Patterns and Behavioural Outcomes of Antipsychotic Use among Nursing Home Residents: a Canadian and Swiss Comparison

by

Chantal Arditi

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ABSTRACT

Background. Although antipsychotic medications are primarily intended to treat schizophrenia and psychotic symptoms in adults, they are commonly administered to nursing home residents as pharmacotherapy for "off-label" indications such as disruptive behaviour. However, clinical trials have demonstrated limited efficacy and serious side-effects of antipsychotics among the elderly. As previous studies have reported inappropriate use in several countries, their use in nursing home residents ought to be monitored to detect and reduce inappropriate administration.

Objectives. The aim of this study was a) to determine and compare prevalence rates of antipsychotic use in Ontario and Swiss nursing homes, b) to identify determinants of antipsychotics use in these two countries, by means of a cross-sectional design, and c) to investigate the impact of antipsychotic use on behaviours over time in Ontario and Swiss residents, by means of a longitudinal design.

Methods. This study involved secondary data analysis of 1932 residents from 24 nursing homes in the province of Ontario in Canada and 1536 residents from 4 nursing homes in a German-speaking canton in Switzerland. Residents were assessed with the Minimum Data Set (MDS) tool. Resident characteristics and prevalence rates were compared internationally with the chi-square test. Demographic and clinical determinants of antipsychotic use, as well as behavioural change associated with antipsychotics, were analyzed using logistic regression.

Results. Although Ontario nursing home residents had an overall heavier-care profile than Swiss residents, antipsychotics were administered to 25% of the Ontario residents compared to 29.5% of the Swiss residents. The adjusted rate among residents without appropriate conditions was also lower in Ontario (14%) than in Switzerland (24.5%). Apart from schizophrenia, bipolar disorder and cognitive impairment, antipsychotic use was determined by a different range of characteristics in these two countries. Antipsychotic use was not predictive of behavioural improvement.

Conclusion. The high adjusted rates of antipsychotic use in Ontario and Swiss nursing home residents, as well as the presence of "inappropriate indications" and "facility" as determinants of their use, raise concerns about the appropriateness of their administration in both countries. Their lack of effectiveness to improve behaviours also questions their use as long-term treatment for behaviour disturbances. Changes in practice patterns and implementation of policies are warranted to reduce inappropriate prescribing practices to enhance the quality of care provided to residents in nursing homes.

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1. INTRODUCTION

Antipsychotic medications have been used since the 1950s to treat schizophrenia, signs and symptoms of psychosis, and commonly used to treat agitation, mood instability and behaviour disturbances in the elderly (Tandon, Milner & Jibson, 1999; Glick, Murray, Vasudevan, Marder & Hu, 2001). However, clinical trials and reviews have suggested limited efficacy of antipsychotics and serious adverse side-effects in older populations (e.g. Lanctôt et al., 1998; Neil, Curran & Wattis, 2003; Lee et al, 2004). The US Food and Drug Administration (FDA) and Health Canada also released a Public Health Advisory in 2005 on the increased risk of death associated with the use of antipsychotic drugs in elderly patients with behaviour disturbance and dementia[1]. Despite this side-effect profile, a number of studies have reported the excessive and inappropriate use of antipsychotics in nursing home residents (Ray, Federspiel & Schaffner, 1980; Beers et al., 1992; Schmidt, Claesson, Westerholm & Svarstad, 1998; Oborne, Hooper, Chi Li, Swift & Jackson, 2002). Thus, concerns have arisen for many years about antipsychotic use[2] in nursing homes. In the US, evidence of misuse in nursing homes led to legislation limiting their use in 1990 (Stoudemire & Smith, 1996).

The prevalence of antipsychotic use in nursing homes has previously been recorded, mostly in the US, for monitoring purposes. Few studies further considered the demographic and clinical characteristics of antipsychotic recipients to uncover practice patterns, using a systematic and standardized assessment tool. Some studies have identified residents' characteristics associated with antipsychotic use in an inconsistent manner, such as younger age, dementia, aggressive behaviour, restlessness, greater mobility, and being physically restrained (e.g. Briesacher et al., 2005; Voyer et al., 2005). Structural variables, such as size of the institution and staffing level, have not been consistently related to antipsychotic prescriptions (Ray et al., 1980; Buck, 1988). Thus, researchers have suggested that antipsychotic use was determined by patient characteristics rather than institutional variables

[1] http://www.fda.gov/cder/drug/advisory/antipsychotics.htm and http://www.hc-sc.gc.ca/dhp-mps/medeff/advisories-avis/prof/atyp-antipsycho_hpc-cps_e.html

[2] antipsychotic use will refer to antipsychotic administration throughout this study

(Buck, 1988). Fewer studies have examined outcomes associated with antipsychotic use in actual clinical practice on large samples. Such studies have suggested mixed improvement in behaviours (Burton, Rovner, German, Brant & Clark, 1995), cognitive decline (McShane et al., 1997), increased falls and fractures (Ray, Blazer, Schaffner & Federspiel, 1987), and urinary incontinence (Lindesay, Matthews & Jagger, 2003).

Therefore, the primary focus of this research was to determine and compare the prevalence rates of antipsychotic use in nursing homes in two different countries, Canada and Switzerland. Second, the demographic and clinical characteristics of recipients were investigated in both countries separately, to uncover practice patterns. Third, the impact of antipsychotic use on specific behaviours was explored using longitudinal data.

After reviewing the literature on the use of antipsychotics in the elderly, the research questions of this study are outlined. Then, the methodology section provides a description of the data collection tool, the samples, the variables and the statistical analyses pertaining to the research questions. After presenting the results, their discussion follows, with suggestions for future research and implications for practice and policy.

2. LITERATURE REVIEW

This literature review provides an overview of: a) the two types of antipsychotics, b) the effectiveness of antipsychotics in the elderly with a focus on efficacy, adverse side-effects and functional outcomes; the published guidelines for their use in the elderly; and the existing regulations in nursing homes; c) the prevalence and incidence of antipsychotic use in nursing homes; the appropriateness of antipsychotic administration; and the demographic, clinical and structural characteristics associated with their use; and d) the value of international comparisons; a brief description of nursing homes in Canada and Switzerland; and previously reported use of antipsychotics in these two countries.

2.1. Neuroleptics and Atypical Antipsychotics

Antipsychotic medication is a psychotropic drug along with anxiolytics, hypnotics and antidepressants. Antipsychotics are divided into typical or conventional agents, and atypical agents, the newer generation[1]. The conventional antipsychotics, introduced in the 1950's, are referred to as neuroleptics ("seize the neurons"), and are generally associated with extrapyramidal side effects (EPS) (Tandon et al., 1999). A new generation of antipsychotics was developed during the 1990's to produce fewer side-effects, and is called atypical as it separates the antipsychotic therapeutic effect from the extrapyramidal side effect (Tandon et al., 1999; Neil et al., 2003). Both types of antipsychotics can be prescribed on a regular basis or on an as-needed basis (*pro re nata*).

Neuroleptics are primarily intended to treat schizophrenia in adults (Neil et al., 2003), but can also be prescribed for medical and psychiatric conditions associated with psychotic symptoms such as depression with psychosis, manic episode of bipolar disorder, Huntington's disease, Tourette's syndrome and aggressive behaviour associated with dementia (Tandon et al., 1999; Glick et al., 2001).

Atypical antipsychotics have recently replaced conventional antipsychotics as the new standard of care for schizophrenia and bipolar disorder (Ghaemi, 2000). In the elderly, atypical antipsychotics

[1] In this study, the term 'neuroleptic' refers to conventional antipsychotic; 'atypical antipsychotic' refers to the newer generation; and 'antipsychotics' refer to both types.

are commonly used as a pharmacotherapy for other conditions as "off-label" indications, such as agitation associated with dementia (Glick et al., 2001). However, in Canada, only one atypical agent is approved for the short-term management of aggressive behaviour disturbances in elderly patients with dementia (Pwee, Shukla, Herrmenn & Skidmore, 2003).

2.2. Antipsychotics and the Elderly

Conventional and atypical agents are mostly used in the elderly as a pharmacotherapy for psychosis and agitation associated with dementia, usually described under the umbrella term of behavioural and psychological symptoms of dementia (BPSD) (Finkel, Costa e Silva, Cohen, Miller & Sartorius, 1996). These BPSDs include delusions and hallucinations, agitation, wandering, restlessness, hostility, uncooperativeness, sleep disturbance, depression or anxiety, and disturbed mood (Finkel, 2001). For instance, antipsychotics were prescribed for restlessness as the diagnostic indication in 40% of the prescriptions, for psychotic symptoms in 27% of the cases, and for agitation in 7% of the cases in a Norwegian study (Ruths, Straand & Nygaard, 2001). Current knowledge on the effectiveness of antipsychotics in the elderly to treat these symptoms, as well as published guidelines on appropriate and inappropriate conditions for antipsychotic treatment are reviewed in the following sections.

2.2.1. Effectiveness

The effectiveness of antipsychotics relates to their ability to produce an overall beneficial effect in actual practice. More precisely, clinical effectiveness covers four domains: the efficacy of antipsychotics, which is their ability to control or relieve the targeted symptoms (e.g. psychotic symptoms); their tolerability and safety, measured by the rate of adverse side-effects; the functional outcomes, such as their impact on the level of physical functioning and cognition, and the quality of life; and their acceptability, where compliance is the major factor (Lalonde, 2003). The efficacy, safety and functional outcomes of antipsychotics in the elderly are reviewed in this section.

Efficacy

The efficacy of antipsychotics in the elderly has mostly been investigated in randomized controlled trials (RCT), focusing on their efficacy to manage agitation and improve BPSD. To measure the efficacy, RCTs have used a range of behavioural scales as primary outcome of interest, such as the Behavioural Pathology in Alzheimer's Disease Rating Scale (BEHAVE-AD) (De Deyn et al., 1999; Katz et al., 1999), the Brief Psychiatric Rating Scale (BPRS) (Barnes, Veith, Okimoto, Raskind & Gumbrecht, 1982; Yoon, Kim, Lee, Shin & Choi, 2003), or the Cohen-Mansfield Agitation Inventory (CMAI) (DeDeyn at al, 1999). Overall, RCTs and reviews suggests that conventional antipsychotics are only moderately effective in the elderly to manage acute behaviour problems, and that no neuroleptic is consistently more effective (Schneider, Pollock & Lyness, 1990; Lanctôt et al., 1998; Sunderland & Silver, 1988; Devenand, Sackeim & Mayeux, 1988; Helms, 1985; Burton et al., 1995). The evidence for the efficacy of atypical antipsychotics in reducing BPSD is more pronounced, but side-effects remain common (Lee et al, 2004; Katz et al., 1999; DeDeyn et al., 1999; Pwee et al., 2003; Glick et al., 2001; Yoon et al., 2003). Findings from key studies on the efficacy of neuroleptics and atypical antipsychotics are summarized in Appendix A, as well as the design, the sample and the outcome measures.

The RCTs reporting evidence for the efficacy of antipsychotics in reducing disruptive behaviours should be interpreted with caution. First, efficacy is often mitigated by improvements in the placebo group as well, possibly due to the increased attention patients received (Katz et al., 1999; DeDeyn et al., 1999; Pwee et al., 2003). Second, consensus on outcome measures and the threshold of significant improvement is lacking, limiting comparisons across studies (Pwee et al., 2003). Third, the quality of studies is of concern as very few reviewed studies meet quality criteria (Helms, 1985; Pwee et al., 2003). Finally, publication bias may be present, if articles showing improved behaviour with antipsychotics were favoured for publication over studies with negative findings.

Only two studies were found in the literature investigating the efficacy of antipsychotics in actual practice. Burton and colleagues (1995) examined the change in nine disruptive behaviours in residents

treated with neuroleptics, using the Psychogeriatric Dependency Rating Scale (PGDRS). A larger proportion of users compared to non-users improved in three behaviours: restlessness, wandering, and exhibiting objectionable behaviour. Either the development or the resolution of disruptive behaviour was suggested to occur among residents regardless of neuroleptic use, but occurred more frequently among neuroleptic users. However, potential confounding variables were not controlled for. The second study, using the MDS assessment tool, found that residents administered antipsychotics were at increased risk for developing wandering behaviour (Kiely, Morris & Algase, 2000). The authors suggested that antipsychotics may cause confusion leading to wandering behaviour, or that wandering was the actual target of treatment and not present at baseline as it was sufficiently controlled for, but developed later because of tolerance.

Adverse Side Effects

Antipsychotics, whether conventional or atypical, are associated with many side-effects in the elderly, and can increase the risk of death. For instance, antipsychotics contributed the most frequently to overall medication problems in a Norwegian study examining drug-related problems in nursing home residents (Ruths, Straand & Nygaard, 2003).

Most common side-effects are extrapyramidal symptoms (EPS), such as pseudo-parkinsonism, tardive dyskinesia (repetitive movement) and akathisia (inability to remain still), anti-cholinergic symptoms, and sedative effects, such as orthostatic hypotension (Maixner, Mellow & Tandon, 1999; Masand, 2000; Neil, Curran & Wattis, 2003). The atypical antipsychotics have a slightly better side-effect profile than conventional, with fewer EPS, lower risk of dyskinesia and less movement disorders (Glick et al., 2001). Antipsychotic recipients were also found to be at increased risk for falls, hip fractures, insomnia and abnormal gait, resulting from the sedative side-effect (Hien et al., 2005; Ray, Griffin, Schaffner, Baugh & Melton, 1987; Maixner et al., 1999, Neil et al, 2003; Katz et al., 1999). Voyer and colleagues (2005) suggested that antipsychotic users had more problems sleeping than non-users. Urinary incontinence has also been reported as side-effect in the elderly (Lindesay et al., 2003).

The risk of side-effect is of special concern in the institutionalized elderly, because of their increased vulnerability resulting from physiological changes induced by the aging process, and from polypharmacy due to comorbidities. The elderly have a higher sensitivity to extrapyramidal symptoms and tardive dyskinesia than younger users, due to how the aging process affects medication metabolization (Maixner et al., 1999; Masand, 2000). In addition, nursing homes residents are more likely to suffer from multiple medical problems requiring drug treatments than elderly living at home (Furniss, Lloyd Craig & Burns, 1998). Studies have shown that nursing homes residents in the US are prescribed on average between 7.2 and 8.1 medications (Beers et al., 1988, Beers et al., 1992). Such prescribing practices increase the risk of adverse effects due to drug interactions (Maixner et al., 1999.)

Finally, concerns have recently arisen about the increased risk of death for the elderly receiving atypical antipsychotics. Hence, public health advisories were issued in several countries warning about the use of atypical agents in the elderly. Concerned about the potential risk of death associated with conventional agents, Wang and colleagues (2005) conducted a retrospective cohort study involving 22,890 patients who received both types of antipsychotics between 1994 and 2003. Their results suggested that both atypical and conventional agents increase the risk of death among elderly persons.

Functional Outcomes

Cognition and physical functioning in the institutionalized elderly are important outcomes as they impact their quality of life, which is an important consideration in determining the effectiveness of a treatment (Ballard & Margallo-Lana, 2004). However, the positive and negative effects of antipsychotics on functional and cognitive domains have not been extensively researched (Beers et al, 1988; Sunderland & Silver, 1988; Lawlor, 2001).

Neuroleptic use has been associated with an increased rate of cognitive decline in the elderly (McShane et al., 1997; Devenand et al., 1989). However, these two studies were based on small samples (n=71 and n=9 respectively) and McShane's sample consisted of non-institutionalized elderly. RCTs, generally using the Mini-Mental State Examination (MMSE) as outcome measure, did not find

significant adverse effect on cognition (Yoon et al., 2003; Katz et al., 1999). De Deyn and colleagues (1999) found that cognitive function deteriorated among neuroleptic users, but not among atypical users. Byerly and colleagues (2001) concluded from their review that some elderly patients may experience adverse cognitive effects when using antipsychotics.

Studies investigating the effect of antipsychotics on Activities of Daily Living (ADL) in the elderly are sparse and were mostly done in schizophrenic patients (Masand, 2004). Yoon and colleagues (2003) investigated the impact on ADL in 48 Korean demented patients and found no significant change. However, the sample size was small, limiting the interpretation of the results.

The limited effectiveness of antipsychotics, their adverse side-effects profile, and the potential adverse impact on cognition and ADL warrant precautious use in the institutionalized elderly. Hence, guidelines were produced to guide the prescription of antipsychotics in the elderly.

2.2.2. Guidelines

Generally applicable guidelines for the prescription of antipsychotics in the elderly are difficult to specify, as each individual has unique characteristics. However, such guidelines are necessary to guide care and decision-making, as benefits of antipsychotic use are weighted with many adverse side-effects.

In the US, the first governmental guidelines for antipsychotic use in the elderly in nursing homes were developed in 1987 by the Health Care Financing Administration (HCFA) defining the appropriate and inappropriate indications, which are regularly updated by the Centres for Medicare and Medicaid Services (CMS) (formerly know as HCFA) (Stoudemire & Smith, 1996; Gurvich & Cunningham, 2000). In parallel, expert consensus guidelines were produced in the Journal of Clinical Psychiatry for the use of antipsychotic agents in older patients in general in 2004 (Alexopoulos, Streim, Carpenter & Docherty, 2004). Their goal was to offer guidance on the use of antipsychotics in the elderly by identifying: 1) the geriatric disorders for which antipsychotics are inappropriate; 2) the indications for

the use of antipsychotics in the elderly, as well as recommended drug, dosage and duration of treatment according to the condition treated; and 3) the most likely disease-drug and drug-drug interactions.

In brief, these CMS guidelines (DHHS & CMS, 2002) and expert consensus guidelines (Alexopoulos et al., 2004) consider antipsychotics to be appropriate for patients with: schizophrenia, delusional disorder, psychotic mood disorder (including mania and depression with psychotic features), acute psychotic symptoms (such as delusions and hallucinations), Tourette's disorder, Huntington's disease, and organic mental syndromes (delirium and dementia) associated with psychotic and/or agitated behaviour causing danger to the resident or others and resulting in distress or impairment of functional capacity. On the other hand, antipsychotics were considered inappropriate for patients with: generalized anxiety disorder, panic disorder, non-psychotic depression, insomnia or sleep disturbances, and non-endangering agitated behaviours, such as wandering, restlessness, fidgeting or nervousness, unsociability, indifference to surroundings, and uncooperativeness.

2.2.3. Regulations

Antipsychotic prescription in the institutionalized elderly is neither regulated nor controlled in both Canada and Switzerland. In the United States, neuroleptics have been the target of legislation in response to the growing concern of neuroleptics being used as form of chemical restraint rather than part of a specific treatment (Harrington, Tompkins, Curtis & Grant, 1992). This legislation, the Omnibus Budget Reconciliation Act [OBRA]-87, was implemented in 1990. This legislation requires the documentation in the resident's medical record of the specific conditions for which antipsychotics are prescribed. Appropriate indications are specified in interpretative guidelines - presented in the precedent paragraph - to protect residents from receiving antipsychotics without proper written indication and documentation (Stoudemire & Smith, 1996). Antipsychotic use significantly decreased in nursing homes following the implementation of OBRA-87 (Shorr, Fought & Ray, 1994; Liperoti et al., 2003; Rovner, Edelman, Cox & Schmuely, 1992). However, recent studies (e.g. Briesacher at al.,

2005) have shown that their use has increased over time, partly due to the introduction of atypical antipsychotics.

2.3. Empirical Literature on Antipsychotic Use in Nursing Homes

As previously mentioned, antipsychotics are mostly used in nursing homes as a pharmacotherapy for the BPSD, as they can be quite problematic when they put the resident or others at risk for injury and interfere with resident's care. The following sections present the prevalence and incidence use of antipsychotics, the appropriateness of antipsychotic administration in nursing homes, as well as the characteristics associated with antipsychotic use in nursing homes.

2.3.1. Prevalence and Incidence

Literature on the prevalence of antipsychotic use in nursing homes is abundant. Appendix B provides an overview of prevalence and incidence rates reported in the literature. Overall, the rates of antipsychotic use vary substantially from 8% to 62%. However, high prevalence rate is not necessary an indicator of excessive use. It could be justified by the overall characteristics of residents in the nursing homes with regards to their health condition and length of stay. For instance, nursing homes specialized in caring for demented patients with psychosis will likely have a higher rate of use than nursing homes only accepting light-care residents. Another explanation to the wide prevalence range reported in the literature is the data collection methodology with regards to the source of information and the time-interval of data collection. Garrard and colleagues (1992) established that prevalence rates based on prescription orders and claims files are more likely to be higher than those based on actual use or administration, as prescribed drugs might not be actually administered. Beers and colleagues (1988) found that an average of 8.1 medications were prescribed, of which 4.7 were actually administered. The length of the observation period can also inflate the rate, as residents are more likely to be administered antipsychotics within a 12-month period than within 7 days (e.g. Bronskill et al., 2004).

2.3.2. Appropriateness

Prevalence estimates are not sufficient to determine whether antipsychotics are appropriately and not excessively prescribed. The indication for antipsychotic administration should also be assessed based on clinical criteria to determine whether their use is appropriate. The CMS guidelines were previously used to assess the appropriateness of antipsychotic prescriptions in nursing homes, by reviewing prescriptions or medical files (McGrath & Jackson, 1996; Oborne et al., 2002; Briesacher et al., 2005). For instance, among nursing home residents prescribed neuroleptics in the UK, only 12% and 17.8% were prescribed antipsychotics appropriately (McGrath & Jackson, 1996; Oborne et al., 2002). Reasons for inappropriateness were: inappropriate indication (mild agitation, wandering, uncooperativeness, insomnia); indication not documented; and dose reduction not attempted. On the other hand, 41.8% of users in US nursing homes received antipsychotics in accordance with these guidelines (Briesacher et al., 2005),. This higher rate of appropriateness is likely due to the OBRA-87 regulation.

Zimmerman and colleagues (1995) developed quality indicators (QIs) of antipsychotic use to monitor the quality of care in nursing homes and to track changes over time, based on the CMS guidelines and using clinical information collected with the MDS assessment tool. The QI is risk-adjusted for resident-level risk factors to correct for differences in residents characteristics over which nursing homes have little or no control. Residents with a diagnosis of schizophrenia or with hallucinations are considered appropriate users and are excluded from the risk-adjusted QI. The high-risk QI is adjusted for residents with potentially appropriate indications: residents being verbally or physically abusive, or showing socially inappropriate behaviour, associated with cognitive impairment, indicated by presence of problems in decision-making and short-term memory deficits. The low-risk QI represents the rate of antipsychotic use among all other residents without appropriate indications.

Appropriateness of antipsychotic use in nursing home residents (n=139,714) was previously examined in the US according to these QIs: among appropriate users, 68.3% received antipsychotics; among potentially appropriate users (high risk), 18.2% received antipsychotics; and among potentially

inappropriate users (low risk), 3.9% received antipsychotics (Liperoti et al., 2003). The authors concluded that these figures indicated good practice and inappropriate use was a limited phenomenon.

The risk-adjustment strategy for the QIs was later modified using statistical regression-based covariate adjustment strategy for resident- and facility-level covariates, and were referred to as MegaQIs (Kidder et al., 2002). However, the QIs for antipsychotic use are no longer recommended for public reporting in the US as they were not validated in the report submitted to the CMS (Morris et al., 2003). The number of preventive or responsive validation elements (existing strategies to minimize the emergence or recognize the presence of problems) for these QIs was limited and these elements did not achieve high correlation with the QIs.

Nevertheless, the appropriateness of antipsychotic prescribing in the institutionalized elderly is an on-going issue, as previous studies have shown that actual practice in nursing homes differed from published guidelines. Thus, the appropriateness of their use among nursing home residents ought to be regularly assessed in order to monitor the quality of care.

2.3.3. Characteristics associated with Antipsychotic Use

Demographic, clinical, behavioural, physical, cognitive, and structural characteristics have been associated with antipsychotic use in the literature. Much of this literature examined a range of characteristics in bivariate analyses (only one explanatory variable) and/or multivariate analyses (more than one explanatory variable) using cross-sectional data. However, direct associations between antipsychotic use and the characteristic of concern (i.e. bivariate association) are of limited interest, as the relationship maybe confounded by third variables. Summaries of the main studies, with information on sample size, data collection method, and central findings are presented in Appendix B. Here is reviewed evidence supporting the relationship between antipsychotics and a range of characteristics.

Demographic Characteristics

Antipsychotic use was associated with being male in bivariate analyses, but not in multivariate (Ruths et al., 2001; Burton et al., 1995; Lindesay et al., 2003; Nygaard et al., 1990). Ruths and colleagues (2001) suggested that the overuse by men in bivariate was due to their younger age, which is associated with antipsychotic use. Younger age was significantly associated with antipsychotic use in some studies (Lindesay et al., 2003; Ruths et al., 2001; Voyer et al., 2005; Castle, 1999), whereas not associated in other studies (Nygaard et al., 1990; Briesacher et al., 2005;). For instance, the younger old (65 to 74) were found to be three times more likely to receive antipsychotics than the older old (over 85) (Voyer et al., 2005). An explanation suggested by Voyer and colleagues (2005) is that antipsychotics are more likely to be prescribed to residents in better health, thus in the younger age group.

Clinical Diagnoses

Clinical diagnoses of schizophrenia, bipolar disorder, and psychotic conditions (such as hallucinations and delusions) were associated with antipsychotics use as expected, as these clinical diagnoses are the principal target of antipsychotic treatment (Spore, Horgas, Smyer & Marks, 1992; Draper et al., 2001; Sorensen, Foldspang, Gulmann & Munk-Jórgensen, 2001; Briesacher et al., 2005).

The association between antipsychotic use and the diagnoses of dementia and Alzheimer's disease is a more problematic issue, as antipsychotics can be prescribed for these diagnoses if they are associated with psychotic symptoms, such as verbal or physical aggression, delusions or hallucinations. Thus, when investigating the relationship between antipsychotics and dementia, psychotic symptoms should be introduced as a confounding variable. Nevertheless, dementia was found to be a significant and independent determinant of antipsychotic use regardless of psychotic symptoms (Spore et al., 1992; Castle, 1999; Draper et al., 2001).

The association between depression and antipsychotics is problematic in a similar manner, as depression with psychosis can be treated with antipsychotics. It has however not been extensively investigated, and studies do not report whether depression was associated with psychosis. Castle (1999)

found that residents on antipsychotics suffered significantly more from depression compared to non-users. Even though anxiety is not an indication for antipsychotics, Castle (1999) also found that residents receiving antipsychotics were more likely to suffer from anxiety disorders. Anxiety was also the primary target in 10% of the antipsychotic prescriptions in Norway (Ruths et al., 2001).

Behavioural Characteristics

The relationship between antipsychotics and the BPSD is problematic to interpret in cross-sectional studies, as associated behaviours can either be triggers for antipsychotic use, consequences of antipsychotic use or consequences of other factors, such as polypharmacy or physical comorbidities. In addition, studies have measured disruptive behaviour in different ways, limiting comparisons and overall interpretations.

For instance, antipsychotic use has been associated in multivariate analyses with displaying at least one disruptive behaviour measured with the CMAI scale (Voyer et al., 2005), and with offensive behaviour defined as behaviour causing others distress or discomfort (Lindesay et al., 2003). In Briesacher and colleagues' study (2005), almost 40% of users had behavioural problems, and 11% of appropriate users had worse behavioural symptoms (measured by the MDS item on general deterioration of behaviour within last 90 days). Antipsychotic users were also found to be agitated more frequently (Spore et al., 1992) and display restlessness compared to non-users in multivariate analyses (Nygaard, Bakket, Breivik & Brudwik, 1990; Nygaard et al., 1994).

The relationship between antipsychotics and insomnia is unclear. Disturbed sleep and insomnia have been reported as independently associated with antipsychotic use in multivariate analyses (OR=2.08 and 4.1) (Sorensen et al., 2001; Voyer et al., 2005). A first explanation could be the use of antipsychotics for their sedative effect to treat sleep problems, though this is not recommended by expets (Sorensen et al., 2001). Antipsychotics were indeed found to be prescribed for insomnia in 6% of antipsychotic prescriptions (Ruths et al, 2001). On the other hand, sleep disturbances could be a side-

effect of antipsychotic use (Voyer et al, 2005). The cross-sectional nature of these studies hinders the inference of causal relationships, which can only be verified in longitudinal studies.

Physical Functioning Characteristics

Studies have investigated the association between antipsychotics and Activities of Daily Living (ADL) items, which measure residents' dependency in various domains such as personal hygiene and locomotion. Studies have shown that residents highly dependent in ADL were less likely to be administered antipsychotics in multivariate analyses (Lindesay et al., 2003; Castle, 1999), while residents with increased mobility were more likely to be administered antipsychotics (Sorensen et al., 2001; Nygaard et al., 1990). The association with increased mobility was suggested to reflect motor restlessness, either as an indicator of resistance to care or as a side-effect of antipsychotic use. Another plausible explanation is that less mobile residents are less likely to disturb their surroundings compared to mobile residents. However, the association between ADL and antipsychotic use was not significant in other studies (Burton et al., 1995; Voyer et al., 2005).

Cognitive Characteristics

Severe cognitive impairment has been significantly associated with the likelihood of receiving antipsychotics in multivariate analyses (Voyer et al., 2005; Lindesay et al., 2005; Castle, 1999). However, whether cognitive impairment precedes or results from antipsychotic use is unclear. On one hand, disruptive behaviour has been shown to increase with the loss of cognitive functioning in individuals with dementia (Voyer et al., 2005). Thus, cognitive impairment and disruptive behaviour are strongly associated (Lindesay et al., 2003; Nygaard et al., 1990) and cognitive impairment likely precedes antipsychotic use. On the other hand, longitudinal studies have shown that cognition decreased in residents receiving antipsychotics (McShane et al., 1997).

Physical Restraint

Physical restraint was found to be commonly used with antipsychotic drugs: between 41% and 60% of antipsychotic users were also physically restrained in Quebec (Voyer et al., 2005) and in the US before the implementation of regulations (Garrard et al, 1992). The use of restraint among antipsychotic users could indicate that these two methods are jointly used to deal with disruptive behaviour.

Structural Variables

The association between antipsychotic use and structural variables has been previously studied, with conflicting results. For instance, the relationship between antipsychotic prescriptions and the nursing home size was significant in one study (Ray et al., 1980) but not in another study (Ruths et al., 2001). Authors have thus concluded that prescriptions of antipsychotics were more likely to be influenced by patient characteristics rather than institutional variables (Buck, 1988).

2.4. International Comparison: Canada and Switzerland

This study compared the use of antipsychotics in two countries, Canada and Switzerland. International comparisons of care settings provide opportunities to uncover differences in care that could not be discovered through studies within one jurisdiction. Indeed, care practices from one country can be benchmarked with those from other countries, revealing potential different models or standard of care. The comparison of practice patterns in nursing homes from two different countries also allow for a better understanding of long-term care within each country in contrast with others.

Canada and Switzerland are both well developed nations with high life-expectancy and a growing ageing population. They share the value of caring for the elderly, have similar long term care system and face similar challenges. A growing part of the ageing population requires care provided in nursing homes, yielding problems of insufficient nursing home beds and problems of quality of care. Indeed, the quality of care in nursing homes has become an area of scrutiny in both countries to ensure good care to the elderly and concerns about antipsychotic use have arisen in both countries. In Ontario,

articles have been published about the problematic increase in antipsychotic use in the last 10 years (Rapoport et al., 2005) and warnings about the use of atypical antipsychotics in the elderly have been posted by the government. In Switzerland, warnings have also been issued in 2004 on the use of atypical antipsychotics in the elderly (Ruggli et al., 2004). However, antipsychotics are not regulated in either country, unlike the US. Thus, comparing countries facing similar problems and challenges offers the possibility to investigate the impact of potential different approaches.

