

# Study Protocol and Baseline Comparisons for a Pan-Canadian Initiative to Reduce Inappropriate Use of Antipsychotics in Long-Term Care Homes

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## Abstract

Antipsychotic use in the absence of symptoms or diagnoses related to psychosis is generally regarded as an inappropriate approach to care of older adults in nursing homes. The Canadian Foundation for Healthcare Improvement (CFHI) launched a pan-Canadian intervention study to reduce antipsychotic use in long-term care based on promising pilot study results from the Winnipeg Regional Health Authority (WRHA). Data from the Continuing Care Report System (CCRS) managed by the Canadian Institute for Health Information (CIHI) were used to compare the characteristics of residents in intervention homes with control homes not in the study. The sample was comprised of 5,434 residents in 49 intervention homes compared with 123,781 residents in 1,193 control homes. Resident-level comparisons included demographic, diagnostic, and clinical indicators. Facility-level comparisons included nine risk-adjusted quality indicators. The main differences of note were in geographic representation (Ontario homes were underrepresented), access to rehabilitation, and discharge patterns (both of which were related to Ontario practice patterns). There were few substantial differences in quality indicator performance between homes by study participation prior to the onset of the intervention. The study protocol used in this pan-Canadian intervention was based on a successful, small-scale pilot undertaken in one province. Sites that participated in the intervention did not differ in substantively meaningful ways from control homes. Therefore, subsequent study findings after the intervention are unlikely to be attributable to differences between homes that existed prior to the study onset.

## Keywords

inappropriate prescribing, quality, assessment, medication use, interRAI, nursing homes

## Background

Approximately 28% of residents who live in long-term care (LTC) homes in Canada are prescribed antipsychotic medication, although they do not have a diagnosis of psychosis (Canadian Institute for Health Information [CIHI], 2016). These drugs are routinely prescribed to control the behavioral symptoms associated with dementia, including being verbally abusive and physically aggressive, resisting care, and acting in socially inappropriate ways. These behaviors can make life difficult for people with dementia and their families, and can make caring for them a challenge. Inappropriately prescribing antipsychotics to older persons with dementia, however, is dangerous, decreases their quality of life, and is a costly practice.

Inappropriate use of antipsychotic medications in older persons is associated with cognitive decline and can increase

the risk of stroke, heart attack, and premature death (De Fazio et al., 2014; Vigen et al., 2011). Falls are another serious side effect of antipsychotic use. Falls are the leading cause of hospitalizations for injury among the elderly: 20% to 30% of seniors fall each year (Pretorius, Gataric, Swedlund,

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& Miller, 2013; Public Health Agency of Canada, 2014). Furthermore, the prescriptions are costly to LTC homes and health and social services (Canadian Deprescribing Network, 2016; Ontario Drug Policy Research Network, 2015). Health Canada (2016) and the U.S. Food and Drug Administration (2008) have both issued warnings against the use of atypical antipsychotics with older adults. There is a general consensus that the use of antipsychotic medication should not be the first resort in caring for residents who have not been diagnosed with psychosis (Choosing Wisely Canada, 2014; Macaulay, 2017). Instead, person-centered therapies and solutions, to safely attend to individualized resident care plans (which address resident's specific environmental, social, cultural, and behavioral needs) have proven to be more effective than pharmacological interventions (Barton, Findlay, & Blake, 2005; Li & Porock, 2014). The substantial use of antipsychotic medications in Canada's LTC setting has prompted attention from care providers, families, medical researchers, and health care leaders alike to make transformative changes to antipsychotic prescribing and dementia-care practices (Choosing Wisely Canada, 2016).

In 2014, the Canadian Foundation for Healthcare Improvement (CFHI)<sup>1</sup> launched a pan-Canadian Appropriate Use of Antipsychotic (AUA) collaborative to reduce the inappropriate use of antipsychotics in LTC homes. Fifteen LTC organizations received funding, education, and mentorship from CFHI to support quality improvement efforts targeting antipsychotic medication use based on previous successful efforts in the Winnipeg Regional Health Authority (WRHA).

CFHI and interRAI Canada researchers at the University of Waterloo collaborated to design and undertake an evaluation of the impact of the intervention. The purpose of the evaluation was to help determine the effect that participation in the collaborative had on improving core quality indicators (QIs) of LTC practices, quality, and resident outcomes. The evaluation is a national-level longitudinal analysis that compared performance on predetermined quantitative indicators among intervention and control homes. The analyses use risk adjustment to account for differences between LTC sites, such as the resident composition (rates of dementia, average age) and characteristics of the organizations (extent that they engage in quality improvement). The risk-adjusted QIs considered in the study were derived from the Resident Assessment Instrument–Minimum Data Set 2.0 (RAI-MDS 2.0), which is completed at admission and on a quarterly basis as part of routine clinical practice in nine provinces/territories as of the launch of the intervention.

