Looking for Balance: Antipsychotic medication use in Ontario long-term care homes

Technical Appendix

Ontario
Health Quality Ontario

Table of Contents

Introduction

Health Quality Ontario (HQO), in partnership with the Ontario Association for Non-Profit Homes and Services for Seniors (OANHSS), the Ontario Drug Policy Research Network (ODPRN), the Ontario Long Term Care Association (OLTCA) and the Ontario Long Term Care Physicians (OLTCP), has produced a report on antipsychotic use among long-term care home residents in Ontario. This document is the technical appendix to *Looking for Balance: Antipsychotic medication use in Ontario long-term care homes,* released May 2015.

The technical appendix provides a description of the methodology used to calculate the prevalence reported in *Looking for Balance* of filled antipsychotic prescriptions among long-term care residents older than 65 years who have lived in an Ontario long-term care home for at least 100 days. It also provides general information on data sources and the external review process.

For more information, please contact us at info@hqontario.ca.

Data sources

The data for the analysis were derived from the following administrative databases linked by the Institute for Clinical Evaluative Sciences (ICES):

- Continuing Care Reporting System
- Discharge Abstract Database
- Ontario Drug Benefit claims database
- Ontario Health Insurance Plan claims database
- Ontario Mental Health Reporting System
- Registered Persons Database

Continuing Care Reporting System (CCRS)

The CCRS contains demographic, administrative, clinical and resource utilization information on individuals receiving continuing care services in hospitals or in long-term care homes. The data in the CCRS are collected using an internationally accepted standard, the Resident Assessment Instrument-Minimum Data Set Version 2.0 (RAI-MDS). The RAI-MDS assessment captures information about function, mental and physical health, social support and service use. Each resident in long-term care is assessed at admission and every three months or whenever they experience a change in health status. Data are submitted to and validated by the Canadian Institute for Health Information (CIHI).

Discharge Abstract Database (DAD)

The DAD contains information abstracted from hospital records, including administrative, clinical and demographic information for each instance of a hospital separation (discharge, death, sign-out or transfer to another facility). It includes patient-level data for acute- and chronic-care hospitals, rehabilitation hospitals and day surgery clinics in Ontario. Data are collected, maintained and validated by CIHI.

Ontario Drug Benefit (ODB) claims database

The ODB claims database contains records of all prescriptions dispensed to individuals who are covered by the ODB program, which includes people living in long-term care facilities in Ontario. The records include the Drug Identification Number, date the drug was dispensed, and the number of days supplied for each dispensed prescription. The record also identifies which of the claims were made in the long-term care setting. The data are collected through the Health Network System by the Ministry of Health and Long-Term Care (MOHLTC).

Ontario Health Insurance Plan (OHIP) claims database

The OHIP claims database contains all reimbursement claims to the MOHLTC from fee-for-service billings made by physicians. The OHIP claims database captures demographic, administrative and clinical information on individuals receiving care from a physician.

Ontario Mental Health Reporting System (OMHRS)

The OMHRS contains demographic, administrative and clinical information about individuals admitted to designated adult mental health beds in Ontario. The information in OMHRS includes data elements related to admissions and discharges as well as data collected using an internationally accepted standard, the Resident Assessment Instrument-Mental Health Version 2.0 (RAI-MH). The RAI-MH captures information about mental and physical health, social support and service use. Assessments are conducted at admission, every three months for patients with extended stays, and at discharge. Data are submitted to and validated by CIHI.

Registered Persons Database (RPDB)

The RPDB is a historical listing of the unique health numbers issued to each person eligible for Ontario health services. This listing includes corresponding demographic information, such as date of birth, sex, address, and date of death (where applicable). The RPDB is maintained by the MOHLTC and enriched with information from ICES.

Study population

The study population was drawn by linking data in the CCRS, the ODB claims database and the RPDB. These databases have been similarly linked by others to study drug prescribing in long-term care homes in Ontario.[1;2]

Long-term care residents were identified for inclusion in the study population if they had a RAI-MDS assessment sometime between December 20 and March 31 (100 or 101 days, depending on the year). Residents were excluded if the resident had an invalid age or birthdate in the RPDB, if the resident was younger than 65 years of age on December 20, if the resident died or was discharged before March 31, if the resident did not have any prescription claims from the long-term care setting in the ODB claims database between December 20 and March 31, if the resident was residing in a facility not designated as a nursing home or home for the aged, or if the resident had an admission RAI-MDS assessment between December 20 and March 31. These criteria ensured

that the study population consisted only of residents 65 years of age or older who have been living in an Ontario long-term care home for at least 100 days.

