Health System Reconfiguration

Long-Stay Alternate Level of Care in Ontario Mental Health Beds

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The Challenge

One of the greatest challenges facing government and health care service providers is how to effectively manage the resources needed to provide care and support for a growing population of persons affected by disabilities, complex medical conditions and age-related health problems. Timely access to care is a fundamental goal of the health system and an important marker of system efficiency. Alternate Level of Care (ALC) patient days are a growing concern because of their impact on system efficiency. An ALC designation occurs when a patient occupies a hospital bed where the intensity of resources and services that are provided is no longer required. In addition to the inefficient use of system resources, this may prevent access to care for other system users. From the perspective of patients and their families, prolonged wait times may have a negative effect on quality of life and satisfaction with the health system.

Recent data provided to the Ontario Hospital Association (OHA) by Cancer Care Ontario (CCO) – *Access to Care* (CCO-ATC) *Wait Time Information System* shows that in September 2015, patients designated ALC occupied approximately 14 per cent (4,053) of all inpatient bed days in Ontario. These patients are waiting in hospital beds for more appropriate care within the hospital or in the community.

A closer look at the September 2015 CCO-ATC data indicates that:

- Thirty-four per cent of the ALC patients residing in complex continuing care (CCC) and mental health beds contribute to 66 per cent of ALC days in hospitals.

- Of those patients waiting for long periods of time (30+ days)

    – 31 per cent are waiting in a CCC bed;

    – 16 per cent are waiting in a mental health bed.

Addressing these ALC challenges and ensuring patients have access to the right care, at the right time and in the right place, requires a coordinated system of care. Ontario's move to strengthen its home and community care sector presents an opportunity to improve our understanding of the needs and barriers of long-stay ALC patients awaiting discharge from hospital.

The Two Research Initiatives

To help improve our understanding of the needs of ALC long-stay mental health and CCC patients, the OHA engaged the University of Waterloo to undertake two research studies. The goal of these research studies was to:

- Characterize long-stay ALC patients in both Mental Health and CCC settings

- Identify the services required to by these long-stay ALC patients enabling them to be transitioned to less resource intensive care settings

- Assist the OHA in pinpointing service gaps so that solutions to reduce ALC patient days may be implemented

Clarity around the needs of these patients will help with the implementation of solutions and planning for future investments. More importantly, it will enhance patients' quality of care and reduce the stress on patients, caregivers and formal service providers.

ALC Patients in Mental Health Beds

Inpatient mental health settings are hospital-based facilities for the observation, care and treatment of persons experiencing mental illness. A patient may be admitted to a mental health unit through different pathways, including voluntary, involuntary and informal admission, as well as through a court order. Once admitted to a mental health unit, patients are assessed for their presenting symptoms, challenges and needs (this information is the primary source of clinical predictors used in the statistical model for ALC).

During the episode of care, patients will receive treatment that may include the services of psychiatrists, psychologists, social workers, and other mental health professionals. Additionally, those overseeing the care of the patient will begin to formulate a discharge plan, which is used to determine the ideal discharge placement(s) for the patient. When acute mental health symptoms have stabilized, many mental health inpatients will transition back to the home or to outpatient or community care settings in accordance with their discharge plan. However, some patients may be designated as ALC. As of September 2015, 10 per cent of designated mental health beds in Ontario were occupied by ALC patients.

STUDY APPROACH

The Andersen-Newman (1976) theoretical framework is often used when studying health service utilization. In the case of this study, hospital inpatient days are the health resources of particular interest. The Andersen-Newman model suggests that health service use is dependent on both societal and individual determinants. Examples of societal determinants may include factors such as volume of resources that are available relative to the population served and the accessibility of services. Individual determinants are divided into three types: predisposing factors, enabling factors and illness level. Predisposing factors increase one's likelihood of utilizing health services. Predisposing factors may include demographics (e.g., age, sex, past illness), social structure (e.g., ethnicity, level of education) and beliefs (e.g., values

concerning health and wellness, attitudes toward health service use). As the name suggests, enabling factors enable individuals to access health services. These may include factors such as income, health insurance and geographic location (i.e. urban versus rural). Lastly, illness level, both perceived by the patient and evaluated by a health professional, determine use of health resources. Theoretical frameworks such as the Andersen-Newman model serve as valuable guides when analyzing complex problems such as ALC patients in mental health facilities.