This article provides an overview of the intervention and presents the first phase of the longitudinal comparative evaluation, which aims to understand whether intervention homes differ systematically from control homes. The main objective of this analysis is to identify whether the sample of residents in the intervention homes represents the broader population of residents served in Canadian LTC homes.

Given that the collaborative involved voluntary participation, rather than random assignment, there is the possibility that participating homes might be more highly motivated to change antipsychotic use, may provide better quality of care, or may have unique populations that are not generalizable to other Canadian LTC homes. The analysis examines and presents the attributes of intervention homes compared with all other LTC homes reporting to the Canadian Institute of Health Information's Continuing Care Reporting System (CCRS) as the control homes using a variety of indicators of resident attributes, care needs, and quality of care prior to the launch of the intervention. The CCRS is a national reporting system that includes both LTC homes and hospital-based continuing care. In provinces, territories, and health regions where the use of the system is mandated, all residents/patients of all ages admitted to these settings are included; however, those with stays less than 2 weeks may be excluded because the first assessment is typically completed by the 14th day of stay.

## Method

### *CFHI AUA Intervention Study Protocol*

**Settings and recruitment.** Between May 2014 and September 2015, 15 teams from LTC organizations, from seven Canadian provinces and one territory, volunteered to participate in a collaborative effort to reduce the inappropriate use of antipsychotic medications among their residents. CFHI provided education and seed funding for the teams to tailor, implement, and evaluate an innovative approach within their LTC homes that had already demonstrated success in reducing antipsychotic medication in the WRHA (CFHI, 2016). This approach was first tested in one nursing home in the WRHA. That home reduced inappropriate antipsychotic medication use by 27% ( $n = 19$ ) in less than a year without any increase in behavioral symptoms or rise in the use of physical restraints (CFHI, 2014). Quality of life for residents improved, and the WRHA estimated a potential cost saving of US\$400,000 in 6 months across the region. In light of these demonstrated results and a growing call for improving antipsychotic medication prescribing practices, CFHI aimed to spread the innovation across the country, working with the innovation champions from the original WRHA initiative and other Canadian and international practice leaders.

**Intervention.** The intervention was designed to support inter-professional teams in a multifaceted approach to reduce inappropriate prescribing of antipsychotic medications in their homes; improve the quality and experience of dementia care for their residents, families, and staff; and build individual and organizational capacity to lead resident-centered, data-driven care innovations. Volunteering LTC organizations submitted applications that outlined the commitment of organizational leaders, linkages of the intervention to their

organization's strategic priorities; readiness to participate; resources and budget allocated to the initiative; and interprofessional team membership. One of the conditions of participation was that the RAI-MDS 2.0 had to be fully implemented into the normal clinical practice of homes (Hirdes, Mitchell, Maxwell, & White, 2011).

The 15 volunteering organizations participated in a series of education and training activities including two in-person workshops, monthly webinars, access to an online learning resource hub, and 1:1 coaching with clinical and quality improvement experts on an as-requested basis. Training was targeted at full interdisciplinary teams including person support workers, recreation therapy, dietary, and pharmacists. In particular, personal support workers (PSWs) were the focus for person-centered approaches to care training, as they spend the most time with the residents. Registered staff were also targeted because they play key roles in supporting and enabling that involvement of PSWs. The curriculum focused on five foundational educational components, including how to

1. engage families, leadership, physicians, pharmacists, and all front-line staff to regularly communicate about possible causes and solutions for resident behaviors;
2. practice person-centered approaches to care to safely design, implement, and reassess individualized care plans (e.g., care strategies based on resident's personal history and past hobbies);
3. conduct regular medication reviews on at least a quarterly basis, but more often during reductions;
4. follow de-prescribing guidelines to safely reduce medications; and
5. collect, interpret, and use data (from interRAI's MDS 2.0 assessment) to monitor resident's behaviors and health status and, if needed, adapt individualized care plans on a regular basis.

At the onset of the AUA collaborative, teams learned to identify the target population that they would focus on to begin appropriate and safe medication reduction. The inclusion criteria encompassed residents in LTC receiving an antipsychotic medication without a diagnosis of psychosis. The exclusion criteria were based on the interRAI QI for antipsychotic use (Jones et al., 2010), which is publicly reported nationally by the CIHI. This indicator excludes residents with schizophrenia, Huntington's chorea, hallucinations, delusions, and end-stage disease (i.e., based on a physician's estimate that the person has 6 months or less to live).