The linked data were used to create study populations to assess the point prevalence of filled antipsychotic prescriptions on March 31 for each year (2010, 2011, 2012 and 2013). All long-term care homes in Ontario submitted RAI-MDS data starting on April 1, 2009, therefore, March 31, 2010 was selected as the earliest time point to begin the analysis. Results up to 2013 were reported because the data for March 31, 2013 were the most recent data available at the time of the analysis.

Antipsychotic prescriptions

Residents in the study population who had an antipsychotic prescription filled in the long-term care setting were identified using information in the ODB claims database.

The analysis identified residents with a claim for an antipsychotic prescription between December 20 and March 31 (100 days[1]), where the days supplied[2] overlapped with the index date (March 31). The ODB claim had to include a flag indicating that the prescription was given in the long-term care setting. If a resident received multiple antipsychotic prescriptions in the 100-day look-back window, only the most recent prescription was considered in the analysis.

Table 1 presents a list of antipsychotic drugs considered in the analysis. Prochlorperazine was excluded from the list of antipsychotic drugs due to its indication as an antiemetic. The list of antipsychotic medications was compiled based on previous work by Rochon *et al*. (2007) and information from the ODPRN.

Table 1. List of Antipsychotic Drugs considered in the analysis

• Chlorpromazine	• Lurasidone	• Pipotiazine
• Aripiprazole	• Methotrimeprazine	• Quetiapine
• Asenapine	• Olanzapine	• Risperidone
• Clozapine	• Paliperidone	• Thioridazine
• Flupentixol	• Periciazine	• Thiothixene
• Fluphenazine	• Perphenazine	• Trifluoperazine
• Haloperidol	• Pimozide	• Ziprasidone
• Loxapine		

[1] For most Ontario Drug Benefit recipients, the maximum quantity permitted is a supply sufficient for a 100-day course of treatment (http://www.health.gov.on.ca/en/pro/programs/drugs/odbf_conditions_for_payment.aspx).
[2] Days supplied refers to the number of days the supply of dispensed medication will last. For example, if a medication was prescribed by a physician to be taken as one pill three times a day and the patient was given 30 pills, then the days supplied would be 10 days (30 pills/ 3 pills per day = 10 days).

Diagnosis groups

Chapter 3 of the report stratifies the long-term care residents according to the following mutually exclusive groups:

1. Residents with psychosis
2. Residents with dementia (without psychosis)
3. Residents without documented diagnosis of psychosis or dementia

These groups have been used previously in studies describing antipsychotic drug use among long-term care residents.[1;3] Antipsychotic medications are indicated for the management of psychotic conditions. They are also used in the management of behavioural and psychological symptoms of dementia. Therefore, the proportions of long-term care residents with these two sets of diagnoses are the primary driver of the prevalence of filled antipsychotic prescriptions. Stratifying the results by residents within these groups controls for any changes in proportion of residents with these diagnoses over time.

Residents were identified as having been diagnosed with either psychosis or with dementia based on diagnosis codes identified in the DAD, OHIP claims database, and OMHRS in the five years prior to the index date (March 31). Additionally, drug dispensation information in the 100 days prior to the index date (March 31) for drug therapy related to dementia (cognitive enhancers/cholinesterase inhibitors) in the ODB claims database was used as a surrogate for the diagnosis of dementia. The codes used to identify psychosis and dementia are based on previous work[1;4], input from the ODPRN, and clinician review.

If a resident was diagnosed with psychosis according to the DAD, OHIP claims database or OMHRS data, they were included in the first group of *residents with psychosis*. Alternatively, if a resident was not diagnosed with psychosis in these databases but was diagnosed with dementia according to the DAD, OHIP claims database, OMHRS or ODB claims database data, then they were included in the second group of *residents with dementia (without psychosis)*. Finally, if a resident did not have a diagnosis of psychosis or dementia according to the DAD, OHIP claims database, OMHRS or ODB claims database data, then they were included in the third group of *residents without documented diagnosis of psychosis or dementia*.

In the report, the percentage of long-term care residents in the 2013 study population who fall into the three diagnosis groups are presented in Figure 3.1. The percentages of residents with an antipsychotic medication prescription were calculated by diagnosis group, and Figure 3.2 of the report presents the 2013 results.

Long-term care home resident characteristics

Several long-term care home resident characteristics were used to describe the study population and a few were selected for risk adjustment of the prevalence of antipsychotic prescriptions. These characteristics were identified from the RPDB, DAD and CCRS.

