

BACKGROUND DOCUMENT: POLYPHARMACY AND MEDICATION SAFETY

Submitted to

Alberta Mental Health Board

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Background Document on Polypharmacy and Adherence – Executive Summary

The Alberta Centre for Injury Control & Research (ACICR) received a *Collaborative Research Grant Initiative* to provide a background document on polypharmacy and medication adherence in seniors and persons with disabilities to Alberta Health Services - Alberta Mental Health Board (AHS-AMHB). The background document is intended to be a resource that a consortium will use to develop research topics/questions with the goals of establishing a shared understanding of the AHS-AMHB research strategy, as well as prioritizing research questions to inform operating grants. Information is needed on polypharmacy and medication adherence for the purpose of improving health and safety in the target populations.

Based on information derived from sources that included psychological, health, medical as well as policy databases, reference lists from relevant articles, the background document addresses four key questions posed by the AHS-AMHB. ACICR project leads reviewed 88 research articles that addressed factors associated with polypharmacy and adherence, strategies to reduce polypharmacy and improve adherence in both populations of seniors and persons with disabilities. This evidence is summarized in the background document.

The studies were used to answer questions relating to the following topics:

- Factors related to adherence in seniors
- Interventions to improve adherence in seniors
- Factors related to adherence in persons with disabilities (focus on mental health disorders)
- Interventions to improve adherence in persons with disabilities (focus on mental health disorders)

The background document revealed that several variables were related to multiple medication adherence in seniors. Factors included financial, health related, social, and psychological factors as well as medication characteristics. The cost of some medications or the payment systems available to individuals for medication can be prohibitive for those in older age groups due to fixed incomes. Social factors such as reduced literacy, reduced access to social support, perceiving that quality of care from providers is poor, and increased age have all demonstrated effects on reducing medication adherence. Psychological factors such as low self-efficacy, presence of a psychiatric disorder, belief that the medication therapy will not work, as well as problems with substance abuse have all been shown to contribute to reducing adherence for medications in seniors populations. Medication characteristics impact on adherence in seniors. Such characteristics include packaging that makes medications difficult to use, poor taste of medication, the size of medication that makes swallowing difficult, side effects, and the complexity of some medication regimens.

Interventions aimed at improving adherence to medication in seniors have shown pharmacist interventions such as follow-up and counseling are the most effective. Provision of written information has also proven useful. Other suggested strategies include offering free medication, reducing costs of drugs, functional assistance to those with impairments, and facilitation of the therapeutic alliance between the patient and provider.

One strategy to improve health and safety for community dwelling seniors is to ensure ordering and dispensing practices are clear and accurate. Themes relating to drug consumption include providing complete instructions and information, ongoing communication, and fostering a strong therapeutic alliance between the patient and provider.

Research on mental health disabilities includes the diagnoses of bipolar disorder, schizophrenia, and depressive disorders. Factors found to be associated with nonadherence in bipolar disorders include younger illness-onset, non-Caucasian ethnicity, a variety of clinical characteristics such as recent mania, greater number of affective symptoms, co-morbid alcohol dependence, as well as psychological factors including denial of illness, distrust of medications or health providers, and treatment side effects. With regard to treatment a recent systematic review found that interventions targeting knowledge and attitudes appear most helpful at improving adherence.

For persons with schizophrenia, factors associated with nonadherence include those found for bipolar disorders such as lack of acceptance of prescribed medications, unwanted side effects of medication, a poor therapeutic alliance, difficulty affording treatment, and cognitive impediments. As with bipolar disorders, a systematic review found that various treatments targeting knowledge and attitudes appear helpful, but no single intervention emerged as a predictor of overall treatment effect for improved adherence.

Factors associated with adherence in depressive disorders include treatment with certain types of medication, higher education, lack of side effects, marital status and female gender. A systematic review focusing on interventions found no clear indication concerning which specific interventions, or combinations thereof, contributed to improved adherence in those with depressive disorder.

Suggestions for strategies to improve health and safety in persons with disabilities include the use of treatment guidelines, authorization rules for medications, and benchmarking.

Background Document: Polypharmacy and Medication Safety

Scale of the Problem of Adherence

On average, medication non-adherence rates of 25% have been reported across a variety of general medical conditions,(1) with others reporting rates of non-compliance between 20-50%.(2) For chronic medical conditions such as hypertension, medication non-adherence leads to worse medical treatment outcomes, higher hospitalization rates, and increased health care costs.(1;2) With growing pressure to reduce reliance on hospital treatment, to shorten hospital stays, and to reduce the intensity of outpatient treatment, contact between clinicians and patients may become increasingly restricted.(3) As a result, opportunities to explain to patients the value of pharmacotherapy may be more important than ever before but is becoming more and more difficult for clinicians to manage.(3) Given the propensity of medical conditions for which medications are prescribed, issues relating to optimal adherence are a significant public health concern.

Many reasons exist for non-adherence to medical regimens including problems with side effects, inadequate instructions provided to patients, reduced therapeutic relationship between the patient and care provider, poor memory, inability to pay for treatments, as well as disagreement on the patient's part on the need for treatment.(4)

Our review of the available literature on adherence and medication safety with particular attention to research pertaining to older individuals (defined as those

aged 65 and over) as well as to those individuals with mental health disorders. The following questions formed the basis of our literature inquiry.

1. Which strategies/techniques are effective in improving adherence to treatment and medication regimens for seniors (65+) in the community?

2. What activities and strategies are thought to aid in improving the health and safety of seniors (65+) in the community who are prescribed multiple medications?

3. Which strategies/techniques are effective in improving adherence to treatment medication regimens for persons (<65) who are receiving assistance for mental or physical disabilities?

4. What activities and strategies are thought to aid in improving the health and safety for persons (<65) who are receiving assistance for mental or physical disabilities?

To answer these questions title and abstract searches were conducted in PubMed, Medline and Ovid databases for each of the four questions. The searches were divided into two **groups**: i. for those aged 65 and older, and ii. those with mental health disorders (community dwelling); also for the **themes** of i. adherence; and ii. medication health/safety. Each group search was conducted independently of the other theme to locate relevant articles. Theme one (adherence) search terms included medication, review, adherence, compliance, improvement, polypharmacy,

and support. Theme two (medication health/safety) terms included disability, medication, and safety. Group search terms included elderly, older, senior, aged, mental health, and community dwelling. No date limits were applied. Article abstracts were reviewed and selected for inclusion if they pertained to the questions in the themes and groups listed above, including available systematic reviews.