**Evaluation methods.** To assess the effect of the intervention on improving the quality of care of LTC residents, CFHI and interRAI Canada collaborated to conduct a national-level longitudinal analysis that compared the performance of intervention and control homes. This analysis presents the

results of a systematic assessment that compared the characteristics of residents in these homes before the intervention began.

The first step of this evaluation was to use the CCRS to identify the characteristics of residents of intervention homes compared with residents from control homes. The aim of this comparison was to determine whether there could be a systematic bias in LTC homes who self-selected to participate in the collaborative compared with others who did not participate. The focus of this assessment of bias was based on three types of indicators:

1. individual items that describe demographic, diagnostic, service use, and clinical characteristics;
2. summary scales developed by interRAI to describe domains such as cognition, functional status, and depression; and
3. clinical assessment protocols (CAPs) that are used to trigger care plan development to various areas of need.

Although 56 LTC homes volunteered to participate in the intervention, seven were excluded because they did not submit RAI-MDS 2.0 data to the CCRS. The control group included the other 1,193<sup>2</sup> CCRS homes that were not participants in the collaborative. The comparisons between the control and intervention homes were based on the most recent RAI-MDS 2.0 assessment submitted by the homes in the first fiscal quarter of 2014.

The quality of care provided by intervention and control homes, prior to the start of the collaborative, was also compared using risk-adjusted interRAI QIs. Examples of relevant QIs that were selected because they might be associated with antipsychotic use include worsening of behavior, use of physical restraints, falls, and declines in mid-loss activities of daily living (ADLs; Feng et al., 2009). For instance, one concern might be that the removal of antipsychotics may result in worsening of behavior that was previously controlled by those medications. In addition, the substitution of physical restraints for antipsychotics as a means of controlling behavior would not be regarded as an improvement in the quality of care. On the contrary, the reduction of these medications may well result in a reduction of falls or slowing of rates of functional loss based on anecdotal reports from the initial sites at the WRHA.

All QI comparisons were based on the LTC home as the unit of observation. The distribution of QIs between the participating and nonparticipating homes was compared using the median and first and third quartile values. In addition, the 20th and 80th percentile values were also reported as these are conventionally used to identify good or poor performance based on risk-adjusted interRAI QIs.

The characteristics of residents were compared using person-level data for 5,180 residents in intervention homes and the 122,792 residents in the control homes in the first quarter

**Table 1.** Comparison of the Demographic Characteristics of Residents in Intervention and Control Homes Over Time Prior to Onset of the Intervention.

	2014 Q1			2014 Q2			2014 Q3		
	Intervention homes	Control homes	<i>p</i> value	Intervention homes	Control homes	<i>p</i> value	Intervention homes	Control homes	<i>p</i> value
<i>n</i>	4,927	122,570		5,009	123,854		5,122	123,556	
Province			<.0001			<.0001			<.0001
AB	3.9%	11.5%		3.8%	11.4%		3.9%	11.4%	
BC	44.9%	16.6%		47.0%	17.0%		46.0%	17.1%	
MB	0.0%	4.4%		0.0%	4.4%		0.0%	4.4%	
NB	4.2%	0.0%		4.3%	0.0%		4.1%	0.0%	
NL	9.9%	1.0%		9.7%	1.1%		9.6%	1.0%	
ON	33.3%	63.1%		32.3%	62.7%		32.0%	62.8%	
SK	2.2%	3.3%		1.5%	3.4%		2.8%	3.3%	
YT	1.6%	0.1%		1.4%	0.1%		1.6%	0.1%	
Female	67.7%	68.6%	.18	67.7%	68.6%	.17	67.7%	68.5%	.22
Age group			<.0001			<.0001			<.0001
<65	8.0%	7.0%		8.0%	7.0%		7.9%	7.0%	
65-74	13.4%	10.7%		12.9%	10.7%		12.8%	10.8%	
75-84	27.0%	25.1%		27.4%	24.8%		26.9%	24.7%	
85 and above	51.6%	57.2%		51.6%	57.4%		52.3%	57.5%	

of 2014. By the first quarter of 2015, there were 5,345 residents in intervention homes and 122,781 in control homes. These numbers reflect modest changes in the populations due to admissions and discharges over that time period. Although these data represent the entire resident population of both intervention and control homes, the chi square test statistic was used to test for statistical significance of differences in resident characteristics. Given the large sample size and the use of multiple comparisons, a conservative approach was used to identify differences between the homes that would be of potential substantive importance. *P* values of less than .01 and absolute differences of 5% or greater were used as a basis for identifying potentially important differences in baseline characteristics of intervention and control homes. For QIs, absolute differences of 5% or greater in the rates of median or 80th percentiles of QI distributions were used to differentiate control and intervention home performance at baseline.