Methods

DATA SOURCES

The primary data source for this project was interRAI's Resident Assessment Instrument – Mental Health (RAI-MH). The RAI-MH is a validated, reliable tool for evaluating patient clinical characteristics and needs, including cognitive, social and physical functioning, as well as mental illness and health service utilization. The RAI-MH was mandated for use in inpatient psychiatry across Ontario in 2005, including 68 participating hospitals. RAI-MH assessments were obtained from the Ontario Mental Health Reporting System (OMHRS), which is managed by the Canadian Institute for Health Information (CIHI). All inpatient assessments from January 2005 to March 2014 were provided.

The secondary data source for this project was the Wait Time Information System (WTIS), provided by CCO. The WTIS database is dedicated to collecting information on ALC, such as the number of days that an inpatient has been designated ALC, as well as specialized needs and barriers to discharge. Based on patient and episode ID, variables related to ALC status were selected from WTIS and linked to the OMHRS dataset for the years 2011 to 2013.

STUDY SAMPLE

Exclusion criteria for the sample included short-stay status (fewer than three days length of stay), as well as forensic status. All other patients were retained in the sample.

Patient episodes were selected as the unit of analysis, allowing a single patient to be represented in the analysis more than once if they had multiple episodes of care. Following that step, admission assessments were isolated from each patient episode, as it would be most useful for clinicians to be able to predict ALC status from the beginning of the episode of care.

The resulting sample for the linked OMHRS and WTIS dataset totaled to 76,184 admission assessments.

VARIABLE SELECTION AND ALC CUT-POINT

Predictors of ALC status were selected from the RAI-MH based on the results of a literature review, as well as input from experienced mental health clinicians. The predictors that were chosen include demographic characteristics, clinical attributes, and scales and clinical assessment protocols (CAPs) embedded in

the RAI-MH. Under the Andersen-Newman framework, the predictors can mostly be categorized as demographic attributes or evaluated needs. However, some variables represent social structure, health use and health beliefs.

A cut-point of 30 days was selected as the definition for long-stay ALC status. The reason for choosing 30 days as the cut-point for ALC is because it is the current standard used to define long-stay status by CCO. Further, it is clinically useful to focus on patients with 30 ALC days or more, as they are a good representation of the population that is most difficult to place. In contrast, patients who accumulate only a few ALC days may simply be experiencing administrative delays, which do not mean they are necessarily difficult to place.

ANALYSES

To determine the average number and percentile distribution of ALC days in mental health, a univariate procedure was conducted on patient episodes containing at least one ALC day. To assess demographic and clinical characteristics among the two ALC groups, a series of descriptive analyses were performed. Finally, a multivariate logistic regression model was developed to identify predictors of ALC status at admission.

Results

AGREEMENT RATE BETWEEN OMHRS AND WTIS

As a starting point, agreement rates for ALC status were assessed between OMHRS and WTIS. Table 1 displays the 30+ agreement rate between the two data sources.

Table 1: Agreement between OMHRS and WTIS for 30+ ALC status

OMHRS	WTIS	
	<30 ALC days	30+ ALC days
<30 ALC days	98.6% (75,126)	0.3% (254)
30+ ALC days	0.2% (157)	0.8% (647)

As can be seen in Table 1, OMHRS and WTIS often concurred on patient episodes that contained less than 30 ALC days. However, in cases where 30 or more days of ALC were identified, OMHRS and WTIS had comparable rates of agreement and disagreement.