Defining adherence

Treatment adherence can be difficult to study because the concept is often defined differently across populations and even among studies within the same population.(5) Adherence has been defined as the extent to which or process by which a patient follows the instructions given for prescribed treatments for medications (6;7) and can be intentional or non-intentional.(8) Studies often mention the concept of compliance with regards to medication which refers to a willingness to go along with a prescribed treatment. Adherence differs from compliance in that adherence requires that a patient agree to the prescribed medication regimen (9) by way of discussion, previous experience, or some other method and compliance reinforces patient passivity and blame.(7) The process of adherence is characterized as being somewhat collaborative. The use of the term compliance does not imply a patient centered perspective and emphasizes the paternalistic role that healthcare providers have traditionally played in many settings. Adherence implies that it is an active choice on the part of the patient to take medication. Within the literature on this topic, there appears to generally be a uniform understanding of the distinction between the two concepts, with the

majority of researchers favoring use of the term adherence and concepts related to it.

Medication taking behaviors which are considered non-adherent include dosage errors, (underuse and overuse), not having a prescription filled, interruption of treatment, failure to take medications at specified times, and taking medications at incorrect intervals.(9)

Measuring adherence

A variety of both validated and invalidated assessment techniques are noted in the literature to measure adherence, most involving self-report via questionnaire.(9;10)

Examples of measurements including have assessed adherence using pill counts by counting the number of medications taken compared to the number that each patient was prescribed (11); measured adherence by self-report (12); pill counts; and repeat prescriptions.(9;10;13)

Which strategies/techniques are effective in improving adherence to treatment and medication regimens for seniors (aged 65+)?

One way of potentially improving adherence in seniors is by looking at which factors are associated with adherence/non-adherence and examining those which are potentially modifiable. The subject of medication and treatment adherence is well researched in the peer-reviewed literature. Several recent reviews include insights

into factors associated with adherence, provide analyses of measures that can give practitioners the evidence to update current practice, describe the scale of the problem, and initiate a call for an evaluation of the criteria used to measure medication adherence.

Factors associated with adherence in seniors

Research has looked at problems with adherence according to the medical conditions faced by the individual. In general, established predictors of adherence among patients with single medical conditions (compared to multiple medical conditions) include: simple short regimens, classes of medications favored by consumers, and severe disease and/or disease with numerous symptoms.(7) Wu et al postulated that physical discomfort is a possible cue to action by patients with severe symptomatic ailments. Such actions include seeing a doctor for symptoms and being adherent to recommended treatments in an attempt to feel 'better'.(9) The overwhelming evidence suggests that these predictors, while important, are perhaps outdated with respect to the current rate of prescription for elderly patients who are more likely to consume several medications concurrently.(7)

Further factors have been researched regarding adherence to single treatments. Some research suggests that gender may be a predictor of adherence with females being less adherent.(4;9) Consumer belief that therapy will help them is an additional predictor of adherence for those with single medical conditions.

Key reasons for non-adherence include adverse effects of medications such as nausea, drowsiness and headache; poor instructions from health providers; poor memory of patients about instructions regarding the medication; affordability of medications, disagreement over the need for treatment between the patient and the doctor; and poor relationships between consumers and healthcare professionals.(7) Other factors related to non-adherence include polypharmacy, weak literacy skills, inadequate social support, depression, and the lack of symptoms for diseases such as hypertension or osteoporosis.(7) For example, patients diagnosed and beginning treatment for osteoporosis often do not persist with their osteoporosis medication because they may perceive their fracture risk to be low and given the asymptomatic nature of osteoporosis, do not experience the benefit of symptom reduction after taking the medication.(14) A similar scenario exists for those being treated for hypertension where patients fail to adhere to treatment regimens due to difficulty taking the medication (28%) not remembering to take medications (32.4%), cost (22.5%), medication not considered necessary (9.3%).(15)

To a lesser extent some research describes reduced cognition and lowered sensory acuity as predictors of reduced adherence.(6) These changes together with the complexity of some medication regimens are problematic for older adults.

Multiple Medications

Little research exists concerning patients with multiple chronic conditions and multiple medication use (polypharmacy). Review of the available literature

identified the following as barriers to patient adherence: financial, health related, sociodemographic, psychological, and cognitive factors. Medication characteristics and health care provider interaction/roles are also very important factors.

Financial factors

Medication cost is often cited as being one of the most important barriers related to medication adherence (9;16;17) especially among those who receive assistance as disabled beneficiaries.(17) Research conducted in the United States indicates that as much as one fourth of its elderly population does not adhere to medication regimens due to the cost.(17) Out of pocket drug costs outpace the incomes of vulnerable elderly and disabled persons with chronic disease. In one U.S. study a high proportion of elderly persons reported that they did not adhere to medication regimens due to the cost of one or more medications.(17) The main types of cost savings employed by both seniors and non-seniors who are disabled include using generic drugs, obtaining free samples, purchasing from the internet, or traveling abroad to purchase medications. In countries such as in the United Kingdom where prescription medications are either free or associated with a small surcharge adherence may be increased.(18) In Alberta seniors are responsible for paying 30 per cent of the cost to a maximum of \$25 for each drug prescribed.(19;20)

Health related factors

Other barriers to medication adherence among the disabled and elderly may reflect the conditions which often qualify them for assistive services. Schizophrenia, AIDS,

kidney disease, poorer general health, lower incomes, cognitive impairments, and neurological illnesses may interact with discretionary incomes and poor insurance intensifying the problem.(17) In U.S. medical insurance programs enrollees with poor self-reported health, greater burden of chronic disease, and more functional limitations are at greater risk for non-adherence.(17) Almost one quarter of the beneficiaries reported cutting back on basic needs to be able to afford their medications. Increasing drug coverage has been reported to substantially reduce the rate of medication non-adherence.(17)

Socio-demographic factors

Social and demographic factors play a significant role in whether patients adhere to their prescribed drug interventions. In a comprehensive qualitative review of theory based interventions, factors affecting adherence were broadly categorized into six themes: patient demographics, psychosocial and behavioral characteristics, disease-related issues, family and cultural issues, healthcare system issues, and issues concerning the treatment itself. Age, weak literacy skills, lack of insurance coverage and homelessness were consistently reported as having a negative impact on adherence.(21)

Evidence of the impact of sex, ethnicity, and marital status is mixed and thought to play a minor role. Education and ethnicity are often associated with limited English proficiency and limited health literacy. Patients with more education are more likely, by self-report, to adhere to their prescribed medication regimens.(9) Low

literacy levels and poor functional ability in the English language hinder the ability of patients to adhere to medication and treatment regimens. A high school reading level (or higher) is often required to understand the educational and informational materials created by healthcare providers. It is estimated that as many as 90 million people in the United States have literacy skills below the high-school level, making this an important factor to consider. Shame or awkwardness associated with low levels of literacy may create barriers to interacting effectively with healthcare professionals. Studies have also shown that patients who have less than optimal skills in communicating in English perceive a lower quality of care than they do receive.(21) This may likely influence the patient-clinician relationship (therapeutic alliance).