2.4.1. Nursing Homes in Ontario and Switzerland

Canada and Switzerland are both composed of a mosaic of health care systems as each province (Canada) and canton (Switzerland) has its own health care system with general federal regulations. Consequently, nursing homes may differ between provinces and cantons. Information on the long-term care system is widely available in Ontario, the most populated province in Canada, but difficult to obtain for small cantons in Switzerland. Thus, the long-term care system will be described for Ontario specifically and for Switzerland in general.

In Ontario, nursing homes are designed for people who need the availability of 24-hour nursing care, supervision or non-hospital extended personal care. The nursing home facilities are operated by for-profit private corporations, municipalities (called homes for the aged) or charities (non-profit organizations), but regulated by the government. Indeed, the Ministry of Health and Long-Term Care (MOHLTC) sets standards for care and inspects long-term care homes annually. The MOHLTC funds the care component, while accommodation is charged to residents based on a co-payment rate set by the MOHLTC. Eligibility for and admissions to long-term care facilities is determined by the Community Care Access Centres (CCACs) across the province. In 2000, there were about 57,000 long term care beds in 498 facilities in Ontario, and beds exceeded 70,000 in 2004 (Smith, 2004).

In Switzerland, nursing homes provide care for chronically disabled elderly. The majority of nursing home facilities are operated by private non-profit enterprises, while some are operated by the public sector and for-profit enterprises (Crivelli, Filippini & Lunati, 2002). Similarly to Ontario,

residents are expected to pay for the accommodation component, while the government and private health insurances share the cost of the care component (DuPasquier & Gilgen, 1999). In 1991, Ribbe and colleagues (1997) estimated that there were 72,000 beds in nursing homes (approximately 70 beds per 1000 elderly population) with additional 42,000 beds in geriatric wards of general hospitals and 12,000 beds in psychiatric hospitals.

2.4.2. Antipsychotic Use in Canadian and Swiss Nursing Homes

The published literature on antipsychotic use in nursing homes is more abundant in Canada than in Switzerland. Canadian studies have reported their use mostly in Ontario and Quebec, and a Swiss study was found to report their use in the canton of Vaud. Finally, one study previously compared the use of antipsychotics in nursing homes in Quebec and in the French-speaking part of Switzerland.

Conn and colleagues (1999) examined prescriptions available from pharmacies supplying medications to long-term care facilities in Ontario. They found the highest rate of antipsychotic use in nursing homes (29.8%) compared to retirement homes. However, information was collected from prescriptions rather than actual administration and the sample size (n=436) was small. Bronskill and colleagues (2004) examined the incidence use of antipsychotics in Ontario nursing homes on a much larger sample size (n=19780). Among residents newly admitted between 1998 and 2000, 17% were prescribed antipsychotics within 100 days and 24% within 1 year of admission. In their sample, men and residents with dementia were more likely to initiate antipsychotic use. However, their data on demographic and diagnostic variables were limited. In Voyer and colleagues' study (2005), the prevalence of antipsychotic consumption by residents in the region of Quebec City was almost 28%. Demographic and clinical characteristics of nursing home residents were also investigated and results indicated that antipsychotic drug consumption was determined by younger age, few hours of family visits, severe cognitive impairment, insomnia, physical restraint and disruptive behaviour.

Lucas and colleagues (2004) investigated medication prescriptions in all nursing homes from the canton of Vaud in Switzerland in 1996. The prevalence of antipsychotic consumption by all the

residents in the canton (n=5884) was 43%. In multivariate linear regression, the number of antipsychotics administered daily was negatively correlated with age, Parkinson's disease, severe orientation problems, drug addiction and the size of the nursing home. Psychiatric morbidity, agitation, disturbing others, impairment in daily decision making, and persistent anxiety increased the likelihood of receiving antipsychotics. Clinical variables explained 22% of the variance in antipsychotic administration, while the nursing home factor explained 20%.

Gobert and D'horre (2005) investigated the use of psychotropics in Quebec and in French-speaking Switzerland in 1998. They found that 32.9% of long-term care residents in Quebec and 35.9% of residents in Switzerland received antipsychotics within the 7 days of assessment. Appropriateness of antipsychotic prescription was assessed using daily dosage and departure from average practice as criteria. The authors concluded that antipsychotics were not over-used, as the dosage seemed adequate and no facility departed from the average practice. However, these criteria for appropriateness are clearly limited. First, clinical characteristics of recipients were not considered in the criteria, leading to the conclusion of appropriateness when, in fact, antipsychotics were administered for inappropriate conditions. Second, antipsychotic use was compared to the average practice within the studied population, disregarding whether the average practice was appropriate.

3. STUDY RATIONALE

The study of antipsychotic use in the institutionalized elderly is an essential area of research as residents in nursing homes are a particularly vulnerable population. Indeed, their clinical, physical, and cognitive status puts them at increased risk for antipsychotic use and their associated adverse side-effects. Thus, the prevalence and appropriateness of antipsychotic use and the impact of their use on residents should be investigated and monitored for the safety and well-being of nursing home residents, and to ensure high quality of care. This research also adds to the limited existing literature on the determinants of antipsychotic use in nursing homes in Canada and Switzerland, and on the behavioural outcomes associated with their use in nursing home residents. Few studies to date have investigated the outcomes of antipsychotic use in the institutionalized elderly, as most studies were randomized, placebo-controlled trials testing the efficacy of antipsychotics under controlled conditions.

The purposes of this present study were: 1) to investigate the pattern of antipsychotic use in nursing homes; 2) to investigate the impact of antipsychotic use on residents' behaviours; and 3) to compare the findings internationally between Ontario and Switzerland. This international comparison was integrated into the first two objectives by benchmarking results from one dataset to the other.

3.1. Research questions

3.1.1. Patterns of Antipsychotic Use

The purpose of the following research questions was to identify patterns of antipsychotic use in the two samples of nursing home residents in Ontario and in Switzerland by: describing the two samples; determining the prevalence of actual administration of antipsychotics among all residents and among residents with appropriate, potentially appropriate and inappropriate indications; and identifying the significant determinants of antipsychotic use.

1) What are the general characteristics of residents in Ontario and Switzerland?
   - *International comparison*: Are there significant differences in the general characteristics of residents between Ontario and Switzerland?

2) What is the prevalence of antipsychotic use in Ontario and Switzerland among all residents and among residents with appropriate, potentially appropriate and inappropriate indications?
   - *International comparison*: Is there a significant difference in the prevalence of antipsychotic use between Ontario and Switzerland?
   - *Longitudinal aspect*: What are the incidence and cessation rates of antipsychotics in Ontario and Switzerland?
3) What are the determinants of antipsychotic use in Ontario and Switzerland?
   - *International comparison*: Do the determinants differ between Ontario and Switzerland?

3.1.2. Behavioural Outcomes of Antipsychotic Use

The purpose of the following research questions was to investigate the impact of antipsychotic use on behaviours over time in the two samples of nursing home residents in Ontario and in Switzerland separately. More specifically, we were interested in determining whether antipsychotic use was associated with the incidence, the cessation, the improvement and/or the deterioration of various behavioural symptoms between time 1 (T1) and time 2 (T2).

4) Does antipsychotic use predict the incidence and/or the cessation of the following behaviours: wandering, verbally abusive, physically abusive, socially inappropriate, resisting care and aggressive behaviour?
5) Does antipsychotic use predict the improvement and/or the deterioration of the following behaviours: wandering, verbally abusive, physically abusive, socially inappropriate, resisting care, and aggressive behaviour?

3.2. Relevance of research

Literature on the use of antipsychotics in the elderly is abundant, and recommendations for their use in the elderly have previously been published for geriatricians. Nevertheless, monitoring their use in the elderly is an on-going issue that remains a focus for care-planners, policy makers and the general public, especially in these two countries without antipsychotic regulations and in the context of quality of care assurance and increasing costs of medications in nursing homes.

The quality of care in nursing homes has been a central issue for several years. As such, information on the pattern of antipsychotic administration is to be continually gathered to monitor their

use in order to rapidly detect and report increased use or inappropriate use for quality and safety of care purposes. Indeed, accurate and up-to-date information on antipsychotics are necessary for program planners to tailor interventions and for policy-makers to improve and ensure the adequacy of antipsychotic administration.

The economical aspect of antipsychotic use is another growing issue, as recent studies have reported a large increase in the costs of antipsychotics. In Ontario, results from the cross-sectional time series analysis of antipsychotic utilization among all individuals residing in the community over 65 years old from 1993 to 2002 (Rapoport et al., 2005) showed that the slight increase in the prevalence of antipsychotic use was associated with over 200% increase in total antipsychotic prescriptions and approximately 750% increase in total cost. In addition, atypical antipsychotics were not available in 1993, but by 2002, they accounted for 82% of the prescriptions and were responsible for 95% of the costs. In Switzerland, a study has shown that the cost of antipsychotics per patient increased 47% between 2002 and 2003 in one nursing home, while the cost of antidepressants per patient decreased (Ruggli et al., 2004). Upon closer examination, the increase was due to the increase in the cost by galenic unit (+19%) and the increase of antipsychotic administration (+34%). This augmentation was mostly due to a new and expensive atypical agent. Thus, in light of these high costs associated with antipsychotics, the monitoring of their administration to detect and reduce inappropriate administration is an important issue for health management policies aiming at rationalizing costs.

4. METHODOLOGY

Analyses were based upon cross-sectional and longitudinal data derived from RAI 2.0 datasets collected in nursing homes in Canada and Switzerland. After briefly describing the data collection tool and the samples, the proposed methodology is presented separately for the two purposes of this study: (1) the pattern of antipsychotic use, and (2) the behavioural outcomes associated with their use. The dependent and independent variables included in the analyses and the statistical procedures used to answer the research questions are also described. All analyses were run on SAS for Windows version 9.1.

4.1. Data Collection Tool: RAI

The datasets were collected using the Resident Assessment Instrument (RAI) version 2.0 for long-term care facilities[1]. The RAI was developed by InterRAI, a non-profit international organization of researchers, to respond to the OBRA-87 which mandated its use in all US nursing homes primarily for care planning purposes, but also for research purposes, quality monitoring and benchmarking using a set of quality indicators, and for facility management and reimbursement using the case-mix algorithm (Morris et al., 1990). It was revised in 1994-95 (Version 2.0) and implemented across all US nursing homes in 1996.

The Minimum Data Set (MDS), which is the core assessment tool of the RAI, is a 7-page questionnaire providing a standardized approach to assessing the health, functional and psychosocial needs and strengths of individuals living in long-term care facilities, such as nursing homes. More specifically, the MDS provides information on socio-demographic variables; cognitive patterns; communication, hearing and vision patterns; mood and behaviour patterns; psychosocial well-being; physical functioning and structural problems; bladder and bowel continence; disease diagnoses; health conditions; oral/nutritional and dental status; skin condition; activity pursuit pattern; medications; special treatments and procedures; and discharge potential and overall status. The full tool was designed

[1] For more information on the RAI instruments: www.interrai.org

to be filled out by nursing staff within 14 days of admission to a facility, when significant change in resident function occurs, and annually after the admission date. A 5-page form, the Quarterly Review, contains a subset of key items and is designed to be used every 3 months after the full assessment. The Ontario full assessment tool is provided in Appendix C.

The MDS also serves as a preliminary screening instrument to identify potential problems in resident's status, through the Resident Assessment Protocols (RAP) (Morris et al., 1990). The RAPs function as decision facilitators, leading to a more thorough understanding of the problem and to the development of a sound care plan. The RAI 2.0 includes 18 RAPs, each outlining the problem of interest and the MDS trigger items, and providing a set of best practice guidelines. The RAP for Psychotropic Drug use, of particular interest in this study, was designed to flag potential side-effects or aggravation of existing symptoms and conditions for residents receiving antipsychotics, antidepressants or anxiolytics. Areas of concern are potential drug-related hypotension or gait disturbance, triggered by indicators such as repetitive physical movement and falls; potential drug-related cognitive and behavioural impairment, triggered by deterioration in cognitive status, mood and behavioural symptoms; and potential drug-related discomfort (see Appendix D for the RAP key). If any of these items is triggered, the RAP suggests reviewing the drug treatment, the resident's condition that may impair drug metabolism and the behaviour, mood, and psychiatric status.

The MDS has been well-established in the literature as a reliable and valid assessment tool (e.g. Hawes et al., 1990; Snowden et al., 1999). The MDS core set of items reach excellent reliability in areas of functional status, such as cognition, ADL, continence, and diagnoses (Snowden et al, 1999). The RAI instruments also reach high reliability coefficients across different countries, including Canada and Switzerland, establishing its utility for international comparison (Sgadari et al., 1997). Indeed, prior studies using the MDS to investigate international differences in nursing homes (e.g. Ribbe et al., 1997; Schroll et al., 1997) have shown that the MDS is a useful and valid tool.

4.2. Sample

This study is based on two samples of nursing homes in two regions: the English-speaking province of Ontario in Canada and the German-speaking canton of Aargau in Switzerland. The sampling design is displayed in Appendix E.

The Ontario nursing home data were derived from the pilot testing of the Canadian version of the MDS 2.0, as part of the RAI-Health Information Project (RAI-HIP) funded by a Health Transition Fund Grant from the Ministry of Health and Long Term Care. The cross-sectional sample comprised initial full assessments of 1961 individuals, collected between the period of December 1999 and February 2001 in 24 nursing homes from different regions in Ontario. The sample was restricted to the initial 1932 assessments with a valid entry for antipsychotic use. A subsample of 1540 residents were reassessed with the quarterly assessment approximately 100 days after the initial assessment, with valid entry for antipsychotic use at time 1 (T1) and time 2 (T2). This constituted the longitudinal sample in Ontario.

The Swiss nursing home data were derived from the Swiss version of the MDS 2.0, collected routinely in nursing homes every 6 months. The Swiss cross-sectional sample was restricted to non-admission assessments to reflect practice patterns of nursing homes. It comprised 1536 full assessments, collected between January 1999 and December 2002 in 4 nursing homes. The Swiss time frame was larger to increase sample size. If more than one assessment was available for a resident, the first one to appear in the dataset was chosen. Longitudinal data in Switzerland consisted of a subsample of 1175 residents who were reassessed approximately 156 days after the initial assessment, with valid entry for antipsychotic use at time 1 and time 2. Due to data protection regulations, resident's date of birth and date of entry in nursing homes were not provided in the Swiss dataset.

4.3. Patterns of Antipsychotic Use

The dependent and independent variables and the analytic approach used to address the research questions pertaining to the first purpose of the study are described in this section.

4.3.1. Operational Definition of Variables

The dependent variable is antipsychotic use. The independent variables were included for descriptive purpose and/or as possible correlates of antipsychotic use based on available literature. The corresponding item in the MDS is indicated in brackets for reference in the assessment form.

Antipsychotic use

Antipsychotic use is recorded in the MDS 2.0 as the number of days the resident received antipsychotic medication within the last 7 days of assessment (O4a). Values range from 0 to 7, where 1 may represent long-acting medication used less than weekly. Since this study was interested in whether the resident is received antipsychotics or not, the variable was treated dichotomously: use (O4a≥1) or no use (O4a=0).

Demographic variables

Age is computed in the MDS 2.0 by subtracting the date of birth (AA3a) from the date of assessment (A3) and dividing it by 365.25 to convert to years. Similarly, length of stay (LOS) is computed by subtracting the date of entry (AB1) from the date of assessment (A3) and dividing it by 365.25 to convert in years. Age and LOS are continuous variables, but were categorized for the multivariate analyses. Age and LOS were unavailable in the Swiss dataset. Gender (AA2) was also included for descriptive and analytic purposes.

Diagnoses and health condition variables

Diagnoses and health conditions were of interest for descriptive purposes and as possible determinants of antipsychotic use. The neurological diagnoses of Alzheimer's disease (I1q) and other types of dementia (I1u) were collapsed into one item. The following psychiatric/mood disorders were examined: anxiety disorder (I1dd), depression (I1ee), manic depressive (bipolar disorder) (I1ff), and schizophrenia (I1gg). Finally, symptoms of delusions (J1e) and hallucinations (J1i) were also included in the analyses. These items are all dichotomously coded in the MDS.

Behavioural variables

The MDS assesses behavioural symptoms by measuring the frequency of 5 types of behaviour within the last 7 days of assessment: wandering (E4aA), verbally abusive (E4bA), physically abusive (E4cA), socially inappropriate or disruptive (E4dA), and resisting care (uncooperativeness) (E4eA). These items are ordinal variables varying between 0 (behaviour not exhibited in last 7 days), 1 (behaviour occurred on 1 to 3 days in the last 7), 2 (behaviour occurred on 4 to 6 days in the last 7) and 3 (behaviour occurs daily). Since we were interested in whether the resident displayed the behaviour or not, all 5 variables were recoded dichotomously as behaviour not exhibited (0) or exhibited at least once within the last 7 days (1).

A summary measure of aggressive behaviour was also examined for descriptive purposes using the Aggressive Behaviour Scale (ABS) based on the addition of 4 behavioural items: verbally abusive, physically abusive, socially inappropriate, and resisting care behaviour. This scale measures the degree of severity of psychotic and behavioural problems, with scores ranging from 0 to 12. Those with the highest scores are residents who are verbally and physically abusive, socially inappropriate, and resisting care daily. Residents exhibiting at least one of the above behaviours, but less than daily, will have lower scores. The ABS was categorized into none (score of 0), mild (scores between 1 and 4) and severe (scores above 5) aggressive behaviour. This summary variable was not introduced in the multivariate model, as we were interested in identifying the type of behavioural symptoms for which antipsychotics were administered.

The presence of repetitive physical movement such as restlessness and fidgeting within the last 30 days of assessment (E1n), and the presence of insomnia or sleep disturbance within the last 30 days of assessment (E1k) were included in the analyses as a dichotomous variable.

Social engagement and symptoms of depression were also included in the analyses. The Index of Social Engagement (ISE) is a summary measure of 6 items (F1a, F1b, F1c, F1d, F1e and F1f). The ISE ranges from 0 (no social engagement) to 6 (high level of social engagement) and has shown good inter-

rater reliability (Sgadari et al., 1997). This item was collapsed into no social engagement (score of 0), low (scores of 1 and 2) and high (scores between 3 and 6) levels of social engagement. This item is not present in the quarterly assessments. The Depression Rating Scale (DRS) measures depression symptoms, based on the sum of 7 items (E1a, E1d, E1f, E1h, E1l and E1m). The scale ranges from 0 to 14 and was categorized into no symptoms (score of 0), minor symptoms (scores of 1 and 2) and major symptoms (scores of 3 and above). Its' criterion validity was previously established in comparison to other scales (Burrows et al., 2000).

Physical functioning variables

Physical functioning was measured with the embedded ADL Self-Performance Hierarchy (ADLH) scale. The ADLH measures residents' stage of disablement based on four items treating early and later loss differently: early loss of personal hygiene (G1jA), middle loss of toileting and toilet use (G1iA), middle loss of movement and locomotion (G1eA) and late loss of eating (G1hA). The scale ranges from 0 (independent) to 6 (total dependence) and has shown strong reliability (Morris, Fries & Morris, 1999; Canadian Collaborating Centre-InterRAI, 2003). It was categorized for the analyses into none (score of 0), mild (scores of 1 and 2), moderate (scores of 3 and 4) and severe (scores of 5 and 6) impairment.

Cognitive variables

Residents' cognitive status was measured with the Cognitive Performance Scale (CPS). The CPS is computed with the addition of five items: whether the resident is comatose (B1), short term memory (B2a), cognitive skills for daily decision making (B4), ability to be understood by others (C4), and self-performance in eating (G1hA) (Canadian Collaborating Centre-InterRAI, 2003). The CPS scores range from 0 (intact cognition) to 6 (very severe impairment). The CPS has been validated against the Mini-Mental State Exam and the Test for Severe Impairment, and has shown strong reliability in nursing home populations (Morris et al., 1994; Hartmaier, Sloane, Guess & Koch, 1995; Gambassi et al, 2000). The CPS was categorized as none (score of 0), mild (scores of 1 and 2), moderate (score of 3), severe (scores of 4 and 5) and very severe impairment (score of 6).

Other medications, restraints and special care

Antianxiety drug use (O4b), antidepressant use (O4c), and hypnotic use (O4d) are coded in the MDS 2.0 in the same manner as antipsychotic drugs and were treated dichotomously. Antianxiety and hypnotic drugs were collapsed, as the same medication (recorded according to the class in the MDS) can be used as anxiolytic or hypnotic.

The MDS assesses restraint use with different categories: the use of bed rails (P4a and P4b) and chairs preventing rising (P4e), trunk (P4c) and limb restraint (P4c) within the last 7 days of assessment. These dichotomized variables were included for descriptive and analytic purposes.

Whether the resident received a special symptom evaluation program in the last 7 days (P2a), and an evaluation by a licensed mental health specialist in the last 90 days (P2b) were included as potential determinants in the analyses. Whether the resident's environment was changed to address mood or behaviour patterns - such as providing a room where to rummage – (P2d), and whether the resident was in an Alzheimer's or dementia special care unit (P1aN) within the last 7 days of assessment were also included. These segregated units address the specific needs of cognitively impaired residents, who may or may not have a specific diagnosis of Alzheimer's disease, in a supportive environment.

Finally, the average case-mix index (CMI) was computed for descriptive purposes. The CMI is a summary measure associated with the RUG-III classification system of residents for funding purposes, based on clinical characteristics such as cognitive status, behaviour patterns, the amount of assistance required for activities of daily living (Fries et al., 1994). The CMI measures the relative utilization of care resources compared to a defined standard and provides an indication of required care. A higher average CMI would indicate a heavier case-mix of residents. The CMI system in Ontario (Hirdes, Botz, Kozak & Lepp, 1996) was applied to the Swiss dataset to allow international comparisons.

4.3.2. Cross-sectional Data Analyses

The subsequent analyses were based on the cross-sectional samples. Longitudinal samples were used to compute incidence and cessation rates. Datasets were assessed for missing values and coding errors.

Question 1: *What are the general characteristics of residents in Ontario and Switzerland?*

Univariate analyses (mean, standard deviation, N, frequency/proportions) were generated to describe the two samples separately on the following demographic and clinical characteristics: age, gender, and LOS; diagnoses and health conditions; behaviours characteristics; ADL and cognitive functioning; medications and restraint use; and special care.

International comparison: *Are there significant differences in the general characteristics of nursing home residents between Ontario and Switzerland?*

Each variable from question 1 was compared between the two samples to examine whether the differences in mean or proportion are statistically significant using the Student t-test for continuous variables and the chi-square (χ^2) test for categorical variables.

Question 2: *What is the prevalence of antipsychotic use in Ontario and Switzerland among all residents and among residents with appropriate, potentially appropriate, and inappropriate indications?*

The prevalence of antipsychotic use in each dataset was computed by running frequency tables of antipsychotic use among all residents first: only including in the denominator residents with appropriate indications (schizophrenia and hallucinations); excluding from the denominator the residents with appropriate indications and only including the residents with potentially appropriate indications (dementia or cognitive impairment associated with being verbally abusive or physically abusive or socially inappropriate); and excluding from the denominator the residents with appropriate and potentially appropriate indications. These risk-adjusted prevalence rates were based on the criteria

defined by Zimmerman and colleagues (1995). Finally, the range of the rate of antipsychotic use by nursing homes within each country was computed.

The initiation and cessation of antipsychotic use was also investigated for exploratory purposes, using the longitudinal sample. The proportion of individuals who initiated, stopped or continued taking antipsychotics between T1 and T2 was computed by running a frequency table between antipsychotic use at T1 and T2.

International comparison: *Is there a significant difference in the prevalence of antipsychotic use between Ontario and Switzerland?*

Chi square (χ^2) tests were generated to assess differences between the two independent proportions of antipsychotic use, among all residents and for each denominator.

Question 3: *What are the determinants of antipsychotic use in Ontario and Switzerland?*

Bivariate and multivariate analyses were performed to examine what characteristics determined antipsychotic use in the two samples separately. Bivariate analyses were carried out to determine variables to be included in multivariate analyses. The association between antipsychotic use and all categorical independent variables were assessed with the chi-square statistic. Crude odds ratios were also generated. Logistic regression analysis was then performed by running the full model with all variables and selecting the best-fitted model through backward selection procedure. The final model included variables with significant regression coefficients at the 0.05 level or deemed to be important to warrant goodness-of-fit. Interaction terms were created, introduced in the model and retained if significant. Finally, adjusted odds ratios were computed.

International comparison: *Do the determinants differ between Ontario and Switzerland?*

The two equations were compared without running statistical tests.

4.4. Behavioural Outcomes of Antipsychotic Use

The dependent and independent variables and the analytic approach to address the research questions pertaining to the second purpose of the study are described in this section.

4.4.1. Operational Definition of Longitudinal Variables

Twenty-four situations of change in resident behaviour were investigated as outcome variables in each sample separately, resulting in 24 models with 24 different dependent variables. Residents who did not change were not of primary interest in this study.

First, the initiation and cessation of the 5 behavioural symptoms – wandering, verbally abusive, physically abusive, socially inappropriate, and resisting care – and the initiation and cessation of aggressive behaviour in general were investigated as 12 separate outcome variables. Residents initiated the behaviour of interest when they displayed the behaviour at T2 but not at T1 and stopped the behaviour of interest when they displayed the behaviour at T1 but not at T2.

Second, the improvement and deterioration of the 5 behaviours listed above and aggressive behaviour in general were explored as 12 other outcome variables. Residents improved in the behaviour of interest when they displayed the behaviour less frequently at T2 than at T1. Residents deteriorated in the behaviour of interest when they displayed the behaviour more frequently at T2 than at T1.

Antipsychotic use at T1 was the primary independent variable of interest, as the study's aim was to investigate behavioural changes associated with their use. In order to ensure that behavioural changes were not due to changes in antipsychotic use, residents who initiated or stopped receiving antipsychotic at T2 were excluded from the bivariate and multivariate analyses.

The following risk factors for disruptive behaviours measured at T1 were considered as potential confounding variables for all predicting models: gender, age and LOS (for Ontario only); behaviours (wandering, verbally abusive, physically abusive, socially inappropriate and resisting care); depression measured with the categorized DRS; social engagement measured with the categorized ISE; physical

functioning measured with the ADLH scale categorized into mild (0-2), moderate (3-4) and severe (5-6) impairment; cognition measured with CPS and categorized as mild (0-1), moderate (2-3), and severe (4-6) cognitive impairment; several diagnoses (dementia, anxiety disorder, depression) and the number of active diagnoses; delusions and hallucinations; incontinence (bowel and bladder); medications (antianxiety, antidepressant, hypnotic) and number of medications received; and restraints (full bed rail, half bed rail, trunk, chair). Pain was also included measured with the embedded pain scale. It ranges from 0 to 3 and was categorized into no pain (0), mild pain (1), and severe pain (2 and 3). Finally, whether the resident received a behaviour intervention (item P2a, P2b and P2d) was also included.

4.4.2. Longitudinal Data Analyses

The subsequent analyses were based on the longitudinal samples. The analytic approach is presented for the two research questions combined. The two datasets were not collapsed for the investigation of outcomes because of the large differences in resident characteristics.

Question 5 and 6: *Does antipsychotic use predict the initiation, the cessation, the improvement and/or the cessation of the following behaviours: wandering, verbally abusive, physically abusive, socially inappropriate, resisting care, and aggressive behaviour?*

Descriptive statistics were conducted first to determine the proportion of residents who initiated and stopped displaying the behaviour, and the proportion of residents who improved, did not change, and deteriorated in the behaviour of interest.

Residents displaying the behaviour of interest at T1 were excluded from the sample for incidence models, whereas only residents displaying the behaviour of interest at T1 were included in the sample for the cessation model. Consequently, the sample size for incidence models was larger than for cessation models. The initiation and cessation rates between the 2 assessments were calculated as follows:

$$\text{Initiation} = \frac{\textit{Number of residents with behaviour at } T2 \textit{ but not at } T1}{\textit{Number of residents without behaviour at } T1}$$

$$\text{Cessation} = \frac{\textit{Number of residents with behaviour at } T1 \textit{ but not at } T2}{\textit{Number of residents with behaviour at } T1}$$

The baseline sample for the improvement and deterioration models consisted of residents displaying the behaviour at T1.Residents not displaying the behaviour at baseline were excluded. The improvement and deterioration rates between the 2 assessments were calculated as follows:

$$\text{Improvement} = \frac{\textit{Number of residents with score on behaviour at } T2 < \textit{score at } T1}{\textit{Number of residents with behaviour at } T1}$$

$$\text{Deterioration} = \frac{\textit{Number of residents with score on behaviour at } T2 > \textit{score at } T1}{\textit{Number of residents with behaviour at } T1}$$

Associations between the change in behaviour and antipsychotic use were assessed using the chi-square statistic. Only antipsychotic users at both times and non-users at both times were included in the sample. If antipsychotic use was associated with a behavioural change, the association between the change in behaviour and other confounding variables were investigated in bivariate analyses. Finally, logistic regression was conducted including antipsychotic use and other risk factors associated in bivariate analyses to predict behavioural change. Logistic regression was chosen as analytic method over Generalized Estimated Equations (GEE) method (used for data with repeated measures per subject) because computing change as the difference in scores resulted in an outcome variable that was no longer measured repeatedly. Also, the independent variables that were included in the model were only measured at T1.

5. CROSS-SECTIONAL RESULTS

The results on general characteristics are based on the full cross-sectional samples from nursing homes in Ontario (n=1961) and in Switzerland (n=1536). The results on the prevalence of antipsychotic use and characteristics associated with antipsychotic use are based on the Ontario sample with valid entry for antipsychotic use (n=1932) and the full Swiss sample (n=1536).

5.1. Resident Characteristics

Tables 1 and 2 present the general characteristics of the nursing home population in Ontario and Switzerland. Most characteristics differed at the 0.05 level in the international comparisons.

With regards to demographic variables, most residents were female in both samples. However, the sample in Ontario comprised a higher proportion of females (74%) than in Switzerland (64%) (p<.0001). In Ontario, the average age was 82.5 years and almost half the sample was over 85 years old. The average length of stay was 3 years and 10 months, and almost a third of the sample was in the nursing home for less than a year. The mean age and length of stay could not be computed in the Switzerland sample as these variables were unavailable. The case-mix index (CMI), based on the Ontario calculation, was lower in the Swiss sample than in Ontario (p<.0001).

Residents in Ontario were more cognitively impaired with a mean score of 3.13 compared to 2.76 in Switzerland (p<.0001), and more impaired in ADL with a mean score of 3.53 compared to 3.06 in Switzerland (p<.0001). Nursing homes in Ontario had a higher proportion of residents suffering from dementia (53%) than Switzerland (21%) (p<.0001). However, the proportion of residents in a dementia special care unit was similar (~9 %). A significantly higher proportion of residents received a behaviour symptom program and an evaluation by mental health specialist in Ontario than in Switzerland, while the environment was changed to address mood or behaviour problems for the same proportion of residents. A much higher proportion of residents had more than 5 diagnoses in the Ontario sample (p<.0001). Finally, Swiss residents had significantly lower levels of social engagement.