To determine whether disagreement was systematic (i.e., disagreement over certain subsets of the population), or whether it was due to random coding errors, odds ratios were calculated for ALC status in relation to several variables within OMHRS and WTIS (odds ratios indicates the relative odds of an ALC designation given the presence of an indicator). If the odds ratios for variables are similar between OMHRS and WTIS, the disagreement in coding did not greatly affect the results of the analysis. However, if the odds ratios differ greatly, that would indicate that the relationship with a given variable is dependent on which indicator of ALC status is used.
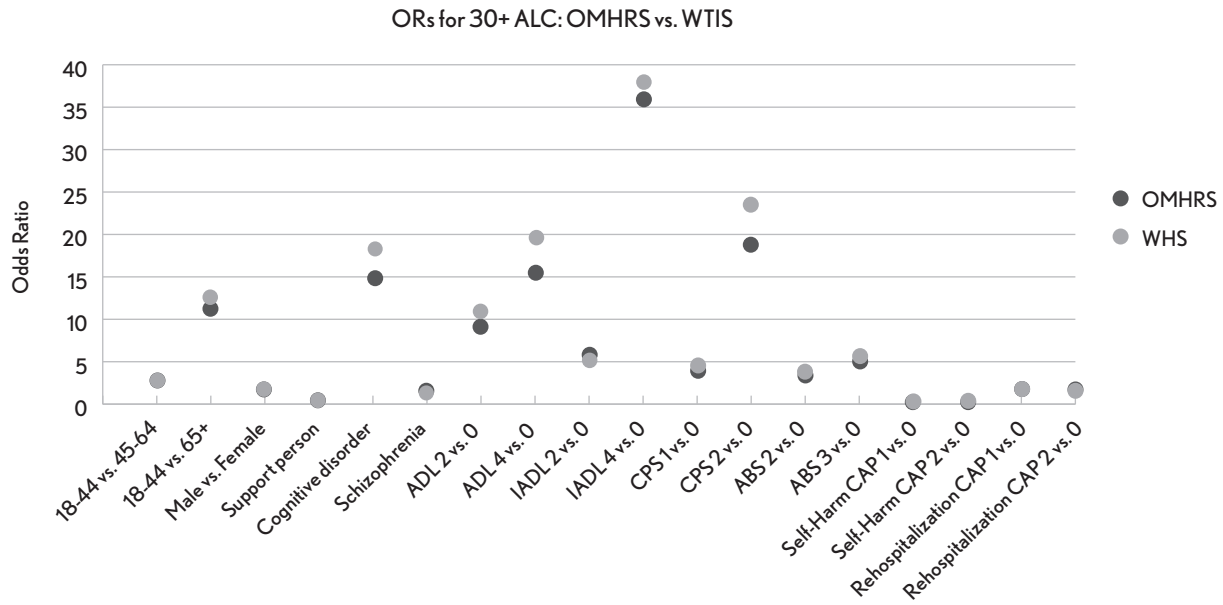
ORs for 30+ ALC: OMHRS vs. WTIS

Figure 1. Odds ratio (OR) values for ALC status across several predictors by OMHRS and WTIS

For the vast majority of variables, the odds ratios are similar between OMHRS and WTIS, suggesting that disagreement between the two datasets is not due to systematic differences in coding ALC status. Rather, it appears that disagreement may occur due to random differences in coding ALC, which does not affect the current project. It would be reasonable for CIHI and CCO to collaborate in the future to reduce these coding differences, but that does not hinder the ability to use the current findings to inform health care decision making.

Since the datasets were not shown to display systematic disagreement, it was decided that WTIS' ALC variable would be used as the primary indicator of ALC status.

Proportion of ALC Episodes & Distribution of ALC Days

Out of 76,184 patient episodes, 901 were identified in WTIS as having 30+ days of ALC. Thus, 1 per cent of patient episodes were designated long-stay ALC between 2011 and 2013.

The mean number of ALC days was 60 days, with a standard deviation of 100 days. The median number was 22 days. The relatively large standard deviation, as well as the difference between the mean and the median, indicates that there is a high level of variability in the number of ALC days that patients experience. This variability is reflected in the chart shown below, which illustrates the percentile distribution of ALC days across patient episodes.

Distribution of ALC Days
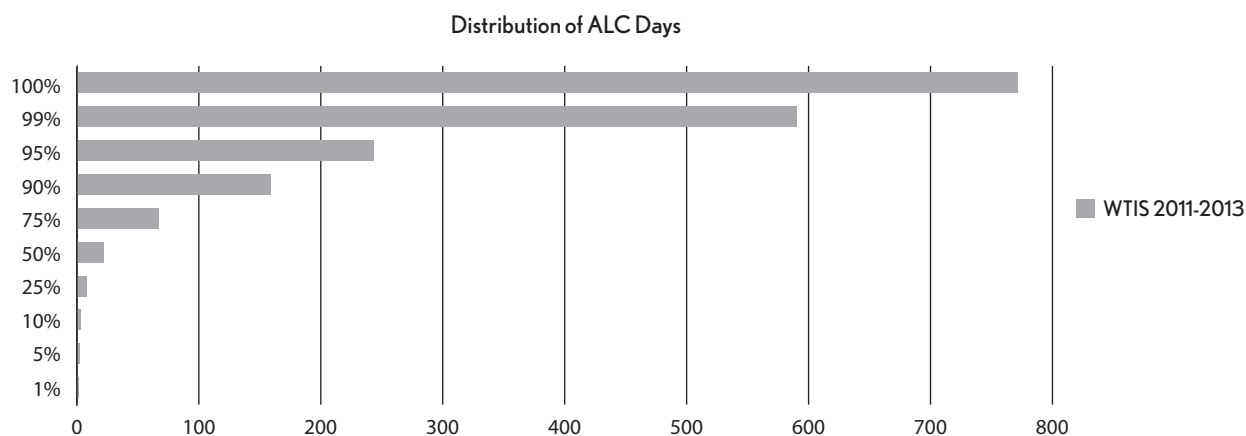
While the majority of patients experienced fewer than 70 days of ALC between 2011 and 2013, the top percentile experienced just over two years as ALC patients. Thus, while the prevalence of ALC episodes is very low (1 per cent for 30+ days), the large number of ALC days that are accumulated over time within this population is still a concern.