Social support in the form of family, friends, and caregivers are important predictors of adherence in all age groups. Patients who believe that they have social support demonstrate greater adherence to medication and this factor has been consistently reported to have the single greatest effect on adherence.(9) However, studies have demonstrated that when too many people living in the household with the patient, or when too many others are dependant upon the patient, adherence declines.(21) Living alone was found to be associated with non-adherence. The odds of not adhering to treatment for those not living with another person were 1.38 times greater compared with those who were living with another person.(9)

Psychological factors

Psychosocial aspects and patient behavioral characteristics are important to treatment adherence. A patient's belief that a medication will work or is working is directly related to adherence and his or her ability to endure the side effects and maintain a positive attitude.(21) Depression, impaired cognition, anger, stress, anxiety, substance abuse, psychiatric disorders, and low self-efficacy are all reported as being associated with reduced treatment adherence.(21)

Cognitive factors

Forgetfulness is an often-cited factor contributing to non-adherence in much of the peer-reviewed literature where this relationship is examined.(9;22) Suggestions for improving medication-taking behavior in light of forgetfulness include using reminders such as weekly drug dispensers, drug cups, or setting up a room for medication. Patients tending to forget to take their medications are more likely to report that another person was instrumental in preparing their medications for them.(9)

Patient knowledge about medication and the importance of medication for their condition was observed by Wu et al as being an important factor in medication adherence.(9) Knowledge, assessed primarily through qualitative studies by Riegel et al and Agard et al revealed that many patients expressed the need to learn about their condition and the medication they were being prescribed.(23;24) This finding may open the path for greater patient provider communication on disease and treatment.

Medication Characteristics

Among difficulties associated with medication, removal of container tops (31%), difficulty with swallowing (8%), poor tasting medication (3%) and the inability or difficulty associated with self-administering were expressed by a study population.(25) Other patients whose regimens call for the taking of several pills simultaneously or throughout the day, report that too many pills makes it difficult to adhere to the regimen.(21)

Treatment factors relating to adherence

The condition being treated must be sufficiently bothersome to the patient to merit the intervention, and the benefit of treatment must be noticeable and advantageous. If patients notice a significant improvement in their condition, they are more likely to adhere to the treatment regimen.(21) Using two or multiple pharmacies to fill prescriptions and frequent changes in drug prescriptions during a hospital stay may contribute to non-adherence, although these relationships are not well understood.(26)

The relationship that healthcare providers establish with their patients is also a factor affecting adherence. Trusting, supportive relationships are reported as increasing adherence.(21) Inconvenience or any embarrassment associated with the regimen will also negatively affect adherence rates.(21)

Interventions aimed at improving adherence

A review by Williams et al. focusing on the question of interventions to improve adherence to medication examined eight randomized controlled trials in which people with multiple chronic conditions were taking an average of four different medications.(7) The number of participants in the individual studies ranged from 20 to 2454. Each study included at least one of the following interventions lead by pharmacists: medication plans which included follow-up visitation, tailored counseling on medication knowledge and adherence, medication plan revisions, customized packaging of medications, telephone counselling, and pharmacy education programs.(7) Three out of eight reviewed interventions showed significant effects. Bernsten et al structured a pharmaceutical care program for elderly patients that was driven by community pharmacists in a multi center international study, and reported that their intervention group had better control of their medical conditions.(27) Ponnusankar et al reported a group receiving pharmacist tailored counseling intervention showed greater adherence in vs. adherence in controls (intervention 92% versus controls 85%)(10). Wu et al used pharmacist led telephone counseling that achieved a 45% reduction in mortality risk by way of increased adherence in people receiving polypharmacy.(28) Those studies which were still effective, but to a lesser degree to improve adherence involved pharmacist visitations for counseling/medication advice (29); pharmacist led tailored interventions which involved telephone assessment of medication use (12); pharmacist identification of actual or drug related problems and tailored interventions (13); interventions involving a pharmacy education program and

custom packaged medications (11); and a multi-dimensional patient centered, educational-behavioral intervention.(30) Overall it was concluded that pharmacist lead interventions were reported as instrumental in aiding patients to navigate co-existing and chronic conditions involving multiple medications with adherence.

Regimen monitoring by pharmacists has a positive influence on patient satisfaction and adherence.(4;7) The mechanism for this may be that the pharmacists help to form the patients' beliefs about the therapy where benefits and expectations about the regimen are addressed.(4;7;21)

Providing written information by community pharmacies is becoming common practice in regimen monitoring although disparities exist in the length and quality of that information.(21) A total of 25% of pharmacists never talked with shoppers, and 47% of shoppers never reported receiving any verbal drug information from pharmacy staff.(21) Most shoppers received no information regarding the length of time they needed to take the prescription medication, how to manage adverse effects, what precaution measures to follow when taking the drug, or when the medicine should begin to have a noticeable effect. In one study, just 5% of shoppers received information leaflets that contained this information and only 8% were subsequently encouraged to read those leaflets.(21) Even when information is provided, studies show that, in many cases, documentation does not contain information that meet usefulness guidelines for patients.(21) The utility of written

instructions has been demonstrated, but the literature recommends this should not be used as a substitute for verbal counseling.(21)

Recommendations for improving medication adherence

Low cost, subsidized, or even free medication may stimulate adherence in those who would otherwise not follow regimens because of cost.(17) Increasing drug medical insurance coverage may reduce the rate of medication non-adherence and the greatest benefit has been found to be among those with disabling conditions. Those with poorer general health, lower self-rated health, greater burden of chronic illness, high rates of cognitive impairment, and functional limitations are at greater risk of cost related medication non-adherence.(17)

Reducing the frequency of doses can improve adherence. Evidence indicates that one daily dose of medication is more likely to be adhered to than medications that need to be taken twice or three times daily.(21) This is particularly important in patients with co-morbidities or in elderly patients whose cognitive and sensory impairments may impede the ability to remember to take several different medications at varying times of the day.(21) Claxton and colleagues reinforced this assertion in their review of 85 studies on adherence and reported that the mean \pm SD rate of adherence for once per day dosing was 79% \pm 14% across 29 studies, compared with 69% \pm 15% for twice-daily dosing (32 studies), 65% \pm 16% for 3-times-daily dosing (13 studies), and 51% \pm 20% for 4-times-daily dosing (11 studies).(31)

