (21.1)	133 (44.6)
Some control, infrequent episodes	83 (13.6)	35 (15.9)	8 (8.9)	40 (13.4)
Occasional incontinence	60 (9.9)	20 (9.1)	8 (8.9)	32 (10.7)
Frequent episodes, no control	235 (38.6)	87 (39.6)	55 (61.1)	93 (31.2)
Bowel incontinence***				
Continent	412 (67.7)	136 (61.8)	48 (53.3)	227 (76.2)
Some control, infrequent episodes	99 (16.3)	46 (20.9)	15 (16.7)	38 (12.7)
Occasional incontinence, frequent episodes, no control	98 (16.1)	38 (17.3)	27 (30.0)	33 (11.1)
No. of chronic conditions				
Mean ± SD**	4.8 ± 2.0	5.1 ± 2.0	5.2 ± 2.2	4.5 ± 1.9
No. of chronic conditions**				
0-3	173 (28.4)	50 (22.7)	20 (22.2)	102 (34.3)
4-5	223 (36.6)	78 (35.5)	35 (38.9)	110 (36.9)
≥6	213 (25.0)	92 (41.8)	35 (38.9)	86 (28.8)
No. of medications				
Mean ± SD**	7.7 ± 3.6	8.4 ± 3.7	8.0 ± 3.5	7.1 ± 3.4
No. of medications*				
0-6	241 (39.6)	69 (31.4)	33 (36.7)	138 (46.3)
7-8	139 (22.8)	50 (22.7)	23 (25.5)	66 (22.1)
9-10	115 (18.9)	46 (20.9)	17 (18.9)	52 (17.5)
≥11	114 (18.7)	55 (25.0)	17 (18.9)	42 (14.1)
Advance directive: Do not hospitalize				
Yes	63 (10.3)	21 (9.6)	8 (8.9)	34 (11.4)
No	546 (89.7)	199 (90.4)	82 (91.1)	264 (88.6)
No. of inpatient hospital admissions in past Year**				
0	413 (67.8)	131 (59.5)	64 (71.1)	217 (72.8)
1	138 (22.7)	54 (24.6)	16 (17.8)	68 (22.8)
2+	58 (9.5)	35 (15.9)	10 (11.1)	13 (4.4)
No. of emergency department visits in past 90 days***				
0	504 (82.8)	168 (76.4)	68 (75.6)	267 (89.6)
≥1	105 (17.2)	52 (23.6)	22 (24.4)	31 (10.4)
Facility Characteristic				
Health Region*				
1 (urban)	166 (27.3)	49 (22.3)	23 (25.6)	93 (31.2)
2 (mixed urban/rural)	135 (22.2)	48 (21.8)	22 (24.4)	65 (21.8)
3 (rural)	77 (12.6)	41 (18.6)	11 (12.2)	25 (8.4)
4 (urban)	174 (28.6)	57 (25.9)	24 (26.7)	93 (31.2)
5 (rural)	57 (9.4)	25 (11.4)	10 (11.1)	22 (38.6)

Ψ One resident (0.4% of the cohort) had other outcome (censored at date of first discharge from DAL) and was omitted from the comparisons.

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADLH – Activities of Daily Living Self-Performance Hierarchy Scale

* <0.05

**<0.01

***<0.0001

Table 5.3.2c. Baseline Resident and Facility Characteristics by Outcome Status (Hospitalized as First Event), Non-Dementia, Linked Cohort (n=457)

	Linked Cohort, Non-Dementia Subgroup (n=457)$^{\psi}$			
	Overall	**Hospital**	**LTC or Death**	**Still in DAL**
Resident Characteristics [n, (column %), unless otherwise noted]				
Overall	457 (100)	193 (42.5)	25 (5.5)	236 (52.0)
Age, yr				
Mean ± SD	83.4 ± 7.9	83.7 ± 8.1	84.2 ± 7.0	83.1 ± 8.0
Age groups				
65-79	145 (31.7)	58 (30.0)	7 (28.0)	78 (33.0)
80-85	103 (22.5)	44 (22.8)	4 (16.0)	54 (22.9)
86-89	99 (21.7)	43 (22.3)	9 (36.0)	47 (19.9)
≥90	110 (24.1)	48 (24.9)	5 (20.0)	57 (24.2)
Sex				
Male	114 (24.9)	46 (23.8)	7 (28.0)	60 (25.4)
Female	343 (75.1)	147 (76.2)	18 (72.0)	176 (74.6)
Marital status				
Widowed	315 (68.9)	133 (68.9)	16 (64.0)	163 (69.1)
Married or with a partner	61 (13.4)	26 (13.5)	3 (12.0)	32 (13.5)
Never married, separated, or divorced	81 (17.7)	34 (17.6)	6 (24.0)	41 (17.4)
Fatigue*				
None	153 (33.7)	61 (31.6)	5 (20.0)	87 (36.8)
Minimal	224 (49.3)	89 (46.1)	14 (56.0)	121 (51.3)
Moderate, severe, or unable to commence any normal day-to-day activities	77 (17.0)	43 (22.3)	6 (24.0)	28 (11.9)
Clinically significant depressive symptoms (DRS score of 3+)				
No	394 (86.2)	169 (87.6)	19 (76.0)	204 (86.4)
Yes	63 (13.8)	24 (12.4)	6 (24.0)	32 (13.6)
Health instability (CHESS)**				
Stable (0)	207 (45.3)	77 (39.9)	6 (24.0)	122 (51.7)
Mild (1)	150 (32.8)	68 (35.2)	11 (44.0)	71 (30.1)
Mild-moderate (2)	76 (16.6)	33 (17.1)	5 (20.0)	38 (16.1)
Moderate-high (≥3)	24 (5.3)	15 (7.8)	3 (12.0)	5 (2.1)
Cognition (CPS score)				
Intact (0)	189 (41.4)	82 (42.5)	4 (16.0)	101 (42.8)
Borderline intact (1)	148 (32.4)	66 (34.2)	10 (40.0)	72 (30.5)
Mild, moderate, severe impairment (≥2)	120 (26.2)	45 (23.3)	11 (44.0)	63 (26.7)
Activities of daily living (ADL score)**				
Independent (0)	256 (56.0)	111 (57.5)	3 (12.0)	141 (59.7)
Supervision required (1)	43 (9.4)	13 (6.7)	5 (20.0)	24 (10.2)
Limited impairment (2)	42 (9.2)	16 (8.3)	7 (28.0)	19 (8.1)
Extensive supervision required or dependent (≥ 3)	116 (25.4)	53 (27.5)	10 (40.0)	52 (22.0)