## Baseline Results

Tables 1 and 2 summarize the demographic and diagnostic characteristics by type of home. Although many of the differences in this and subsequent tables, based on resident-level data, are statistically significant due to the large sample sizes, these differences are typically modest in absolute terms with no major substantive implications. By far the largest difference between the two types of homes was in the province in which the homes were located. Although the majority of CCRS homes are located in Ontario,<sup>3</sup> about half of the homes that participated in CFHI's AUA Collaborative were located

in British Columbia ( $n = 24$ ). Alberta homes are also underrepresented among CFHI's study homes<sup>4</sup> ( $n = 1$ ) and Newfoundland homes are slightly overrepresented ( $n = 7$ ). Manitoba (particularly the WRHA) was the only province that reports to CCRS, but did not participate in CFHI's AUA Collaborative. Prince Edward Island and Quebec were excluded from this analysis because they currently do not use the RAI-MDS 2.0 and are not part of CCRS.

There was a somewhat smaller percentage of residents aged 85 years and above in the CFHI's study homes. All other differences shown in Tables 1 and 2 were less than 5% in absolute value.

Table 3 shows the rates and patterns of discharge from the LTC homes. There were no substantial differences in discharges within 90 days of admissions between the two types of LTC homes; however, discharges in CFHI's AUA Collaborative homes were somewhat overrepresented by deaths and underrepresented by discharges to hospital.

Table 4 shows the distributions of selected care planning needs based on the interRAI CAPs for four clinical areas that may be affected by antipsychotic use. There were no differences in triggering rates for these reported CAPs greater than 5% in absolute terms.

Table 5 provides the percentage distributions of six major interRAI scales used to describe resident status in different domain areas. The largest absolute differences were evident for the Cognitive Performance Scales (CPS; about 5% more residents in the two highest CPS categories in intervention homes), Depression Rating Scale (about 9% fewer residents in the 3+ category representing potential depression in intervention homes), and Aggressive Behavior Scale (about 5%

**Table 2.** Comparison of the Distributions of Diagnoses and Mental Health Service Use of Residents in Intervention and Control Homes Over Time Prior to Onset of the Intervention.

	2014 Q1			2014 Q2			2014 Q3		
	Intervention homes	Control homes	p value	Intervention homes	Control homes	p value	Intervention homes	Control homes	p value
<i>n</i>	4,927	122,570		5,009	123,854		5,122	123,556	
Diagnosis									
Alzheimer/other dementia	80.2%	78.2%	.01	81.5%	79.0%	.00	80.3%	78.8%	.03
Heart failure	12.0%	12.5%	.51	12.2%	12.5%	.74	11.5%	12.6%	.11
Emphysema/COPD	13.3%	14.8%	.09	14.8%	14.7%	.87	13.3%	15.1%	.03
Diabetes	24.0%	25.1%	.06	24.0%	25.1%	.07	23.5%	25.0%	.02
Cancer	10.5%	9.1%	.05	9.4%	9.0%	.48	10.3%	8.8%	.02
Stroke	20.1%	20.9%	.20	20.6%	20.7%	.86	20.8%	20.6%	.69
Schizophrenia/bipolar	5.0%	5.2%	.64	5.2%	5.2%	.96	5.3%	5.2%	.74
Brain injury	2.1%	1.4%	.01	2.1%	1.3%	.00	2.2%	1.4%	.00

Note. COPD = chronic obstructive pulmonary disease.

**Table 3.** Comparison of the Discharge Patterns of Residents in Intervention and Control Homes Over Time Prior to Onset of the Intervention.

	2014 Q1			2014 Q2			2014 Q3		
	Intervention homes	Control homes	p value	Intervention homes	Control homes	p value	Intervention homes	Control homes	p value
<i>n</i>	4,927	122,570		5,009	123,854		5,122	123,556	
Discharge ≤90 days of admission (all residents)	2.2%	3.5%	<.0001	1.8%	3.4%	<.0001	2.1%	3.7%	<.0001
Discharge destination (discharges only)									
Home	3.1%	4.4%	.01	3.1%	4.6%	.01	3.0%	4.6%	.01
Hospital	25.3%	33.1%	<.0001	24.7%	32.8%	<.0001	24.5%	33.2%	<.0001
Deceased	64.9%	56.9%	<.0001	64.9%	57.0%	<.0001	65.0%	56.5%	<.0001
Psych hospital	0.5%	0.6%	.44	0.7%	0.6%	.48	0.8%	0.6%	.29

**Table 4.** Comparison of the Triggering Rates for Clinical Assessment Protocols a Residents in Intervention and Control Homes Over Time Prior to Onset of the Intervention.