Reducing language barriers, increasing access to healthcare for ethnic minorities, and improving educational levels can hold benefits for increasing medication adherence in these population subgroups.(21;32) As an example, nearly 90 million people in the United States have literacy skills at or below the high-school level. Many have difficulty finding and understanding information in texts such as newspaper articles or on prescription labels.(21) Literacy levels tend to be lowest among the elderly, those with few years of education, people in lower socioeconomic levels, among minority populations, and those with limited English proficiency.(32) Interventions that improve knowledge and understanding about disease and treatment in patients with low levels of health literacy have been developed and warrant exploration in attempts to reduce barriers to understanding information and ultimately to improving adherence.(21)

Several key themes may form the basis for a comprehensive system for intervention where the improvement of medication adherence is the desired result. Themes that have been identified within this document include:

- Short-term treatments may require several interventions to improve adherence.(7)
- For long term treatments, simplifying the dose regimen, counseling, reminders, close follow-up, supervised self monitoring, rewards for success, psychological therapy, crisis intervention, and mutual telephone follow-up

can improve adherence and treatment outcomes. The common theme being more frequent patient interaction.(4)

- Blister packs, calendar charts, compartmentalized trays designed to assist the patient with complex medication regimens improve adherence in older populations.(26)
- Newer devices, pill bottle caps, boxes with digital alarms are available and have the potential to increase adherence.(26)
- Participation of family and close relatives in elevating a patient's social support.(9)
- Reducing language barriers and increasing interventions that improve knowledge and understanding about disease and treatment in patients with low levels of health literacy.(21)
- Strengthening the patient-provider alliance which includes:
 - Respect patients' perspectives of their illnesses and treatments.
 - Drug therapy should not be used simply as a convenient way to satisfy the patient.
 - Patients should be provided with the rationale for the diagnosis and treatment.
 - Physicians should share in the expertise of the patients; find out what he or she knows about the illness.
 - Physicians should ensure that communication with the patient be both cognitively and emotionally significant.

- Ask about a patient's adherence in a non-judgmental and nonthreatening manner; monitor compliance at each visit.
- A collaborative approach that involves the patient in the decision making process and in the selection of a solution might be beneficial.

What activities and strategies are thought to aid in improving the health and safety of seniors (65+) in the community who are prescribed multiple medications?

Facility based issues in medication safety

Problems associated with medication use are well documented internationally. Due to the scope of the problem, public attention has been drawn to medication safety concerns. In Canada, recent studies have highlighted safety concerns with regard to the medication use system. Notably among the studies are adverse events related to medication use. Adverse events concerning drugs and fluids were said to represent 23.6% of all events occurring in randomly selected teaching hospitals in British Columbia, Alberta, Ontario, Quebec, and Nova Scotia.(33) This translates to 141,250 to 232,250 hospital admissions per year in Canada and an event rate of 7.5 per 100 hospitalizations.(34) In a prospective study following 328 patients, 23% experienced an adverse event after discharge from a hospital and 72% of those events were attributed to medications.(35)

In a National Survey conducted by the American Society of Health-System Pharmacists in the United States, a large percentage (61%) of people surveyed indicated that they were “very concerned” about the possibility of being given the wrong medications.(36) The University of Michigan sampled a large cohort (n=920) of its employees and retirees. Of these 18% reported having experienced a medication error during their lifetime.(34) In the 2002 Commonwealth Fund Survey (CFS) in Canada, 11% reported that they had been given the wrong medication at one time or another. Sixty percent of those who experienced a medication error in the CFS study said that the error did have a serious impact on their health.(34)

Ackroyd-Stolarz et al report that the most common preventable adverse events in the hospital setting involve the concomitant use of medications with known interactions.(34) In Canada the total economic cost of adverse drug events (ADE's) translates to an additional 2.2 day stay for hospitalized patients, (4.6 days for preventable ADE's) and \$11 billion each year in added costs to the Canadian health care system.(37)

A preventable ADE is an injury caused by a medication due to an error in the medication use process. An example of a preventable ADE is the patient who develops an anaphylactic reaction of an antibiotic to which they are known to be allergic. A non-preventable ADE or Adverse Drug Reaction is not the result of an error. A non-preventable ADE, for example, is the patient who is prescribed

amoxicillin for an ear infection and subsequently develops diarrhea during the course of treatment.(38)

Medication error is defined by the British Department of Health as any preventable event that may cause or lead to inappropriate medication use or patient harm.(39)

On average, a hospital patient is subjected to more than one medication error per day.(40) Medication errors often lead to adverse events. An adverse drug event is defined as “any response to a drug that is noxious and unintended”. Seven thousand U.S. deaths annually are attributed to medication error.(40)

A medication error can occur at any stage in the medication use process, including prescribing, transcribing, dispensing, administering, or monitoring.(38) Improving the safety of medication at the system level involves targeting strategies where the greatest risk occurs. There are five levels where intervention may be beneficial - ordering, transcription and verification, dispensing, medication administration and consumption.(41)

Ordering

A high proportion of adverse events occur at the ordering stage in the medication system. Ordering is more likely to be accurate if there is a clear treatment plan with objectives that are understood by all involved. This plan includes the physician, the patient, and the pharmacist.

Computerized physician order entry is one of the most frequently recommended approaches to preventing problems associated with the ordering of medications.(42-45) With this technology the need for transcription, which increases error, is eliminated. This reduces the possibility for errors at this stage in the medication use process.(34) Widespread adoption of this technology may be limited by the cost of implementation and the willingness of physicians and organizations to adopt it. There is also evidence to suggest that the introduction of the technology may introduce new opportunities for error.(34) The current evidence states that medication errors are reduced by adopting computerized entry.(34)

A second technological approach at the ordering stage involves implementing computerized pharmacy systems. These systems are designed to alert pharmacists to potential problems associated with a prescription medication. Essential to a well functioning electronic warning system are appropriately sensitive and clinically important alerts. Without these, there is a risk that medication interaction warnings may simply be ignored. In healthcare centers without this technology, the task of an electronic alert system can be performed via manual review of orders by the pharmacist. Targeted physician education, usually conducted by pharmacists, may change physician-prescribing practices by providing objective information on specific medications.(46) Physician education might work in tandem with computerized physician order entry. The system flags would reinforce information

provided in the academic detailing further reducing problems at the ordering stage of medication delivery.(41)

Transcription and verification

Physician order entry eliminates the transcription stage of the medication ordering process. Physician order entry is however not available to all providers with only 7% of U.S. hospitals having adopted the electronic entry system. Physicians should be held accountable to write legibly and to seek clarity for verbal orders. Sufficient, well-trained personnel in a work environment that minimizes distraction will provide the best conditions for reducing problems at the transcription and verification stage of the process. Another approach involves avoiding abbreviations or the use of standard abbreviations.(41)