Age

A resident's age was determined from the RPDB and based on the age of the resident on the index date (March 31). Residents were categorized according to the following three age groups: 65-74 years of age, 75-84 years of age, and 85 years of age and older.

Sex

A resident's sex (male or female) was determined from the RPDB.

Comorbidity

Residents were classified by the severity of their comorbidities according to the Charlson Comorbidity Index score assigned to each resident in the study population. The Charlson Comorbidity Index is a method of categorizing residents' comorbidities using diagnosis information from hospital discharge abstracts.[5;6] Comorbidities are assigned a weight based on the mortality risk and resource use associated with it. Each resident receives a score based on the sum of all the comorbidity weights and is assigned a Charlson group depending on this score.[7] A score of 0 indicates that the resident did not have any comorbidities.

For this report, the calculation of the Charlson comorbidity score was based on hospitalization information in the five years prior to the index date (March 31) obtained from the DAD. Using the Charlson Comorbidity Index scores, residents were categorized into the following four groups: 0, 1, 2 or more, and missing. Missing refers to residents for whom there were no records from Ontario hospitals identified in the past five years.

Aggressive behaviour

Aggressive behaviours exhibited by long-term care residents in the study population were classified using a standardized scale based on information from the RAI-MDS in the CCRS. The Aggressive Behaviour Scale (ABS)[8;9] considers frequency and intensity of aggressive behaviours to determine a score ranging from 0 to 12 that provides a summary measure of aggressive behaviour for a resident. Aggressive behaviours include verbal abuse, physical abuse, socially inappropriate or disruptive behaviour, and resistance to care.

For this report, the residents' ABS scores were based on their most recent RAI-MDS assessment prior to the index date (March 31). Residents were categorized into the following three groups: 0 (no aggressive behaviour), 1-4 (mild to moderate aggressive behaviours), and 5 or more (severe aggressive behaviours).[9]

Cognitive performance

The degree of cognitive impairment of long-term care residents in the study population were described using RAI-MDS information in the CCRS. The Cognitive Performance Scale (CPS)[8;9] is a hierarchical scale that assigns residents a score according to the following: whether the resident is comatose, their cognitive skills for daily decision-making, their short term memory, their ability to make themselves understood, and their dependence in eating. Scores range from 0 to 6.

For this report, the residents' CPS scores were based on their most recent RAI-MDS assessment prior to the index date (March 31). Residents were categorized based on the following three groups: 0-1 (cognitively intact), 2-3 (mild or moderate impairment) and 4-6 (severe impairment).[9]

Calculation of percentage of long-term care residents with a filled antipsychotic prescription

The percentage of Ontario long-term care residents with a filled antipsychotic prescription was calculated as a point prevalence by dividing the number of long-term care residents with an antipsychotic prescription covering March 31 by the total number of long-term care residents on March 31 in the study population (Table 2). The results were risk-adjusted for resident age, sex and comorbidity. This methodology is based on previous work looking at variation in antipsychotic use in Ontario long-term care homes.[1]

In the report, the risk-adjusted point prevalence measure is referred to as the percentage of long-term care home residents using an antipsychotic medication.

Table 2: Description of the point prevalence of filled prescriptions for an antipsychotic medication among Ontario long-term care residents

Measure	Point prevalence of filled prescriptions for an antipsychotic medication among Ontario long-term care residents
Description	Percentage of residents 65 years of age or older who have been living in an Ontario long-term care home for at least 100 days with a filled prescription for an antipsychotic medication covering March 31
Numerator	(This is a subset of the denominator) Residents who had a filled prescription for an antipsychotic medication that was prescribed in the long-term care setting, where the days supplied covers March 31 of the year of interest.
Denominator	Residents with valid RAI-MDS assessments who were 65 years of age or older and were admitted to an Ontario long-term care home for at least 100 days prior to March 31 of the year of interest.
Risk-Adjustment	The results are risk-adjusted by the following covariates: - Age group (65–74, 75–84, 85 and older) - Sex (male, female) - Comorbidity (Charlson score of 0, 1, 2 or more, missing)
Data Sources	- CCRS - DAD - ODB claims database - OHIP claims database - OMHRS - RPDB

Risk-adjustment and confidence intervals

The report presents risk-adjusted results measuring the prevalence of Ontario long-term care residents with a filled prescription for an antipsychotic medication. Results were risk-adjusted according to the following formula:

Risk-adjusted result = (Unadjusted result/Predicted result) x Overall unadjusted result

The predicted result was determined by running a logistic regression model that included as covariates: age group (65–74 years of age, 75–84 years of age, 85 years of age and older), sex (male, female) and comorbidity group (0, 1, 2 or more, missing).