The distribution of psychiatric disorders was quite different. A higher proportion of Ontario residents suffered from anxiety disorder and schizophrenia compared to Swiss residents (p<.0001). The prevalence rates of depression, bipolar disorder, delusions and hallucinations were slightly higher in the Ontario sample than in the Swiss one, while the rate of depressive symptoms was similar and the rate of insomnia was slightly higher in the Swiss sample.

More residents in Ontario displayed wandering behaviour than in Switzerland, while the pattern of restless behaviour tended to be similar. Aggressive behaviours –verbally abusive, physically abusive, socially inappropriate and resisting care – were significantly more prevalent in the Ontario sample than in the Swiss one. Further, the rate of physically abusive and resisting care behaviour in the Ontario sample was twice the rate in the Swiss one. Thus, the mean score on the ABS was significantly higher in Ontario (2.41) than in Switzerland (1.17). Indeed, 37% of the residents in Switzerland exhibited at least one aggressive behaviour compared to 55% in Ontario, and only 12% exhibited severe aggressive behaviour compared to 26% in Ontario.

The proportion of residents receiving anxiolytics/hypnotics medications was similar (~24%), though most drugs were recorded as anxiolytics in Ontario and as hypnotics in Switzerland. The proportion of residents receiving antidepressants was similar (~29%). Finally, the use of full and half bed rails and chairs preventing rising was much more prevalent in Ontario than in Switzerland. The use of trunk restraint was low in both samples.

Table 1. Comparison of the mean of continuous variables in Ontario and in Switzerland[1]

	Ontario			Switzerland			
Variable	**N**	**mean**	**SD**	**N**	**Mean**	**SD**	p-value[a]
Age (yrs)	1960	82.53	9.78		not available		
LOS (yrs)	1949	3.86	5.32		not available		
CPS (0-6)	1961	3.13	2.07	1536	2.76	1.95	<.0001
ADL (0-6)	1956	3.53	1.82	1536	3.06	1.87	<.0001
ABS (0-12)	1956	2.41	3.14	1536	1.17	2.14	<.0001
CMI (0.46-1.63)	1961	0.75	0.19	1525	0.70	0.20	<.0001

a = p-value associated with t-test for differences in mean between 2 independent samples

[1] For all tables, abbreviations were used as follows: AP=Antipsychotic, ABS=Aggressive Behaviour Scale, AD=Alzheimer's disease, ADL=Activities of Daily Living, CMI=Case Mix Index, CPS=Cognitive Performance Scale, DRS=Depression Rating Scale, LOS=Length Of Stay, MH=Mental Health, OR=Odds Ratio, CI=Confidence Interval, SD=Standard Deviation, SE=Standard Error

Table 2. Comparison of the frequency and distribution of categorical variables in Ontario and in Switzerland

Variable	Ontario		Switzerland		*p*-value[a]
	Frequency	Percent	Frequency	Percent	
Gender					
Female	1457	74.49	984	64.06	<.0001
Male	499	25.51	552	35.94	
Age group					
<65	101	5.15	not available		
65-74	270	13.77			
75-84	707	36.05			
85+	883	45.03			
LOS (years)					
< 1 yr	596	31.04	not available		
1-3 yrs	571	29.74			
3-5 yrs	284	14.79			
5+ yrs	469	24.43			
Cognitive impairment (CPS)					
None *0*	316	16.11	262	17.06	<.0001
Mild *1-2*	379	19.33	400	26.04	
Moderate *3*	459	23.41	376	24.48	
Severe *4-5*	492	25.09	356	23.18	
Very severe *6*	315	16.06	142	9.24	
Physical impairment (ADL)					
None *0*	181	9.25	194	12.63	<.0001
Mild *1-2*	272	13.91	370	24.09	
Moderate *3-4*	799	40.85	505	32.88	
Severe *5-6*	704	35.99	467	30.40	
Diagnoses					
Dementia / AD	1010	52.77	315	20.51	<.0001
Anxiety disorder	95	5.02	11	0.72	<.0001
Depression	332	17.18	240	15.63	0.2191
Bipolar disorder	36	1.86	22	1.43	0.3255
Schizophrenia	104	5.50	31	2.02	<.0001
Delusions	89	4.56	51	3.32	0.0642
Hallucinations	58	2.97	28	1.82	0.0299
# diagnoses (dx)					
1-2 dx	591	30.14	1043	67.90	<.0001
3-4 dx	727	37.07	311	20.25	
5+ dx	643	32.79	182	11.85	
Behavioural symptoms					
Wandering	384	19.69	262	17.06	0.0468
Verbally abusive	556	28.53	390	25.39	0.0387
Physically abusive	354	18.15	143	9.31	<.0001
Socially inappropriate	532	27.28	232	15.10	<.0001
Resisting care	818	42.01	284	18.49	<.0001
Restless	636	32.60	460	29.95	0.0942
Aggressive behaviour (ABS)					
None *0*	892	45.49	962	62.63	<.0001
Mild *1-4*	554	28.25	292	25.59	
Severe *5-12*	515	26.26	181	11.78	
Insomnia	286	14.67	252	16.41	0.1600

a = *p*-value associated with chi-square test for differences in proportions between 2 independent samples

Table 2. Comparison of the frequency and distribution of categorical variables in Ontario and in Switzerland (continued)

Variable	Ontario		Switzerland		*p*-value[a]
	Frequency	Percent	Frequency	Percent	
Social engagement					
None *0*	714	37.40	951	61.91	<.0001
Low level *1-2*	582	30.49	281	18.29	
High level *3-6*	613	32.11	304	19.79	
Depression (DRS)					
None *0*	717	36.94	546	35.64	0.2628
Minor *1-2*	628	32.35	536	34.99	
Major *3-14*	596	30.71	450	29.37	
Medication					
Antianxiety/Hypnotic	471	24.39	371	24.15	0.8711
Antidepressant	553	28.51	447	29.10	0.6997
Mood and behaviour intervention					
Behaviour symptom eval. prog.	71	3.71	9	0.59	<.0001
Evaluation by MH specialist	72	3.76	14	0.91	<.0001
Environmental changes	107	5.59	71	4.62	0.2027
Dementia Unit	172	8.80	141	9.18	0.6986
Restraint use					
Full bed rail	1125	58.05	439	28.58	<.0001
Half bed rail	529	27.38	316	20.57	<.0001
Trunk	83	4.31	66	4.30	0.9881
Chair	513	26.61	106	6.90	<.0001

a = *p*-value associated with chi-square test for differences in proportions between 2 independent samples

5.2. Prevalence of Antipsychotic Use

Table 3 presents the distribution of antipsychotic administration within the last 7 days of assessment in the 2 samples. In both settings, antipsychotics were mostly administered on a daily basis. The aggregated pattern of antipsychotic administration was significantly different and indicated that 29.5% of the Swiss sample received antipsychotics versus 25% of the Ontario sample.

Table 3. Comparison of the prevalence of antipsychotic use in Ontario and in Switzerland

# of days of antipsychotic administration	**Ontario** (N = 1932)		**Switzerland** (N = 1536)		*p*-value[a]
	Frequency	Percent	Frequency	Percent	
0	1451	75.10	1083	70.51	
1	26	1.35	27	1.76	
2	3	0.16	3	0.20	
3	4	0.21	1	0.07	
4	2	0.10	1	0.07	
5	1	0.05	1	0.07	
6	3	0.16	0	0	
7	442	22.88	420	24.34	
Antipsychotic use					
Yes	481	24.90	453	29.49	0.0024
No	1451	75.10	1083	70.51	

a = *p*-value associated with chi-square test for differences in proportions between 2 independent samples

When examining the use of antipsychotics by nursing homes in Switzerland, the prevalence rate varied from 23% (nursing home #1) to 34% (nursing home #2) (p<.0.01). The rate varied even more between nursing homes in the Ontario dataset, from 12% to 47% (p<.0001). However, the number of assessments per nursing home varied greatly as well, limiting the validity of this relationship.

Table 4 presents the prevalence of antipsychotics by appropriateness of use. Antipsychotics were prescribed to 62% and 65% of the residents with conditions appropriate for antipsychotic prescription in a similar pattern in the Ontario and Swiss sample respectively. Among potentially appropriate residents, the proportion of users was larger in Switzerland (42%) than in Ontario (37%), though the difference was not significant (p=0.1616). However, among potentially inappropriate residents, the proportion of users was significantly higher in Switzerland (24.5%) than in Ontario (14%) (p <.0001).

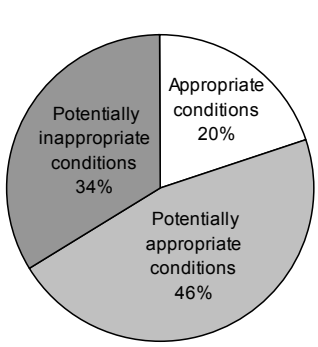
Table 4. Comparison of the prevalence of antipsychotic use by appropriateness in Ontario and Switzerland

Appropriateness	Ontario			Switzerland		
	N	# receiving AP	% receiving AP	N	# receiving AP	% receiving AP
Appropriate[a]	150	93	62.00	55	36	65.45
Potentially appropriate[b]	568	211	37.15	337	141	41.84
Potentially inappropriate[c]	1128	157	13.92	1122	275	24.51‡
Total[d]	1912*	479	25.05	1514	452	29.85†

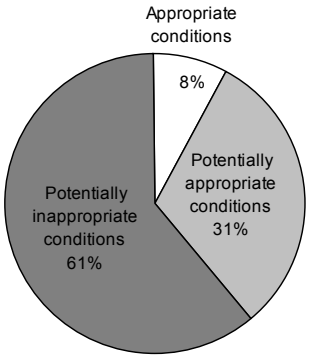
Note: appropriateness based on criteria defined by Zimmerman et al. (1995). See section 2.3.2 for further details.
a Residents with schizophrenia or hallucinations.
b Residents with dementia or cognitive impairment, associated with being verbally or physically abusive or socially inappropriate. Appropriate residents excluded.
c Appropriate and potentially appropriate residents excluded.
d Residents with end-stage disease and in hospice care excluded from all analyses.
*The total differs from the addition of the 3 categories due to missing variables
† p <.005 ‡ p <.0001

Figure 1 displays the distribution of appropriateness among antipsychotic users separately in the two countries. In Ontario, 20% of users had an appropriate condition, 46% had potentially appropriate conditions, and 34% had potentially inappropriate conditions. In Switzerland, less than 10% of users had appropriate conditions, 31% had potentially appropriate conditions, and 61% of users had potentially inappropriate indications.

Figure 1. Distribution of appropriateness among antipsychotics users in Ontario and Switzerland



AP users in Ontario

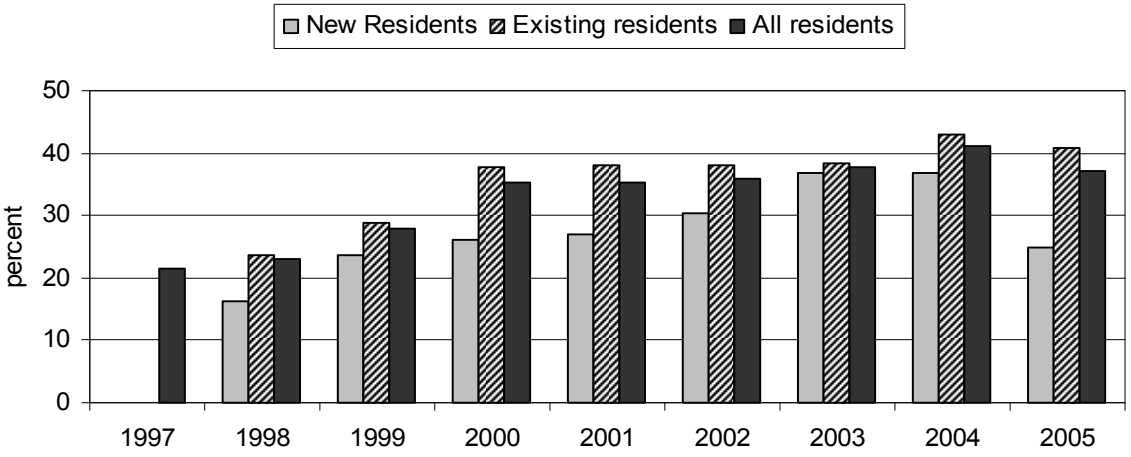


AP users in Switzerland

5.2.1. Cross-sectional Time Series of Antipsychotic Use in Switzerland

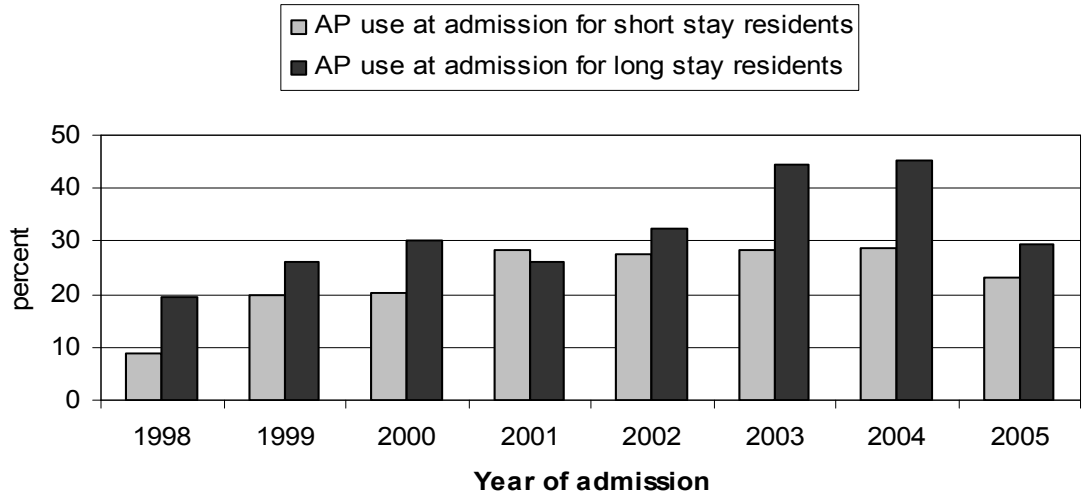
The time-frame of the Swiss dataset allowed for further analysis of the pattern of antipsychotic use based on the entire Swiss dataset (assessments from 1997 to 2005), described in tables 1 and 2 in Appendix F. The prevalence of antipsychotic administration was examined by fiscal year of assessment. Figure 2 presents the rate of antipsychotic administration for newly admitted residents (based on admission assessments completed within 14 days of entry), existing residents (based on non-admission assessments) and all residents, by year. The rate of antipsychotic administration for new residents was lower than the rate in existing residents for each year. Both rates increased over time, with a peak in 2004 where 37% of new residents and 43% of existing residents were administered antipsychotics (range by nursing home: 33% to 49%). The rate in existing residents decreased slightly in 2005, while the rate in new residents dropped to 25% in 2005.

Figure 2. Prevalence of antipsychotic use for new, existing, and all residents by fiscal year in Switzerland



The prevalence rate of antipsychotic use at admission for short stay residents, who were discharged before a second assessment (stay under 5 months), was lower than for long stay residents, who remained in a nursing home at least until second assessment (stay over 5 months), as shown in figure 3. The rate at admission for short stay residents increased slightly over time, whereas the rate for long stay residents increased considerably, especially between 2002 and 2003.

Figure 3. Prevalence of antipsychotic use at admission assessment for short stay and long stay residents by fiscal year of admission in Switzerland



5.3. Characteristics Associated with Antipsychotic Use

5.3.1. Bivariate Analyses

Table 5 displays the prevalence of antipsychotic use by demographic variables, as well as crude odds ratios - unadjusted for other independent variables - with *p*-values associated with the chi-square test from bivariate analyses in the Ontario and Swiss samples separately. Gender was not associated with antipsychotic use, though it was more prevalent among males than females in both samples. Age was significantly associated with antipsychotic use in Ontario (p=.0004) as residents over 85 years old were two times less likely to receive antipsychotics compared to residents under 65. In the Ontario sample, the relationship between antipsychotic use and categories of length of stay was U-shaped (p=0.0062), where the prevalence rates among residents with shorter (<1 yr) and longer (5+ yrs) stays were higher than residents with lengths of stay between 1 and 5 years.

Table 5. Prevalence of antipsychotic use by demographic variables, crude OR and 95% CI, and p-values from bivariate analyses in Ontario and Switzerland

Variable	Ontario			Switzerland		
	AP use (%)	**Crude OR (95%CI)**	***p*-value**	**AP use** (%)	**Crude OR (95%CI)**	***p*-value**
Gender						
Female	24.34	1.00	0.3224	28.35	1.00	0.1914
Male	26.57	1.12 (0.89-1.43)		31.52	1.16 (0.93-1.46)	
Age (yrs)						
<65	33.66	1.00[a]	0.0004		not available	
65-74	26.59	0.71 (0.44-1.17)				
75-84	28.45	0.78 (0.5-1.22)				
85+	20.51	0.51 (0.33-0.79)				
LOS (yrs)						
<1	25.66	1.00[a]	0.0062		not available	
1-3	22.07	0.83 (0.64-1.09)				
3-5	20.42	0.76 (0.54-1.07)				
≥5	30.06	1.27 (0.97-1.66)				

a: reference category

Table 6 presents the prevalence of antipsychotic use by clinical and behavioural characteristics as well as crude odds ratios with *p*-values associated with the chi-square test from bivariate analyses in the Ontario and Swiss samples separately. In both settings, dementia was significantly associated with receiving antipsychotics, especially in Switzerland where residents suffering from dementia were

almost three times more likely to receive antipsychotics. The prevalence of antipsychotic use was significantly higher among residents with anxiety disorder in the Ontario sample ($p<.0001$). Cases of anxiety disorders in the Swiss dataset were insufficient to make any inferences. Suffering from bipolar disorder, schizophrenia, delusions and hallucinations were all significantly associated with receiving antipsychotics in both samples.

In Ontario and Switzerland, residents displaying wandering behaviour, being verbally abusive, physically abusive, socially inappropriate, resisting care, and being restless were all significantly more likely to receive antipsychotics than those without these symptoms. Suffering from insomnia was significantly associated with receiving antipsychotics in both samples ($p<.0001$). In Ontario, residents with higher levels of social engagement had a significantly lower prevalence rate than residents less involved. The relationship was not significant in Switzerland, though residents highly involved had lower rates of antipsychotic use. A diagnosis of depression was not associated with antipsychotics in the Ontario sample ($p=.1212$), while mildly associated in the Swiss sample ($p=.0838$). However, when measuring depression using the DRS, the relationship became significant in both samples ($p<.0001$): residents suffering from depression were more likely to receive antipsychotics. Finally, in both samples, the rate of antipsychotic use was higher among residents with physical impairment compared to residents with no impairment, especially for residents with mild and moderate physical impairment.

The prevalence rates of antipsychotic use among residents receiving antianxiety or hypnotic drugs, and antidepressants were higher than those not receiving these drugs in both samples, but the relationships were only significant in the Ontario sample. In Ontario, residents with full bed rails were significantly less likely to receive antipsychotics. On the other hand, residents with half bed rails and chairs preventing rising had a higher prevalence rate of antipsychotic use. In Switzerland, residents with half bed rails had greater odds of receiving antipsychotics. Trunk restraint was not associated with receiving antipsychotics in either country. In both settings, residents who received environmental changes and were in a dementia special care unit were significantly more likely to receive

antipsychotics than residents not receiving those types of care (p<.0001). In Ontario, an evaluation by a mental health specialist was also associated with receiving antipsychotics.

Table 6. Prevalence of antipsychotic use by clinical and behavioural variables, with crude OR, 95% CI, and p-values from bivariate analyses in Ontario and Switzerland

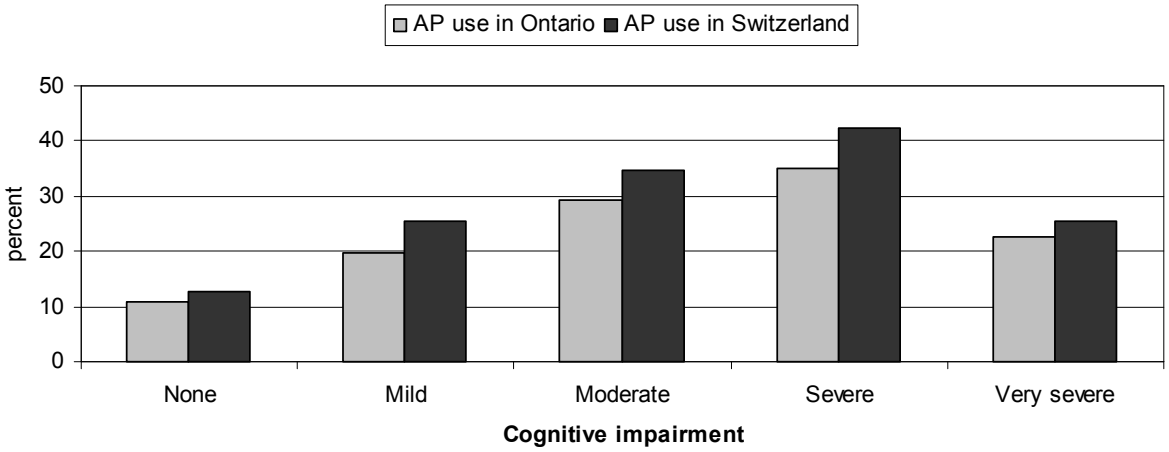
Variable	Ontario			Switzerland		
	AP use (%)	Crude OR (95%CI)	*p*-value[a]	AP use (%)	Crude OR (95%CI)	*p*-value[a]
Diagnoses						
Dementia/AD						
No	19.73	1.00	<.0001	24.73	1.00	<.0001
Yes	29.07	1.67 (1.35-2.07)		47.94	2.80 (2.17-3.62)	
Anxiety disorder						
No	23.81	1.00	<.0001		insufficient cases	
Yes	42.55	2.37 (1.55-3.62)				
Depression						
No	24.23	not significant	0.1212	28.63	1.00	0.0838
Yes	28.31			34.17	1.29 (0.97-1.73)	
Bipolar disorder						
No	24.06	1.00	<.0001	28.93	1.00	<.0001
Yes	69.44	7.17 (3.50-14.69)		68.18	5.26 (2.13-13.00)	
Schizophrenia						
No	21.95	1.00	<.0001	28.44	1.00	<.0001
Yes	72.82	9.52 (6.08-14.91)		80.65	10.48 (4.27-25.73)	
Delusions						
No	23.78	1.00	<.0001	28.35	1.00	<.0001
Yes	48.86	3.06 (1.99-4.72)		62.75	4.26 (2.39-7.59)	
Hallucinations						
No	24.25	1.00	<.0001	29.11	1.00	0.0163
Yes	46.55	2.72 (1.61-4.61)		50.00	2.43 (1.15-5.15)	
Behaviour						
Wandering						
No	20.73	1.00	<.0001	25.43	1.00	<.0001
Yes	41.88	2.76 (2.17-3.5)		49.24	2.84 (2.16-3.74)	
Verbally abusive						
No	19.69	1.00	<.0001	26.00	1.00	<.0001
Yes	38.07	2.51 (2.02-3.12)		39.74	1.88 (1.47-2.39)	
Physically abusive						
No	20.59	1.00	<.0001	28.07	1.00	0.0001
Yes	44.32	3.07 (2.41-3.92)		43.36	1.96 (1.38-2.79)	
Soc. inappropriate						
No	18.42	1.00	<.0001	26.84	1.00	<.0001
Yes	42.21	3.23 (2.60-4.03)		44.40	2.18 (1.63-2.90)	
Resisting care						
No	19.21	1.00	<.0001	27.00	1.00	<.0001
Yes	32.88	2.06 (1.67-2.54)		40.49	1.84 (1.41-2.40)	
Restless						
No	19.07	1.00	<.0001	21.65	1.00	<.0001
Yes	36.97	2.49 (2.01-3.08)		47.83	3.32 (2.63-4.19)	
Insomnia						
No	22.94	1.00	<.0001	27.18	1.00	<.0001
Yes	35.94	1.88 (1.44-2.47)		41.27	1.88 (1.42-2.49)	

Table 6. Prevalence of antipsychotic use by clinical and behavioural variables, with crude OR, 95% CI, and p-values from bivariate analyses in Ontario and Switzerland (continued)

Variable	Ontario			Switzerland		
	AP use (%)	Crude OR (95%CI)	*p*-value[a]	AP use (%)	Crude OR (95%CI)	*p*-value[a]
Social engagement						
None *0*	31.06	1.00	<.0001	29.65	not significant	0.3559
Low level *1-2*	25.13	0.74 (0.58-0.95)		32.03		
High level *3-6*	17.06	0.46 (0.35-0.0)		26.64		
Depression (DRS)						
None *0*	16.03	1.00	<.0001	22.89	1.00	<.0001
Minor *1-2*	21.75	1.46 (1.10-1.92)		30.60	1.48 (1.13-1.95)	
Major *3-14*	38.92	3.34 (2.57-4.33)		36.44	1.93 (1.40-2.55)	
Phys. impairment (ADL)						
None *0*	18.75	1.00	0.0353	24.23	1.00	0.0048
Mild *1-2*	25.09	1.45 (0.91-2.32)		28.11	1.22(0.82-1.82)	
Moderate *3-4*	27.83	1.67 (1.11-2.51)		35.25	1.70 (1.17-2.48)	
Severe *5-6*	22.96	1.29 (0.85-1.96)		26.55	1.13 (0.77-1.67)	
Medication						
Antianxiety/Hypnotic						
No	21.54	1.00	<.0001	29.44	1.00	0.9391
Yes	34.91	1.95 (1.56-2.45)		29.65	1.01 (0.78-1.309	
Antidepressant						
No	22.57	1.00	0.0003	28.19	1.00	0.0809
Yes	30.43	1.5 (1.20-1.87)		32.66	1.24 (0.97-1.57)	
Behaviour intervention						
Behav. program						
No	24.49	not significant	0.1869		insufficient cases	
Yes	31.43					
MH specialist						
No	23.35	1.00	<.0001		insufficient cases	
Yes	61.76	5.30 (3.21-8.75)				
Environment change						
No	23.68	1.00	<.0001	28.26	1.00	<.0001
Yes	42.06	2.34 (1.57-3.49)		54.93	3.09 (1.91-5.01)	
Dementia Unit						
No	23.09	1.00	<.0001	27.03	1.00	<.0001
Yes	43.27	2.54 (1.84-3.51)		53.90	3.16 (2.22-4.49)	
Restraint use						
Full bed rail						
No	27.67	1.00	0.0163	29.81	not significant	0.6673
Yes	22.86	0.77 (0.63-0.95)		28.58		
Half bed rail						
No	23.78	1.00	0.0743	27.95	1.00	0.0092
Yes	27.75	1.23 (0.98-1.55)		35.44	1.42 (1.09-1.84)	
Trunk						
No	24.9	not significant	0.92	29.18	not significant	0.2108
Yes	24.39			36.36		
Chair						
No	23.73	1.00	0.0757	30.00	not significant	0.1088
Yes	27.7	1.23 (0.98-1.55)		22.64		

As shown in figure 4, greater cognitive impairment was significantly associated with greater prevalence rates of antipsychotic use in both samples (p<.0001 in Ontario Switzerland), while the prevalence rate decreased among residents with very severe cognitive impairment.

Figure 4. Prevalence of antipsychotic use by cognitive impairment in Ontario and Switzerland



5.3.2. Multivariate Analyses

Table 7 displays the results of logistic regression analyses examining characteristics independently associated with the use of antipsychotics in the Ontario and Swiss sample separately. Variables that failed to reach significance were excluded to produce a more parsimonious and better fitting model. In the Ontario sample, 16 variables were included in the multivariate model and 14 variables were statistically significant at the 0.05 level. In the Swiss sample, 10 variables were included in the model and 8 were statistically significant at the 0.05 level.

Four factors were found to be common determinants in the two samples. The psychiatric diagnoses of schizophrenia and bipolar disorder were the strongest determinants of antipsychotic use in the two datasets. Cognitive impairment was also among the most significant factors linked to antipsychotic use in the two samples. Cognitively impaired resident were between 1.7 and 2.8 times more likely to receive antipsychotics. Finally, dementia was a significant determinant in the Swiss sample (OR=2.18, CI 1.64-2.9), while mildly associated with antipsychotic use in the Ontario sample (OR=1.32, CI 0.97-1.81). All other factors differed between the two samples.

In the Ontario sample, residents with symptoms of depression (measured with the DRS) were almost three times more likely to be administered antipsychotics compared to non-depressed residents. Residents displaying wandering (OR=1.47, CI 1.07-2.04), physically abusive (OR=1.87, CI 1.36-2.56) and inappropriate behaviours (OR=1.46, CI 1.08-1.96) were more likely to receive antipsychotics then those without these behavioural symptoms. Having an anxiety disorder (OR=1.75, CI 1.06-2.90), as well as receiving anxiolytics or hypnotics (OR=1.52, CI 1.14-2.03), was associated with receiving antipsychotics. Residents who were in a dementia care unit (OR=1.69, CI 1.14-2.51) and who received an evaluation by a mental health specialist (OR=2.43, CI 1.32-4.65) had greater odds of receiving antipsychotics compared to residents not receiving such care. Residents with full bed rails were less likely to receive antipsychotics (OR=0.74, CI 0.54-1.00). By contrast, residents with chairs preventing rising were more likely to receive antipsychotics (OR=1.38, CI 1.00-1.91). Finally, age and a length of stay between 1 and 5 years were inversely associated with antipsychotic use. For instance, the odds of receiving antipsychotics for residents under 65 were twice the odds of residents over 85.

In the Swiss dataset, delusions (OR=2.49, CI 1.31-4.71), restlessness (OR=2.36, CI 1.78-3.13), insomnia (OR=1.51, CI 1.10-2.06), half bed rails (OR=1.51, CI 1.13-2.02), and being in the nursing home #2 (OR=1.45, CI 1.01-2.08) were significant determinants for antipsychotic use. ADL impairment was the only protective factor against antipsychotic use, as residents severely impaired in ADL were less likely to receive antipsychotics compared to residents not impaired. Finally, neither specific behavioural variables nor aggressive behaviour were statistically significant determinants for antipsychotic use.

Gender did not emerge as a statistically significant determinant in either dataset neither did hallucinations, verbally abusive and resisting care behaviours, the diagnosis of depression and antidepressant use.

