

Integrated Pharmacies at Community Mental Health Centers: Medication Adherence and Outcomes

2017 Update:

Including results from newly published research study

WHITE PAPER

PART I: BACKGROUND

INTRODUCTION

Adherence has been defined as the “active, voluntary, and collaborative involvement of the patient in a mutually acceptable course of behavior to produce a therapeutic result.” This definition implies that the patient has a choice and that both patient and provider mutually establish treatment goals and the medication regimen. Medication adherence usually refers to whether patients take their medications as prescribed (e.g., twice daily), as well as whether they continue to take a prescribed medication.¹

The importance of medication adherence has a direct correlation to outcomes for patients. If patients do not adhere to their agreed-upon therapy, the result can lead to relapse or re-hospitalization. Often times clinicians may be misinformed about a patient’s medication adherence. A patient may take the medication more carefully a few days before their appointment, which leads the clinicians to believe the patient is following the medication therapy. Clinician judgment and patient reports are commonly used to evaluate whether patients are taking their medications as prescribed. However, two studies reveal the limitations of these methods. One study found that only 10 percent of 39 patients had taken all of their pills, whereas 68 percent of these patients rated themselves as having taken all doses over 3 months. A second study compared adherence assessed by Microelectronic Event Monitoring System (MEMS) medicine bottle caps, which record each time the bottle is opened, with clinician ratings of patient adherence based on a 7-point scale (n = 21). After 3 months, the MEMS cap data showed 38 percent of patients to be adherent, while clinicians rated 95 percent of patients as adherent.² These data points suggest there is a definite gap in assumed adherence and actual adherence.

If a patient is non-adherent, any efforts by the prescriber to achieve a positive outcome through changes in dose or drug are seriously compromised and frequently less successful. Non-adherence complicates a provider’s ability to establish a critical baseline therapy. Without this baseline the probability of modifying treatment and achieving a successful outcome is significantly diminished. The effect of non-adherence can include relapse, hospitalization, job loss, wasted resources and continued reliance on healthcare systems and government systems. Individuals with a mental illness tend to have more medications, making adherence even more challenging. A recent study revealed that adherence to antipsychotic medications has an average rate of 50 percent.³ More specifically, it has also been determined that only 41 percent of Medicaid beneficiaries with schizophrenia using antipsychotic medication were adherent to treatment. The rates of medical hospitalization and hospital costs were lower for those who were adherent versus the non-adherent.⁴

“Drugs don’t work
in patients who
don’t take them.”

– C. Everett Koop, MD¹

HEALTHCARE COSTS

Nearly half (44 percent) of patients eligible for both Medicare and Medicaid (dual eligible) have at least one mental health diagnosis. Furthermore, 20 percent of these patients are dual eligible with more than one mental health diagnosis. These patients have healthcare costs twice as high as average spending for the dual eligible population.⁵ These costs could be reduced if adherence is improved. Individuals with a mental illness need a more hands-on approach to managing their medications due to more complex therapies including multiple doses, side effects, and multiple medications. Adherence is critical. Non-adherence can lead to diminished outcomes and higher healthcare and government agency costs.

FIGURE 1: Convenient Adherence Packaging

Maximum Medication Use Gap	Odds for Hospitalization – California Medicaid Population	Odds for Hospitalization – National Managed Care Population
None	1.0	1.0
1-10 days	2.0*	
11-30 days	2.8 [†]	2.1 [‡]
> 30 days	4.0 [†]	4.7 [§]

In both a Medicaid and managed care setting, longer duration of maximum medication gap use was associated with significantly greater odds for hospitalization.

*P=0.004, †P<0.001, ‡P=0.058, §P<0.0001

¹Weiden PJ et al. *Psychiatric Services*. 2004;55:886-891. ²Kozma CM, Locklear J, Weiden P. Gaps in antipsychotic medication and risk of hospitalization for the treatment of schizophrenia in managed-care settings. [Poster]. Presented at: International Society of Pharmacoeconomics and Outcomes Research Ninth Annual International Meeting. Arlington, VA, May 16-19, 2004.

Additional barriers exist for patients living with mental illness. These barriers may include patient reluctance to accept a diagnosis and begin treatment due to the stigma of having a mental illness; failure to attend future appointments; or even the patient’s ability, understanding or willingness to follow a prescribed course of therapy. Gaps in therapy for these patients can result in the worst possible consequences. Non-adherent patients’ risk on average is 3.7 times greater for relapse and/or re-hospitalization than adherent patients.⁶ Even a short gap in drug therapy can quickly turn into costly re-hospitalization. Recent data from the U.S. Department of Health and Human Services indicate the average hospitalization for persons with schizophrenia is over \$16,000.⁷ A recent study also estimated that Medicaid programs and other state agencies spent over \$21 billion on schizophrenia-related costs in 2013 with health care costs accounting for 79 percent. It is suggested that better medication adherence could yield an annual net savings of up to \$3.28 billion to states. Lower hospitalization rates, due to better medication adherence, would account for 68 percent of the savings alone.⁸ Therefore, finding a solution or set of solutions to help improve the adherence in this demographic is crucial.