Confidence intervals around each risk-adjusted result were calculated at the 95% confidence level according to the method outlined by Hosmer and Lemeshow.[10] The confidence intervals were used to compare results between jurisdictions and time points. A statement of an increase/decrease or higher/lower result in the report is made only when the results' 95% confidence intervals do not overlap (i.e., when the differences in the results are statistically significant).

Descriptive analyses and report figures

Descriptive statistics were used to describe the percentage of long-term care residents with a filled prescription for an antipsychotic medication over time and across regions, long-term care homes and diagnosis groups.

Provincial results

The provincial measure of the percentage of residents with a filled prescription for an antipsychotic medication in Ontario was calculated by dividing the overall number of residents with an antipsychotic prescription by the number of residents in the study population in Ontario. The provincial result was also calculated after stratifying the study population into the diagnosis groups.

In Figure 2.1, the report presents the risk-adjusted percentage of residents with a filled prescription for an antipsychotic medication in Ontario over four discrete time points: March 31 of 2010, 2011, 2012 and 2013. The report also describes the trend once stratified by diagnosis groups in chapter 3.

The 95% confidence intervals were used to determine if the point estimates for 2011, 2012 and 2013 were statistically significantly different from the result in 2010. If the 95% confidence interval corresponding to the value of interest did not overlap with the 95% confidence interval of the 2010 result, the result was significantly higher or lower than the result in 2010 and described as having increased or decreased.

In Figure 3.2, the report presents the risk-adjusted percentage of residents with a filled prescription for an antipsychotic medication stratified by the diagnosis groups for Ontario on March 31, 2013.

Regional results

The percentage of residents with a filled prescription for an antipsychotic medication was calculated for each of the 14 Local Health Integration Network (LHIN) regions by dividing the number of residents with a filled prescription for an antipsychotic medication by the number of residents in a LHIN region. Residents living in each of the regions were identified from the location of the long-term care home in which they were living on the index date (March 31).

The report gives the results of the LHIN regions with the lowest and highest risk-adjusted percentage of residents with a filled prescription for an antipsychotic medication for March 31, 2013.

Facility results

The percentage of residents with a filled prescription for an antipsychotic medication was calculated for each long-term care home with at least 25 licensed long-term care beds (n=604) by dividing the number of residents with an antipsychotic prescription by the number of residents in the home. Homes with fewer than 25 long-term care beds were excluded because these homes would have very small denominators, resulting in unstable measures of the percentage of residents with a filled prescription for an antipsychotic medication. Similar exclusions have been applied by others.[1;11]

In the report, the risk-adjusted home-level results for March 31, 2013 are presented in Figure 2.2, where each home is represented by one bar. Homes were ordered along the x-axis from lowest percentage to highest percentage, so that the outline of the bars provide a graphical description of the distribution of results across long-term care homes in Ontario. The report also gives the results of the long-term care homes with the lowest and highest risk-adjusted percentage of residents with a filled prescription for an antipsychotic medication for March 31, 2013.

Limitations

The limitations of the analysis that should be considered when interpreting the results are described below and consist of limitations due to the methodology used to calculate the percentage of filled antipsychotics prescriptions among long-term care residents as well as the data sources selected and the information available for the analysis.

Limitations due to methodology

Point prevalence estimates were calculated to describe the percentage of Ontario long-term care residents with a filled prescription for an antipsychotic medication over four years. March 31 of each year was chosen as the index date for measuring the point prevalence. It is assumed that the index date is representative of the prevalence of filled antipsychotic prescriptions in long-term care in Ontario on any given day of the year and that the use of the same date over time will minimize seasonal effects. This is not a measure of the rate of filled antipsychotics per long-term care resident over the year, nor is it the percentage of long-term care residents during the year who had at least one filled prescription for an antipsychotic. The point prevalence measure simply provides a snapshot of the percentage of residents in long-term care in Ontario who have a filled prescription for an antipsychotic medication on that particular day.

The point prevalence measure was risk-adjusted for age, sex and comorbidity. However, results were not adjusted for other factors that are predictors of antipsychotic prescribing, such as psychosis or dementia diagnoses and resident behaviours. Since there is little change or even a slight increase in the proportion of residents with psychosis or dementia diagnoses in each of the four time points described in the report, the observation of a decrease in the percentage of

residents with a filled antipsychotic prescription can be made with confidence. Additionally, when the results were stratified by clinical indication groups, the statistically significant decrease was maintained in both the psychosis and dementia (no psychosis) groups.