	2014 Q1			2014 Q2			2014 Q3		
	Intervention homes	Control homes	p value	Intervention homes	Control homes	p value	Intervention homes	Control homes	p value
<i>n</i>	4,927	122,570		5,009	123,854		5,122	123,556	
ADL CAP			.10			.30			.73
Facilitate improvement	32.7%	31.4%		31.8%	31.0%		31.7%	30.9%	
Prevent decline	50.5%	53.0%		51.2%	53.0%		52.2%	53.0%	
Delirium CAP	10.3%	6.4%	<.0001	9.4%	6.2%	<.0001	8.7%	6.4%	<.0001
Falls CAP			<.0001			<.0001			<.0001
High risk	4.9%	7.5%		5.4%	7.8%		5.7%	7.8%	
Medium risk	6.8%	7.4%		8.0%	7.2%		7.6%	7.3%	
Medication CAP									
High priority	16.1%	15.3%	.54	13.6%	15.2%	.23	13.6%	15.2%	.20

Note. ADL = activities of daily living; CAP = clinical assessment protocols.

**Table 5.** Comparison of the Scale Distributions for Residents in Intervention and Control Homes Over Time Prior to Onset of the Intervention.

	2014 Q1			2014 Q2			2014 Q3		
	Intervention homes	Control homes	<i>p</i> value	Intervention homes	Control homes	<i>p</i> value	Intervention homes	Control homes	<i>p</i> value
<i>n</i>	4,927	122,570		5,009	123,854		5,122	123,556	
Cognitive Performance Scale			<.0001			<.0001			<.0001
0	9.5%	10.3%		9.2%	10.1%		9.1%	10.0%	
1-2	24.9%	26.7%		24.8%	26.6%		24.7%	26.6%	
3-4	38.3%	41.4%		38.8%	41.5%		39.9%	41.8%	
5-6	27.4%	21.5%		27.2%	21.8%		26.3%	21.6%	
ADL Hierarchy Scale			.00			.43			.06
0	5.6%	4.6%		5.2%	4.7%		5.0%	4.7%	
1-2	17.5%	17.5%		17.7%	17.4%		17.9%	17.1%	
3-4	45.0%	46.8%		46.1%	46.6%		45.2%	47.1%	
5-6	31.9%	31.1%		31.1%	31.3%		31.9%	31.2%	
Depression Rating Scale			<.0001			<.0001			<.0001
0	49.2%	37.9%		50.3%	38.4%		48.4%	38.8%	
1-2	27.3%	30.9%		25.4%	30.7%		28.0%	30.6%	
3+	23.6%	31.3%		24.4%	30.9%		23.6%	30.6%	
Aggressive Behavior Scale			<.0001			<.0001			<.0001
0	61.1%	56.2%		61.2%	56.2%		61.2%	56.6%	
1-4	30.8%	34.8%		31.1%	34.8%		30.7%	34.5%	
5+	8.1%	9.0%		7.7%	9.0%		8.0%	8.8%	

Note. ADL = activities of daily living.

more residents in the intervention homes with no indications of aggressive behavior).

Table 6 shows the distributions of various process measures dealing with therapies, physician services, medications, and emergency department visits for the two types of homes. Differences in number of medications and emergency department visits were either not statistically significant or minor in nature. The only differences in excess of 5% between these homes was the much higher rate of receiving physical therapy and lower rates of receiving recreational therapy in control homes compared with intervention homes. These differences are largely attributable to practice pattern differences in Ontario compared with other provinces that have been reported elsewhere (McArthur, Hirdes, Berg, & Giangregorio, 2015).

Table 7 shows the distributions of risk-adjusted QIs over three fiscal quarters for nine QIs comparing intervention and control homes. The dominant trend is of modest differences in the QI distributions between the two types of homes over time. The only exceptions to these trends were lower median rates for depressive symptoms (MOD4A) in intervention homes, but higher median rates for ADL impairment in those homes. If one compares the worst performing homes at the 80th percentile, the rates of potentially inappropriate antipsychotic use (DRG01) were higher in the worst intervention homes than in control homes, but the rates of delirium (DELOX) and worsened bladder continence (CNT03) were

lower in the worst performing intervention homes compared with the worst homes among the control homes.

## Discussion

Although the large sample size in this study yielded numerous statistically significant baseline differences between CFHI AUA homes and other homes reporting to CCRS, the overwhelming majority of these differences are minor in size with absolute differences in values below 5%, making them of little substantive importance. The most pronounced differences are in the province in which the homes are located, the receipt of physical therapy and recreational therapy, and discharges due to death and hospital placement. All of these latter differences are closely tied to the province in which the home is located. The greater tendency for Ontario homes to report discharging residents to hospital rather than due to death has been reported elsewhere (Hirdes et al., 2011). In addition, Ontario homes have been previously reported to have higher levels of physical therapy than other homes (McArthur et al., 2015). In other words, these differences between intervention homes and control homes are more likely a reflection of geographic practice pattern differences than differences attributable to the motivation to participate in the CFHI initiative.