Demographic and Clinical Characteristics of 30+ and <30 ALC Groups

Demographic and clinical characteristics were selected from the RAI-MH and tested for their frequency of occurrence among the two ALC groups. The purpose of these frequencies was to determine whether certain variables would differentiate the two groups from one another, as well as to indicate which variables presented the biggest challenges for the 30+ ALC group.

Variable	30+ Days ALC	<30 Days ALC
Age 18-44 44-65 65+	17% 32% 51%	52% 36% 12%
Male	61%	49%
Married	25%	23%
Lived alone prior to admission	30%	32%
Aboriginal origin	3%	3%
Primary language other than English/French	10%	4%
Insight into mental health Full Limited None	4% 45% 51%	21% 60% 19%
Diagnosis – Schizophrenia	38%	35%
Diagnosis – Cognitive disorder	50%	5%
Diagnosis – Mood disorder	24%	53%
Diagnosis – Substance use disorder	9%	24%
Diagnosis – Anxiety disorder	5%	14%
Diagnosis – Personality disorder	5%	9%

Variable	30+ Days ALC	<30 Days ALC
Diagnosis – Other	5%	9%
Comorbid Diagnoses	35%	41%
Intellectual disability	15%	4%
Cognitive Performance Scale		
0	17%	66%
1-2	34%	27%
3-6	49%	7%
Aggressive Behaviour Scale		
0	43%	74%
1-3	25%	14%
4-6	18%	8%
7-12	14%	4%
Activities of Daily Living Scale		
0	38%	87%
1-2	19%	6%
3-4	13%	3%
5-7	11%	2%
8-16	20%	2%
Instrumental Activities of Daily Living Scale		
0	12%	61%
1-3	6%	14%
4-9	13%	12%
10-18	19%	7%
19-30	51%	6%
Depressive Severity Index		
0	40%	27%
1-3	38%	32%
4-7	16%	25%
8-15	6%	16%
Positive Symptoms Scale – Long		
0	33%	43%
1-3	25%	20%
4-8	28%	22%
9-24	15%	14%
Social Withdrawal Scale		
0	47%	41%
1-4	25%	24%
5-8	16%	19%
9-12	13%	16%

Patients with 30+ days of ALC were more likely to be older adults, males, and persons with a primary language other than English or French. There were no differences between the two groups regarding Aboriginal origin, and minor differences in marital status and living alone prior to admission.

With respect to clinical diagnoses, patients with 30+ days of ALC were far more likely to have a cognitive disorder, and slightly more likely to have a diagnosis of schizophrenia. Conversely, patients with less than 30 days of ALC were more likely to have mood disorders, substance use disorders, anxiety disorders, and personality disorders.

Several interRAI scales were used in the comparison of the 30+ ALC and <30 ALC groups. A brief description will be written for each scale; for more detailed descriptions, please refer to www.interrai.org.

The Depressive Severity Index (DSI): greater depressive symptoms with each increase in score. DSI scores were higher among the <30 ALC group than the 30+ ALC group.

The Positive Symptoms Scale – Long Version (PSSL): greater number of positive symptoms of psychosis with each increase in score. The PSSL was similar between the two groups overall, with slightly higher scores among the 30+ ALC population.

The Aggressive Behaviour Scale (ABS): higher scores signify more varied and more frequent acts of aggressive behaviour. The ABS was higher among the 30+ ALC group compared to the <30 ALC group.

Activities of Daily Living Hierarchy (ADLs): higher scores indicate a greater dependence on ADLs such as eating and personal hygiene. ADL scores were higher for the 30+ ALC group compared to the <30 ALC group.

Social Withdrawal Scale: higher scores indicate a greater number of symptoms related to social withdrawal. Scores on the social withdrawal scale were lower among the 30+ ALC group than the <30 ALC group.