Table 7. Characteristics concurrently associated with antipsychotic use: results of logistic regression analysis in Ontario and Switzerland

	Ontario			Switzerland		
Variables	**Parameter estimate (SE)**	***p*-value**	**Adjusted OR (95% CI)**	**Parameter estimate (SE)**	***p*-value**	**Adjusted OR (95% CI)**
Intercept	-2.41 (0.36)			-2.13 (0.25)		
Bipolar disorder	2.17 (0.44)	<.0001	8.76 (3.68-20.84)	1.25 (0.50)	0.0126	3.49 (1.31-9.31)
Schizophrenia	2.67 (0.28)	<.0001	14.47 (8.35-25.05)	2.15 (0.48)	<.0001	8.55 (3.32-21.99)
CPS						
- Mild vs none	0.62 (0.27)	0.0234	1.85 (1.09-3.16)	0.63 (0.23)	0.0069	1.96 (1.19-2.99)
- Moderate vs none	1.00 (0.27)	0.0003	2.69 (1.57-4.61)	0.88 (0.24)	0.0003	2.41 (1.49-3.90)
- Severe vs none	1.05 (0.29)	0.0003	2.84 (1.61-5.01)	1.00 (0.26)	0.0001	2.71 (1.62-4.52)
-Very severe vs none	0.90 (0.32)	0.0053	2.45 (1.30-4.60)	0.47 (0.34)	0.1717	1.59 (0.82-3.12)
Dementia	0.28 (0.16)	0.0835	1.32 (0.97-1.81)	0.78 (0.14)	<.0001	2.18 (1.64-2.90)
Dementia unit	0.53 (0.20)	0.0090	1.69 (1.14-2.51)	not significant		
MH specialist	0.91 (0.32)	0.0047	2.43 (1.32-4.65)	not significant		
DRS						
- Minor vs none	0.11 (0.17)	0.4920	1.12 (0.81-1.55)	not significant		
- Major vs none	0.81 (0.17)	<.0001	2.24 (1.62-3.11)			
Anxiety disorder	0.56 (0.26)	0.0278	1.75 (1.06-2.90)	not significant		
Wandering	0.39 (0.17)	0.0190	1.47 (1.07-2.04)	not significant		
Physically abusive	0.62 (0.16)	0.0001	1.87 (1.36-2.56)	not significant		
Soc. inappropriate	0.38 (0.15)	0.0128	1.46 (1.08-1.96)	not significant		
Anxiolytic/hypnotic	0.42 (0.15)	0.0068	1.52 (1.14-2.03)	not significant		
Full bed rail	-0.31 (0.15)	0.0479	0.74 (0.54-1.00)	not significant		
Chair	0.32 (0.17)	0.0532	1.38 (1.00-1.91)	not significant		
Age						
- 65-75 vs <65	-0.50 (0.32)	0.1153	0.61 (0.33-1.13)	not available		
- 75-85 vs <65	-0.35 (0.28)	0.2220	0.71 (0.41-1.23)			
- 85+ vs <65	-0.69 (0.28)	0.0139	0.50 (0.29-0.87)			
LOS						
- 1-3yrs vs <1yr	-0.43 (0.16)	0.0090	0.65 (0.47-0.90)	not available		
- 3-5yrs vs <1yr	-0.71 (0.22)	0.0011	0.49 (0.32-0.75)			
Delusions	not significant			0.91 (0.33)	0.0053	2.49 (1.31-4.71)
Restlessness	not significant			0.86 (0.14)	<.0001	2.36 (1.78-3.13)
Insomnia	not significant			0.41 (0.16)	0.0105	1.51 (1.10-2.06)
ADL						
- mild vs none	not significant			-0.36 (0.23)	0.1240	0.70 (0.44-1.10)
- moderate vs none				-0.31 (0.23)	0.1796	0.73 (0.46-1.15)
- severe vs none				-0.60 (0.25)	0.0169	0.55 (0.34-0.90)
Half bed rail	not significant			0.41 (0.15)	0.0049	1.51 (1.13-2.02)
Facility-Switzerland						
- #2 vs #1	not significant			0.31 (0.19)	0.0461	1.45 (1.01-2.08)
- #3 vs #1				0.16 (0.19)	0.4103	1.17 (0.81-1.69)
- #4 vs #1				0.21 (0.17)	0.2262	1.23 (0.88-1.74)
Model fit	LR χ^2=421, df=24, p<.0001 C statistic: 0.8 Hosmer-Lemeshow: p=0.57			LR χ^2=236, df=14, p<.0001 C statistic: 0.74 Hosmer-Lemeshow: p=0.33		

6. LONGITUDINAL RESULTS

The longitudinal results are based on the longitudinal samples in Ontario (n=1540) and Switzerland (n=1175). Time 1 (T1) assessment refers to resident's initial assessment (but not the admission assessment) and time 2 (T2) assessment refers to resident's second assessment, on average 3 months later in the Ontario sample and 5 months later in the Swiss sample. General characteristics of the Ontario and Swiss longitudinal subsample did not differ significantly from the characteristics of the cross-sectional sample.

6.1. Longitudinal Pattern of Antipsychotic Use

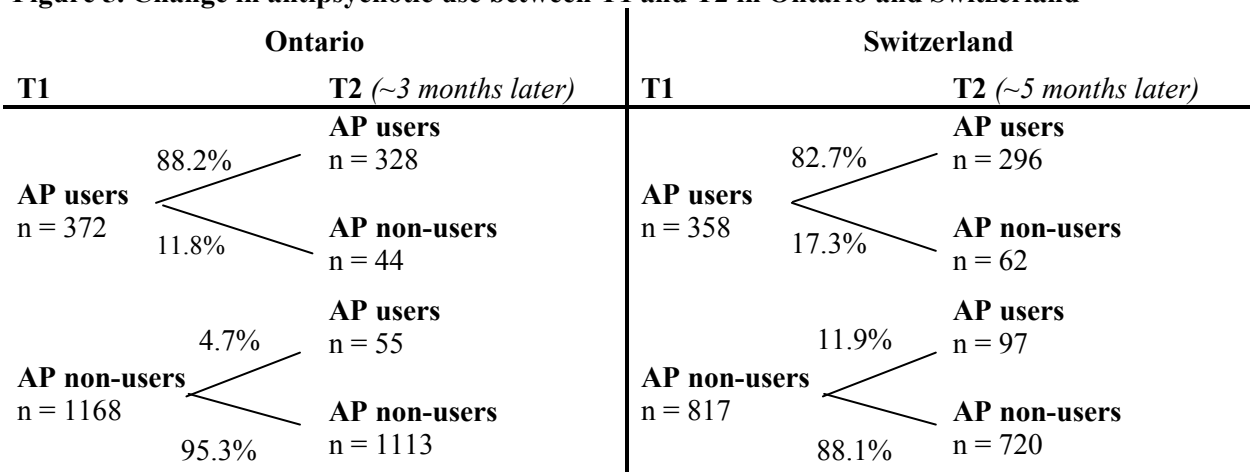
Table 8 presents the distribution of antipsychotic use at T1 and T2 in the Ontario and Swiss longitudinal samples. In Ontario, the rate remained similar, whereas the Swiss rate increased from 30% to 33%. Antipsychotic use was more prevalent at both times in Switzerland than in Ontario.

Table 8. Prevalence of antipsychotic use at T1 and T2 in Ontario and Switzerland

	Ontario				**Switzerland**			
	T1		**T2** *(~3 months later)*		**T1**		**T2** *(~5 months later)*	
	Freq.	**Percent**	**Freq.**	**Percent**	**Freq.**	**Percent**	**Freq.**	**Percent**
Antipsychotic use								
Yes	372	24.16	383	24.87	358	30.47	393	33.45
No	1168	75.84	1157	75.13	817	69.53	782	66.55

Figure 5 displays the change in antipsychotic use between T1 and T2 in Ontario and Switzerland. Most residents either stayed on antipsychotics or remained free of antipsychotics at both times in the two samples, and few residents stopped or initiated antipsychotics. Nevertheless, more change occurred in the Swiss sample than in the Ontario sample. For instance, the initiation rate in Switzerland (12%) was higher than in Ontario (5%).

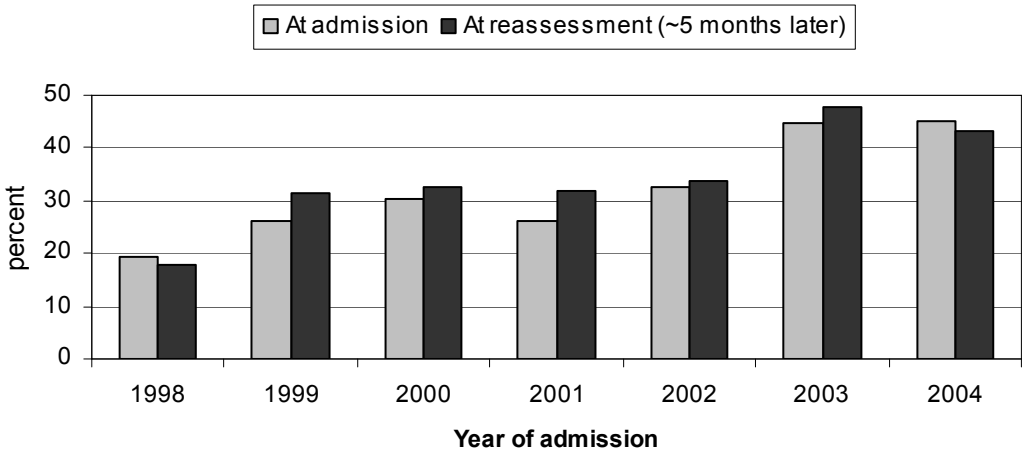
Figure 5. Change in antipsychotic use between T1 and T2 in Ontario and Switzerland



6.1.1. Antipsychotic Use at Admission and Reassessment by Year in Switzerland

The time-frame of the Swiss dataset allowed for the analysis of the longitudinal pattern of antipsychotic administration at admission and at reassessment by year. This is displayed in figure 6 for residents with at least two assessments. Overall, the rate of antipsychotic use at reassessment was higher than the rate at admission. The rate among residents assessed at two times was especially high in 2003 and 2004, where almost half of the residents were administered antipsychotics at admission and reassessment.

Figure 6. Prevalence of antipsychotic use at admission and at reassessment for residents with at least two assessment in Switzerland



6.2. Longitudinal Patterns of Behavioural Symptoms

Table 9 presents the prevalence of behaviours of interest at T1 and T2 in the Ontario and Swiss longitudinal samples. In Ontario, the prevalence rates of all the behaviours of interest increased slightly at T2. In Switzerland, the rate of wandering decreased at T2, while it increased for the other behaviours of interest. The details of behavioural changes can be found in Appendix G.

Table 9. Prevalence of behaviours at T1 and T2 in Ontario and Switzerland

	Ontario				Switzerland			
	T1		T2 *(~3 months later)*		T1		T2 *(~5 months later)*	
Behaviour of interest	**Freq.**	**Percent**	**Freq.**	**Percent**	**Freq.**	**Percent**	**Freq.**	**Percent**
Wandering	310	20.33	328	21.51	214	18.21	195	16.60
Verbally abusive	427	28.11	478	31.47	318	27.06	348	29.62
Physically abusive	284	18.65	296	19.44	117	9.96	131	11.15
Socially inappropriate	414	27.13	435	28.51	188	16.00	206	17.53
Resisting care	653	42.88	687	45.11	220	18.72	247	21.01
Aggressive behaviour	850	55.19	891	57.86	461	39.23	494	42.04

6.2.1. Behavioural Initiation and Cessation

The frequency and percentage of residents who started (initiation) and stopped (cessation) displaying the behaviour of interest between T1 and T2 are presented in tables 10 and 11. In general, the number of residents starting displaying the behaviour was higher than the number of residents stopping in both samples, explaining the increase in overall prevalence.

Apart from aggressive behaviour in general, the highest initiation rate was for resisting care behaviour in Ontario and verbally abusive behaviour in Switzerland. The initiation rates were slightly higher in the Ontario sample than in the Swiss samples for all behaviours except verbal abuse.

Table 10. Initiation of behaviours of interest between T1 and T2 in Ontario and Switzerland: frequencies and percentages

	Ontario			Switzerland		
Initiation of behaviour	**N baseline***	**Freq.**	**Percent**	**N baseline***	**Freq.**	**Percent**
Wandering	1241	58	4.77	961	39	4.06
Verb. abusive	1092	101	9.25	857	97	11.32
Phys. abusive	1239	70	5.65	1058	42	3.97
Soc. inappropriate	1112	94	8.45	987	61	6.18
Resisting care	870	109	12.53	955	73	7.64
Aggressive	673	116	17.24	714	113	15.83

*number of residents not displaying the behaviour of interest at T1

The highest cessation rate was for physically abusive behaviour in Ontario and for wandering behaviour in Switzerland. The cessation rates for all six behaviours were higher in the Swiss sample compared to the Ontario one.

Table 11. Cessation of behaviours of interest between T1 and T2 in Ontario and Switzerland: frequencies and percentages

Cessation of behaviour	Ontario			Switzerland		
	N baseline*	Freq.	Percent	N baseline*	Freq.	Percent
Wandering	310	40	12.90	214	58	27.10
Verbally abusive	427	50	11.71	318	67	21.07
Physically abusive	284	58	20.42	117	28	23.93
Socially inappropriate	414	73	17.63	188	43	22.87
Resisting care	653	75	11.48	220	46	20.91
Aggressive	841	77	9.16	461	80	17.35

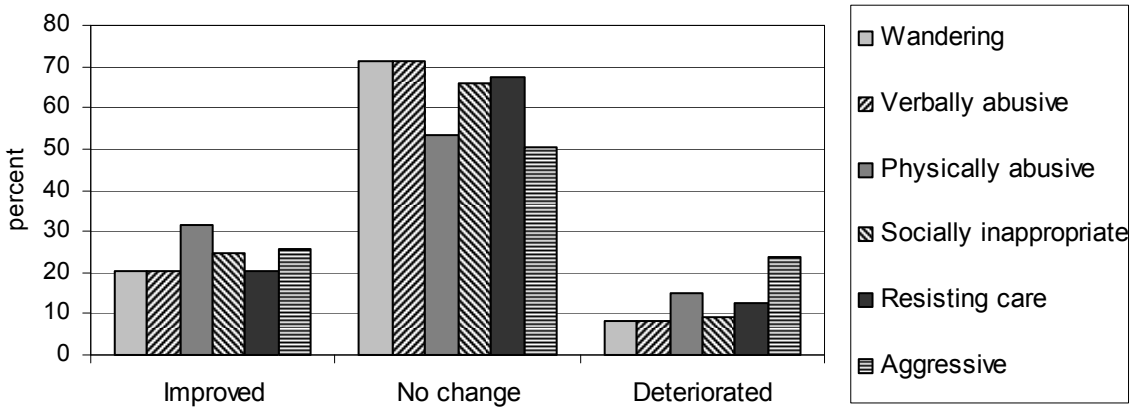
*number of residents displaying the behaviour of interest at T1

6.2.2. Behavioural Improvement and Deterioration

Figure 7 and 8 presents the percentage of residents who improved, did not change, and deteriorated their behaviour between T1 and T2 (for each behaviour of interest separately) in Ontario and Switzerland respectively. While most residents displayed the same frequency of behavioural symptoms at both times, the proportion of residents who improved in their behavioural symptoms was greater than the proportion of residents who deteriorated in both samples.

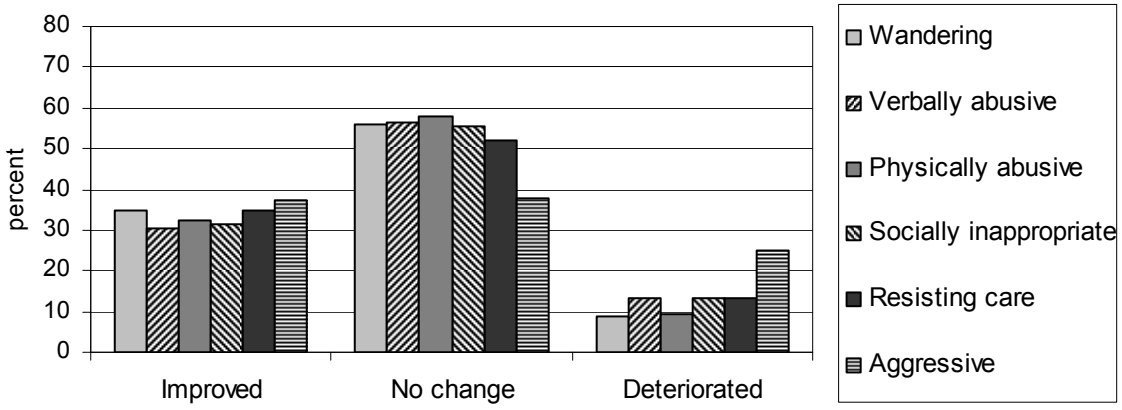
In Ontario (figure 7), improvement rates for separate behaviours were fairly similar (~20%) except for the improvement rate for physically abusive behaviour (32%). Deterioration rates were fairly similar as well (~9%) except for the deterioration rate of physically abusive behaviour (15%). For aggressive behaviour in general, approximately the same number of aggressive residents improved and deteriorated (~25%).

Figure 7. Change in behaviour between T1 and T2 among residents displaying the behaviour of interest at T1 in Ontario



In Switzerland (figure 8), improvement rates for separate behaviours ranged from 30% to 35%, while deterioration rates ranged from 9% to 13%. The deterioration rate for aggressive behaviour in general was the highest (25%).

Figure 8. Change in behaviour between T1 and T2 among residents displaying the behaviour of interest at T1 in Switzerland



The improvement rates for all behaviours were higher in the Swiss sample compared to the Ontario sample. Deterioration rates were similar, although a higher proportion of Swiss residents with verbally abusive and socially inappropriate behaviour deteriorated compared to residents in Ontario.

6.3. Antipsychotic Use and Behavioural Change

6.3.1. Bivariate Analyses I: Antipsychotic Use and Behavioural Initiation/Cessation

The rates of initiation/cessation among antipsychotic users and non-users are presented in tables 12 and 13, as well as crude odds ratios for the association between antipsychotics and behaviour change. Residents who stopped or started using antipsychotics between T1 and T2 were excluded.

Behavioural initiation

Overall, the initiation rates for all behaviours were higher among antipsychotic users than non-users in both samples. However, the relationship between initiation and antipsychotic use was not statistically significant in all cases. In the Ontario sample, antipsychotic users were significantly more likely to start wandering, and being verbally abusive and socially inappropriate than non-users. In the Swiss sample, the odds of antipsychotics users to initiate physically abusive, socially inappropriate and aggressive behaviours were significantly higher than the odds of non-users, while the relationship between antipsychotic use and being verbally abusive was statistically significant at the 0.1 level of significance.

Table 12. Relationship between initiation of behaviour and antipsychotic use in Ontario: frequencies and percentages among AP users and non-users, and crude OR and 95% CI

Initiation of behaviour	Ontario					Switzerland				
	AP user		AP non-user		Crude OR (95% CI)	AP user		AP non-user		Crude OR (95% CI)
	Freq[a]	%	Freq[b]	%		Freq[a]	%	Freq[b]	%	
Wandering	18 (208)	8.65	34 (936)	3.63	2.51*** (1.39-4.54)	8 (211)	3.79	17 (635)	2.68	1.43 (0.61-3.37)
Verbally abusive	24 (179)	13.41	68 (854)	7.96	1.79** (1.09-2.94)	26 (188)	13.83	49 (557)	8.80	1.66* (1.00-2.76)
Physically abusive	15 (212)	7.08	49 (960)	5.10	1.42 (0.78-2.58)	16 (251)	6.37	18 (662)	2.72	2.44** (1.22-4.85)
Socially inappropriate	24 (179)	13.41	67 (886)	7.56	1.89** (1.15-3.11)	25 (223)	11.21	25 (633)	3.95	3.07*** (1.72-5.47)
Resisting care	20 (140)	14.29	81 (687)	11.7	1.25 (0.74-2.11)	21 (217)	9.6	39 (610)	6.39	1.57 (0.90-2.73)
Aggressive	17 (81)	20.99	90 (562)	16.01	1.39 (0.78-2.49)	29 (135)	21.48	64 (491)	13.03	1.83** (1.12-2.97)

*p <.10, **p <.05, ***p <.005
a: baseline samples were residents receiving antipsychotics and not displaying the behaviour of interest at T1 (in brackets)
b: baseline samples were residents not receiving antipsychotics and not displaying the behaviour of interest at T1 (in brackets)

Behavioural cessation

The cessation rates for all behaviours were lower among antipsychotic users compared to non-users in Ontario. However, antipsychotic use was only statistically associated with the cessation of three behaviours: physically abusive ($p<0.05$), verbally abusive ($p<0.1$), and aggressive behaviour ($p<0.05$).

In the Swiss sample, the cessation rates for wandering, verbally abusive, socially inappropriate and aggressive behaviours were lower among antipsychotic users compared to non-users. On the other hand, a higher proportion of users stopped being physically abusive and resisting care. However, the association was not statistically significant in most cases. Antipsychotic users were less likely to stop displaying wandering ($p<0.05$) and socially inappropriate behaviour ($p<0.1$) compared to non-users.

Table 13. Relationship between cessation of behaviour and antipsychotic use in Switzerland: frequencies and percentages among AP users and non-users, and crude OR and 95% CI

Cessation of behaviour	Ontario					Switzerland				
	AP user		AP non-user		Crude OR (95% CI)	AP user		AP non-user		Crude OR (95% CI)
	Freq[a]	%	Freq[b]	%		Freq[a]	%	Freq[b]	%	
Wandering	11 (119)	9.24	24 (167)	14.37	0.61 (0.28-1.29)	15 (85)	17.65	28 (85)	32.94	0.44** (0.21-0.89)
Verbally abusive	12 (148)	8.11	34 (243)	13.99	0.54* (0.27-1.08)	20 (108)	18.52	31 (163)	19.02	0.97 (0.52-1.81)
Physically abusive	14 (113)	12.39	36 (143)	25.17	0.42** (0.21-0.83)	11 (45)	24.04	13 (58)	22.41	1.12 (0.45-2.80)
Socially inappropriate	88 (148)	12.16	42 (218)	19.27	0.58 (0.32-1.06)	10 (73)	13.70	21 (87)	24.41	0.50* (0.22-1.14)
Resisting care	15 (187)	8.2	15 (414)	13.04	0.58 (0.32-1.06)	19 (79)	24.05	21 (110)	19.09	1.34 (0.66-2.70)
Aggressive	11 (244)	4.51	59 (530)	11.13	0.38*** (0.19-0.73)	21 (161)	13.04	38 (229)	16.59	0.75 (0.42-1.34)

*p <.10, **p <.05, ***p <.005
a: baseline samples were residents receiving antipsychotics and displaying the behaviour of interest at T1 (in brackets)
b: baseline samples were residents not receiving antipsychotics and displaying the behaviour of interest at T1 (in brackets)

6.3.2. Bivariate Analyses II: Antipsychotic Use and Behavioural Improvement/Deterioration

The rates of behavioural improvement and deterioration among antipsychotic users and non-users are presented for each country separately in tables 14 and 15, as well as the crude odds ratio for the relationship between antipsychotic use and change in behaviour. Among antipsychotic users, a higher

proportion improved their behaviour than deteriorated in both samples. When considering aggressive behaviour in general, more antipsychotic users deteriorated than improved in Ontario, while slightly more users improved than deteriorated in Switzerland.

Behavioural improvement

Overall, less antipsychotic users improved their behaviour compared to non-users in Ontario. However, antipsychotic use was inversely associated with the improvement of three behaviours at the 0.1 level of significance. Antipsychotic users were less likely to improve their resisting care behaviour ($p<0.05$), and verbally and physically abusive behaviour ($p<0.1$) compared to non-users.

In the Swiss sample, the improvement rates for wandering, verbally abusive, socially inappropriate and aggressive behaviours were lower among antipsychotic users compared to non-users, while higher for physically abusive and resisting care behaviours. However, antipsychotic use was only statistically associated with the improvement of two behaviours. Antipsychotic users were less likely to improve their wandering and socially inappropriate behaviour ($p<0.05$) compared to non-users.

Table 14. Relationship between improvement of behaviour and antipsychotic use in Ontario and Switzerland: frequencies and percentages among AP users and non-users, and crude OR

Improvement of behaviour	Ontario					Switzerland				
	AP user[a]		AP non-user[b]		Crude OR (95% CI)	AP user[a]		AP non-user[b]		Crude OR (95% CI)
	Freq	%	Freq	%		Freq	%	Freq	%	
Wandering	20 (119)	16.81	38 (167)	22.75	0.69 (0.38-1.25)	20 (85)	23.53	35 (85)	41.18	0.44** (0.23-0.85)
Verbally abusive	23 (148)	15.54	55 (243)	22.63	0.63* (0.37-1.08)	28 (108)	25.93	48 (163)	29.45	0.84 (0.48-1.45)
Physically abusive	29 (113)	25.66	52 (143)	36.36	0.60* (0.35-1.04)	15 (45)	33.33	17 (58)	29.31	1.21 (0.52-2.79)
Socially inappropriate	29 (148)	19.59	58 (218)	26.61	0.67 (0.41-1.11)	15 (73)	20.55	31 (87)	35.63	0.47** (0.23-0.96)
Resisting care	28 (187)	14.97	92 (414)	22.22	0.62** (0.39-0.98)	28 (79)	35.44	37 (110)	33.64	1.08 (0.59-1.99)
Aggressive	54 (244)	22.13	135 (530)	25.47	0.83 (0.58-1.19)	49 (161)	30.43	87 (229)	37.99	0.71 (0.46-1.10)

*p <.10, **p <.05, ***p <.005

a: baseline samples were residents receiving antipsychotics and displaying the behaviour of interest at T1 (in brackets)

b: baseline samples were residents not receiving antipsychotics and displaying the behaviour of interest at T1 (in brackets)

Behavioural deterioration

Overall, a higher proportion of antipsychotic users deteriorated their behaviour compared to non-users in both samples for all behaviours. In the Ontario sample, only the odds of antipsychotics users to deteriorate in aggressive behaviour were significantly higher than the odds of non-users. Antipsychotic use was not statistically associated with any behavioural deterioration in the Swiss sample.

Table 15. Relationship between deterioration of behaviour and antipsychotic use in Ontario and Switzerland: frequencies and percentages among AP users and non-users, and crude OR

Deterioration of behaviour	Ontario					Switzerland				
	AP user[a]		AP non-user[b]		Crude OR (95% CI)	AP user[a]		AP non-user[b]		Crude OR (95% CI)
	Freq	%	Freq	%		Freq	%	Freq	%	
Wandering	12 (119)	10.08	12 (167)	7.19	1.45 (0.63-3.35)	10 (85)	11.76	5 (85)	5.88	2.13 (0.70-6.53)
Verbally abusive	12 (148)	8.11	19 (243)	7.82	1.04 (0.59-2.21)	17 (108)	15.74	20 (163)	12.27	1.34 (0.66-2.68)
Physically abusive	18 (113)	15.93	20 (143)	13.99	1.16 (0.58-2.32)	5 (45)	11.11	4 (58)	6.90	*insufficient cases*
Socially inappropriate	17 (148)	11.49	16 (218)	7.34	1.64 (0.80-3.36)	13 (73)	17.81	10 (87)	11.49	1.67 (0.68-4.07)
Resisting care	29 (187)	15.51	48 (414)	11.59	1.40 (1.08-2.30)	14 (79)	17.72	11 (110)	10	1.94 (0.83-4.53)
Aggressive	70 (244)	28.69	117 (530)	22.08	1.42** (1.01-2.00)	46 (161)	28.57	54 (229)	23.58	1.30 (0.82-2.05)

**$p < .05$

a: baseline samples were residents receiving antipsychotics and displaying the behaviour of interest at T1 (in brackets)

b: baseline samples were residents not receiving antipsychotics and displaying the behaviour of interest at T1 (in brackets)

6.3.3. Multivariate Analyses

Only models where antipsychotic use was a significant predictor are presented here. Other models can be found in Appendix H.

Cessation and improvement of wandering behaviour in Switzerland

In the Swiss sample, antipsychotic users were less likely to stop and reduce the display of wandering behaviour compared to non-users (tables 16 and 17). The same characteristics predicted the cessation and the reduction of wandering: residents with greater cognitive impairment were less likely to stop or improve wandering behaviour, while residents with greater ADL impairment were more likely to stop or improve wandering behaviour.

Table 16. Results of logistic regression analysis for predicting the cessation of wandering behaviour in Switzerland

Variables	Parameter estimate (SE)	*p*-value	Adjusted OR (95% CI)
Intercept	0.81 (0.92)		
Antipsychotic use	-0.67 (0.39)	0.0854	0.51 (0.24-1.10)
ADL impairment (severe vs mild)	1.51 (0.57)	0.0087	4.50 (1.46-13.87)
Cognitive impairment (severe vs mild)	-2.28 (0.96)	0.0176	0.10 (0.02-0.67)

Model fit: LR χ^2=22, df=5, p=0.0006 C statistic: 0.71 Hosmer-Lemeshow: p=0.99

Table 17. Results of logistic regression analysis for predicting the improvement of wandering behaviour in Switzerland

Variables	Parameter estimate (SE)	*p*-value	Adjusted OR (95% CI)
Intercept	1.16 (0.62)		
Antipsychotic use	-0.66 (0.36)	0.0641	0.52 (0.26-1.04)
ADL impairment (severe vs mild)	1.49 (0.59)	0.0109	4.45 (1.41-14.04)
Cognitive impairment (continuous)	-0.5 (0.15)	0.0012	0.61 (0.45-0.82)

Model fit: LR χ^2=21, df=4, p=0.0003 C statistic: 0.70 Hosmer-Lemeshow: p=0.78

Cessation and improvement of physically abusive behaviour in Ontario

In Ontario, antipsychotic use was inversely associated with the cessation and reduction of physically abusive behaviour: users were less likely to stop and reduce the display of physical abuse compared to non-users (tables 18 and 19). Residents displaying socially inappropriate and verbally abusive behaviour were also less likely to stop and improve physically abusive, while residents in pain were more likely to stop and improve compared to residents not in pain.

Table 18. Results of logistic regression analysis for predicting the cessation of physically abusive behaviour in Ontario

Variables	Parameter estimate (SE)	*p*-value	Adjusted OR (95% CI)
Intercept	-1.26 (0.29)		
Antipsychotic use	-0.76 (0.36)	0.0337	0.47 (0.23-0.94)
Soc. inappropriate behaviour	-0.77 (0.34)	0.0241	0.31 (0.13-0.77)
Pain			
- Mild vs none	1.29 (0.37)	0.0005	3.65 (1.75-7.59)
- Severe vs none	0.91 (0.47)	0.0508	2.29 (1.00-6.24)

Model fit: LR χ^2=24, df=4, p<.0001 C statistic: 0.70 Hosmer-Lemeshow: p=0.24

Table 19. Results of logistic regression analysis for predicting the improvement of physically abusive behaviour in Ontario

Variables	Parameter estimate (SE)	*p*-value	Adjusted OR (95% CI)
Intercept	-0.87 (0.29)		
Antipsychotic use	-0.68 (0.31)	0.0255	0.50 (0.28-0.92)
Verbally abusive behaviour	-0.61 (0.31)	0.0521	0.54 (0.29-1.01)
Half bed rail	0.85 (0.34)	0.0125	2.34 (1.12-4.56)
Pain			
- Mild vs none	1.43 (0.33)	<.0001	4.19 (2.18-8.07)
- Severe vs none	1.17 (0.40)	0.0035	3.23 (1.47-7.14)

Model fit: LR χ^2=33, df=5, p<.0001 C statistic: 0.72 Hosmer-Lemeshow: p=0.97

Initiation and improvement of socially inappropriate behaviour in Switzerland

In the Swiss sample, antipsychotic use predicted the initiation of socially inappropriate behaviour, along with wandering, being verbally abusive, and being cognitively impaired (table 20).

Table 20. Results of logistic regression analysis for predicting the initiation of socially inappropriate behaviour in Switzerland

Variables	Parameter estimate (SE)	*p*-value	Adjusted OR (95% CI)
Intercept	-4.15 (0.40)		
Antipsychotic use	0.73 (0.31)	0.0189	2.07 (1.13-3.82)
Wandering	0.85 (0.36)	0.0172	2.35 (1.16-4.73)
Verbally abusive	0.90 (0.36)	0.0038	2.46 (1.34-4.54)
Cognitive impairment			
- moderate vs mild	0.88 (0.45)	0.0503	2.41 (1.00-5.83)

Model fit: LR χ^2=38, df=5, p<.0001 C statistic: 0.75 Hosmer-Lemeshow: p=0.55

In the Swiss sample, antipsychotic use was also inversely associated with the improvement of socially inappropriate behaviour (table 21). Not being physically impaired and insomnia were other predictors.