Dispensing medications

The most notable advancement in the area of medication dispensing is the use of the unit dose.(41) In this format, medications are dispensed as either a single unit or a single dose in ready to administer format. No more than 24 hours of medication are dispensed at a time. Two studies indicate that this method results in the reduction of error improving upon safety.(47;48) In one notable example, the reduction of medication error fell by more than 80%.(47;48) It should be noted that nurses indicate a strong preference for this system because it reduces the time needed to administer medication.(41) A non-technological approach to minimizing problems associated with dispensing medications is for the pharmacist to exercise care in

making calculations and have a second person check the accuracy of those calculations. A work environment free from distractions and adequate lighting and space can also contribute to the prevention of calculation errors.(41)

Healthcare administration

In hospital and long-term care settings the administration of health care facilities is often characterized as a high-risk environment for nurses.(49) Work environment and availability of adequate personnel are important factors in the overall safety of the system. Some technological advances include unit dosing and bar coding. Bar coding advances have demonstrated time-savings in work processes and fewer system errors.(41)

Consumption

Adequate information from the pharmacist is pivotal in the improvement of medication safety and reducing error. Safety is said to be enhanced at the consumption level by ensuring that there exists a collaborative relationship between the prescriber and the pharmacist that includes direct access to the pharmacist by the patient.(49) Ongoing communication with patients once they leave the dispensary is key to preventing problems associated with medication use/misuse from happening.(41)

System-wide approaches

Several broad system-level approaches have been recommended. Healthcare represents a large collection of various bodies that are cohesively identified as a system. All system members including providers, patients, purchasers, industry and regulatory bodies, professional bodies, licensing and accreditation bodies all share in the accountability for safety.(41) Additional system level safety initiatives include academic institutions' shared responsibility for educating future healthcare professionals concerning the necessity for accountability and patient safety.(41;49) Several authors suggest that pharmacists should become more visible in the healthcare system. Regardless of the approach, consensus suggests that a systems approach could provide a higher degree of efficacy than trying to change individual behaviours.(42-45;49)

Clinical issues in medication safety

As early as 1967 pharmacists were encouraged to “relate directly to the patient, the physician, and the nurse and to take his/her place on the healthcare team as a practitioner of pharmacy”.(50) Christen further asserts that improved decision making of the medication use process by pharmacists, as well as cooperative interdisciplinary action, are key to providing better patient care and improving the safety of medications.(50)

One of the factors associated with an improved decision making process in medication safety was the development of individualized medication profiles.

Individualized profiles assisted judgments about the safety and efficacy of drug therapy based on patient characteristics such as the patients' information about demographics, diagnosis, medical co-morbidities, allergies, laboratory values, and prior drug therapy. Individualized profiles are a very useful system for pharmacists. They contribute to patient knowledge concerning drug hypersensitivity ultimately leading to fewer prescribing errors.(50)

Drug confusion

Drug confusion is a major area of concern at all levels. Drugs with similar sounding names account for about 10% of all preventable medication errors.(36) There are more than 33,000 trademarked medication names in the United States and more than 9,000 generic drug names. Clinicians' heavy workloads, job stress, unfamiliarity with drug names, and confusing unclear orders invite opportunities for mistakes and undue harm.(36) Confusion between chlorpropamide (used to treat type II diabetes) and chlorpropazine (a psychotic disorder medication) resulted in one patient's death.(36) These types of events, combined with poor handwriting, different accents and other factors increase the difficulty in addressing drug confusion.

The rate at which new drugs are introduced adds to the problem. New drug names become harder to find. One approach which has been adopted is the use of the "tall man lettering" scheme used to differentiate drugs with similar spellings. Tall man

lettering involves the capitalization of letters in words that are different from words with similar spellings: primaCOR vs. PrimaXIN for example.(36)

Eight safety measures formed the basis of a recommendation list put fourth by the American Hospital Association (36) and include:

1. Evaluate the formulary to identify medications that are prone to drug name confusion.
2. Track errors involving look-alike, sound-alike drugs and educate staff on the potential for medication errors.
3. Use both the generic and brand names on drug orders to prevent confusion. Separate items with similar names on pharmacy shelves and in dispensing cabinets.
4. Ask for drug-name spelling on verbal orders.
5. Include the intended use of the drug with the order.
6. Advise patients to check medication labels before taking them.
7. Conduct a Failure Modes Effects Analysis for all new drugs considered by the pharmacy and therapeutics committee for inclusion on the formulary. This process involves modeling the steps performed by individuals, (physicians, nurses, clerks, and pharmacists). By conducting this assessment, experts can assess mechanisms and methods, that are prone to failure. By utilizing this model interventions can be planned to reduce variation in human performance that leads to errors.(51)

Community dwelling patient issues in medication safety

A strong provider-patient relationship in increasing patient safety is a key theme in the research literature.(52) Engaging patients in their healthcare improves compliance, satisfaction, and enhances safety.(38;52) Education plays a central role in this relationship. Providers should seek to provide information in as many formats as possible including oral and written instructions. One author cites video as providing meaningful layers of information. The inclusion of family members who will assist in the patient's care also provides additional safety and support.(38)

For community-dwelling patients, few systems currently exist to monitor drug administration and prevent medication errors in the home. Older adults taking high risk medications need clear understandable information about how and when to take their medications, what to do with regard to food and missed doses and how to spot potentially harmful side effects.

Critical to community dwelling patients' safety is their ability to recall instructions accurately. A patient's cognitive and sensory deficits affecting recall should be taken into account when formulating instructions. Many older community dwelling people take multiple medications, and may need a system to manage their medication use.(53) When 5,000 participants of the Pennsylvania Pharmacy Assistance Contract for the elderly (PACE) were studied researchers determined that problems with medication and organization are common, and that many (32%)

did not receive specific instructions about their medications. Only 24% of subjects in this sample reported being asked to bring in all of their medications to review with their physicians. Forty-eight percent of patients reported splitting their Warfarin, which requires accurate dosing. Slight variations in dosage can increase the risk of bleeding or clotting, making this finding alarming. A report of failing to receive instructions from health care providers does not necessarily mean that instructions were not given. However, if instructions are being provided, the instructional system might need assessment as to its efficacy.(53)

Which strategies/techniques are effective in improving adherence to treatment/medication regimens for persons with disabilities?