Instrumental Activities of Daily Living Scale (IADLs): higher scores indicate a greater dependence on IADLs such as managing finances and medication. IADL scores were much higher among the 30+ ALC group than the <30 ALC group, with almost half the 30+ ALC group experiencing extreme dependence.

It should be noted that although certain characteristics occur more in one group than the other, it is also important to consider the full ranges of values for a given risk factor. For instance, while there are a greater percentage of older adults in the 30+ ALC group than the <30 ALC group, half of the 30+ ALC days group is not aged 65 and older. In other words, ALC patients are more likely to be elderly than non-ALC patients, but about half of ALC patients are under 65 years of age. Similarly, while the <30 ALC group has a higher rate of mood disorders, about one quarter of the 30+ ALC group experiences a mood disorder, which also requires treatment and attention.

Clinical Predictors of 30+ ALC Days

To identify the variables that predict ALC status at admission, a series of bivariate logistic regression analyses were performed, followed by a descending multivariate logistic regression model. Logistic regression analyses produce odds ratio estimates, which indicate how likely an outcome is given the presence of a variable. If the odds ratio value is higher than one, then there are greater odds that a patient will be designated ALC if the variable is present. If the odds ratio is lower than one, then there are lower odds that a patient will be designated ALC. Odds ratios, along with their accompanying confidence intervals and significance values, can be used to identify both risk and protective factors for ALC status. In addition, the multivariate model accounts for the effects of all the variables together, so that each odds ratio represents an independent effect on ALC status.

During the bivariate logistic regression stage, each variable was examined for its odds ratio in relation to ALC status. Variables with the most significant odds ratios were selected for the next stage, which was the multivariate logistic regression with all the variables tested together. During the multivariate stage, each variable was entered into the logistic regression model together, and any variables with highly insignificant odds ratios would be removed from the model. After removing the insignificant variables, the model would be run once again. This step was repeated several times, until only significant variables remained. Alternative models were also examined to ensure that the final model was not affected by order of entry/ deletion effects.

WTIS Multivariate Logistic Regression Model for 30+ ALC days

Variable	Group Level	Odds Ratio (95% Confidence Interval)	p value (significance)
Age group	18-44 (reference)	-	-
	45-64	2.01 (1.62-2.49)	<.0001
	65+	2.89 (2.24-3.73)	<.0001
Sex	Female (reference)	-	-
	Male	1.42 (1.23-1.65)	<.0001
Primary language	English/French (reference)	-	-
	Other	1.40 (1.11-1.78)	0.006
Marital status	Unmarried (reference)	-	-
	Married	0.71 (0.59-0.85)	0.0002
Insight into mental health	Full (reference)	-	-
	Limited	1.89 (1.34-2.67)	0.0003
	None	1.92 (1.34-2.76)	0.0004
Lifetime admissions to a psychiatric hospital	0 (reference)	-	-
	1-3	1.18 (0.98-1.41)	0.08
	4-5	1.35 (1.06-1.73)	0.02
	6+	1.60 (1.29-2.00)	<.0001
Visit from a social relation	<3 days (reference)	-	-
	<7 days	1.12 (0.92-1.36)	0.3
	<30 days	1.24 (0.98-1.56)	0.07
	30+ days	1.66 (1.36-2.01)	<.0001
Disorder of childhood/ adolescence	No (reference)	-	-
	Yes	2.38 (1.69-3.36)	<.0001
Delirium, dementia and amnestic and other cognitive disorders	No (reference)	-	-
	Yes	3.11 (2.53-3.83)	<.0001
Mood disorders	No (reference)	-	-
	Yes	0.66 (0.56-0.79)	<.0001
Intellectual disability	No (reference)	-	-
	Yes	1.65 (1.30-2.10)	<.0001