Table 21. Results of logistic regression analysis for predicting the improvement of socially inappropriate behaviour in Switzerland

Variables	Parameter estimate (SE)	*p*-value	Adjusted OR (95% CI)
Intercept	-0.35 (0.36)		
Antipsychotic use	-0.86 (0.39)	0.0253	0.42 (0.20-0.90)
Insomnia	0.90 (0.47)	0.0541	2.46 (0.98-6.17)
ADL impairment			
- moderate vs mild	-1.00 (0.46)	0.0296	0.37 (0.15-0.91)

Model fit: LR χ^2=17, df=4, p=0.0023 C statistic: 0.69 Hosmer-Lemeshow: p=0.81

Deterioration and cessation of aggressive behaviour in Ontario

In Ontario, antipsychotic use was negatively associated with the cessation of aggressive behaviour in logistic regression analyses: users were less likely to stop displaying aggressive behaviour than non-users (table 22). Residents with depressive symptoms, longer length of stay, and who have chairs preventing raising were less likely to stop, while female residents and residents suffering from pain and dementia were more likely to stop displaying aggressive behaviour.

Table 22. Results of logistic regression analysis for predicting the cessation of aggressive behaviour in Ontario

Variables	Parameter Estimate (SE)	*p*-value	Adjusted OR (95% CI)
Intercept	-1.14 (0.46)		
Antipsychotic use	-0.85 (0.36)	0.0193	0.43 (0.21-0.87)
Female	0.92 (0.35)	0.0089	2.50 (1.26-4.98)
LOS			
- 1-3 yrs vs <1 yr	-0.78 (0.34)	0.0218	0.46 (0.23-0.89)
- 3-5 yrs vs <1 yr	-1.44 (0.46)	0.0208	0.24 (0.10-0.58)
- >5 vs <1 yr	-1.04 (0.37)	0.0053	0.35 (0.17-0.73)
Dementia	0.76 (0.28)	0.0075	0.47 (0.27-0.82)
Depressive symptoms			
- moderate vs none	-0.76 (0.33)	0.0216	0.47 (0.25-0.89)
- severe vs none	-1.25 (0.36)	0.0006	0.29 (0.14-0.58)
Chair	-0.61 (0.34)	0.0684	0.54 (0.28-1.05)
Pain			
- moderate vs none	0.71 (0.33)	0.0311	2.04 (1.07-3.87)
- severe vs none	0.56 (0.34)	0.1073	1.74 (0.89-3.43)

Model fit: LR χ^2=56, df=11, p<.0001 C statistic: 0.76 Hosmer-Lemeshow: p=0.35

In Ontario, antipsychotic use predicted the deterioration of aggressive behaviour in logistic regression analyses (table 23), along with having sleep problems, being cognitively impaired, receiving anxiolytics and being trunk restrained. Residents receiving antidepressants were less likely to deteriorate.

Table 23. Results of logistic regression analysis for predicting the deterioration of aggressive behaviour in Ontario

Variables	Parameter estimate (SE)	*p*-value	Adjusted OR (95% CI)
Intercept	-1.76 (0.28)		
Antipsychotic use	0.32 (0.19)	0.0832	1.38 (0.96-1.99)
Insomnia	0.42 (0.22)	0.0560	1.52 (0.99-2.33)
CPS impairment			
- moderate vs mild	0.69 (0.31)	0.0239	2.00 (1.10-3.64)
Antianxiety	0.37 (0.21)	0.0793	1.45 (0.96-2.18)
Antidepressant	-0.53 (0.21)	0.0131	0.59 (0.39-0.89)
Trunk restraint	0.61 (0.37)	0.0973	1.84 (0.89-3.80)

Model fit: LR χ^2=26, df=7, p=0.0005 C statistic: 0.62 Hosmer-Lemeshow: p=0.33

7. DISCUSSION

This study examined residents' characteristics in general, prevalence rates and determinants of antipsychotic administration, and behavioural outcomes associated with their use in nursing home residents from two different countries, using common measures allowing international comparisons and benchmarking. As few studies previously compared resident characteristics in Switzerland and Canada, results from this international comparison of care settings are discussed first. Secondly, patterns of antipsychotic administration are discussed and compared between the two countries. Thirdly, the results from the investigation of predictors of antipsychotic administration are discussed separately in the two countries. Fourthly, results from the investigation of behavioural outcomes associated with the administration of antipsychotics in actual practice are discussed. Finally, limitations of this study are presented, followed by suggestions for future research and implications for practice and policy.

7.1. Comparison of Resident Characteristics

This study is one of the first to compare nursing homes residents in Ontario and in a German-speaking canton in Switzerland. Results of this international comparison revealed many differences in resident characteristics. Although these differences may be due to coding practices, it likely reflects differences in the types of residents admitted in nursing homes, as the MDS has demonstrated good reliability in international comparisons (Sgadari et al., 1997).

The resident profile was clearly less severe in the Swiss sample than in Ontario, as indicated by the significantly lower proportion of residents with multiple diagnoses, psychiatric diagnoses, dementia and severe impairment in cognition and functioning, and confirmed by the lower case-mix index for Swiss residents compared to Ontario residents. This lighter care resident profile in Swiss nursing homes has previously been reported (Gobert & D'horre, 2005) and could be the result of admission policies. Indeed, nursing homes in Switzerland may function as a residential facility for some residents seeking social support rather than medical care per se (Ribbe et al., 1997). Access to nursing homes is more

strongly regulated in Ontario, leading to the admission of heavier-care residents. Also, the availability of beds for Swiss elderly patients in geriatric wards of general hospitals and in psychiatric hospitals may explain the less complex medical conditions of residents in nursing homes.

The difference in the proportion of patients with dementia was salient: over half of the residents in Ontario were diagnosed with dementia compared to a fifth of the residents in the Swiss sample. Rates of dementia in different countries have previously been found to vary substantially. For example, rates ranged from 19% in Sweden to 65% in Finland (PricewaterhouseCoopers LLP, 2001). Reasons for such discrepancies may be related to admission practices, treatment approach, or may be due to under-diagnosis. Indeed, when examining the rate of dementia per year of assessment, it appeared that 35% of the residents assessed in 2002 had a diagnosis of dementia, compared to 20% or less of residents assessed between 1999 and 2001. This finding suggests that dementia was under-diagnosed in the sample before 2002. The rate of dementia was also examined at admission and at follow-up for residents admitted between 2000 and 2002: the rate of dementia decreased at follow-up, denoting that residents diagnosed with dementia at admission were reassessed as not having dementia six months later. This finding was very surprising and no clear explanation was found, warranting further investigation. Alternatively, cognitive impairment can be measured with the CPS in the MDS. Based on this scale, 32% of the Swiss residents were severely cognitively impaired. Thus, the CPS appeared to be a more reliable item to measure cognitive impairment in the Swiss-MDS than diagnosis of dementia.

Swiss residents also suffered less from behaviour disturbances than Ontario residents, as illustrated by the much lower prevalence of physically abusive, socially inappropriate, resisting care and aggressive behaviour in general. One explanation for this great difference in the rate of behaviour disturbances may reside in the degree of tolerance for behavioural symptoms by the medical staff. Medical training and culture can greatly influence how nurses react towards residents who act out, how they consider what constitutes socially inappropriate and resisting care behaviours. Another explanation may be that the manifestation of aggressive behaviour is influenced by cultural factors (Fuh et al.,

2002). Thus, the lower prevalence in Switzerland may indicate that residents truly display less behavioural symptoms or that staff are more tolerant towards behavioural symptoms. One may also argue that this lower prevalence of behavioural symptoms is due to the effective use of antipsychotics in agitated residents, suppressing their agitated symptoms. However, results from the study do not support this hypothesis, as antipsychotic use was preventative of behavioural cessation and improvement.

Another pronounced difference was the higher proportion of male residents in the Swiss sample compared to Ontario. However, the proportion of males in nursing homes from other cantons in Switzerland (Lucas et al., 2004; Gobert & D'horre, 2005) was similar to Ontario. This difference likely reflects intrinsic characteristics of the Swiss sample and is not representative of residents in general.

7.2. Patterns of Antipsychotic Use

Antipsychotics were administered to 25% of the residents in the Ontario sample in 2001. This estimate was similar to the estimate reported by Bronskill and colleagues (2004) for the same period. In comparison to prevalence rates in nursing homes from other countries, the rate was higher than in the US, where antipsychotics are strongly regulated, and similar to other countries without regulations such as Iceland, Italy and the UK (Liperoti et al., 2003; Hughes et al., 2000; Oborne et al, 2002).

The aggregated rate of antipsychotic use between 1999 and 2002 was 29% in the Swiss sample. This rate is lower than other estimates reported in French-speaking cantons in Switzerland (Lucas et al., 2004; Gobert & D'horre, 2005). This difference may be due to the profile of the nursing homes included in the sample. For instance, in Lucas and colleagues' study (2004), the sample included nursing homes specialized in psychiatric conditions, admitting more psychiatric cases for whom antipsychotics are likely prescribed, hence inflating the rate of antipsychotic administration.

In comparison to Ontario, antipsychotic administration was surprisingly more common in Switzerland. Given the lower prevalence of psychiatric diagnoses and behaviour disturbances in the Swiss sample, one might have predicted a lower rate in the Swiss sample. This higher rate in the Swiss

sample could be due to a different classification system for medications and availability of medications. This could be the case for a medication called Distraneurin® which is coded as an antipsychotic in the Swiss MDS and is not available in Ontario. However, physicians from three of the nursing homes in Switzerland reported that this medication was only rarely administered (Dr. R. Gilgen, personal communication, March 17, 2006), reducing this potential bias. On the other hand, the lower prevalence of antipsychotic use in Ontario was mitigated by the more widespread use of chair restraints compared to Switzerland, possibly indicating the use of physical restraint instead of chemical restraint for some residents with behaviour disturbances. Previous studies have already raised concerns about the overuse of restraints in Canada compared to other countries (e.g. Jensdottir et al., 2003; Teare, Hirdes, Ziraldo, Proctor & Nenadovic, 2000).

When adjusting for nursing home case-mix profile, rates of antipsychotic prescription among high- and low-risk residents were higher than in the US, suggesting antipsychotic misuse in both settings. The risk-adjusted rates were also higher in Switzerland than in Ontario. In particular, the high rate of antipsychotic use among low risk residents – residents with potentially inappropriate conditions - in the Swiss sample (25%) raises serious concerns about the appropriateness of their administration in nursing homes in Switzerland. Indeed, among residents receiving antipsychotics, 60% did not have a diagnosis of schizophrenia and did not display psychotic symptoms or agitated behaviours associated with cognitive impairment. In comparison, the rate among low-risk residents was 14% in Ontario, and 34% of users had potentially inappropriate conditions. These results suggest that antipsychotics may be prescribed for convenience purposes rather than for treatment of targeted conditions or symptoms.

A possible reason for the difference in rates of inappropriate use may reside in the type of physicians prescribing medications to residents, as suggested by a previous study in Ontario (Dhalla et al., 2002). In this study, inappropriate prescribing in general after nursing home admission was predicted by physicians' characteristics, such as having more than one prescriber, a non-specialist physician and having a physician older than 50. This may also hold true in Switzerland and could be a

factor explaining the rate differences. Finally, the potentially inappropriate use found in Switzerland contradicts the results from Gobert and D'horre (2005), who considered antipsychotic administration to be appropriate in Switzerland, based on dosage and average practice. Thus, this study illustrates the importance of considering resident's medical and clinical characteristics in addition to dosage and average practice to assess appropriateness.

With regards to change in antipsychotic administration, most residents in the two countries remained free of antipsychotics or on antipsychotics at both baseline and follow-up. However, change did occur for a substantial number of residents, suggesting that residents do not remain on antipsychotics indefinitely. However, firm conclusions on whether guidelines for discontinuation of treatment were followed can not be made, as recommendations vary according to the targeted symptoms. Upon comparison of results in the two countries, the incidence and cessation rates were higher in Switzerland than in Ontario. The longer follow-up period in Switzerland likely allowed for the inclusion of more cases of initiation and discontinuation of treatment. This preliminary finding suggests that the rate of discontinuation/initiation increases with the length of follow-up. To determine whether this trend is linear requires longer follow-up periods.

Results from the cross-sectional time pattern of antipsychotic administration in Swiss nursing homes showed an important increase in the overall rate over time (from 23% in 1997 to 41% in 2004), as well as an increase in the rates at admission. Unfortunately, such data were unavailable in the Ontario dataset. Results from the time series of antipsychotic utilization among all community-dwelling individuals residing Ontario over 65 years old, from 1993 to 2002 (Rapoport et al., 2005) indicated an increasing trend as well. The authors also noted that atypical antipsychotics, while not available in 1993, accounted for 82% of the prescriptions by 2002. The increase in the administration of antipsychotics appears to be a global phenomenon both in Switzerland and Canada, likely due to the introduction of atypical agents. Thus, strategies to reduce antipsychotic administration are needed, targeting physicians and geriatricians both in nursing homes and in private practices in both countries.

Finally, results from the comparison of antipsychotic use at admission and at reassessment in Switzerland warrant discussion. First, the rate of antipsychotic use at admission for residents with longer stays was higher than the rate at admission for residents who were discharged within 5 months. This finding may be explained by the fact that residents with extended lengths of stay likely have more serious conditions which warrant the administration of antipsychotics. It would be also interesting to compare rates among residents admitted from the community with those admitted from hospitals. As this subject was not the primary focus of this study, future research should investigate the differences in characteristics between short and long stay residents, and antipsychotic users and non-users at admission, to better understand these findings. Second, the rate at reassessment was higher than at admission for most years, suggesting that nursing homes were responsible for a large number of antipsychotic prescriptions. The rate at reassessment in 2003 and 2004 was of special concern: almost half the residents who were admitted 5 months prior to assessment were receiving antipsychotics.

7.3. Determinants of Antipsychotic Use

This study identified a range of characteristics concurrently associated with antipsychotic use in multivariate analyses in both samples (16 and 10 variables in the Ontario and Swiss samples respectively). Psychiatric conditions, health conditions (cognitive and physical impairment), behavioural symptoms, demographic characteristics, and interventions predicted the administration of antipsychotics. Most determinants differed between the two countries, suggesting different practice patterns when antipsychotics were not administered for schizophrenia and bipolar disorders.

The psychiatric diagnoses of schizophrenia and bipolar disorder were the strongest determinants in both settings. This finding was not surprising, as these psychiatric conditions are the principal target of antipsychotic treatment. Upon closer examination, 21% of antipsychotic users were diagnosed with schizophrenia or bipolar disease in Ontario, whereas only 9% of users in the Swiss sample. This finding suggests that these psychiatric conditions determine administration of antipsychotics for only a minority of residents, especially in Switzerland. While antipsychotic use was associated with psychotic

symptoms such as delusions and hallucinations in bivariate analyses in both samples, only the presence of delusions emerged as a determinant in multivariate analyses in the Swiss sample. The lack of association in Ontario suggests that antipsychotic administration was not primarily determined by the presence of psychotic features. However, it may also be possible that psychotic symptoms were present in users but not recorded in the MDS, leading to the absence of association.

In Ontario, residents with major symptoms of depression were more likely to receive antipsychotics than those without such symptoms. However, having a diagnosis of depression was not associated with AP use. This finding implies that antipsychotics were not prescribed to treat diagnosed depression per se. Yet, half of antipsychotic users displayed depressive symptoms, suggesting that antipsychotics may cause or worsen depressive symptoms in cognitively impaired residents. Future research is needed to investigate this association in more depth.

Residents diagnosed with an anxiety disorder were also more likely to receive antipsychotics in Ontario. This finding suggests that antipsychotics were inappropriately prescribed to treat anxiety disorders in Ontario, as antipsychotics are not indicated to treat anxiety disorders (Alexopoulos et al., 2004). Receiving anxiolytics or hypnotics was also associated with receiving antipsychotics, suggesting that anxiolytics/hypnotics were administered concomitantly with antipsychotics, possibly for their sedative effect as a treatment for agitated behaviours associated with dementia, as recommended by experts (Alexopoulos et al., 2004). Contrasting previous findings, antidepressant use was not longer associated with antipsychotics in multivariate analyses (e.g. Lindesay et al., 2003). As antipsychotics combined with antidepressant is a first line treatment for depression with psychotic symptoms (Alexoploulos et al., 2004), this finding suggests that antipsychotics were not predominantly prescribed for such indication in either country.

The finding that cognitive impaired residents and residents diagnosed with dementia were more likely to be administered antipsychotics in both samples is consistent with previous studies (e.g. Voyer et al., 2005; Draper et al., 2001). Indeed, as cognitive impairment increased, so did the likelihood of

receiving antipsychotics. There also seems to be a ceiling effect, as very severely impaired residents were less likely to receive antipsychotics than severely and moderately impaired residents. This association is likely due to the presence of agitation in cognitively impaired individuals with dementia (Cohen-Mansfield, Marx & Rosenthal, 1990), leading to antipsychotic administration. Although cognitive impairment likely precedes antipsychotic use, we can not exclude the possibility that antipsychotic use triggered or exacerbated cognitive loss, as suggested by McShane et al (1997).

Consistent with previous studies (e.g. Voyer et al., 2005; Sorensen et al., 2001), sleep disturbances were associated with antipsychotic administration in the Swiss sample. Antipsychotics may be administered for their sedative effect to treat insomnia, as almost a quarter of users had sleep problems in Switzerland. However, according to guidelines, antipsychotics are not appropriate to treat insomnia, for which hypnotics or antidepressants are recommended (Alexopoulos et al., 2004). Though it can not be excluded that sleep problems were caused by antipsychotic intake, this finding suggests that antipsychotics are inappropriately prescribed to treat insomnia in Swiss residents.

In the Ontario sample, displaying physically abusive and socially inappropriate behaviours emerged as significant determinants, while verbal abuse and resisting care were no longer associated with antipsychotic use. This finding suggests that the bivariate association between antipsychotics and verbal abuse and resisting care was probably confounded by physically abusive behaviour. Indeed, verbally abusive and resisting care behaviours were present in 70% and 90% of physically abusive residents respectively. Thus, these results suggest that physically abusive and socially inappropriate behaviour were the symptoms that triggered antipsychotic treatment in Ontario. On the contrary, behavioural symptoms no longer determined antipsychotic use in multivariate analyses in Switzerland. This finding is rather surprising, suggesting that antipsychotics were not primarily administered to control behavioural problems in Switzerland. In addition, wandering residents in the Ontario sample were more likely to receive antipsychotics, even when adjusting for the presence of dementia and cognitive impairment. The relationship may indicate that antipsychotics were prescribed to control

wandering behaviour (though they are not recommended to treat wandering) or that wandering is a side effect of antipsychotic use. The longitudinal results favoured this second interpretation, as users were more likely to start wandering and less likely to stop wandering compared to non-users.

Nearly half of antipsychotic users were restless in both samples, but restlessness was associated with antipsychotic use in multivariate analysis in Switzerland only. Consistent with previous studies (e.g. Nygaard et al., 1994), the association with restlessness may indicate that antipsychotics are given as treatment for this behavioural symptom associated with dementia, though not recommended for this kind of symptom. On the other hand, restless behaviour could also be due to antipsychotic side-effect.

Consistent with previous studies (e.g. Ruths et al., 2001; Lindesay, Matthews and Jagger, 2003), gender was no longer associated with antipsychotic use in multivariate analyses. As suggested, the relationship between gender and antipsychotic was confounded by age. The overuse by men in bivariate analyses was likely due to their younger age, which was independently associated with the likelihood of receiving antipsychotics in Ontario. Indeed, the odds of residents under 65 to receive antipsychotics were twice the odds of residents older than 85, consistent with previous findings (e.g. Voyer et al., 2005). This association may be explained by the fact that antipsychotics are more likely given to individuals in better health (i.e. younger residents) because of their side-effect profile.

In Ontario, being in a dementia care unit increased the likelihood of receiving antipsychotics. Almost half of the residents in these units received antipsychotics in Ontario, and over half of the residents in Swiss dementia units were receiving them. Although these units are usually designed to provide comprehensive care to patients with behavioural and cognitive problems, possibly favouring alternatives to pharmacological treatments, our finding suggests that antipsychotic administration remains the dominant approach to manage behaviours in these units. As previously reported (Sloane et al, 1991; Phillips, Spry, Sloane & Hawes, 2000), these specialized units are not successful in reducing pharmacological treatment of behaviour disturbances. The number of residents with cognitive and

behavioural problems may drive staff to administer antipsychotics in fear of an overwhelming workload alternative strategies would involve.

In the Swiss sample, the prevalence of antipsychotics by facility ranged from 23% to 34% and the facility emerged as an independent determinant: being in the nursing home with the highest rate of AP use increased residents' likelihood of receiving antipsychotics, regardless of clinical or behavioural characteristics. This finding is consistent with Lucas and colleagues' results (2004), where the nursing home variable explained 20% of the variance in antipsychotic prescribing in Switzerland. These findings raise concerns about the possible non-rational administration of antipsychotics, such as physicians' personal preferences or local habits. An explanation may also reside in number and type of physicians prescribing medications to residents. In two of the four nursing homes in Switzerland, residents were followed by their treating physician prior to entry, resulting in prescriptions originating from about 30 physicians, while a unique physician from a nearby hospital prescribed medications in another of the nursing homes (Dr. R. Gilgen, personal communication, March 17, 2006). Though it could not be determined whether the nursing home with the lowest rate was the one with a single physician, this hypothesis should be tested in future research.

Antipsychotic administration was also associated with an evaluation by a mental health specialist within the last 3 months in Ontario. This finding suggests that specialists were consulted when prescribing antipsychotic treatment. However, mental health specialists were only consulted for 9% of antipsychotic users in Ontario. In contrast, mental health specialists were very rarely consulted in Switzerland, suggesting that such service was not available for residents. Residents confined to a chair to prevent them from rising were more likely to be receiving antipsychotics in Ontario, suggesting that chair restraints were used conjointly with antipsychotic treatment in Ontario nursing homes to manage behaviour disturbances.

7.4. Behavioural Change in Residents

Before examining behavioural change associated with antipsychotics, a general overview of behavioural change in residents in both countries is presented.

The display of behavioural symptoms remained stable for most residents, whether or not they displayed behavioural symptoms at baseline. Nevertheless, more residents started displaying agitated behaviour over time than stopped displaying it in both countries, as the overall prevalence rate of all types of behavioural symptoms increased over time. This suggests that residents' behaviours deteriorate with time. This trend is likely caused by the deterioration of cognitive impairment over time, as previous studies have shown that the increase in cognitive impairment was associated with the worsening of agitated behaviours (e.g. Cohen-Mansfield, Marx & Rosenthal, 1990). The only exception was the lower rate of wandering behaviour at follow-up in the Swiss sample. One explanation may reside in the worsening of physical impairment over time, decreasing the ability of residents to wander. However, such trend in Ontario was not observed, suggesting a ceiling effect of the impact of physical impairment on wandering behaviour.

Results also showed that less behavioural change occurred in Ontario residents than Swiss residents, as more residents resolved or improved their behavioural symptoms in the Swiss sample compared to the Ontario sample. These higher improvement rates did not appear to be due to the more widespread use of antipsychotics in Switzerland, as antipsychotics were not associated with behavioural improvement. This difference may be explained by the level of behaviour symptoms expressed in residents. Residents in Ontario may display heavier forms of behaviour disturbance than in Switzerland, which may be more difficult to alleviate. This hypothesis can only be confirmed in future research if detailed information on behavioural symptoms is available.

7.5. Behavioural Outcomes of Antipsychotic Use

Most residents displayed behavioural symptoms at the same frequency at baseline and follow-up, whether they received antipsychotics or not. Nevertheless, bivariate results suggested that for residents

free of behavioural symptoms at baseline, those receiving antipsychotic drugs started displaying behavioural symptoms more often compared to residents who remained free of antipsychotics. As suggested by Kiely and colleagues (2000), behavioural symptoms may not be present at baseline in antipsychotic users because they were controlled for by the treatment, but developed later due to drug tolerance or their overall condition that triggered the administration of antipsychotics.

For residents already displaying behavioural symptoms, use of antipsychotics appeared to hinder the improvement or cessation of most disruptive behaviours, as a higher proportion of non-users improved compared to users, in contrast to findings from Kiely and colleagues (2000). As well, although antipsychotics were not predictive of behavioural deterioration, a higher proportion of users compared to non-users deteriorated. These results suggest that antipsychotics were not effective in reducing behavioural symptoms. Although it can not be ruled out that behavioural deterioration was due to some unmeasured variable, such as overall severity of resident's condition, antipsychotics may be responsible for this deterioration due to their associated side-effects resulting in the display of additional disturbing behaviours. For instance, the anti-cholinergic effects associated with antipsychotics were shown to cause confusion, delirium, visual hallucinations and irritability in users (Maixner, Mellow & Tandon, 1999; Neil, Curran & Wattis, 2003). As well, tardive dyskinesia can lead to anger, and acute extra-pyramidal symptoms and urinary retention may cause great discomfort in users, resulting in the display of disturbing behaviours (Maixner et al., 1999). Thus, based on the literature on antipsychotic side-effects, behavioural deterioration may be induced by side-effects of antipsychotics.

Upon examination of the predictive power of antipsychotics on behavioural change while controlling for confounding factors, antipsychotic use predicted few behavioural changes, stressing the importance of considering confounding variables, such as cognitive impairment (strongest predictor of behavioural change). The significant behavioural outcomes also differed between the two countries, possibly due to the different prescription pattern.

In contrast to findings from Kiely and colleagues' study (2000), the initiation of wandering behaviour in Ontario was no longer associated with antipsychotic use when confounding factors such as cognitive impairment and physical functioning were introduced into the model. However, results from the Swiss sample showed that among residents who wandered at baseline, those who were administered antipsychotics were less likely to reduce or completely stop wandering than non-users. Thus, receiving antipsychotics appeared to prevent residents from improving or resolving wandering behaviour. As suggested by Kiely and colleagues' study (2000), one plausible explanation may be that wandering behaviour is provoked by akathisia, a well documented side-effect of antipsychotic medications, which can only be stopped or reduced with dose reduction or drug discontinuation.

In Switzerland as well, antipsychotic users were more likely to start being socially inappropriate compared to non-users. In addition, antipsychotics prevented the reduction of socially inappropriate behaviour, as antipsychotic use was inversely associated with improving in this type of behaviour. These findings suggest that antipsychotics were not effective in reducing socially inappropriate behaviour. On the contrary, they appeared to trigger this kind of behaviour. Even though other agitated behaviours and cognitive impairment were controlled for, this association may be due to the overall condition of residents receiving antipsychotics that makes future disruptive behaviour more likely.

Another interesting finding was that among residents displaying physically abusive behaviour, those who were not taking antipsychotics were more likely to stop or reduce physically abusive behaviour within the next months compared to users in the Ontario sample. This inverse relationship may indicate that antipsychotics were not effective in alleviating or reducing physically abusive behaviour. However, as the type of physical behaviour was unknown, this relationship may be explained by the fact that residents who were not being administered antipsychotics displayed milder forms of physical abuse which were more easily and rapidly handled than those displayed by antipsychotic users.

When considering the impact of antipsychotics on aggressive behaviour in general, it appeared that antipsychotics were inversely associated with the cessation of aggressive behaviour in Ontario. As explained above, this may be due to the severity of behaviours among residents who are receiving antipsychotics, hindering complete resolution of problems. However, antipsychotic use also predicted the deterioration of aggressiveness, suggesting that antipsychotics were not effective in controlling aggressive behaviour in general.

In conclusion, these exploratory findings suggest that behavioural improvement was not due to antipsychotic use. On the contrary, antipsychotic use seemed to have prevented users from improving and resolving behavioural symptoms. Moreover, antipsychotics appeared to have triggered and exacerbated the display of some behavioural symptoms. These results raise questions about the use of antipsychotics as a long-term treatment for behaviour disturbances as evidence of behavioural reduction due to antipsychotic administration is lacking in actual practice.

7.6. Limitations

Despite the advantages of a large sample size and standardized assessment tool providing information on numerous demographic and clinical variables, limitations exist and warrant caution in the interpretation of the results and the generalization of findings.

First, the use of secondary data has inherent constraints, such as the restricted use of variables present in the assessment tool. The MDS 2.0 does not provide information on the reasons associated with administering antipsychotics or the type, dose or number of antipsychotic drugs prescribed. Such information would have been useful for refining the appropriateness criteria. Further, facility-level variables, such as staffing level, medical approach, and prescribing practices, are not assessed in the MDS. Such information would have been useful to clarify the differences between the two countries. Indeed, facility factors may have contributed to the variation of antipsychotic administration between the two countries.

Second, the MDS assessment instrument may be completed differently in the two countries, although the MDS has demonstrated good inter-rater reliability in cross-national comparisons. Such differences may explain part of the variation in resident characteristics and behaviour patterns between the two samples. As stated, nursing staff in Switzerland may be more tolerant for some types of behaviours compared to staff from Ontario, leading to different criteria when completing the MDS.

Third, the constraints of data protection in Switzerland limited the availability of residents' date of birth. Information on age would have been useful for international comparison and as a variable for the analyses. It can be hypothesized that age is a predictor in Switzerland as well, and its inclusion in the model would likely increase the fit of the model without invalidating other predictors.

Fourth, firm conclusions about the effect of antipsychotic use on behaviours in the longitudinal analyses were limited by the inability to control what happened between assessments. Indeed, whether the residents continuously took antipsychotics during the follow-up period was unknown. Non-users at T1 and T2 may have briefly used antipsychotics in between, or users may have stopped in between. However, antipsychotics are usually administered for at least 3 months before attempts of discontinuation, limiting the potential for this bias. Misclassification bias is more likely present for assessments of behavioural changes. For instance, if a resident wandered between T1 and T2 but not within the 7 days prior to assessment, they would be classified as non-wanderer at T2. These situations of misclassification may explain the small number of statistically significant relationships between antipsychotic use and behavioural change. The measurement of behavioural display at only two times was also a limitation, as behavioural change was found to vary considerably over time in cognitively impaired residents (van Reekum et al., 2002).

Fifth, some of the longitudinal analyses in this research did not produce large enough sample size to reach significance. Thus, type II error may have occurred, where the relationship truly existed, but was too modest to be detected with the available sample size. Nevertheless, the results were included in this study for exploratory purposes.

Finally, the generalization of the results is limited by the fact that the samples in both countries were not representative of all nursing homes in the regions of interest, especially in Switzerland where the sample consisted of only 4 nursing homes. However, several findings in the Ontario sample, such as the rate of antipsychotic use, were consistent with previous studies in Ontario, suggesting that the Ontario sample may be somewhat representative of nursing homes in Ontario. In Switzerland, only results from studies in French-speaking cantons were available, which were somewhat different from this study. However, these differences are likely due to the distinctive long term care systems in French- and German- speaking cantons.

7.7. Future research

The results and limitations of this study revealed several areas that require further investigation. Indeed, the findings of potential inappropriate use of antipsychotics and the increasing trend over time demonstrated the need for ongoing assessment of antipsychotic prescribing in nursing homes. Such studies should also have access to the reason for prescribing antipsychotics to assess appropriateness in a more comprehensive fashion. Facility level characteristics should also be incorporated in future research on international comparisons of patterns of antipsychotic prescription. Such studies could examine the impact of staff training, physician characteristics, treatment and management approach.