As with senior populations, non-adherence to prescription medication treatment leads to poor treatment outcomes, higher hospitalization rates, and increased health care costs (1;54) and evidence suggests that a lower rate of adherence appears for persons with psychiatric disorders than for those with physical disorders (24-90% for patients treated with antipsychotics, and 40-90% with those treated with antidepressants).(3) Because of this, adherence has been referred to as the “key mediator between medical practice and patient outcomes.”(55) As mentioned, adherence refers to the extent to which a person’s behaviour coincides with the medical advice given with non-adherence referring to failure to enter a treatment program, premature termination of therapy and incomplete implementation of instructions (including prescriptions).(56) A recent review in the Cochrane

database suggests that for short course therapies, such as those requiring antibiotics, simple interventions to improve adherence appear to be effective, however those interventions targeting individuals with more chronic conditions appear to be less effective overall.(4) Studies aimed at interventions intended to enhance adherence with self-administered medications used in the treatment of chronic medical conditions were discussed in a recent systematic review.(2) Only studies with longer term follow up were permitted for a focus on chronic medical conditions. The review authors chose to exclude trials that pertained to psychiatric disorders because adherence is generally lower in patients with psychiatric disorders and unique challenges may also be present, potentially limiting the generalizability of interventions tested in that context.(57) This exclusion is a good example of how, compared to the literature on adherence in older persons, fewer papers deal explicitly with the topic of mental health disorders, community dwelling individuals and adherence.

Factors Associated with Adherence

One way of potentially improving adherence in those with mental health disorders is to look at which factors are associated with adherence/nonadherence and to examine those that are potentially modifiable. Since patients with mental health disorders have a different profile for medication taking and treatment adherence, studies that focus on this population group are especially necessary. Unfortunately,

there are few studies that report on factors/characteristics that are associated with treatment adherence in patients with mental health disorders.

One group examining factors associated with treatment adherence in patients with bipolar disorder found that alcohol dependence, younger age, greater number of affective symptoms, not being in full remission, frustration from side effects, cognitive impairment (as a perceived adverse effect of treatment), 'anticholinergic' side effects (such as dry mouth or blurred vision), co-morbid obsessive-compulsive disorder, recent mania or hypomania were all significantly associated with non adherence. The odds ratio for these factors ranged from 1.90-7.24.(58) The paper also cited such factors as male sex, youth, younger illness onset, non-Caucasian ethnicity, substance abuse, previous mania with psychosis, adverse effects of treatment, regimen complexity, poor insight, distrust of clinicians and denial as important for their associations with adherence.(58) However, the authors indicate that previous research has considered only relatively simple drug regimens that are not characteristic of the polypharmacy typical of the current treatment for bipolar disorder. The study authors advocate that patients with bipolar disorder should discuss their attitudes about and experiences with long-term mood-stabilizing treatments. Health care professionals should be paying greater attention to even minor complaints, making efforts to limit the complexity of treatment regimens to avoid compromising otherwise effective prophylactic treatments for this disorder. A second paper focusing on bipolar groups cited longer duration of treatment, increased complexity of medication regimen, decreased insight into illness, more

negative beliefs about medication, poor patient-doctor alliance, as well as the presence of psychotic features, personality disorders, and co-morbid substance abuse as factors predictive of nonadherence.(5) The paper also cited patients' initial expectancies for improvement and the quality of the patient-doctor alliance significantly predicted time remaining in treatment up to 28 months following hospitalization.

A study examining persons defined as having 'severe mental illness' looked at the effect of involuntary outpatient commitment programs (OPC). They found factors associated with non-adherence included Black race, substance abuse, and higher global impairment of functioning.(59) Within this population group, other previously noted factors for non-adherence to community based treatments were unwanted side effects, poor therapeutic alliance, difficulty affording treatment, cognitive impediments to adherence, a lack of awareness, or a lack of acceptance of the illness.(60-63)

A Japanese study looked at what factors were associated with polypharmacy and excessive dosing of patients with schizophrenia in acute care psychiatric units in Japanese hospitals.(64) In a final model, factors associated with excessive dosage of medication were patient characteristics such as length of illness, psychiatrists' perceptions doubting treatment algorithms and nurses' requests to increase current dosage or to add another drug.(64) While the study was specific to inpatients, the

findings concerning psychiatrists' perceptions may also be found in community settings and is worth considering for future research.

A systematic review of those with depressive disorders found that use of fluoxetine versus other drugs, previous use of antidepressants, higher education/IQ, female gender, being married, and having a diagnosis other than personality disorder or substance abuse were associated with better adherence.(65)

Interventions Aimed at Altering Adherence

Difficulties commonly cited when evaluating studies of adherence are due to differing definitions, methods of compliance assessment, and the use of comparison groups in interventional studies of adherence.(3;5;56;66) Multiple methods are employed to make across study comparisons, as well as pooling of data through meta-analytic techniques make it difficult to know what types of interventions are beneficial for specific mental health populations. Since mental health disorders have differing adherence profiles, evaluating these within specific diagnostic categories appears as an appropriate way to view the literature.

Bipolar disorders

A review article of psychosocial treatments examined 14 studies about bipolar disorder.(5) The interventions identified were divided between cognitive-behavioural interventions, psychoeducation, and family focused therapy. Cognitive-behavioural therapy (CBT) trials reported favourable results for medication

adherence in four of six trials.(5) Results from trials evaluating the efficacy of psychoeducational approaches for bipolar disorder have been similarly mixed. Three of five reviewed studies provided some evidence that adjunctive psychoeducation (PE) might enhance treatment adherence.(5) One family-focused therapy (FFT) trial showed no difference between post-treatment groups at nine months on a medication compliance index but were significantly more likely to be rated as adherent at one year post treatment. The comparison group was receiving crisis management and was not TAU. Overall, the authors reported interventions directly targeting knowledge and attitudes about medication that used either cognitive-behavioural, or didactic approaches and focused on medication adherence/pharmacotherapy were those that showed significant treatment effects.(5) Treatments that addressed medication adherence in a more nonspecific manner appeared to be less effective in generating positive adherence outcomes, paralleling data reported in depression adherence. Like interventions for depression adherence, low-intensity, targeted interventions for bipolar disorder adherence were more effective than longer duration interventions that only devoted a small fraction of time to addressing adherence.(5) The study authors suggest an urgent need to develop and test novel treatment adherence programs for bipolar patients which should include CBT, PE, and FFT components seeing as these have demonstrated modest effects.