There is also variation in provincial initiatives, resources, and policies to support AUA medications in

**Table 6.** Comparison of the Distributions of Services Received and Resource Intensity Levels Among Residents in Intervention and Control Homes Over Time Prior to Onset of the Intervention.

	2014 Q1			2014 Q2			2014 Q3		
	Intervention homes	Control homes	p value	Intervention homes	Control homes	p value	Intervention homes	Control homes	p value
n	4,927	122,570		5,009	123,854		5,122	123,556	
Any therapy									
Physical	27.8%	42.5%	<.0001	26.6%	41.2%	<.0001	26.7%	40.7%	<.0001
Occupational	7.5%	5.8%	<.0001	5.4%	5.5%	.70	5.3%	5.5%	.49
Recreation	30.7%	15.6%	<.0001	31.2%	14.9%	<.0001	32.4%	14.2%	<.0001
Physician visits			<.0001			<.0001			<.0001
0	49.6%	35.9%		50.0%	37.0%		46.4%	36.0%	
1	31.1%	38.3%		31.3%	38.2%		33.0%	38.3%	
2+	19.3%	25.8%		18.7%	24.8%		20.5%	25.7%	
Physician orders			<.0001			.00			<.0001
0	57.3%	54.1%		58.3%	56.2%		57.0%	53.9%	
1	26.3%	27.7%		26.7%	26.7%		26.8%	27.7%	
2+	16.4%	18.2%		15.0%	17.2%		16.1%	18.4%	
No. of medications			.09			.04			<.0001
0	0.6%	0.5%		0.5%	0.5%		0.4%	0.5%	
1-4	9.2%	8.9%		9.8%	9.1%		9.9%	9.1%	
5-8	30.6%	29.2%		30.9%	29.7%		32.1%	29.5%	
9+	59.6%	61.4%		58.8%	60.7%		57.6%	60.9%	
Emergency department visits			.37			.73			.26
0	91.3%	91.0%		91.0%	90.8%		91.7%	91.1%	
1	7.2%	7.8%		7.5%	7.9%		6.8%	7.7%	
2+	1.5%	1.2%		1.4%	1.3%		1.5%	1.3%	

**Table 7.** Comparison of the Distributions of Selected Risk-Adjusted Quality Indicators Among Intervention and Control Homes Prior to the Onset of the Intervention.

Quality indicator	2014 Q1 (median, 20th & 80th percentile)		2014 Q2 (median, 20th & 80th percentile)		2014 Q3 (median, 20th & 80th percentile)	
	Intervention homes	Control homes	Intervention homes	Control homes	Intervention homes	Control homes
DRG01	28.9 (23.2-41.1)	26.9 (18.7-35.2)	26.5 (19.3-36.6)	25.9 (17.7-35.6)	26 (19.4-32.8)	25.5 (17.5-33.9)
BEHD4	9.8 (5.4-14.9)	12.5 (6.7-18.6)	9.7 (4.8-16.2)	12.5 (6.8-18.6)	10.2 (7.6-14.6)	11.4 (6.4-17.5)
DEL0X	16.7 (9.5-22.9)	17.3 (8.5-28.2)	18.0 (11.6-25.6)	17.1 (8.5-27.5)	17.2 (11.8-24.5)	16.8 (8.7-26.8)
RES01	6.4 (1.2-15.4)	6.0 (1.2-15.6)	7.6 (0.8-13.8)	6.2 (1.3-15.7)	5.9 (0.9-15.0)	6.0 (1.0-15.5)
MOD4A	17.6 (9.9-26.8)	23.9 (11.9-35.6)	16.0 (8.9-23.3)	22.5 (11.3-34.0)	17.2 (11.2-23.4)	22.6 (11.4-33.6)
CNT03	17.1 (11.7-21.9)	17.1 (9.1-26.8)	15.0 (9.8-21.2)	17.1 (9.4-27.2)	15.6 (10.5-20.9)	16.7 (9.4-26.5)
ADL5A	30.8 (22.5-40.2)	33.7 (25.8-41.0)	30.4 (23.7-37.0)	33.9 (25.4-40.9)	29.1 (25.5-36.5)	33.3 (25.6-41.1)
COG01	11.5 (5.7-20.1)	9.4 (4.8-15.9)	9.8 (4.9-15.3)	8.8 (4.6-15.3)	9.5 (4.8-14.9)	8.7 (4.5-14.7)
FAL02	11.7 (6.9-15.2)	13.5 (9.0-19.5)	13.6 (8.8-20.7)	13.8 (8.9-19.7)	14.2 (9.7-17.5)	14.1 (9.0-19.4)