Greater caution must be used in interpreting the variation in the prevalence measure between regions and long-term care homes since the proportions of residents with psychosis and dementia diagnoses do differ between regions and homes and this, as well as other resident characteristics, are not accounted for in the prevalence measure. In other words, some of the variation between regions and homes is likely explained by differences in characteristics of the resident populations. For instance, some long-term care homes specialize in care for residents with psychiatric disorders, so a higher prevalence of residents with filled antipsychotic prescriptions would be expected in these homes.

The analysis for this report sought only to describe the percentage of residents in Ontario long-term care homes with a filled prescription for an antipsychotic medication, so it did not explore the factors that may play a role in driving variation. Some of these factors may include setting (urban or rural), staff-to-resident ratios, availability of behavioural units, size of long-term care homes, and complexity of resident population. Therefore, the report does not provide an explanation for why some regions or homes may have higher or lower results than others.

The study population excludes residents who were in the long-term care home for less than 100 days. The intention is to focus the estimates of resident medication use on care that can be attributed to the care provided by the long-term care home and not care received prior to moving into the home. One hundred days was selected because it covers the maximum number of days supplied according to the ODB.[3]

The study population was restricted to residents over the age of 65, therefore the results in the report describe the prevalence among older long-term care residents and not all long-term care residents. There are some long-term care homes in Ontario that specialize in providing care to younger patients with mental illness, so the results in this report would not be representative of these types of homes.

Limitations due to data sources

Residents were categorized into three mutually exclusive groups: those with a diagnosis of psychosis, those with a diagnosis of dementia and no diagnosis of psychosis, and those without a documented diagnosis of psychosis or dementia. The diagnoses were identified based on diagnosis codes identified in the DAD, OHIP claims database and OMHRS, as well as drug dispensation information for drug therapy related to dementia from the ODB claims database. There is the potential for misclassification of residents who may or may not have these diagnoses, particularly among the group of residents in the dementia (no psychosis) group. For example, physicians often list diagnoses as “dementia” in OHIP billing data instead of “dementia with

[3] For most Ontario Drug Benefit recipients, the maximum quantity permitted is a supply sufficient for a 100-day course of treatment (http://www.health.gov.on.ca/en/pro/programs/drugs/odbf_conditions_for_payment.aspx)

psychosis." This would result in some residents categorized in the analysis as having dementia (no psychosis) when they actually have psychosis and should have been included in the psychosis group. The extent of misclassification is not known, but may result in the prevalence of filled antipsychotic prescriptions among those with dementia being higher than if there were no misclassification. There are other sources of diagnostic information that could have been used to classify residents (i.e., the RAI-MDS data from the CCRS), however they would likely be prone to similar potential for misclassification.

The ODB claims database provides comprehensive and accurate information on drug claims from residents in long-term care homes in Ontario.[12] There are some important limitations in the extent of information available in the ODB claims database and in the methodology used in this report to measure prevalence of antipsychotic prescriptions in long-term care. Since the information in the ODB claims database is derived from claims for filled antipsychotic prescriptions, the report describes the prevalence of filled antipsychotic prescriptions, and uses this measure as a proxy for antipsychotic drug use.

Claims data do not allow us to capture the actual use of antipsychotic medications by residents in long-term care homes. Medications can be prescribed to be taken by the resident "as needed" or *pro re nata* (PRN). Information within the ODB claims database does not distinguish between prescriptions dispensed for use "as needed" from those prescribed for scheduled use. Therefore, all antipsychotic prescriptions filled, even if prescribed for use "as needed," are included in this analysis as long as the days supplied overlaps with the index date. This may overestimate the percentage of long-term care residents using antipsychotic medications on the index date because residents may or may not have taken the antipsychotic if it was not needed on that day.

Another limitation is the potential to miss capturing residents in the numerator if they were dispensed a long-lasting antipsychotic with a supply of one day that does not overlap with the index date even if the drug continues to be active for several days, including the index date. The extent of filled antipsychotic medications prescribed for use "as needed" or that are long-lasting was not explored in this report, so the impact on the results is not known. Similarly, the report does not differentiate between residents on large doses of antipsychotics and residents on minimal doses or tapering protocols.

External review

Subject matter experts, stakeholders and data providers were sent a draft of the report, *Looking for Balance*. Reviewers were asked to comment on the accuracy of the data and our interpretations of the results. The report was then revised accordingly. A complete list of external reviewers is located in both the Acknowledgements section of the report and below.

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