	Linked Cohort, Non-Dementia Subgroup (n=457)Ψ			
	Overall	**Hospital**	**LTC or Death**	**Still in DAL**
Bladder incontinence				
Continent	205 (44.9)	90 (46.6)	8 (32.0)	106 (44.9)
Some control, infrequent episodes	73 (16.0)	29 (15.0)	4 (16.0)	40 (16.9)
Occasional incontinence	54 (11.8)	28 (14.5)	3 (12.0)	23 (9.8)
Frequent episodes, no control	125 (27.3)	46 (23.8)	10 (40.0)	67 (28.4)
Bowel incontinence*				
Continent	354 (77.5)	154 (79.8)	18 (72.0)	180 (76.3)
Some control, infrequent episodes	66 (14.4)	28 (14.5)	1 (4.0)	36 (15.2)
Occasional incontinence, frequent episodes, no control	37 (8.1)	11 (5.7)	6 (24.0)	20 (8.5)
No. of chronic conditions				
Mean ± SD	4.4 ± 1.9	4.5 ± 1.9	4.1 ± 1.4	4.4 ± 1.8
No. of chronic conditions				
0-3	150 (32.8)	57 (29.5)	10 (40.0)	83 (35.2)
4-5	175 (38.3)	77 (39.9)	10 (40.0)	87 (36.8)
≥6	132 (28.9)	59 (30.6)	5 (20.0)	66 (28.0)
No. of medications				
Mean ± SD**	9.1 ± 3.6	9.8 ± 3.7	10.3 ± 3.5	8.4 ± 3.4
No. of medications*				
0-6	108 (23.6)	37 (19.2)	3 (12.0)	68 (28.8)
7-8	93 (20.3)	38 (19.7)	8 (32.0)	47 (19.9)
9-10	99 (21.7)	41 (21.2)	3 (12.0)	53 (22.5)
≥11	157 (34.4)	77 (39.9)	11 (44.0)	68 (28.8)
Advance directive: Do not hospitalize				
Yes	46 (10.1)	21 (10.9)	3 (12.0)	20 (8.5)
No	411 (89.9)	172 (89.1)	22 (88.0)	216 (91.5)
No. of inpatient hospital admissions in past Year*				
0	250 (54.7)	97 (50.3)	11 (44.0)	141 (59.8)
1	116 (25.4)	46 (23.8)	7 (28.0)	61 (25.8)
2+	91 (19.9)	50 (25.9)	7 (28.0)	34 (14.4)
No. of emergency department visits in past 90 days				
0	386 (84.3)	159 (82.4)	22 (88.0)	203 (86.0)
≥1	72 (15.7)	34 (17.6)	3 (12.0)	33 (14.0)
Facility Characteristic				
Health Region				
1 (urban)	145 (31.7)	62 (32.1)	7 (28.0)	76 (32.2)
2 (mixed urban/rural)	93 (20.4)	34 (17.6)	9 (36.0)	49 (20.8)
3 (rural)	76 (16.6)	37 (19.2)	1 (4.0)	38 (16.1)
4 (urban)	94 (20.6)	39 (20.2)	3 (12.0)	51 (21.6)
5 (rural)	49 (10.7)	21 (10.9)	5 (20.0)	22 (9.3)

Ψ Three residents (0.4% of the cohort) had other outcomes (censored at date of first discharge from DAL) and were omitted from the comparisons.

Abbreviations: DRS – Depression Rating Scale; CHESS – Changes in Health, End-Stage Disease, and Symptoms and Signs; CPS – Cognitive Performance Scale; ADLH – Activities of Daily Living Self-Performance Hierarchy Scale

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