Future research should also investigate antipsychotic use from admission to discharge to examine the longitudinal pattern of administration on a wider time-frame. The longitudinal predictors of antipsychotic initiation and discontinuation should also be examined on large samples to clarify the directionality of the relationship between antipsychotics and several characteristics, including depressive symptoms, sleep disturbances, and cognitive impairment.

In this study, antipsychotics were associated with a lower likelihood of behavioural improvement. However, more research is required to clarify why antipsychotics may prevent improvement. As such, future studies should have access to more details on behaviours and examine patterns of behavioural change at closer intervals and at more than two points in time to better understand the relationship

between antipsychotic use and behavioural changes. Indeed, previous studies have shown that behaviours change considerably over time in cognitively impaired residents, warranting a close monitoring to assess the impact of antipsychotics on behaviour.

This study also uncovered differences between residents in Ontario and Switzerland that require further examination. First, the lower prevalence of behavioural symptoms in Switzerland would be an interesting focus area for qualitative research in order to understand the underlying causes of this difference and to determine whether it was due to a higher tolerance level for behaviour disturbances. This could be done through in-depth interviews with nursing home staff. Second, the low prevalence of dementia in Swiss residents and the fact that residents deemed to have dementia at admission were reassessed as not having dementia warrants further investigation.

7.8. Implications for Practice and Policy

Findings from this study question the extent and appropriateness of antipsychotic administration in nursing homes in Ontario and Switzerland, warranting changes in practice patterns and implementation of policies. Indeed, results from this study showed that antipsychotics were widely used in both countries. In addition, antipsychotic administration increased over time in the Swiss sample, reaching the prevalence rate of 43% in 2004. Furthermore, potentially inappropriate administration was substantial in both countries, especially in Switzerland where six out of ten users had inappropriate conditions. As well, some determinants of antipsychotic use that emerged from the analyses are not considered as appropriate indications. Thus, this section provides suggestions for reducing and improving antipsychotic administration in nursing homes, based on the findings and existing literature.

Clear guidelines about the appropriate and inappropriate use of antipsychotics in the elderly should be widely disseminated among physicians to address potential inappropriate prescribing practices in these countries. Indeed, prescribing physicians may not always have up-to-date information on the use of antipsychotics and their effects in geriatric patients. This could be due to a lack of training in geriatric medicine, a lack of time to consult recent publications or the unavailability of clear

guidelines. Such information should emphasize on the definition of psychiatric conditions and symptoms responsive to antipsychotic treatment. For instance, as insomnia emerged as strong determinant in Switzerland, the inefficacy of antipsychotics to treat insomnia and the benefits of using hypnotics instead when appropriate should be stressed. In Ontario, the inappropriateness of antipsychotics for anxiety disorders should be emphasized.

In Ontario, the fact that being in a dementia unit determined receiving antipsychotics implies that these units were not successful in reducing pharmacological treatment of behaviour disturbances. Thus, the design and utility of these units should be reassessed and enhanced to actually provide comprehensive care to patients with behavioural and cognitive problems favouring alternatives to pharmacological treatments.

In Switzerland, antipsychotics appeared to be administered differently according to the facility, regardless of clinical characteristics. In response, educational programs targeted towards physicians and nurses could be implemented in nursing homes with high prevalence rates of antipsychotic use, informing staff about the appropriate and inappropriate use of antipsychotics and promoting alternative solutions to drug treatment. Staff education is an important step to reduce antipsychotic use, as one study pointed out the reluctance of nursing staff to discontinue drug treatment because they believed in the utility of antipsychotic drugs to control agitation. Further, more than half the staff thought that drug withdrawal would result in worsening of behavioural problems (Cohen-Mansfield et al., 1999). Past educational interventions have successfully led to reductions in antipsychotic administration by improving selectivity and proposing alternatives to drug use (e.g. Avorn et al., 1992; Ray et al., 1993). In addition, reduction in drug administration did not result in more behaviour disturbance or greater physical functioning among residents or in increased levels of stress among staff. These findings are also supported by studies investigating the impact of antipsychotic withdrawal on residents' behaviours (e.g. Cohen-Mansfield et al., 1999; van Reekum et al., 2002). Though most of these studies were based

on small sample sizes, the reproducibility of the findings suggests that the results are valid and generalizable to most nursing home residents.

In addition, a consultant pharmacist could be appointed to nursing homes. The role of such pharmacist would be to review drug prescriptions to assess whether medications are appropriate to the resident's condition and appropriate in terms of type and dosage, and whether drug interactions are minimized. Further, the determinants found in this study could be used to target residents for review. Such solutions have previously been implemented with success in Switzerland, where this strategy improved the adequacy and rationality of prescription, and decreased the overall drug costs (Rugli et al., 2004). A consultant pharmacist was also appointed to nursing homes in the US as part of the OBRA regulations, with limited success due to physicians' reticence to discontinue treatment when suggested (Stoudemire & Smith, 1996).

Finally, policies restricting the use of antipsychotics for targeted symptoms and disorders in nursing home residents could be implemented in both countries. The experience of the implementation of the OBRA regulations in the US (presented in section 2.2.3) illustrates that regulations are effective in reducing the use of antipsychotic drugs as well as to use of physical restraints (Rovner et al., 1992; Shorr, Fought & Ray, 1994; Hughes et al., 2000). This legislation achieved this reduction by limiting the use of physical restraint and requiring documentation of the specific condition for which antipsychotic drug is prescribed, as well as requiring trials of dose reduction with the goal of discontinuing the drug unless clinically contraindicated.

However, precaution should be taken that chemical restraints are not replaced with physical restraints, which are also associated with negative outcomes. Instead, emphasis should be placed upon other alternatives. As behavioural and psychosocial approaches require more staff time in general than pharmaceutical or restraining approaches, funding from public sources ought to be increased to enable nursing homes to initiate changes. Such funding could be used for training existing staff and hiring additional staff to deal with psychotic and agitated residents and alleviate work load, for training

physicians caring for elderly individuals, and for implementing educational programs and appointing consultant pharmacists.

7.8.1. Implications for the MDS Quality Indicator for Antipsychotic Use

Based on the findings of this study, it is recommended that the QI for antipsychotic use be retained in Ontario and Switzerland, unlike in the US where this QI is no longer recommended for public reporting. Indeed, the situation of potentially inappropriate and excessive use in Ontario and Switzerland is quite dissimilar to the one in the US where the OBRA-87 regulations resulted in significant reduction of inappropriate and excessive antipsychotic administration to nursing homes residents (e.g. Liperoti et al., 2003). For instance, the prevalence rate of antipsychotic use in US nursing homes (14%; Hughes et al., 2000) was much lower than rates found in this study for Ontario and Switzerland. Since antipsychotic use remains problematic in nursing homes in Ontario and Switzerland, it is necessary to continue using this QI to detect inappropriate use; these reports could then inform strategies to reduce such use.

As reviewed above, a number of strategies exist to reduce the administration of antipsychotics and enhance the appropriateness of prescribing practices. These strategies include: the implementation of regulations and policies restricting the prescription of antipsychotics to specific indications; the appointment of consultant pharmacist to nursing homes; the diffusion of comprehensive guidelines; the offering of educational programs aiming at physicians and nursing home staff; and the promotion of alternative strategies (e.g. environmental changes, behavioural or psychosocial programs). The reporting of the QI would also enable program-planners to target nursing homes with high rates of inappropriate use.

7.8.2. Implications for the RAI-RAP for Psychotropic Drugs

The care planning protocol for psychotropic drugs outlines that the need for the drug should be critically reassessed and that antipsychotic treatment should target specific behavioural symptoms or conditions and not be administered for convenience purposes. The RAP also encourages staff to clarify

the potential drug-related problems, such as mood and behavioural problems and describes when drug treatment should be discontinued. The RAP could further be improved in several points.

Though the RAP concerns residents receiving any type of psychotropic, it is suggested that the first section describing the problem includes a paragraph on the specific concerns associated with antipsychotic drugs and on the extent of inappropriate use of antipsychotics in nursing homes. A link could also be added to the published guidelines on the appropriate and inappropriate indications for antipsychotic prescription in the elderly to help review the reason of administration and make a decision with regards to continuing the treatment.

The presence of a diagnosis of depression as trigger item could be replaced with the presence of depressive symptoms as measured by the DRS to better capture the negative effects of antipsychotics on depression, as antipsychotics were associated with depressive symptoms rather than a diagnosis of depression. Further investigation on whether to include wandering as trigger item is recommended, because of its potential role as side-effect. The list of drugs should be regularly updated, as new antipsychotics were and will continue to be introduced.

In step one of drug review, guidelines should include reviewing whether trials of dose reduction and discontinuation were attempted. As well, the reviewer should be encouraged to assess whether alternatives to pharmacological treatments were previously sought for residents with conditions that do not necessarily require antipsychotic treatment. The care planning protocol could also offer suggestions of alternative strategies to pharmacological treatments, as mentioned above. Finally, the guidelines should include a discussion on the detriments of replacing pharmacotherapy with physical restraint.

8. CONCLUSION

The care and management of behaviour disturbances and psychotic features in nursing homes residents is complex, especially in cognitively impaired residents. Thus, finding the best method to deal with these problems require much efforts. However, this should not hinder nursing home staff from finding

alternative strategies to antipsychotic treatment, as they are associated with many side-effects. Yet, findings from this study show that antipsychotics are excessively and inappropriately prescribed to a substantial amount of nursing home residents in both countries, but especially in Switzerland, as uncovered by international comparison with Ontario. In addition, the longitudinal results demonstrating a lack of association with behavioural improvement question their use as a long-term treatment for behaviour disturbances. Thus, changes in practice patterns and implementation of policies are warranted to improve prescribing practices and promote the quality of care provided to residents in nursing homes, as well as residents' safety and well-being.

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APPENDIX A: LITERATURE REVIEW OF THE EFFECTIVENESS OF ANTIPSYCHOTICS

1. Reviews and RCTs on effectiveness of neuroleptics (chronological order)

Study	Design / sample	Outcome measure	Results
Barnes et al, 1982	randomized, double-blind, placebo controlled 53 nursing home (NH) residents	BPRS and SCAG as outcome measures	Improvement for behavioural problems of anxiety, excitement, emotional liability, uncooperativeness
Sunderland & Silver, 1988	Qualitative review	20 double-blind and/or placebo-controlled studies published between 1954 and 1986	60% of the studies demonstrated positive clinical results in demented patient using neuroleptics. When used at low doses for symptoms of dementia (agitation, hyperactivity, hallucinations, and hostility) they appeared to be safe and effective.
Devenand et al, 1988	Qualitative review	14 uncontrolled studies 15 double-blind controlled trials of neuroleptics in dementia	Limited evidence to suggest that neuroleptics may be effective in relatively low doses in some demented patients with behavioural disturbance
Helms, 1985	Qualitative review	21 studies up until 1985 of antipsychotics in the treatment of behavioural complications of dementia	Only 3 studies met the quality criteria. Results were mixed and antipsychotics showed moderate benefit in treating certain symptoms associated with dementia.
Schneider et al, 1990	Quantitative meta-analysis	Controlled trials comparing neuroleptics to placebo published between 1962 and 1982	Neuroleptics were "significantly more effective than placebo and had a small effect size": 18% of patients with dementia benefited from neuroleptic treatment.
McShane et al, 1997	2 year prospective study. 71 subjects with dementia living at home	Cognitive function scores measured with the MMSE, behaviour measured with PBE	22.5% on antipsychotics The rate of cognitive decline was greater among users compared to non-users
Lanctôt et al, 1998	Quantitative meta-analysis	Randomized, controlled, double-blind trials published between 1966 and 1995	The pooled mean percentage of patients who improved was 64% (54% to 72%). The therapeutic effect was 26% (neuroleptic minus placebo). All neuroleptics had similarly small but significant efficacy over placebo. Risk of side-effects: 25%.

2. Reviews and RCTs on effectiveness of atypical antipsychotics (chronological order)

Study	Design / sample	Outcome measure	Results
Katz et al, 1999	double-blind, randomized, placebo-controlled study 625 residents in NH and chronic care hospital with dementia	Efficacy and safety of risperidone in the treatment of psychotic and behavioural symptoms using the BEHAVE-AD scale as main outcome measure. Clinical improvement measured as the percentage of patients with >50% reduction on BEHAVE-AD total score	Risperidone users showed significantly greater reductions in BEHAVE-AD total scores, and psychosis and aggressiveness in subscales scores. Most common adverse events: EPS, somnolence, peripheral oedema. No significant change in cognition compared to placebo.
De Deyn et al, 1999	international, double-blind, placebo-controlled trial 344 patients with dementia.	Comparison of risperidone with haloperidol and placebo using the BEHAVE-AD and the CMAI scores as outcome measures. Clinical improvement measured as the percentage of patients with >30% reduction on BEHAVE-AD total score.	Risperidone was associated with greater reductions in the severity and frequency of behavioural symptoms, particularly aggression, in elderly patients with dementia, than placebo and conventional. Their results did not show substantial improvement in cognition.
Yoon et al, 2003	Prospective open-labelled study in Korea 48 demented patients	Effect of risperidone on the BPSD using the BPRS scale, on cognitive function using the MMSE, and on ADL using the BADL scale	Risperidone was effective in significantly reducing the scores on the BPSD (except anxiety subscale) without affecting cognition and ADL (no significant change on scores)
Lee et al, 2004	Qualitative review	5 trials (Katz, DeDeyn, Brodaty, Street) on the efficacy of atypical in the treatment of behavioural and psychological symptoms of dementia, and over conventional antipsychotics	Treatment with atypical antipsychotics was superior to placebo for improving BSPD and adverse events were common (EPS, somnolence, abnormal gait). Limited evidence supports the perception of improved efficacy and adverse events compared to typical.

3. Clinical studies on effectiveness of antipsychotics (chronological order)

Study	Design / sample	Outcome measure	Results
Burton et al, 1995	1 year longitudinal study. 201 residents in 8 skilled NH in the US.	9 behaviours measured with PGDRS collected with interviews, psychiatric evaluations, and medical charts.	39.3% on neuroleptics within 1 year A change in behaviour was more likely to occur in neuroleptic users towards resolving or development of disruptive behaviour
Kiely et al, 2000	Retrospective cohort study 8982 NH residents in 2 US states	Incidence of wandering, measured with MDS	Residents with short- and long-term memory problem, pneumonia, asked repetitive questions, with dementia, constipation, and used antipsychotic medications were at increased risk for wandering.

APPENDIX B: LITERATURE REVIEW OF STUDIES ON PREVALENCE AND CHARACTERISTICS ASSOCIATED WITH ANTIPSYCHOTICS IN NURSING HOMES

(by chronological order)

Study	Sample	Design / Data collection method	AP use (range)	Associates
Ray et al, 1980	5,902 Medicaid patients over 65 in 173 NH (US)	Nursing home patient's use of neuroleptics, within 1 year of being in a nursing home, using drug claims	43%	Greater use among larger nursing home facilities Lack of association with other facility factors (cost per patient day, staff per bed)
Buck, 1988	All Medicaid recipients in 1 state in the US (not only elderly)	Retrospective exam of residents' drug claims, within 1 year of being in a nursing home	44%	Prescriptions of neuroleptic were more influenced by patient characteristics than institutional variables. However, resident characteristics only explained 10% of the variance in neuroleptic use.
Beers et al, 1988	850 residents in 12 intermediate care facilities in the US	Use of a software program to capture needed information, use within 1 month	26% (20.9 – 27.8) (actual use) 33% prescribed	Not investigated.
Burns & Kamerow, 1988	526 nursing home residents in 112 NH in the US	Data from the National Nursing Home Study Pretest (which consisted of surveys of medical records and interviews with staff)	22% (combined with lithium)	Appropriateness among antipsychotic/lithium users: 6.7% had no mental disorders, 24% had an organic brain syndrome, and 44.7 had other mental disorders
DeLeo et al, 1989	1533 residents in 11 geriatric institutions in Italy	Review of clinical record and treatment charts	8%	Not investigated.
Nolan & O'Malley, 1989	301 residents in 11 NH in Ireland	Drugs prescribed during 1-week period	27%	The rate of psychotropic drug prescribing was inversely related to nursing home size.
Nygaard et al, 1990	1300 residents in 21 NH in Norway	1 week census data of resident interviews by nurses	32.6 %	No association with gender and age. Restlessness and wandering, inability to perform personal hygiene, and mobility associated in logistic regression.
Garrard et al., 1992	5752 nursing home residents in 60 NH in 8 states (US)	Retrospective cohort study (admission, 3 months later, at discharge/end of study)	17% (at each point of time)	Neuroleptic use was associated in bivariate analyses with younger age and physical restraint.
Spore et al, 1992	419 residents in 4 NH in the US	Cross-sectional data using medical records	23.2%	Dementia, psychosis, frequency of agitation, level of withdrawal, and marital status were associated in logistic regression.
Nygaard et al, 1994	83 permanent residents in 5 NH in Norway	Prospective study Information on variables by nurses	35% on admission 34% after 3 months	Dementia (OR=3.4), dependency (ADL) (OR=0.14 – 0.21), restlessness (OR=16.76) and problems in short-term memory (6.13) were associated with neuroleptic use in bivariate Restlessness only (13.53) in multivariate

Study	Sample	Design / Data collection method	AP use (range)	Associates
Koopmans et al., 1996	All residents with dementia admitted to 1 NH in Holland between Jan 1980 and dec 1989	Retrospective study of medical records	62% (at least once during study period)	Not investigated.
McGrath & Jackson, 1996	909 residents in 28 NH in the UK	Cross-sectional study of medical files	24%	Antipsychotics prescription was only appropriate in 12% of users (using OBRA guidelines).
Wancata et al, 1997	262 residents in 10 NH in Austria	Review of treatment sheets (data on actual administration) and semi-structured interviews	13% before admission (n=185) 32.1% two weeks after admission 31.2% 6 months after admission (n=186)	Sleeping patterns and psychiatric disorders were significantly associated with psychotropic use in general, but sociodemographic variables (gender, age, marital status) and source of admission were not associated Suggest that a large percentage of psychotropic intake is due to nursing home orders.
Lasser & Sunderland, 1998	298 residents in 7 NH in the US between 1995 and 1996	Retrospective chart review	42%	Not investigated.
Schmidt et al, 1998	1823 residents in 33 NH in Sweden	Cross-sectional review of patients' medication list	34% (7 - 53)	29.2% of users had no psychotic diagnosis.
Conn et al, 1999	436 residents in 4 NH in Ontario	Review of pharmacy files	29.8%	Not investigated.
Castle, 1999	2088 residents in 268 NH in 10 states in the US in 1993	Cross-sectional study using the MDS for resident level variables and OSCAR for facility level variables	16.9%	Antipsychotic use associated with ADL, CPS, age, gender, history of psychiatric problems, dementia, depression, anxiety disorder and stroke.
Hughes et al, 2000	Cross-national study in 6 countries	MDS v 1.0	Japan: 7.5% US: 14.4% Denmark: 16.9% Italy: 22.1% Iceland: 24.5% Sweden: 26.5%	Only impact of legislation was investigated. Large international variations in residents' clinical characteristics.
Draper et al, 2001	647 residents in 11 NH in Sydney	Review of nursing home charts and interview with residents	21.3%	Associated in bivariate analyses with delusions-, hallucinations-, activity disturbance- and aggressiveness-subscales of the BEHAVE-AD. In multivariate with activity disturbance subscale, dementia and psychosis.
Ruths et al, 2001	1552 residents in 23 NH in Norway	Information obtained from survey of nurses and physicians	23% (0 - 61)	Age and gender were associated with antipsychotic use in bivariate analysis. Only age in logistic regression. Facility variables (size, staff) not significant.

Study	Sample	Design / Data collection method	AP use (range)	Associates
Sorensen et al., 2001	288 residents (65+) in 10 NH in Denmark	Cross-sectional analysis of interviews and medical files	21%	Associated with behavioural problems in bivariate (resisting care, becoming easily upset, seeing/ hearing things not there, asking for attention, pacing uncooperativeness). Associated in multivariate with psychiatric morbidity (OR=8), ADL impairment in transfer (OR 9.7) and in mobility (OR=0.2), disturbing others during night (OR=4.1), and accusing others falsely (OR=5.3)
MacDonald et al, 2002	445 non-mentally infirm residents in NH in the UK	Cross-sectional study using prescription sheets, and interviews and MDS for clinical data	15.3%	Antipsychotic use was associated in bivariate analyses with cognitive impairment and behavioural disturbances.
Oborne et al, 2002	934 NH residents in the UK	Cross-sectional survey of medication administration records	24.5%	17.8% were prescribed neuroleptics appropriately (using OBRA guidelines).
Lindesay et al, 2003	1990: 4528 1997: 4226 in the UK	1 night census data using questionnaires administered by care staff	1990: 17.8% 1997: 21.9%	Associated with younger age, type of home, cognitive impairment, offensive behaviour, lower ADL dependency, antidepressant use, urinary incontinence, mobility in multivariate analysis.
Liperoti et al, 2003	139'714 residents in 1732 NH in the US (1999-2000)	Cross-sectional study using the MDS	15% overall	Among appropriate users: 68.3% Among potentially appropriate users: 18.2% Among potentially inappropriate users: 3.9%
Bronskill et al, 2004	19'780 individuals (66+ yrs) newly admitted in NH between 1998 and 2000 in Ontario	Retrospective cohort study using claims from the Ontario Drug Benefit (ODB) program	17% within 100 days of admission 24% within 1 year of admission	New exposure to neuroleptics was less likely in women (OR=0.7) and more likely in residents with dementia (OR=3.5).
Lukas et al., 2004	All 5884 NH residents in the canton of Vaud (Switzerland) in 1996	Cross-sectional analysis using an administrative database (PLAISIR system)	43%	In multivariate linear regression, the number of antipsychotics administered daily was negatively associated with age, Parkinson's disease, severe orientation problems, drug-addiction and the size of the nursing home. It was positively associated with psychiatric morbidity, agitation, disturbing others, impairment in daily decision making, and persistent anxiety. Clinical variables explained 22% of the variance, the nursing home alone 20%, and 32% combined.
Briesacher et al, 2005	1096 Medicare beneficiaries in NH during 2000-2001 in the US	Retrospective analysis of MDS assessments, medication administration records, and Medicare claims	27.6% (at least once during study period)	With appropriate indication: 19.4% No appropriate indication: 8.4%

Study	Sample	Design / Data collection method	AP use (range)	Associates
Gobert & D'horre, 2005	8183 long-term care residents in Quebec and 7592 long-term care residents in Switzerland	Cross-sectional analysis using an administrative database (PLAISIR system)	32.9% in Quebec 35.9% in Switzerland	Common factors associated with antipsychotic use in logistic regression were younger age, difficulties in orientation, behavioural disorders, organic psychotic state and other psychoses, and, for Switzerland only, neurotic personality disorder, and ADL.
Snowdon et al., 2005	2302 residents in 40 NH in Sydney in 2003	Cross-sectional study using clinical files and medication cards recording use of medication in the previous 4 weeks	25.1%	80% of nursing home residents who received antipsychotics did not have a diagnosis of schizophrenia. Most recipients had dementia or cerebral disease.
Voyer et al, 2005	2332 residents in 28 NH in Quebec	Cross-sectional study using interviews with nurses and review of medical files	27.8%	Factors associated with antipsychotic use in logistic regression were younger age, few hours of family visit, severe cognitive impairment, insomnia, physical restraint, and disruptive behaviour.

APPENDIX C: MINIMUM DATA SET ASSESSMENT TOOL (ONTARIO VERSION)

MINIMUM DATA SET (MDS) VERSION 2.0

Modified for Ontario Chronic Care Institutions

Addressograph

FULL ASSESSMENT

SECTION A: IDENTIFICATION AND BACKGROUND INFORMATION

1	RESIDENT NAME	a. First b. Middle Initial c. Last d. Jr/Sr
2	ROOM NUMBER	
3	ASSESSMENT REFERENCE DATE	Last day of MDS observation period Year - Month - Day
5	MARITAL STATUS	1. Never married 3. Widowed 5. Divorced 2. Married 4. Separated 9. Unknown
6a	CHART NUMBER	
6b	REGISTER NUMBER	
7	RESPONSIBILITY FOR PAYMENT	*(Check all that apply in LAST 30 DAYS.)* a. Resident of Canada (covered by OHIP or other provincial funding) [a] b. Workers' Compensation Board (Workplace Safety and Insurance Board) [b] c. Non-resident of Ontario, resident of Canada [c] d. Self-pay [d] e. Federal government (RCMP, Canadian Armed Forces, inmate of federal penitentiary, veteran, refugee) [e] f. Other [f]
9	RESPONSIBILITY/ LEGAL GUARDIAN	*(Check all that apply. Use '9' if unknown.)* a. Legal guardian [a] b. Durable power of attorney/financial [b] c. Other legal oversight [c] d. Family member responsible [d] e. Durable power of attorney/health care [e] f. Patient responsible for self [f] g. *NONE OF ABOVE* [g]
10	ADVANCED DIRECTIVES	*(For those items with supporting documentation in the medical record, check all that apply. Use '9' if unknown.)* a. Living will [a] f. Feeding restrictions [f] b. Do not resuscitate [b] g. Medication restrictions [g] c. Do not hospitalize [c] h. Other treatment restrictions [h] d. Organ donation [d] i. *NONE OF ABOVE* [i] e. Autopsy request [e]

SECTION B: COGNITIVE PATTERNS

1	COMATOSE	*(Persistent vegetative state or no discernible consciousness)* 0. No 1. Yes (Skip to item G1)

SECTION B: COGNITIVE PATTERNS (cont'd)

2	MEMORY	*(Recall of what was learned or known)* a. Short-term memory OK—seems or appears to recall after 5 minutes 0. Memory OK 1. Memory problem b. Long-term memory OK—seems or appears to recall long past 0. Memory OK 1. Memory problem
3	MEMORY/ RECALL ABILITY	*(Check all that resident was normally able to recall during the last 7 days.)* a. Current season [a] b. Location of own room [b] c. Staff names and faces [c] d. That he/she is in a facility [d] e. *NONE OF ABOVE* are recalled [e]
4	COGNITIVE SKILLS FOR DAILY DECISION MAKING	*(Made decisions regarding tasks of daily life.)* 0. INDEPENDENT–decisions consistent and reasonable 1. MODIFIED INDEPENDENCE–some difficulty in new situations only 2. MODERATELY IMPAIRED—decisions poor; cues or supervision required 3. SEVERELY IMPAIRED—never/rarely made decisions
5	INDICATORS OF DELIRIUM-PERIODIC DISORDERED THINKING/ AWARENESS	*(Code for behaviour in last 7 days.) Accurate assessment requires conversations with staff and family who have direct knowledge of resident's behaviour over this time.* 0. Behaviour not present 1. Behaviour present, not of recent onset 2. Behaviour present, over last 7 days appears different from resident's usual functioning (e.g. new onset or worsening) a. EASILY DISTRACTED (e.g. difficulty paying attention, gets sidetracked) b. PERIODS OF ALTERED PERCEPTION OR AWARENESS OF SURROUNDINGS (e.g. moves lips or talks to someone not present; believes he or she is somewhere else; confuses night and day) c. EPISODES OF DISORGANIZED SPEECH (e.g. speech is incoherent, nonsensical, irrelevant, or rambling from subject to subject; loses train of thought) d. PERIODS OF RESTLESSNESS (e.g. fidgeting or picking at skin, clothing, napkins, etc.; frequent position changes; repetitive physical movements or calling out) e. PERIODS OF LETHARGY (e.g. sluggishness; staring into space; difficult to arouse; little bodily movement) f. MENTAL FUNCTION VARIES OVER THE COURSE OF THE DAY (e.g. sometimes better, sometimes worse; behaviours sometimes present, sometimes not)
6	CHANGE IN COGNITIVE STATUS	Resident's cognitive status, skills or abilities have changed as compared to status of 90 DAYS AGO (or since last assessment if less than 90 days). 0. No change 1. Improved 2. Deteriorated

☐ = when box blank, must enter number or letter.
[a] = when box holds a letter, check if condition applies.