Note. DRG01 = percentage of residents on antipsychotics without a diagnosis of psychosis; BEHD4 = percentage of residents who have worsening behavioral symptoms; DEL0X = percentage of residents with symptoms of delirium; RES01 = percentage of residents in physical restraints; MOD4A = percentage of residents who worsen in mood from symptoms of depression (based on MDS Depression Rating Scale); CNT03 = percentage of residents with worsening bladder continence; ADL5A = percentage of residents with worsened status on mid-loss ADL functioning (transfer, locomotion); COG01 = percentage of residents whose cognitive ability has worsened; FAL02 = percentage of residents who have fallen in the last 30 days; MDS = minimum data set; ADL = activities of daily living.

LTC homes facilities (see Table 8). Provinces such as British Columbia, Alberta, and Ontario have formal initiatives underway. For example, Alberta started building the case for a provincial AUA initiative in 2012 that spread

**Table 8.** Provincial Antipsychotic Reduction Initiatives and Number LTC Homes Participating in the AUA Collaborative.

Province	Organization	Initiative, objective, and reach (as of February 2017)	No. of homes
British Columbia	BC Patient Safety and Quality Council	CLeAR: Voluntary initiative supporting teams from residential care homes to address the BPSD with a focus on reducing inappropriate use of antipsychotics. Wave I (2013-2014): 48 care homes participated as Action & Improvement Teams along with 91 Organizational Partners Wave II (2015): 44 care homes signed up as Action & Improvement Teams.	24
Alberta	Alberta Health Services	AUA 2013-2014: developed AUA Guideline and online Toolkit, worked with 11 Early Adopter Sites 2014-2015: spread to all 170 LTC sites	1
Saskatchewan	Ministry of Health	2013-2014: developed decision support tool to provide accurate and timely LTC data. Antipsychotic medication use without a diagnosis of psychosis selected as one of the six indicators for provincial QIPs. Annual benchmarks for reduction set through to 2017-2018.	1
Manitoba	IERHA	No formal provincial program. Initial antipsychotic reduction innovation undertaken in WRHA, spread informally to four Homes in IERHA.	0
Ontario	MOHLTC  HQO	BSO: system redesign encouraging collaboration, knowledge sharing and partnerships across health care sectors 2007: Ontario's Aging at Home strategy and BSO program introduced Phase 1 (2010): target population and framework defined Phase 2 (2011): four early adopter LHINs identified through a competitive process demonstrate and test the BSO framework Phase 3: (February 2012): remaining 10 LHINs implemented the framework Excellent Care for All Act (2010): requires all public hospitals, interdisciplinary primary health care organizations, Community Care Access Centers, and LTC homes to create annual QIPs. Residents First (2012): a strategy designed to strengthen the LTC Home sector's capacity for ongoing quality improvement. QIPs: submitted to HQO by April 1 HQO provides resources, support and reporting on quality indicators across the health system Measuring Up: a yearly report on the health of people living in Ontario and the performance of Ontario's health system Looking for Balance Report (2015): a snapshot of the current state of antipsychotic medication use in Ontario LTC homes.	12
Quebec		No formal provincial program during pan-Canadian AUA Collaborative. Note, in June 2016, parliamentary commission ( <i>La Commission de la santé et des services sociaux</i> ) tabled a report that looked at the conditions of seniors in LTC and tabled a report on the need for non-pharmacological approaches for senior care.	0
Nova Scotia		No formal provincial program	2
Prince Edward Island		No formal provincial program	0
New Brunswick		No formal provincial program during pan-Canadian collaborative. Note provincial program launched in partnership with CFHI and Government of New Brunswick in 2016.	1
Newfoundland and Labrador		No formal provincial program.	7

Note. LTC = long-term care; AUA = appropriate use of antipsychotic; CLeAR = Call for Less Antipsychotics in Residential Care; BPSD = behavioral and psychological symptoms of dementia; QIPs = quality improvement plans; IERHA = Interlake Eastern Regional Health Authority; WRHA = Winnipeg Regional Health Authority; MOHLTC = Ministry of Health and Long-Term Care Homes; BSO = Behavior Supports Ontario; LHINs = Local Health Integration Networks; HQO = Health Quality Ontario; CFHI = Canadian Foundation for Health care Improvement.