Legal mandates, such as involuntary outpatient commitment (OPC), have been evaluated as an attempt to compel adherence. This approach involves a judge

ordering a patient who is reluctant or unable to follow through with community-based treatment to adhere to treatment. OPC may decrease hospital readmission rates and total days hospitalized.(67) A randomized trial showed that receiving extended court-ordered treatment had a significantly higher likelihood of adherence during a one year follow-up versus those with brief (non-renewed) OPC (65% in the extended, 42.2% in the brief and 48.7% in the control group; $p=0.024$). The study authors concluded that for persons with serious mental illness, sustained outpatient commitment (greater than six months) improves treatment adherence when it is combined with frequent services (odds ratio of 3.85). Also, administration of depot antipsychotics is significantly associated with improved treatment adherence (odds ratio of 2.48).(59)

Schizophrenia

Interventions focusing on psychosocial factors aimed at those with psychosis have important impacts on treatment adherence. A Danish study that used assertive community treatment enhanced by specific content via family involvement and social skills training found those patients randomized to the enhanced treatment received significantly lower doses of second generation antipsychotics and were significantly less likely to discontinue integrated treatment for at least a month than standardized treatment patients (8% vs. 22%).(68) Subjects in this study who had experienced a first episode of psychosis were offered integrated treatment for a period of two years with involvement of team members, hospital staff (if admitted to hospital) as well as family members (when interested).

A multicenter European study of schizophrenics evaluated the effectiveness of adherence therapy with a health education control to see whether this protocol improved medication adherence.(69) The subjects were recruited from typical general adult psychiatric in-patient and community settings. They required antipsychotic medication for at least one year prior to entering the study and had evidence of clinical instability in the year. The adherence therapy intervention was described as a collaborative, patient-centered, phased approach to achieve a joint decision about medication between the individual and the therapist. For both the experimental and control groups participants were offered a maximum of eight weekly session lasting 30-50 minutes over a maximum of five months. At one year the authors found that adherence therapy had no clear health benefit in terms of treatment adherence compared to health. The authors stated that a high initial refusal of those unwilling to participate in the study may have created a ceiling effect in the remaining study subjects. That is, the sample included those who were more cooperative and adherent in the first place.

A recent systematic review of interventions to improve medication adherence in schizophrenics noted interesting results. Zygmunt et al reported that a variety of approaches were used to improve medication compliance including psychoeducational, group therapy, family, cognitive and individual interventions. Psychoeducational interventions were defined as primarily focusing on dissemination of knowledge about schizophrenia, treatment and medications

without focusing on attitudinal and behavioural change to achieve medication adherence. Group therapy was based on the importance of peer support and shared identification. Family interventions derived from a belief in the family as a critical influence on the course of a patient's illness.(66) Cognitive treatments targeted patients' attitudes and beliefs toward medication, while behavioural modification techniques tried to modify behaviour through rewards and punishment, reinforcement, provision of cues, and the promotion of self-management. Each intervention style had varying results regarding its effectiveness. In general, the authors stated that interventions that made medication adherence the primary goal were more successful in increasing medication use than those that viewed adherence as a secondary outcome.(66) Also, there was little evidence in the relationship between the intensity of the interventions, as measured by duration or number of sessions, and effectiveness.(66) No one specific modality demonstrated overwhelming success in improving adherence. Some modalities however were represented by only a few studies. Specifically, psychoeducational interventions without focus on attitudinal and behavioural change were largely unsuccessful for improving adherence. Family therapy alone did not have a large effect on adherence. Behavioural interventions were successful in promoting adherence when they used psychoeducational techniques such as detailed instructions, concrete problem-solving such as reminders, self-monitoring tools, cues, and reinforcements. Programs using cognitive approaches targeting patients' attitudes toward medication were often effective in improving adherence, and assertive community treatment and intensive case management models of community care

were effective in promoting medication adherence.(66) The authors caution that nuances in study design, subject recruitment and retention patterns make it difficult to be dismissive about any single type of treatment approach in its totality.

An additional review incorporated meta-analytic techniques to evaluate which community psychiatric services reduce medication and appointment non-adherence for patients with psychosis (schizophrenia).(56) Overall, this meta-analysis reported that clinical interventions for reducing patient non-adherence were significantly more effective than control interventions with a pooled odds ratio for dichotomous outcomes at 2.59 (95% CI 2.21-3.03); similarly, the pooled standard mean difference for continuous outcomes was 0.36 (95% CI 0.06-0.66).(56) Subgroup analyses demonstrated that for those studies employing short follow-up periods, the effect was greater (OR=2.27, 95% CI 1.78-2.90) than in those interventions with a follow-up of six months or more (OR-1.70, 95% CI 1.04-2.78). Moreover, studies that had more homogenous populations of patients with schizophrenia, as well as studies assessing adherence with hospital discharge programs, had a slighter greater effect.(56) Another trend noted was that studies assessing adherence to medication yielded a slightly higher odds ratio than studies assessing adherence to out-patient and post-discharge appointments.(56) As in the review by Zygmunt et al, longer length of follow-up was significantly associated with a less favourable treatment outcome. No single intervention emerged as a predictor of overall treatment effect. Educational programs, psychotherapeutic, and service policy program groups did not show greater benefit over any other program).

Researchers are cautioned about making assumptions based on definitive conclusions regarding these types of interventions because of differing sample sizes and evaluation techniques within studies.(56) In contrast to the review completed by Zygmunt et al, this meta-analysis only included studies where the primary outcome measure of each study was adherence (versus those studies which used adherence as a secondary or tertiary measure), and only compared interventions against a control group (treatment as usual) and not against another intervention (one treatment arm versus another treatment arm). Taken together, Nose et al suggest that these differences may have overemphasized the treatment effect found in this analysis, and explain the contrasting, negative conclusions reached by Zygmunt et al.

Depressive disorders

Those affected by depressive disorders show poor medication adherence, with nearly one-third of patients discontinuing medication in the first month of treatment.(70) A study evaluating a telephone intervention randomized subjects to receive three phone calls after a new prescription for antidepressants.(71) Phone calls were administered within two weeks of randomization, then again at four and twelve weeks. The calls included brief, structured assessments of current depressive symptoms, current use of antidepressant medication, and antidepressant side effects with specific scripts to address concerns regarding side effects and motivational enhancement for those discontinuing medication. The results showed that the program had no statistically significant effect on either medication

adherence or clinical outcomes at six months, but showed the intervention group had fewer numbers of antidepressant medication follow-up visits and fewer psychotherapy visits.(71)

In a representative community sample for those with a new course of treatment for depressive illness, authors tried to ascertain whether a brief intervention, including drug counselling, improved adherence to medication when compared to a group receiving a leaflet only, and a group who had treatment as usual.(72) After randomization of subjects, those who were allocated to counseling had a 2.1 greater odds ratio of self-reported adherence at six weeks, and 2.7 times greater odds at twelve weeks. Allocation to receive a leaflet was not significant. Survival analysis confirmed that counseling had a significant effect compared to treatment as usual with a hazard ratio of 2.1 (95% CI 1.3-3.2). This means that the rate at which subjects discontinued taking their medication was 2.1 times sooner in the treatment as usual group compared to the counseling group.