Variable	Group Level	Odds Ratio (95% Confidence Interval)	p value (significance)
Social withdrawal scale	0 (reference)	-	-
	1-4	1.05 (0.88-1.25)	0.6
	5-8	0.90 (0.73-1.11)	0.3
	9-12	0.74 (0.60-0.93)	0.01
Positive Symptoms Scale – Long (PSSL)	0 (reference)	-	-
	1-3	0.93 (0.77-1.13)	0.5
	4-8	0.93 (0.77-1.13)	0.5
	9-24	0.69 (0.54-0.87)	0.002
Cognitive Performance Scale (CPS)	0 (reference)	-	-
	1-2	1.61 (1.29-2.02)	<.0001
	3-6	1.90 (1.45-2.48)	<.0001
Instrumental Activities of Daily Living (IADL) Scale	0 (reference)	-	-
	1-3	1.41 (0.98-1.94)	0.07
	4-9	2.35 (1.76-3.14)	<.0001
	10-18	3.21 (2.40-4.30)	<.0001
	19-30	3.81 (2.79-5.21)	<.0001
Activities of Daily Living (ADL) Hierarchy	0 (reference)	-	-
	1-16	1.55 (1.28-1.87)	<.0001
Depressive Symptoms Index (DSI)	0 (reference)	-	-
	1-3	0.87 (0.74-1.02)	0.09
	4-7	0.72 (0.58-0.89)	0.002
	8-15	0.57 (0.41-0.78)	0.0008
Aggressive Behaviour Scale (ABS)	0 (reference)	-	-
	1-12	1.17 (1.00-1.38)	0.05
Substance use CAP	Not triggered (reference)	-	-
	Triggered for past use	1.62 (1.22-2.15)	0.0008
	Triggered for current use	0.68 (0.54-0.85)	0.0006
Social Supports for Discharge (SSDIS) CAP	Not triggered (reference)	-	-
	Triggered	1.53 (1.33-1.77)	<.0001

The final multivariate logistic regression model contained several predictors of ALC status. Looking first at demographic variables, a patient was more likely to be designated ALC if they were older, male, or if their primary language was not English or French. A patient was also more likely to be ALC if they had limited or no insight into their own mental health, or if they had four or more lifetime admissions to a psychiatric hospital. In terms of social supports, patients had greater odds of becoming ALC if they were not visited by a social relation in the last 30 days, and/or they triggered the Social Supports for Discharge (SSDIS) Clinical Assessment Protocol (CAP), and lower odds of becoming ALC if they were married.

Focusing on DSM-IV diagnoses, a diagnosis of an intellectual disability, cognitive disorder or a disorder of childhood/adolescence was associated with greater odds of ALC, while a diagnosis of a mood disorder was associated with lower odds.

Next, there were several interRAI scales that were associated with ALC status. Higher scores on the DSI, social withdrawal, and PSSL scales led to lower odds of becoming ALC. Conversely, the ADL, IADL, CPS, and ABS scales were all associated with higher odds of ALC status.

Finally, two of the interRAI Clinical Assessment Protocols (CAPs) were predictive of ALC designations. Triggering the SSDIS CAP led to higher odds of ALC status, denoting a lack of social supports. For the substance use CAP, a trigger for past substance abuse was associated with higher odds of ALC status, while a trigger for current substance abuse was associated with lower odds of ALC status.

Conclusion

There are several important points to take away from the results of this project. First, while the proportion of ALC episodes in mental health is relatively low, the number of ALC days that accrue over time in this population can be costly, especially at the high end of the distribution. Second, the prevalence of various characteristics and mental disorders differed between the ALC population and other mental health inpatients, providing some insight into the unique needs of the ALC population. However, even when a characteristic is higher in the non-ALC group, it is still necessary to pay attention to the frequency of that characteristic in the ALC group, especially if it is fairly high (as with younger adults and mood disorders). Lastly, the multivariate logistic regression model identified several risk and protective factors for ALC designations. Notable risk and protective factors for ALC status included IADL and ADL dependence, cognitive impairment, social isolation, aggression, substance use, symptoms of depression, positive psychosis and social withdrawal, presence of a disorder of childhood/adolescence or an intellectual disability, male sex, speaking a foreign first language, and older age.

The implications of this research are varied. Most notably, the results of the data analysis can be used to develop clinical treatment interventions targeted at reducing ALC designations, by identifying risk and protective factors as early as the first three days after admission. In addition, the results of this project will help policy makers and mental health service providers to understand the needs of the ALC population, as well as the resources that patients need to help reduce prolonged stays. Finally, this research demonstrates the advantages of using the RAI-MH in mental health inpatient settings – future work should focus on making full use of the information contained within it to help prevent delayed discharges.

There are several interesting prospects for future research on ALC in mental health settings. First, the predictors in this study were mostly individual level characteristics; research on ALC overall would benefit from studies that examine other categories of the Andersen-Newman model, such as facility and regional factors. Second, future work will focus on developing an algorithm that can be used to assess risk of ALC status at admission, which will be of great utility to mental health clinicians. Lastly, potential interventions and policy options that manage the risk of ALC status should be explored. For example, interRAI CAPs could be used to track changes to risk factors over the episode of care, informing clinicians about the ongoing possibility of ALC designations. Additionally, resources and services that match the needs of the ALC population should be developed in the community, and monitored for their effectiveness in reducing delays.