OCCPS/MDS 2.0
97-002 Updated July 99

SECTION C: COMMUNICATION/HEARING PATTERNS

1	HEARING	*(With hearing appliance, if used)* 0. HEARS ADEQUATELY—normal talk, TV, phone 1. MINIMAL DIFFICULTY—when not in quiet setting 2. HEARS IN SPECIAL SITUATION ONLY—speaker has to adjust tonal quality and speak distinctly 3. HIGHLY IMPAIRED or absence of useful hearing 9. UNKNOWN (for cognitively impaired only)	
2	COMMUNICATION DEVICES/ TECHNIQUES	*(Check all that apply during last 7 days.)* a. Hearing aid, present and used b. Hearing aid, present and not used regularly c. Other receptive communication techniques used (e.g. lip reading) d. *NONE OF ABOVE*	a b c d
3	MODES OF EXPRESSION	*(Check all used by resident to make needs known.)* a. Speech [a] b. Writing messages to express or clarify needs [b] c. American sign language or Braille [c] d. Signs or gestures or sounds [d] e. Communication board f. Other g. *NONE OF ABOVE*	e f g
4	MAKING SELF UNDERSTOOD	*(Expressing information content—however able)* 0. UNDERSTOOD 1. USUALLY UNDERSTOOD—difficulty finding words or finishing thoughts 2. SOMETIMES UNDERSTOOD—ability is limited to making concrete requests 3. RARELY OR NEVER UNDERSTOOD	
5	SPEECH CLARITY	*(Code for speech in last 7 days.)* 0. CLEAR SPEECH—distinct, intelligible words 1. UNCLEAR SPEECH—slurred, mumbled words 2. NO SPEECH—absence of spoken words	
6	ABILITY TO UNDERSTAND OTHERS	*(Understanding verbal information content—however able)* 0. UNDERSTANDS 1. USUALLY UNDERSTANDS—may miss some part or intent of message 2. SOMETIMES UNDERSTANDS—responds adequately to simple, direct communication 3. RARELY OR NEVER UNDERSTANDS 9. UNKNOWN (for cognitively impaired only)	
7	CHANGE IN COMMUNICATION/ HEARING	Resident's ability to express, understand, or hear information has changed as compared to status of 90 DAYS AGO (or since last assessment if less than 90 days). 0. No Change 1. Improved 2. Deteriorated	

SECTION D: VISION PATTERNS

1	VISION	*(Able to see in adequate light and with glasses, if used)* 0. ADEQUATE—sees fine detail, including regular print in newspapers or books 1. IMPAIRED—sees large print, but not regular print in newspapers or books 2. MODERATELY IMPAIRED—limited vision; not able to see newspaper headlines, but can identify objects 3. HIGHLY IMPAIRED—object identification in question, but eyes appear to follow objects 4. SEVERELY IMPAIRED—no vision or sees only light, colours or shapes; eyes do not appear to follow objects 9. UNKNOWN (for cognitively impaired only)	

SECTION D: VISION PATTERNS (cont'd)

2	VISUAL LIMITATIONS/ DIFFICULTIES	a. Side vision problems—decreased peripheral vision (e.g. leaves food on one side of tray, difficulty travelling, bumps into people and objects, misjudges placement of chair when seating self) 0. No 1. Yes 9. Unknown (for cognitively impaired only) b. Experiences any of the following: sees halos or rings around lights, sees flashes of light, sees "curtains" over eyes 0. No 1. Yes 9. Unknown (for cognitively impaired only) c. *NONE OF ABOVE*	
3	VISUAL APPLIANCES	Glasses; contact lenses; magnifying glass 0. No 1. Yes	

SECTION E: MOOD AND BEHAVIOUR PATTERNS

1	INDICATORS OF DEPRESSION, ANXIETY, SAD MOOD	*(Code for indicators observed in LAST 30 DAYS, irrespective of the assumed cause.)* 0. Indicator not exhibited in last 30 days 1. Indicator of this type exhibited up to 5 days a week 2. Indicator of this type exhibited daily or almost daily (6, 7 days) VERBAL EXPRESSIONS OF DISTRESS a. Resident made negative statements (e.g. "Nothing matters; Would rather be dead; What's the use; Regrets having lived so long; Let me die.") b. Repetitive questions: (e.g. "Where do I go? What do I do?" c. Repetitive verbalizations (e.g. Calling out for help; "God help me.") d. Persistent anger with self or others (e.g. easily annoyed, anger at placement in facility; anger at care received) e. Self deprecation (e.g. "I am nothing, of no use to anyone.") f. Expressions of what appear to be unrealistic fears (e.g. fear of being abandoned, left alone, being with others) g. Recurrent statements that something terrible is about to happen (e.g. believes is about to die, have a heart attack) h. Repetitive health complaints (e.g. persistently seeks medical attention, obsessive concern with body functions) i. Repetitive anxious complaints or concerns—non-health (e.g. persistently seeks attention or reassurance regarding schedules, meals, laundry or clothing, relationship issues) SLEEP-CYCLE ISSUES j. Unpleasant mood in morning k. Insomnia or change in usual sleep pattern SAD, APATHETIC, ANXIOUS APPEARANCE l. Sad, pained, worried facial expressions (e.g. furrowed brows) m. Crying, tearfulness n. Repetitive physical movements (e.g. pacing, hand wringing, restlessness, fidgeting, picking) LOSS OF INTEREST o. Withdrawal from activities of interest (e.g. no interest in longstanding activities or being with family, friends) p. Reduced social interaction	
2	MOOD PERSISTENCE	One or more indicators of depressed, sad or anxious mood were not easily altered by attempts to "cheer up", console, or reassure the resident in last 7 days. 0. No mood indicators 1. Indicators present, easily altered 2. Indicators present, not easily altered	
3	CHANGE IN MOOD	Resident's mood status has changed as compared to status of 90 DAYS AGO (or since last assessment if less than 90 days). 0. No change 1. Improved 2. Deteriorated	

SECTION E: MOOD AND BEHAVIOUR PATTERNS (cont'd)

4	BEHAVIOURAL SYMPTOMS	*(Code for behaviour in last 7 days.)* A. Behavioural symptom frequently in last 7 days 0. Behaviour not exhibited in last 7 days 1. Behaviour of this type occurred on 1 to 3 days in last 7 days 2. Behaviour of this type occurred 4 to 6 days, but less than daily 3. Behaviour of this type occurred daily B. Behavioural symptom alterability in last 7 days 0. Behaviour not present —OR—behaviour was easily altered 1. Behaviour was not easily altered	A	B
		a. **WANDERING** (moved with no rational purpose, seemingly oblivious to needs or safety)		
		b. **VERBALLY ABUSIVE** behavioural symptoms (others were threatened, screamed at, cursed at)		
		c. **PHYSICALLY ABUSIVE** behavioural symptoms (others were hit, shoved, scratched, sexually abused)		
		d. **SOCIALLY INAPPROPRIATE or DISRUPTIVE** behavioural symptoms (made disruptive sounds, noisiness, screaming, self-abusive acts, sexual behaviour or disrobing in public, smeared or threw food or feces, hoarding, rummaged in others' belongings)		
		e. **RESISTS CARE** (resisted taking meds or injections, ADL assistance, or eating)		
5	CHANGE IN BEHAVIOURAL SYMPTOMS	Resident's behavioural status has changed as compared to status of 90 DAYS AGO (or since last assessment if less than 90 days). 0. No change 1. Improved 2. Deteriorated		

SECTION F: PSYCHOSOCIAL WELL-BEING

1	SENSE OF INITIATIVE/ INVOLVEMENT	a. At ease interacting with others	a
		b. At ease doing planned or structured activities	b
		c. At ease doing self-initiated activities	c
		d. Establishes own goals	d
		e. Pursues involvement in life of facility (e.g. makes and keeps friends; involved in group activities; responds positively to new activities; assists at religious services)	e
		f. Accepts invitations into most group activities	f
		g. *NONE OF ABOVE*	g
2	UNSETTLED RELATIONSHIPS	a. Covert/open conflict with or repeated criticism of staff	a
		b. Unhappy with roommate	b
		c. Unhappy with residents other than roommate	c
		d. Openly expresses conflict/anger with family/friends	d
		e. Absence of personal contact with family or friends	e
		f. Recent loss of close family member or friend	f
		g. Does not adjust easily to change in routines	g
		h. *NONE OF ABOVE*	h
3	PAST ROLES	a. Strong identification with past roles and life status 0. No 1. Yes 9. Unknown (for cognitively impaired only)	
		b. Expresses sadness, anger or empty feeling over lost roles or status 0. No 1. Yes 9. Unknown (for cognitively impaired only)	
		c. Resident perceives that daily life (customary routine, activities) is very different from prior pattern in the community 0. No 1. Yes 9. Unknown (for cognitively impaired only)	

SECTION G: PHYSICAL FUNCTIONING AND STRUCTURAL PROBLEMS

1	A. ADL SELF-PERFORMANCE *(Code for resident's PERFORMANCE OVER ALL SHIFTS during last 7 days, not including setup)* 0. **INDEPENDENT**. No help or oversight–OR–help/oversight provided only 1 or 2 times during last 7 days. 1. **SUPERVISION**. Oversight, encouragement or cueing provided 3 or more times during last 7 days–OR–Supervision plus physical assistance provided only 1 or 2 times during last 7 days. 2. **LIMITED ASSISTANCE**. Resident highly involved in activity; received physical help in guided maneuvering of limbs, or other nonweight-bearing assistance 3 or more times–OR–More help provided only 1 or 2 times during last 7 days. 3. **EXTENSIVE ASSISTANCE**. Although resident performed part of activity, over last 7-day period, help of the following type(s) was provided 3 or more times: • weight-bearing support • full staff performance during part (but not all) of last 7 days. 4. **TOTAL DEPENDENCE**. Full staff performance of activity during entire 7 days. 8. **ACTIVITY DID NOT OCCUR** during entire 7 days.		
	B. ADL SUPPORT PROVIDED *(Code for MOST SUPPORT PROVIDED OVER ALL SHIFTS during last 7 days; code regardless of resident's self-performance classification.)* 0. No setup or physical help from staff 1. Setup help only 2. One-person physical assist 3. Two+ persons physical assist 8. ADL activity did not occur during entire 7 days		A (SELF-PERFORMANCE)	B (SUPPORT)
a	BED MOBILITY	How resident moves to and from lying position, turns from side to side, and positions body while in bed		
b	TRANSFER	How resident moves between surfaces–to and from: bed, chair, wheelchair, standing position (EXCLUDE to and from bath and toilet)		
c	WALK IN ROOM	How resident walks between locations in own room		
d	WALK IN CORRIDOR	How resident walks in corridor on unit		
e	LOCOMOTION ON UNIT	How resident moves between locations in own room and adjacent corridor on same floor. If in wheelchair, self-sufficiency once in chair		
f	LOCOMOTION OFF UNIT	How resident moves to and returns from off-unit locations (e.g. areas set aside for dining, activities or treatments). If facility has only one floor, how resident moves to and from distant areas on the floor. If in wheelchair, self-sufficiency once in chair		
g	DRESSNG	How resident puts on, fastens, and takes off all items of street clothing, including donning and removing prosthesis		
h	EATING	How resident eats and drinks (regardless of skill). Includes intake of nourishment by other means (e.g. tube feeding, total parenteral nutrition)		
i	TOILET USE	How resident uses the toilet room (or commode, bedpan, urinal); transfers on/off toilet, cleanses, changes pad, manages ostomy or catheter, adjusts clothes		
j	PERSONAL HYGIENE	How resident maintains personal hygiene, including combing hair; brushing teeth; shaving; applying makeup; washing and drying face, hands, and perineum (EXCLUDE baths and showers)		

SECTION G: PHYSICAL FUNCTIONING AND STRUCTURAL PROBLEMS (cont'd)

2 BATHING

How resident takes full-body bath or shower, sponge bath, and transfers in and out of tub or shower (EXCLUDE washing of back and hair). *(Code for most dependent in self-performance and support.)*

Bathing self-performance codes are:

0. Independent–No help provided
1. Supervision–Oversight help only
2. Physical help limited to transfer only
3. Physical help in part of bathing activity
4. Total dependence
8. Bathing did not occur during the entire 7 days

(Bathing support codes are as defined in item 1B above)

	A (SELF-PERFORMANCE)	B (SUPPORT)

3 TEST FOR BALANCE

(Code for ability during test in the last 7 days.)

0. Maintained position as required in test
1. Unsteady, but able to rebalance self without physical support
2. Partial physical support during test or doesn't follow directions
3. Not able to attempt test without physical help

a. Balance while standing	
b. Balance while sitting–position, trunk control	

4 FUNCTIONAL LIMITATION IN RANGE OF MOTION

(Code for limitations during last 7 days that interfered with daily functions or put resident at risk of injury.)

A. RANGE OF MOTION: 0. No limitation; 1. Limitation on 1 side; 2. Limitation on both sides

B. VOLUNTARY MOVEMENT: 0. No loss; 1. Partial loss; 2. Full loss

	A	B
a. Neck		
b. Arm—including shoulder or elbow		
c. Hand—including wrist or fingers		
d. Leg—including hip or knee		
e. Foot—including ankle or toes		
f. Other limitation or loss		

5 MODES OF LOCOMOTION

(Check all that apply during last 7 days.)

- a. Cane, walker, or crutch [a]
- b. Wheeled self [b]
- c. Other person wheeled [c]
- d. Wheelchair primary mode of locomotion [d]
- e. *NONE OF ABOVE* [e]

6 MODES OF TRANSFER

(Check all that apply during last 7 days.)

- a. Bedfast all or most of the time [a]
- b. Bed rails used for bed mobility or transfer [b]
- c. Lifted manually [c]
- d. Lifted mechanically [d]
- e. Transfer aid (e.g. slide board, trapeze, cane, walker, brace) [e]
- f. *NONE OF ABOVE* [f]

7 TASK SEGMENTATION

Some or all of ADL activities were broken into sub-tasks during last 7 days so that resident could perform them.

0. No 1. Yes

8 ADL FUNCTIONAL REHAB. POTENTIAL

(Check all that apply during last 7 days.)

- a. Resident believes self to be capable of increased independence in at least some ADLs [a]
- b. Direct care staff believe resident is capable of increased independence in at least some ADLs [b]
- c. Resident able to perform tasks/activity but is very slow [c]
- d. Difference in ADL self-performance or ADL support, comparing mornings to evenings [d]
- e. *NONE OF ABOVE* [e]

9 CHANGE IN ADL FUNCTION

Resident's ADL Self-Performance status has changed as compared to status of 90 DAYS AGO (or since last assessment if less than 90 days).

0. No change 1. Improved 2. Deteriorated

SECTION H: CONTINENCE IN LAST 14 DAYS

1 CONTINENCE SELF-CONTROL CATEGORIES *(Code for performance over all shifts.)*

0. CONTINENT–Complete control
1. USUALLY CONTINENT–BLADDER, incontinent episodes once a week or less; BOWEL, less than weekly
2. OCCASIONALLY INCONTINENT– BLADDER, 2+ times a week but not daily; BOWEL, once a week
3. FREQUENTLY INCONTINENT–BLADDER, tended to be incontinent daily, but some control present (e.g. on day shift); BOWEL, 2 or 3 times a week
4. INCONTINENT–Had inadequate control. BLADDER, multiple daily episodes; BOWEL, all (or almost all) of the time

a	BOWEL CONTINENCE	Control of bowel movement, with appliance or bowel continence programs, if used
b	BLADDER CONTINENCE	Control of urinary bladder function (if dribbles, volume insufficient to soak through underpants), with appliances (e.g. foley) or continence programs, if used

2 BOWEL ELIMINATION PATTERN

(Check all that apply in LAST 14 DAYS.)

- a. Bowel elimination pattern regular—at least 1 movement every 3 days [a]
- b. Constipation [b]
- c. Diarrhea [c]
- d. Fecal impaction [d]
- e. *NONE OF ABOVE* [e]

3 APPLIANCES AND PROGRAMS

(Check all that apply in LAST 14 DAYS.)

- a. Any scheduled toileting plan [a]
- b. Bladder retraining program [b]
- c. External (condom) catheter [c]
- d. Indwelling catheter [d]
- e. Intermittent catheter [e]
- f. Did not use toilet room, commode, urinal [f]
- g. Pads or briefs used [g]
- h. Enemas, irrigation [h]
- i. Ostomy present [i]
- j. *NONE OF ABOVE* [j]

4 CHANGE IN URINARY CONTINENCE

Resident's urinary continence has changed as compared to status of 90 DAYS AGO (or since last assessment if less than 90 days).

0. No change 1. Improved 2. Deteriorated

SECTION I: DISEASE DIAGNOSES

(Check only those diseases that have a relationship to current ADL status, cognitive status, mood and behaviour status, medical treatments, nurse monitoring, or risk of death. Do not list inactive diagnoses.)

1 DISEASES

(If none of I1a–I1qq apply, CHECK item I1rr, NONE OF ABOVE.)

ENDOCRINE/METABOLIC/NUTRITIONAL

- a. Diabetes mellitus [a]
- b. Hyperthyroidism [b]
- c. Hypothyroidism [c]

HEART/CIRCULATION

- d. Arteriosclerotic heart disease (ASHD) [d]
- e. Cardiac dysrhythmia [e]
- f. Congestive heart failure [f]
- g. Deep vein thrombosis [g]
- h. Hypertension [h]
- i. Hypotension [i]
- j. Peripheral vascular disease [j]
- k. Other cardiovascular disease [k]

MUSCULOSKELETAL

- l. Arthritis [l]
- m. Hip fracture [m]
- n. Missing limb (e.g. amputation) [n]
- o. Osteoporosis [o]
- p. Pathological bone fracture [p]

NEUROLOGICAL

- q. Alzheimer's disease [q]
- r. Aphasia [r]
- s. Cerebral palsy [s]
- t. Cerebrovascular accident (stroke) [t]
- u. Dementia other than Alzheimer's disease [u]
- v. Hemiplegia/hemiparesis [v]
- w. Multiple sclerosis [w]
- x. Paraplegia [x]
- y. Parkinson's disease [y]
- z. Quadriplegia [z]
- aa. Seizure disorder [aa]
- bb. Transient ischemic attack (TIA) [bb]
- cc. Traumatic brain injury [cc]

(cont'd over)

SECTION I: DISEASE DIAGNOSES (cont'd)

(Check only those diseases that have a relationship to current ADL status, cognitive status, mood and behaviour status, medical treatments, nurse monitoring, or risk of death. Do not list inactive diagnoses.)

1 DISEASES (cont'd) — *(If none of I1a–I1qq apply, CHECK item I1rr, NONE OF ABOVE.)*

PSYCHIATRIC/MOOD

- dd. Anxiety disorder [dd]
- ee. Depression [ee]
- ff. Manic depressive (bipolar disease) [ff]
- gg. Schizophrenia [gg]

PULMONARY

- hh. Asthma [hh]
- ii. Emphysema/COPD [ii]

SENSORY

- jj. Cataracts [jj]
- kk. Diabetic retinopathy [kk]
- ll. Glaucoma [ll]
- mm. Macular degeneration [mm]

OTHER

- nn. Allergies [nn]
- oo. Anemia [oo]
- pp Cancer [pp]
- qq. Renal failure [qq]
- rr. *NONE OF ABOVE* [rr]

2 INFECTIONS — *(If none apply, CHECK the NONE OF ABOVE box.)*

- a. Antibiotic resistant infection (e.g. Methicillin resistant staph) [a]
- b. Clostridium difficile [b]
- c. Conjunctivitis [c]
- d. HIV infection [d]
- e. Pneumonia [e]
- f. Respiratory infection [f]
- g. Septicemia [g]
- h. Sexually transmitted diseases [h]
- i. Tuberculosis (active) [i]
- j. Urinary tract infection in LAST 30 DAYS [j]
- k. Viral hepatitis [k]
- l. Wound infection [l]
- m. *NONE OF ABOVE* [m]

SECTION J: HEALTH CONDITIONS

1 PROBLEM CONDITIONS — *(Check all problems present in last 7 days UNLESS OTHER TIME FRAME IS INDICATED.)*

INDICATORS OF FLUID STATUS

- a. Weight gain or loss of 1.5 or more kilograms in last 7 days (3 lbs.) [a]
- b. Inability to lie flat due to shortness of breath [b]
- c. Dehydrated; output exceeds intake [c]
- d. Insufficient fluid; did NOT consume all or almost all liquids provided during LAST 3 DAYS [d]

OTHER

- e. Delusions [e]
- f. Dizziness/vertigo [f]
- g. Edema [g]
- h. Fever [h]
- i. Hallucinations [i]
- j. Internal bleeding [j]
- k. Recurrent lung aspirations in LAST 90 DAYS [k]
- l. Shortness of breath [l]
- m. Syncope (fainting) [m]
- n. Unsteady gait [n]
- o. Vomiting [o]
- p. *NONE OF ABOVE* [p]

2 PAIN SYMPTOMS — *(Code for the highest level of pain present in last 7 days.)*

a. FREQUENCY with which resident complains or shows evidence of pain:
0. No pain *(Skip to J4)*
1. Pain less than daily
2. Pain daily

b. INTENSITY of pain:
1. Mild pain
2. Moderate pain
3. Times when pain is horrible or excruciating

3 PAIN SITE — *(Check all sites where pain was present in last 7 days.)*

- a. Back pain [a]
- b. Bone pain [b]
- c. Chest pain during usual activities [c]
- d. Headache [d]
- e. Hip pain [e]
- f. Incisional pain [f]
- g. Joint pain (other than hip) [g]
- h. Soft tissue pain (e.g. lesion, muscle) [h]
- i. Stomach pain [i]
- j. Other [j]

SECTION J: HEALTH CONDITIONS (cont'd)

4 ACCIDENTS — *(Identify all that apply.)*

- a. Fell in PAST 30 DAYS [a]
- b. Fell in PAST 31 to 180 DAYS [b]
- c. Hip fracture in LAST 180 DAYS [c]
- d. Other fracture in LAST 180 DAYS [d]
- e. *NONE OF ABOVE* [e]

5 STABILITY OF CONDITIONS — *(Check all that apply.)*

- a. Conditions or diseases make resident's cognitive, ADL, mood, or behaviour patterns unstable (fluctuating, precarious, or deteriorating) [a]
- b. Resident experiencing an acute episode or a flare-up of a recurrent or chronic problem [b]
- c. End-stage disease; 6 months or less to live [c]
- d. *NONE OF ABOVE* [d]

SECTION K: ORAL/NUTRITIONAL STATUS

1 ORAL PROBLEMS — *(Check all that apply in last 7 days.)*

- a. Chewing problem [a]
- b. Swallowing problem [b]
- c. Mouth pain [c]
- d. *NONE OF ABOVE* [d]

2 HEIGHT AND WEIGHT

a. (Record height in centimetres) a. HEIGHT (cm.)

b. (Record weight in kilograms) b. WEIGHT (kg.)

Base weight on most recent measure in LAST 30 DAYS; measure weight consistently in accord with standard facility practice (e.g. in AM after voiding, before meal, with shoes off, and in nightclothes).

3 WEIGHT CHANGE

a. **Weight loss**—5% or more in LAST 30 DAYS or 10% or more in LAST 180 DAYS.
0. No 1. Yes 9. Unknown

b. **Weight gain**—5% or more in LAST 30 DAYS or 10% or more in LAST 180 DAYS
0. No 1. Yes 9. Unknown

4 NUTRITIONAL PROBLEMS — *(Check all that apply in last 7 days.)*

- a. Complains about the taste of many foods [a]
- b. Regular or repetitive complaints of hunger [b]
- c. Leaves 25% or more of food uneaten at most meals [c]
- d. *NONE OF ABOVE* [d]

5 NUTRITIONAL APPROACHES — *(Check all that apply in last 7 days.)*

- a. Parenteral/IV [a]
- b. Feeding tube [b]
- c. Mechanically altered diet [c]
- d. Syringe (oral feeding) [d]
- e. Therapeutic diet [e]
- f. Dietary supplement between meals [f]
- g. Plate guard, stabilized built-up utensil, etc. [g]
- h. On a planned weight change program [h]
- i. NONE OF ABOVE [i]

6 PARENTERAL OR ENTERAL INTAKE — *(Skip to Section L if neither 5a nor 5b is checked.)*

a. Code the proportion of total calories the resident received through parenteral or tube feedings in the last 7 days
0. None 1. 1% to 25% 2. 26% to 50% 3. 51% to 75% 4. 76% to 100%

b. Code the average fluid intake per day by IV or tube in the last 7 days
0. None 1. 1 to 500 cc/day 2. 501 to 1000 cc/day 3. 1001 to 1500 cc/day 4. 1501 to 2000 cc/day 5. 2001 or more cc/day

SECTION L: ORAL/DENTAL STATUS

1 ORAL STATUS AND DISEASE PREVENTION — *(Check all that apply in last 7 days.)*

- a. Debris (soft, easily removable substances) present in mouth prior to going to bed at night [a]
- b. Has dentures and/or removable bridge [b]
- c. Some or all natural teeth lost—does not have or does not use dentures (or partial plates) [c]
- d. Broken, loose, or carious teeth [d]
- e. Inflamed gums (gingiva); swollen or bleeding gums; oral abscesses, ulcers, or rashes [e]
- f. Daily cleaning of teeth or dentures, or daily mouth care—by resident or staff [f]
- g. *NONE OF ABOVE* [g]

SECTION M: SKIN CONDITION

1	ULCERS (due to any cause)	*(Record the number of ulcers at each ulcer stage—regardless of cause. If none present at a stage, record "0" (zero). Code all that apply in last 7 days. Code 9 = 9 or more.)* Requires a full body exam. a. Stage 1–A persistent area of skin redness (without a break in the skin) that does not disappear when pressure is relieved b. Stage 2–A partial thickness loss of skin layers that presents clinically as an abrasion, blister or shallow crater c. Stage 3–A full thickness of skin is lost, exposing the subcutaneous tissues—presents as a deep crater with or without undermining adjacent tissue d. Stage 4–A full thickness of skin and subcutaneous tissue is lost, exposing muscle or bone	
2	TYPE OF ULCER	*(For each type of ulcer, code for the highest stage in last 7 days using scale in item M1—i.e., 0 = none; stages 1, 2, 3, 4.)* a. Pressure ulcer—any lesion caused by pressure resulting in damage of underlying tissue b. Stasis ulcer—open lesion caused by poor circulation in the lower extremities	
3	HISTORY OF RESOLVED ULCERS	Resident has had a pressure ulcer that was resolved or cured in LAST 90 DAYS. 0. No 1. Yes	
4	OTHER SKIN PROBLEMS OR LESIONS PRESENT	*(Check all that apply during last 7 days.)* a. Abrasions, bruises b. Burns (second or third degree) c. Open lesions other than ulcers, rashes or cuts (e.g. cancer lesions) d. Rashes (e.g. intertrigo, eczema, drug/heat rash, herpes) e. Skin desensitized to pain or pressure f. Skin tears or cuts (other than surgery) g. Surgical wounds h. *NONE OF ABOVE*	a b c d e f g h
5	SKIN TREATMENTS	*(Check all that apply during last 7 days.)* a. Pressure relieving device(s) for chair b. Pressure relieving device(s) for bed c. Turning or repositioning program d. Nutrition or hydration intervention to manage skin problems e. Ulcer care f. Surgical wound care g. Application of dressings (with or without topical medications) other than to feet h. Application of ointments or medications (except to feet) i. Other preventative or protective skin care (except to feet) j. *NONE OF ABOVE*	a b c d e f g h i j
6	FOOT PROBLEMS AND CARE	*(Check all that apply during last 7 days.)* a. Resident has one or more foot problems (e.g. corns, callouses, bunions, hammer toes, overlapping toes, pain, structural problems) b. Infection of the foot (e.g. cellulitis, purulent drainage) c. Open lesions on the foot d. Nails or callouses trimmed during LAST 90 DAYS e. Received preventative or protective foot care (e.g. used special shoes, inserts, pads, toe separators) f. Application of dressings (with or without topical meds) g. *NONE OF ABOVE*	a b c d e f g

SECTION N: ACTIVITY PURSUIT PATTERNS

1	TIME AWAKE	*(Check appropriate time periods over last 7 days.)* Resident awake all or most of the time (i.e. naps no more than 1 hour per time period) in the: a. Morning [a] c. Evening [c] b. Afternoon [b] d. *NONE OF ABOVE* [d]	
		(If resident is comatose, skip to Section O.)	

SECTION N: ACTIVITY PURSUIT PATTERNS (cont'd)

2	AVERAGE TIME INVOLVED IN ACTIVITIES	*(When awake and not getting treatment or ADL care)* 0. Most—more than 2/3 of time 1. Some—from 1/3 to 2/3 of time 2. Little—less than 1/3 of time	
3	PREFERRED ACTIVITY SETTINGS	*(Check all settings in which activities are preferred.)* a. Own room [a] d. Outside facility [d] b. Day or activity room [b] e. *NONE OF ABOVE* [e] c. Inside facility/off unit [c]	
4	GENERAL ACTIVITY PREFERENCES (adapted to resident's current abilities)	*(Check all PREFERENCES whether or not activity is currently available to resident.)* a. Cards, other games [a] g. Trips or shopping [g] b. Crafts or arts [b] h. Walk/wheeling outdoors [h] c. Exercise or sports [c] i. Watching TV [i] d. Music [d] j. Gardening or plants [j] e. Reading, writing [e] k. Talking or conversing [k] f. Spiritual or religious activities [f] l. Helping others [l] m. *NONE OF ABOVE* [m]	
5	PREFERS CHANGE IN DAILY ROUTINE	*(Code for resident preferences in daily routine.)* 0. No change 1. Slight change 2. Major change a. Type of activities in which resident is currently involved b. Extent of resident involvement in activities	

SECTION O: MEDICATIONS

1	NUMBER OF MEDICATIONS	*(Record the NUMBER of different MEDICATIONS used in the last 7 days. Enter "0" if none used.)*	
2	NEW MEDICATIONS	Resident currently receiving medications that were initiated during the LAST 90 DAYS. 0. No 1. Yes 9. Unknown (admission only)	
3	INJECTIONS	*(Record the NUMBER OF DAYS injections of any type were received during the last 7 days. Enter "0" if none used.)*	
4	DAYS RECEIVED THE FOLLOWING MEDICATION	*(Record the NUMBER OF DAYS during last 7 days; enter "0" if not used. N.B. Enter "1" for long-acting meds used less than weekly.)* a. Antipsychotic [ ] c. Antidepressant [ ] b. Antianxiety drug [ ] d. Hypnotic [ ] e. Diuretic [ ]	

SECTION P: SPECIAL TREATMENTS AND PROCEDURES

1	SPECIAL TREATMENTS, PROCEDURES, AND PROGRAMS	*a. SPECIAL CARE—(Check treatments or programs received in LAST 14 DAYS.)* TREATMENTS: A. Chemotherapy [A]; B. Dialysis [B]; C. IV medication [C]; D. Intake/output [D]; E. Monitoring acute medical condition [E]; F. Ostomy care [F]; G. Oxygen therapy [G]; H. Radiation [H]; I. Suctioning [I]; J. Trach. Care [J]; K. Transfusions [K]; L. Ventilator or respirator [L] PROGRAMS: M. Alcohol or drug treatment program [M]; N. Alzheimer's or dementia special care unit [N]; O. Hospice care [O]; P. Pediatric care [P]; Q. Respite care [Q]; R. Training in skills to return to the community (e.g. taking medications, housework, shopping, transportation, ADLs) [R]; S. *NONE OF ABOVE* [S] *b. THERAPIES—(Record the number of days and total minutes each of the following therapies was administered (for at least 15 minutes a day) in the last 7 days. Enter "0" if none or less than 15 minutes daily.) Note: Count only post-admission therapies.* Box A = # of days administered for 15 minutes or more Box B = total # of minutes provided in last 7 days	

	A	B
a. Speech—language pathology, audiology service		
b. Occupational therapy		
c. Physical therapy		
d. Respiratory therapy		
e. Psychological therapy (by any licensed mental health professional)		

[ ] = when box blank, must enter number or letter.
[a] = when box holds a letter, check if condition applies.

SECTION P: SPECIAL TREATMENTS AND PROCEDURES (cont'd)

2	INTERVENTION PROGRAMS FOR MOOD, BEHAVIOUR, COGNITIVE LOSS	*(Check all interventions or strategies used in the last 7 days, no matter where received.)* a. Special behaviour symptom evaluation program b. Evaluation by a licensed mental health specialist in LAST 90 DAYS c. Group therapy d. Resident-specific deliberate changes in the environment to address mood or behaviour patterns (e.g. providing bureau in which to rummage) e. Reorientation (e.g. cueing) f. *NONE OF ABOVE*	a b c d e f
3	NURSING REHABILITATION/ RESTORATIVE CARE	*(Record the NUMBER OF DAYS each of the following rehabilitation or restorative techniques or practices was provided to the resident for more than or equal to 15 minutes per day in the last 7 days. Enter "0" if none or less than 15 minutes daily.)* a. Range of motion (passive) b. Range of motion (active) c. Splint or brace assistance Training and skill practice in: d. Bed mobility e. Transfer f. Walking g. Dressing or grooming h. Eating or swallowing i. Amputation or prosthesis care j. Communication k. Other	
4	DEVICES AND RESTRAINTS	*(Use the following codes for the last 7 days:)* 0. Not used 1. Used less than daily 2. Used daily Bed Rails a. Full bed rails on all open sides of bed b. Other types of side rails used (e.g. half rail, 1 side) c. Trunk restraint d. Limb restraint e. Chair prevents rising	
5	HOSPITAL STAY(s)	*(Record number of times resident was admitted to hospital in the LAST 90 DAYS [or since last assessment if less than 90 days]. Enter "0" if no admission.)*	
6	EMERGENCY ROOM (ER) VISIT(s)	*(Record number of times resident visited ER in the LAST 90 DAYS [or since last assessment if less than 90 days]. Enter "0" if no ER visits.)*	

SECTION P: SPECIAL TREATMENTS AND PROCEDURES (cont'd)

7	PHYSICIAN VISITS	In the LAST 14 DAYS (or since admission, if less than 14 days in facility), how many days has the physician (or authorized assistant or practitioner) examined the resident? *(Enter "0" if none.)*	
8	PHYSICIAN ORDERS	In the LAST 14 DAYS (or since admission, if less than 14 days in facility), on how many days has the physician (or authorized assistant or practitioner) changed the resident's orders? *Do not include order renewals without change. (Enter "0" if none.)*	
9	ABNORMAL LAB VALUES	Has the resident had any abnormal lab values during the LAST 90 DAYS (or since admission)? 0. No 1. Yes	

SECTION Q: DISCHARGE POTENTIAL AND OVERALL STATUS

1	DISCHARGE POTENTIAL	a. Resident expresses or indicates preference to return to the community. 0. No 1. Yes	
		b. Resident has a support person who is positive towards discharge. 0. No 1. Yes	
		c. Stay projected to be of a short duration—Discharge projected WITHIN 90 DAYS. *(Do not include expected discharge due to death.)* 0. No 2. Within 31–90 days 1. Within 30 days 3. Discharge status uncertain	
2	OVERALL CHANGE IN CARE NEEDS	Resident's overall level of self-sufficiency has changed significantly as compared to status of 90 DAYS AGO (or since last assessment if less than 90 days). 0. No change 1. Improved—receives fewer supports, needs less restrictive level of care 2. Deteriorated—receives more support	

SECTION R: ASSESSMENT INFORMATION

1	PARTICIPATION IN ASSESSMENT	a. Resident: 0. No 1. Yes b. Family: 0. No 1. Yes 2. No family c. Significant other: 0. No. 1. Yes 2. None	

2. SIGNATURES OF THOSE COMPLETING THE ASSESSMENT

Provider Type | Assessor ID #

a. Signature of RN Assessment Coordinator (sign on above line)

b. Date RN Assessment Coordinator signed as complete

Year - Month - Day

Other Signatures	Title	Sections	Date	Provider Type	Assessor ID #
*c.					
d.					
e.					
f.					
g.					
h.					
i.					