to all 170 LTC sites in Alberta by 2015. Three Alberta LTC homes participated in the CFHI AUA Collaborative, with

one home reporting to the CCRS. In 2013, the British Columbia Patient and Safety Quality Council (BCPSQC)

launched the voluntary initiative, CLeAR (Call for Less Antipsychotics in Residential Care), with 48 improvement teams in Wave 1 (2014-2015) and 44 improvement teams now in Wave 2 (2016-2017). Of the 24 participating LTC homes from BC participating in the intervention, six also participated in CLEAR Wave 1. In 2013, the Saskatchewan government selected appropriate prescribing as a priority indicator, set provincial targets for a 5-year period, and incorporated the indicator into their quality improvement plans (QIPs). One LTC homes from Saskatchewan participated in the CFHI AUA Collaborative and spread across units. During the period of the intervention, the Ontario Ministry of Health and Long-Term Care provided all of the Local Health Integration Networks (LHINs) with funding for the Behavior Supports Ontario (BSO) program, a system redesign that breaks down barriers, encourages collaborative work, shares knowledge, and fosters partnerships among local, regional, and provincial agencies. In addition, Health Quality Ontario (HQO) undertook capacity building for quality improvement through the Residents First program for LTC Homes and provided support for the implementation of QIPs. All 12 Ontario LTC homes participating in the intervention would have received some form of BSO support. Overall, the intervention homes were not remarkably better or worse performers on QIs prior to the launch of the initiative, whether they participated or benefited from some of the existing provincial initiatives or not. Therefore, if the intervention is associated with lower rates of antipsychotic use in the intervention homes, it would not be simply explained by preexisting differences in the quality of care provided by participating and comparison organizations or to provincial initiatives that may or may not have been underway.

This evaluation focused on LTC homes reporting to CCRS, which is the most comprehensive information existing on LTC homes across the country. The ability to link pan-Canadian, population-level, standardized data to a national intervention to improve quality in this sector has been unprecedented to date. The CCRS data are highly representative of most provinces/territories in which the RAI-MDS 2.0 is used, and previous analyses of CCRS data quality have shown it to be highly valid and reliable (Hirdes et al., 2013; Poss et al., 2008). The main limitation of the CCRS is the complete absence of data from two provinces (Prince Edward Island, Quebec) and two territories (Northwest Territories, Nunavut) and the availability of only partial data for Nova Scotia (where it remains voluntary) and Manitoba (where it is used only in the WRHA).

## Conclusion

The overall conclusion supported by these analyses is that the voluntary recruitment strategy used by CFHI to enroll homes in the CFHI AUA Collaborative did not result in an obvious systematic bias in the types of homes participating

or in the types of residents represented in these sites. Although this does not mean that all unmeasured attributes are equally distributed between study and control homes, this does provide strong evidence that the homes are comparable in numerous important respects.

The fact that Ontario homes are underrepresented in the data does not appear to have affected the representativeness of the types of residents enrolled in the study. In that sense, the findings arising from the CFHI intervention study may be reasonably expected to be attributable to the population of residents served in Canadian LTC homes.

A next step for analysis is to examine implications of this type of AUA Collaborative on the quality of LTC homes in Canada and the outcomes at the home and individual levels. A pan-Canadian quality improvement initiative of this magnitude may demonstrate the feasibility and merits of using a collaborative approach to spread an innovation like antipsychotic reduction to other LTC sites so that prescribing practices can be improved, and enhanced quality of care for LTC residents and family can be measured and achieved across the country.

## Authors' Note

The authors do not have permission to transmit the data from this study to a third party. However, access to Canadian Resident Assessment Instrument–Minimum Data Set 2.0 (RAI-MDS 2.0) data can be obtained through CIHI.

## Ethics Approval

Ethics clearance for this study was obtained through the Office of Research at the University of Waterloo (ORE#20558). The Ethics clearance was for secondary analyses of de-identified data provided by Canadian Institute for Health Information (CIHI) for homes that implemented the Canadian Foundation for Health care Improvement (CFHI) quality improvement protocol and for other homes in CCRS that were not part of the CFHI initiative. Consents were not required for this protocol.

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## Notes

1. The Canadian Foundation for Health care Improvement (CFHI) is a not-for-profit organization funded by Health Canada. CFHI identifies proven innovations and accelerates their spread across Canada by supporting health care organizations to adapt, implement, and measure improvements in patient care, population health, and value-for-money.

2. Note that in some quality indicator (QI) analyses, the *n* for CCRS homes varied because some homes may not have had enough observations available for the denominator in the calculation of certain QIs.
3. Note: 12 Ontario long-term care (LTC) homes participated in the appropriate use of antipsychotic (AUA) Collaborative.
4. Note: Three Alberta homes participated in the AUA Collaborative. Two homes did not submit data to Continuing Care Report System (CCRS) at the time of the study.

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