A systematic review looking at depressive symptoms and medication adherence found that no clear indication has emerged concerning which specific interventions, or combinations thereof, contribute to improved adherence.(65) The authors advocate that carefully designed clinical trials are needed to clarify the effect of single and combined interventions given the current state of the available literature.

Other Groups

Homeless individuals with mental health issues are a group that has garnered some attention in the literature. When exploring adherence in young homeless people, researchers conducting qualitative analyses found that obtaining medication (mostly relating to financial resources impeding access), managing medication (relating to storage issues), side-effects of medication (adding unwanted complications to already difficult life situations), and interaction with illicit drugs were all problematic.(73) Strategies which have been cited as helpful to improve medication adherence in this population include the provision of a 10-day supply of medication in small self-sealing bags, so medication is easily portable and replaceable (74); the use of compartmentalized pill boxes/dosettes (75); the availability of someone to supervise medications, including community workers or family members (76;77); a pharmacist on-site at a health clinic to fill prescriptions immediately following the person's appointment (78); and simplifying dosage regimens, which may include depot medications.(77)

What activities and strategies are thought to aide in improving the health and safety of mental health clients who are prescribed multiple medications?

Antipsychotic polypharmacy for schizophrenia appears to be prevalent with some authors estimating that up to 40% of patients experience multiple medications, with others reporting 23% receive long-term antipsychotic polypharmacy.(79) For reasons relating to patient safety, activities/strategies addressing such problems are

both important and necessary. One research paper evaluated how actual psychiatrist treatments correlated with a standardized practice guideline aimed at guiding clinical decisions to improve quality of care for patients with schizophrenia.(80) The Patient Outcomes Research Team (PORT) statement has six specific psychopharmacologic recommendations some of which include first line treatment, dosage ranges for medications, recommendations for nonadherent patients, recommendations for depressed patients, and recommendations for those with anxiety symptoms.(81) The report indicated that 37% of the study population had difficulties with adherence to treatment, and 75% were unemployed because of physical or mental disability. Measures for psychopharmacologic treatment adherence were recorded by a psychiatrist's self-report at 30 days in accordance to the PORT guidelines. Psychiatrists conformance with practice guidelines in routine psychiatric practice ranged from a low of 30% (category for nonadherent patients receiving depot antipsychotics); 38% (category for providing antidepressant treatment to those patients with moderate to severe depression); 45% (category for those patients receiving benzodiazepines with moderate to severe anxiety symptoms); to a high of 100% (category for patients being provided with antidepressant treatment for those with major depression). A major finding reported was psychopharmacologic treatment is characterized by significant polypharmacy (a mean of three medications prescribed per patients), with a significant proportion of patients also receiving two or more antipsychotics (not endorsed by the PORT guidelines). The paper states that pilot studies are being conducted to look at treatment adherence, patient response and outcomes of

specific subgroups, and to determine which of these studies have superior outcomes. Improvements in adherence, illicit substance use and mental health have been reported in other patient groups when following guidelines.(82) The use of standardized guidelines may provide impetus as well as knowledge to clinicians dealing with mental health disorders, such as schizophrenia, and this could impact on health and safety. Further research is required to determine whether specific subgroups benefit more from such guidelines compared to others (i.e./ across spectrum of the disorder).

Policy changes for state funded health insurance programs have been advocated for those with schizophrenia to prevent polypharmacy. Ganguly et al report an estimated cost savings for the for the Medicaid systems of California and Georgia (where the study population was derived from) if they implemented a policy that included a prior authorization rule for long-term polypharmacy (usage beyond 60 days).(79) This becomes important given that there appear to only be two instances where antipsychotic polypharmacy is advocated: short-term p.r.n. (as required) use for 'symptom control' and as a short-term tactic while switching from one monotherapy to another. Also, polypharmacy is generally discouraged since multiple antipsychotic medications are likely only to exacerbate side effects without further alleviating symptoms.(83) While Canadian payment systems are different from those of the United States, monitoring systems in pharmacies, or with insurance plans covering medication costs offer a possible option in preventing polypharmacy for instances when it is not indicated.

Benchmarking offers another option to improve care, measure how treatments are administered, and how they adhere to accepted guidelines. Using the Patient Outcomes Research Team (PORT) guidelines evaluating the quality of care delivered with a health care system, a veterans hospital (VA) was compared to a private care hospital in the United States. The study found that important dosing and treatment differences existed between hospitals in the study.(83) While hospital differences such as the ones described in this study may not exist in Canada, benchmarking within and between health regions, provinces and across nations may assist in determining how polypharmacy is occurring and to what extent, particularly if participating facilities are using the same benchmark measures for determining outcomes. The authors performed an additional study that measured similar outcomes within the same provider group of hospitals (VA hospitals) and noted that PORT recommendations were not always adhered to.(84) The use of the treatment guidelines, such as the PORT recommendations, demonstrate a useful tool to monitor the way that treatment is being provided by clinicians, and a way to monitor those who receive multiple medications.

The use of algorithms for medication dispensing has also been advocated in schizophrenia. Rationale for practice algorithms includes improving the quality of treatment by reducing unnecessary variations in clinical practice, improving the quality of diagnostic reasoning by making explicit clinical decisions, providing a standard to rate patient progress, providing a rational basis for when and where to

introduce new medications and tests, allowing for a smoother continuum of care by documenting all elements of therapy provided, and by enabling evaluations of physician practices through drug utilization reviews and quality improvement.(85-87) A well designed and implemented algorithm may provide both administrative and health-related benefits.(88) While the development of practice algorithms requires evaluation, a group in Texas found that physician and staff education alone did not significantly alter providers' practice behaviour (adherence to algorithms) but difficulties in assessing physician documentation and the inadequacy of documentation made this difficult to assess.(88)

Conclusion

A variety of associated factors, interventions and health and safety policies were reviewed in the preparation of this background document. It appears that both differences and similarities exist between older adults and persons with disabilities. Similarities include the interventions aimed at reducing financial, ordering, and dispensing barriers to improve medication adherence, as well as establishment of a solid therapeutic alliance between patients and health care providers through information sharing, consultation and follow-up. Differences exist in those specific factors relating to adherence according to a specific population profile (i.e. differences between seniors and those with bipolar disorders).

The importance of the problem of medication adherence and polypharmacy necessitates that coordinated action among various stakeholders, including front-line workers, policy makers, community dwelling persons with disabilities and seniors, needs to occur to improve health and safety. This background document attempts to offer insight to inform stakeholders and acts as a reference to facilitate setting research priorities for AHS-AMHB initiatives.

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