* most responsible physician

= when box blank, must enter number or letter.

a = when box holds a letter, check if condition applies.

APPENDIX D: RESIDENT ASSESSMENT PROTOCOL FOR PSYCHOTROPIC DRUG USE (US VERSION)

17. RESIDENT ASSESSMENT PROTOCOL: PSYCHOTROPIC DRUG USE

I. PROBLEM

Psychotropic drugs (i.e., drugs that affect the mind, emotions, or behavior) are among the most frequently prescribed agents for elderly nursing facility residents. Studies in nursing facilities have shown that 35% to 65% of residents receive psychotropic medications. When used appropriately and judiciously, these medications can enhance the quality of life of residents who need them. For instance, greater than 70% of patients with major depression respond to single antidepressant treatment with complete remission of symptoms. However, all psychotropic drugs have the potential for producing undesirable side effects or aggravating problematic signs and symptoms of existing conditions. An important example is postural hypotension, that may be caused by some commonly prescribed psychotropic medications, and which can be serious or life threatening. Another example is acute confusion (delirium), which can be caused by a single drug, or by the interaction of two or more drugs, and can occur just as easily with prescription or non-prescription (i.e., "over-the counter") medications. Independent risk factors for development of delirium include older age, concurrent medical illness, greater number of medications and the presence of dementia.

Maximizing the resident's functional potential and well-being while minimizing the hazards associated with drug side effects are important goals of therapy. In reviewing a psychotropic drug regimen there are several rules of thumb:

- Evaluate the need for the drug (e.g., consider intensity and quality of distress, response to nonpharmaclogic interventions, pros and cons of drug treatment vs. no drug treatment). Distinguish between treating specific diagnosed psychiatric disorders and treating symptoms. Specific psychiatric disorders (e.g., schizophrenia, major depression) have specific drug treatments with published guidelines for dosage and duration of treatment. However, a recorded diagnosis of a psychiatric disorder does not necessarily require drug treatment if symptoms are not present or are not posing a problem.
- Start low and go slow. If needed, psychotropic drugs should be started at the lowest dosage possible. To minimize side effects, doses should be increased slowly until there is a therapeutic effect, side effects emerge, or the maximum recommended dose is reached. Keep in mind that many elders may show a clinical response and possibly complete resolution of symptoms at drug doses and intervals lower than those recommended.
- Each drug has its own set of actions and side effects, some more serious than others; these should be evaluated in terms of each user's medical-status profile, including interaction with other medications.
- Consider symptoms or decline in functional status as a potential side effect of medication.
- Remember that any drug, prescription or non-prescription can cause problems in some patients.

17. PSYCHOTROPIC DRUG USE RAP KEY

(For MDS Version 2.0)

TRIGGER – REVISION

TO BE TRIGGERED, MUST FIRST USE PSYCHOTROPIC DRUG [Antipsychotic, antidepressant, or antianxiety] **[O4a, b, or c = 1-7]**

If used, go to RAP review if one or more of following present:

_____

Potential for drug-related hypotension or gait disturbances:

- Repetitive Physical Movements[a]
  [E1n = 1, 2]
- Balance While Sitting
  [G3b = 1, 2, 3]
- Hypotention
  [I1i = checked]
- Dizziness/Vertigo[b]
  [J1f = checked]
- Syncope
  [J1m = checked]
- Unsteady Gait
  [J1n = checked]
- Fell in Past 30 Days[b]
  [J4a = checked]
- Fell in Past 31-180 Days[b]
  [J4b = checked]
- Hip Fracture
  [J4c = checked]
- Swallowing Problem
  [K1b = checked]

Potential for drug-related cognitive/behavioral impairment if:[c]

- **Delirium/Disordered Thinking**
  - Easily Distracted
    [B5a = 2]
  - Periods of Altered Perception or Awareness or Surroundings
    [B5b = 2]

_____

[a] **Note:** This items also triggers on the Mood RAP.

[b] **Note:** These items also trigger on the Falls RAP.

[c] **Note:** All of these items also trigger on the Delirium RAP.

GUIDELINES

If resident is triggered, review the following:

- **Drug Review [from record]:**
  - Length of Time Between when Drug First Taken and Onset of Problem;
  - Doses of Drug and How Frequently Taken;
  - Number of Classes of Psychotropics Taken;
  - Reason Drug Prescribed.
- **Review Resident's Condition that Affects Drug Metabolism/Excretion:**
  Impaired Liver/Renal Function **[I1qq, I3]**, Acute Condition **[J5b]**, Dehydration **[J1c]**

- **Review Behavior/Mood Status:**
  Current Problem Status **[E1, E2, E4]**, Recent Changes **[E3, E5]**, Behavior Management Program **[P1be, P2]**, Psychiatric Diagnoses **[I1dd,ee,ff,gg]**

Clarifying information if hypotension present:

- Postural Changes in Vital Signs **[from exam]**
- Drugs with Marked Anticholinergic Properties **[from record]**

Clarifying information if movement disorder present:

- High Fever **[J1h]** AND/OR Muscular Rigidity **[from record, observation]**
- Tremors, Especially of Hands; Pill-Rolling of Hands; Muscle Rigidity of Limbs, Neck Trunk (Parkinsonism) **[I1y; from record, observation]**
- Marked Decrease in Spontaneous Movement (Akinesia) **[from record, observation]**
- Rigid, Unnatural, Uncomfortable Posture of Neck or Trunk (Dystonia) **[from record, observation]**
- Restlessness, Inability to Sit Still (Akathisia) **[from record, observation]**
- Persistent Movements of the Mouth (e.g., Thrusting of Tongue, Movements of Lips, Chewing/Puckering) **AND/OR** Peculiar and Recurrent Postures of Limbs, Trunk (Tardive Dyskinesia) **[from record, observation]**

17. PSYCHOTROPIC DRUG USE RAP KEY (continued)

(For MDS Version 2.0)

TRIGGER – REVISION	GUIDELINES

Potential for drug-related cognitive/behavioral impairment if: [(c)] ***(continued)***

- Episodes of Disorganized Speech
  [B5c = 2]
- Periods of Restlessness
  [B5d = 2]
- Periods of Lethargy
  [B5e = 2]
- Mental Function Varies over the Course of the Day
  [B5f = 2]

- Deterioration in Cognitive Status[(c)]
  [B6 = 2]
- Deterioration in Communication
  [C7 = 2]
- Deterioration in Mood[(c)]
  [E3 = 2]
- Deterioration in Behavioral Symptoms[(c)]
  [E5 = 2]
- Depression
  [I1ee = checked]
- Hallucinations
  [J1i = checked]

Potential for drug-related discomfort if:

- Constipation
  [H2b = checked]
- Fecal Impaction
  [H2d = checked]
- Lung Aspiration
  [J1k = checked]

Clarifying information if gait disturbances present:

- Long-Acting Benzodiazepines **[from med record]**
  - Recent Dosage Increase **[from med record]**
- Short-Term Memory Loss, Decline in Cognition **[B6]**, Slurred Speech **[C5]**
- Decreased AM Wakefulness **[E1k, N1a]**, Little/No Activity Involvement **[N2]**

Clarifying information if cognitive/behavioral impairment present:

If <u>neither</u> of following are present, psychotropic drug side effects can be considered as a major cause of problem:

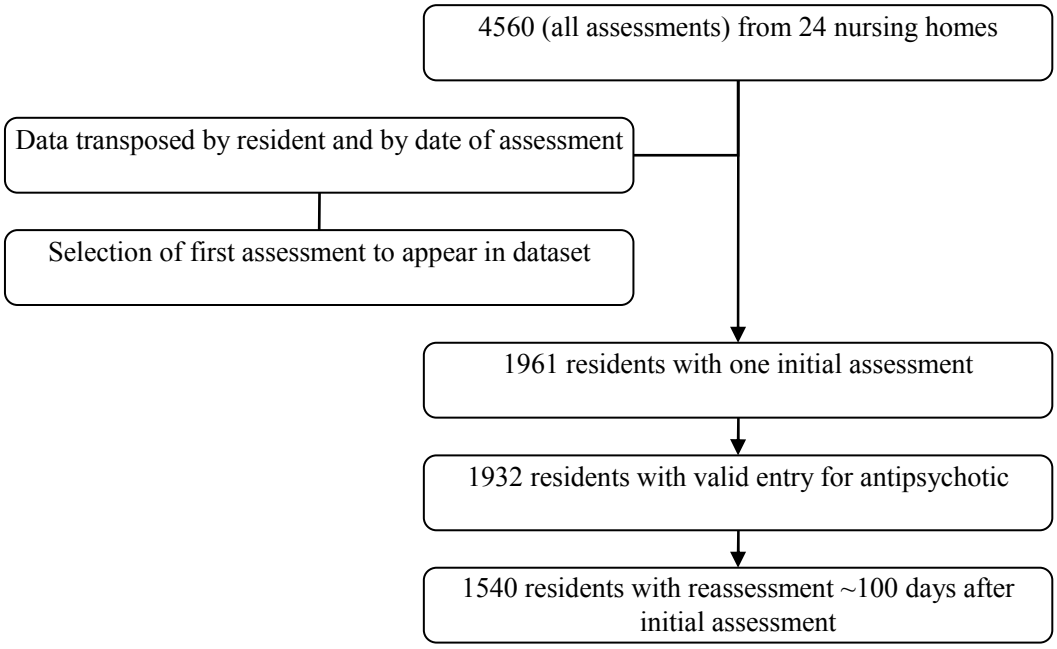
- Acute Confusion (Delirium) Related to Medical Illness **[B5[**
- Depression **[I1ee]**

Clarifying issues if drug-related discomfort present:

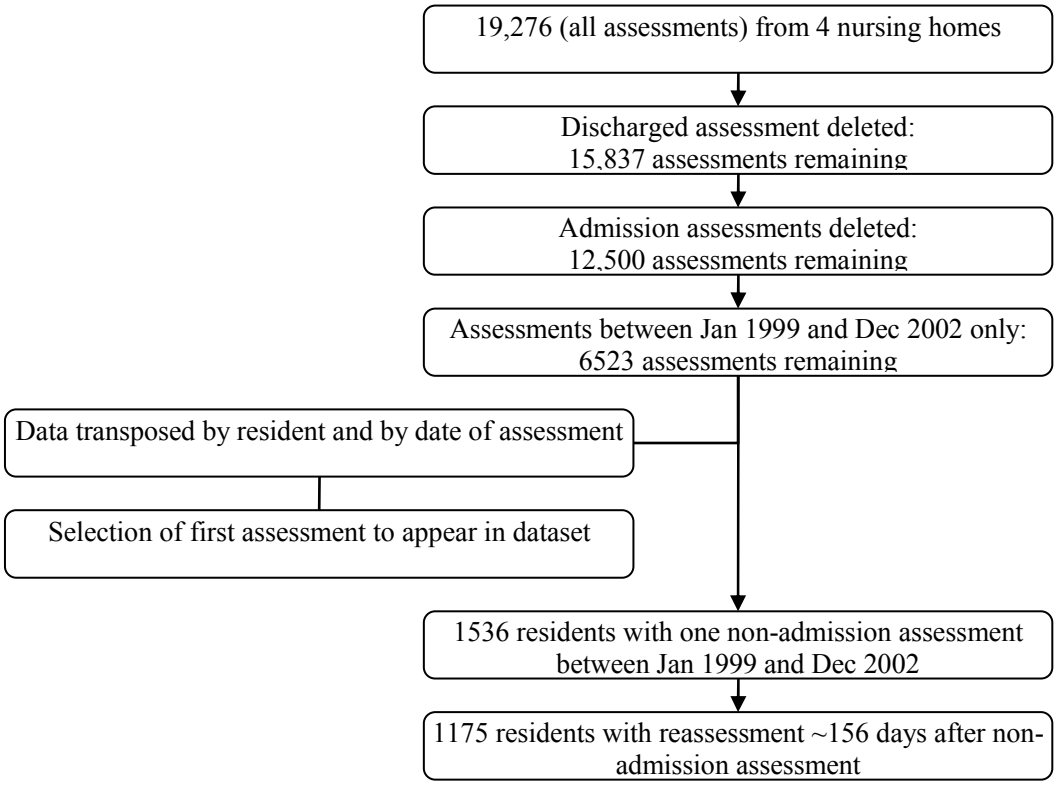
- Dehydration **[J1c]**, Reduced Dietary Bulk, Lack of Exercise **[from record]**, Constipation **[H2b[**, Fecal Impaction **[H2d]**, Urinary Retention **[I3; from record]**
- Other Potential Drug-Related Discomforts that May Require Resolution: Dry Mouth, if on Antipsychotic or Antidepressant **[observation]**

APPENDIX E: SELECTION OF THE ONTARIO AND SWISS SAMPLES

1. ONTARIO SAMPLE December 1999 – February 2001



2. SWISS SAMPLE August 1997 – October 2005



APPENDIX F: TIME SERIES OF ANTIPSYCHOTIC USE IN SWITZERLAND

Table 1. Prevalence of antipsychotic use for newly admitted residents by length of stay and by fiscal year in Switzerland

	Antipsychotic use					
	Newly admitted residents with short stay (not reassessed [a])		Newly admitted residents with long stay (reassessed [b])		All newly admitted residents	
Year	Freq	Percent	Freq	Percent	Freq	Percent
1998	4/46	8.70	23/119	19.33	27/165	16.36
1999	29/147	19.73	58/222	26.13	87/369	23.58
2000	33/162	20.37	67/221	30.32	100/383	26.11
2001	44/156	28.21	60/229	26.20	104/385	27.01
2002	54/197	27.41	81/249	32.53	135/446	30.27
2003	58/204	28.43	98/220	44.55	156/424	36.79
2004	65/226	28.76	101/224	45.09	166/450	36.89
2005	59/255	23.14	31/105	29.52	90/360	25.00
Total	346/1393	24.87	519/1589	32.66	865/2982	29.01

a: not reassessed because of discharge and/or because of pending reassessment for admission assessments in 2005
b: reassessed at least once after admission
Note: no admission assessments in 1997

Table 2. Overall prevalence of antipsychotic use by fiscal year in Switzerland

		Antipsychotic use	
Year	N	Freq	Percent
1997	111	24	22.62
1998	1541	354	22.97
1999	2185	613	28.05
2000	1940	682	35.15
2001	1998	707	35.39
2002	2172	778	35.82
2003	2114	799	37.80
2004	2076	852	41.04
2005	1696	632	37.36
Total	15,837	5443	34.37

Note: includes all assessments except discharge (more than 1 assessment per resident per year possible)

APPENDIX G: CHANGE IN BEHAVIOURS IN ONTARIO AND SWITZERLAND

Table 1. Change in wandering behaviour between T1 and T2 in Ontario and Switzerland

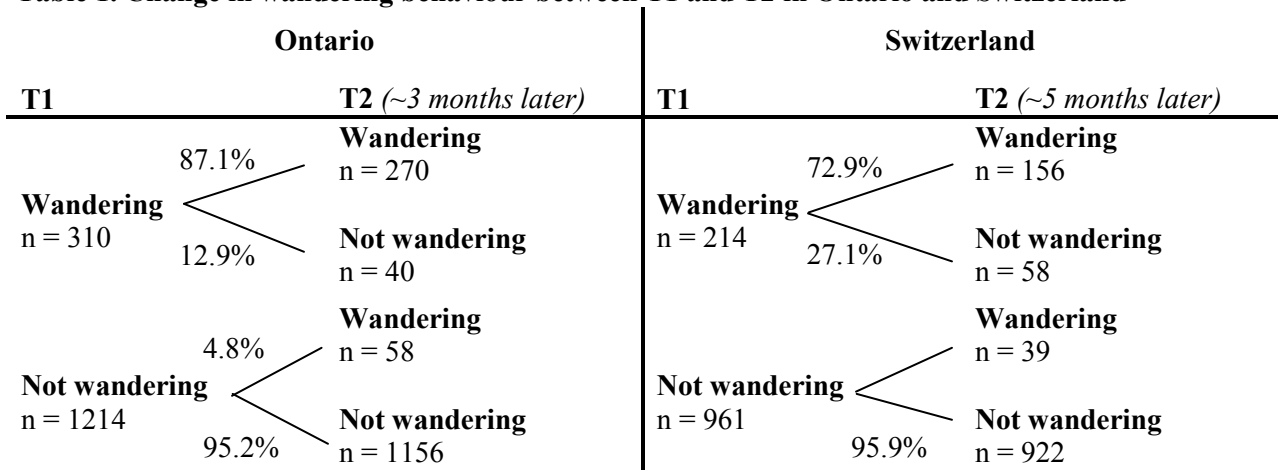


Table 2. Change in verbally abusive behaviour between T1 and T2 in Ontario and Switzerland

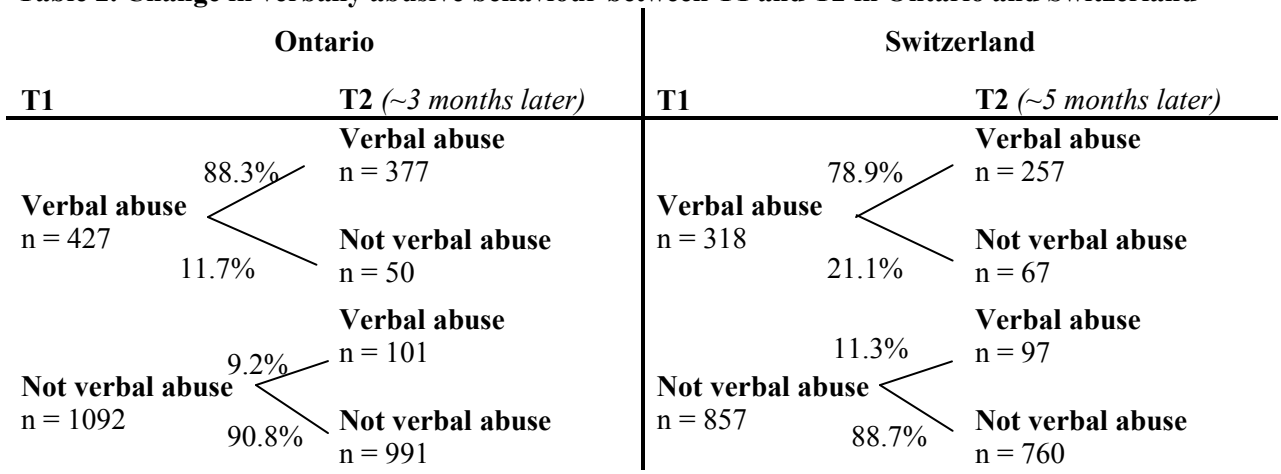


Table 3. Change in physically abusive behaviour between T1 and T2 in Ontario and Switzerland

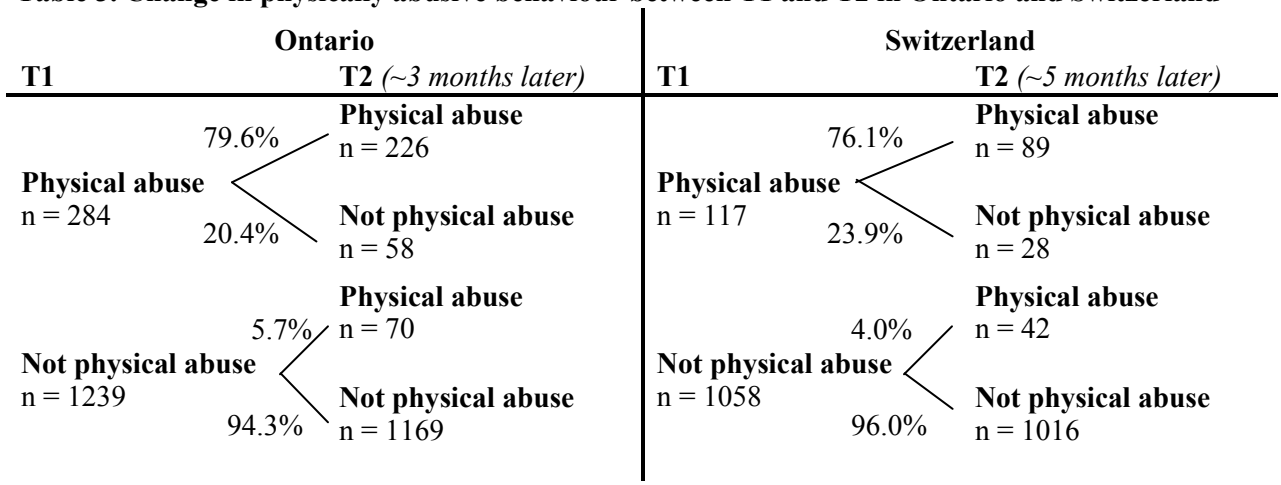


Table 4. Change in socially inappropriate behaviour between T1 and T2 in Ontario and Switzerland

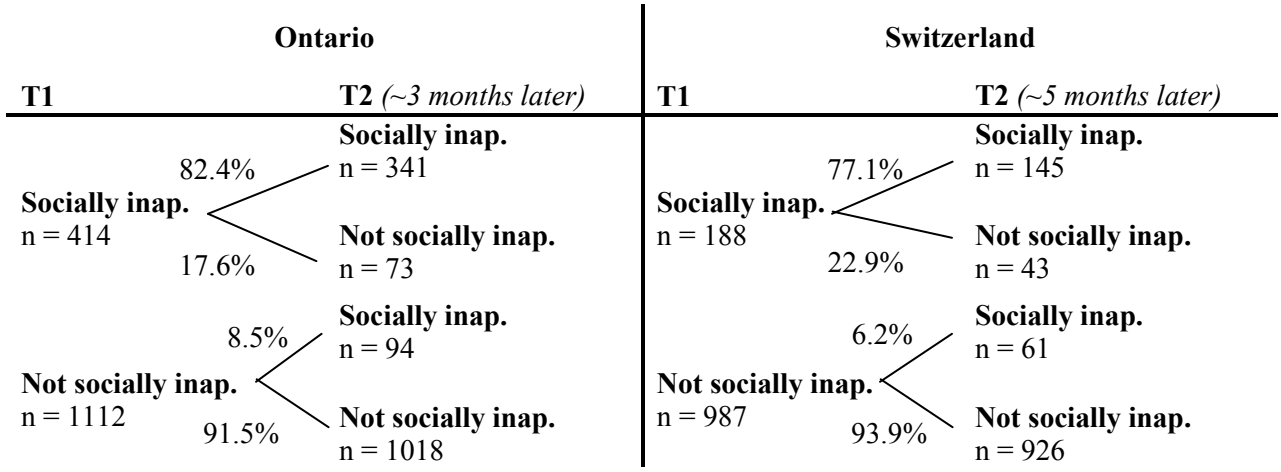


Table 5. Change in resisting care behaviour between T1 and T2 in Ontario and Switzerland

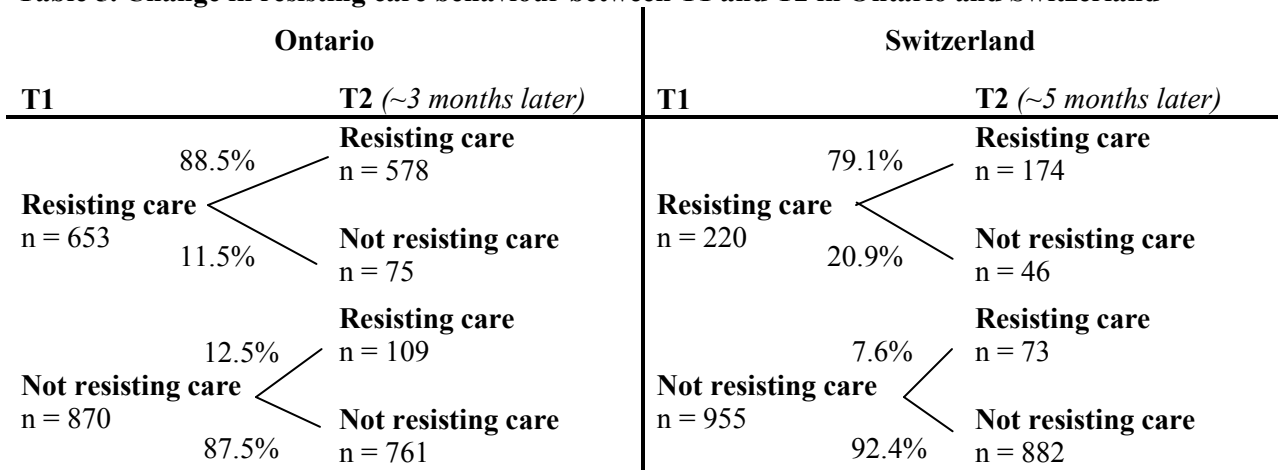
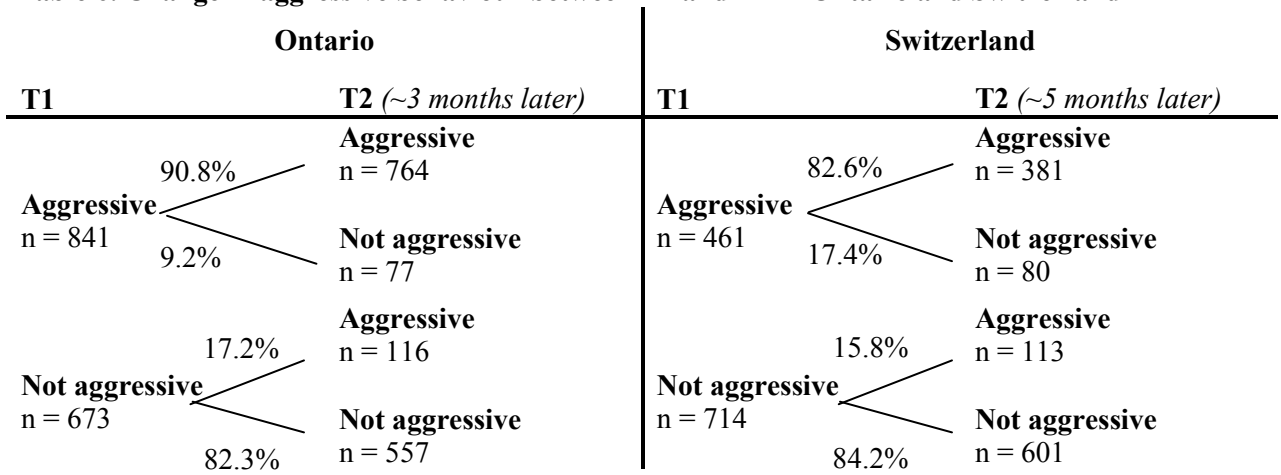


Table 6. Change in aggressive behaviour between T1 and T2 in Ontario and Switzerland



APPENDIX H: LONGITUDINAL MULTIVARIATE MODELS

Table 1. Models of change in wandering behaviour: predictors in Ontario and Switzerland

	Ontario		Switzerland	
	AP	**Other predictors**	**AP**	**Other predictors**
Initiation	ns	*Positive*: cognitive impairment, dementia, half-bed rails. *Negative*: pain and ADL impairment	ni	
Cessation	ni		*negative*	*Positive*: ADL impairment *Negative*: cognitive impairment
Improvement	ni		*negative*	*Positive*: ADL impairment *Negative*: cognitive impairment

ns = not significant in multivariate model
ni = not investigated in multivariate analyses because not significant in bivariate analyses

Table 2. Models of change in verbally abusive behaviour: predictors in Ontario and Switzerland

	Ontario		Switzerland	
	AP	**Other predictors**	**AP**	**Other predictors**
Initiation	ns	*Positive*: dementia, resisting care, being socially engaged, sleep disturbances, male *Negative*: full bed rails	ns	*Positive*: wandering, physically abusive behaviour, depressive symptoms *Negative*: ADL impairment
Improvement	ns	*Positive*: shorter stay, pain *Negative*: inappropriate behaviour, ADL impairment	ni	

ns = not significant in multivariate model
ni = not investigated in multivariate analyses because not significant in bivariate analyses

Table 3. Models of change in physically abusive behaviour: predictors in Ontario and Switzerland

	Ontario		Switzerland	
	AP	**Other predictors**	**AP**	**Other predictors**
Initiation	ni		ns	*Positive*: male, verbally abusive, resisting care, cognitive impaired, depression
Cessation	*negative*	*Positive*: pain *Negative*: socially inappropriate behaviour	ni	
Improvement	*negative*	*Positive*: pain, half bed rail *Negative*: verb. abusive behaviour	ni	

ns = not significant in multivariate model
ni = not investigated in multivariate analyses because not significant in bivariate analyses

Table 4. Models of change in socially inappropriate behaviour: predictors in Ontario and Switzerland

	Ontario		Switzerland	
	AP	**Other predictors**	**AP**	**Other predictors**
Initiation	ns	*Positive*: male, dementia, resisting care, depressive symptoms, and *Negative*: 5+ diagnoses	*positive*	*Positive*: wandering, verbally abusive, cognitive impairment
Cessation	ni		ns	*Positive*: male, verbally abusive, restless, having depressive symptoms *Negative*: 5+ diagnoses
Improvement	ni		*negative*	*Positive*: insomnia *Negative*: ADL impairment

ns = not significant in multivariate model
ni = not investigated in multivariate analyses because not significant in bivariate analyses

Table 5. Models of change in resisting behaviour: predictors in Ontario and Switzerland

	Ontario		Switzerland	
	AP	**Other predictors**	**AP**	**Other predictors**
Improvement	ns	*Positive*: pain, shorter stay *Negative*: behaviour intervention, soc. inap. behaviour	ni	

ns = not significant in multivariate model
ni = not investigated in multivariate analyses because not significant in bivariate analyses

Table 6. Models of change in aggressive behaviour: predictors in Ontario and Switzerland

	Ontario		Switzerland	
	AP	**Other predictors**	**AP**	**Other predictors**
Initiation	ni		ns	*Positive*: restless, cognitive impairment *Negative*: ADL impairment
Cessation	*negative*	*Positive*: female, pain, dementia *Negative*: depressive symptoms, longer length of stay, chairs preventing raising	ns	*Positive*: pain *Negative*: restless, dementia
Deterioration	*positive*	*Positive*: insomnia, cognitive impairment, antianxiety, trunk restraint *Negative*: antidepressant	ni	

ns = not significant in multivariate model
ni = not investigated in multivariate analyses because not significant in bivariate analyses