A recent study published in the *Journal of Managed Care & Specialty Pharmacy* showed Genoa Healthcare patients experienced a 40 percent lower rate of behavioral health related hospitalizations per year.⁹

A recent study found that patients utilizing Genoa Healthcare pharmacies integrated with the Community Mental Health Centers (CMHCs) had higher medication adherence rates, lower rates of hospitalization, and lower emergency department utilization than those filling their prescriptions at community pharmacies, associated with a cost savings of \$58 per member per month (approximately \$700,000 per 1,000 patients annually).⁹ These cost savings are based on evidence in the study showing patients of CMHCs using Genoa Healthcare pharmacies had a 40 percent lower rate of behavioral health-related hospitalizations, and an 18 percent lower rate of behavioral health-related emergency department visits than those using other community pharmacies.

WHY PATIENTS AREN'T ADHERENT

There are multiple reasons for non-adherence in any patient group, both intentional and unintentional. These reasons, which are inflated in the mental health population, can be divided into five categories: health system, condition, patient, therapy, and socioeconomic.¹ The health system as a driver of non-adherence deals with reasons such as lack of access to healthcare, continuity of care, or poor communication between the clinician and the patient. Condition, patient, and therapy reasons may include patient reluctance to accept a diagnosis and begin treatment, failure to attend future appointments, or even the patient's ability, understanding or willingness to follow a prescribed course of therapy. Patients may be incapable of remembering to take doses as prescribed or may be overwhelmed by myriad doses and the medications required. Standard prescription vials can cause some patients to forget to take doses as prescribed. Patients may also be affected by socioeconomic barriers such as financial strain, lack of transportation, and an inability to pay for their medication. While the typical American is dispensed an average of 12 prescriptions a year, a mental health patient is taking 48 per year,¹ or four or more prescriptions monthly.¹⁰

Many factors contribute to non-adherence. Changing or improving adherence requires a multi-solution approach including a combination of solutions tailored to the patient. Such solutions include identifying, managing and tracking adherence in individual patients to improve outcomes.

The typical American is dispensed an average of 12 prescriptions a year, a mental health patient is taking 48 per year.¹

PART II: GENOA HEALTHCARE'S APPROACH TO IMPROVING ADHERENCE

Genoa Healthcare is focused on improving adherence for those in our care. We are the largest pharmacy provider specializing in the treatment of those living with mental illness. Genoa provides adherence-driven pharmacy services co-located within mental health clinics throughout the United States. Our goal is to ensure that patients gain access to their prescriptions and take their medication correctly. We focus on the very specific needs of the mental health community (our staff are specially trained in mental health) by creating and tailoring our services to this niche. Genoa Healthcare addresses the medication adherence issues through its services including:

- On-Site Pharmacy Services
- Specialized Dispensing Frequency
- Convenient Adherence Packaging
- Personalized Refill Reminder Calls
- Medication and Refill Synchronization
- Long-Acting Injectable (LAI) Antipsychotic Services
- Clozapine Monitoring
- Putting Pharmaceutical Samples to Good Use
- Coordination with Drug Manufacturer Patient Assistance Programs (PAP)
- Prior Authorization Assistance
- Enhanced Communication with Providers and Patients
- Flexible Delivery Options

We measure the effectiveness of these interventions through robust reporting tools, such as our Online MedAnalyzer tool which provides state of the art information technology to providers in order to identify non-adherence with our patient population. We use outcomes and adherence data to identify and intervene at the point of care to help manage, improve, and track adherence and thus improve the outcomes of our patients.

ON-SITE SERVICES

A recent survey conducted by the National Alliance on Mental Illness (NAMI) and the College of Psychiatric and Neurological Pharmacists (CPNP), discovered that 91 percent of individuals taking a mental health medication are very comfortable going to community pharmacies; however, their biggest concern is privacy.¹¹ Genoa Healthcare pharmacies are small, quaint and local with the ability to fill all of the patient's medications. By working in a setting where our patients feel the most comfortable, Genoa Healthcare is able to maintain open lines of communication between the pharmacy, the prescribers, the case managers and the patients. This allows doctors and case managers easy, HIPAA-compliant access to the pharmacy system, which reduces the likelihood that patients will neglect to pick up their prescriptions. People discharged with a prescription who failed to fill it were 1.75 times more likely to be re-hospitalized.¹² A recent study reviewed Medicaid data and showed that pharmacies

In a peer-reviewed study it was found that Genoa Healthcare pharmacies integrated within community and mental health centers (CMHCs) not only improve medication adherence but can also reduce the need for other expensive health care services.

People discharged with a prescription who failed to fill it were 1.75 times more likely to be re-hospitalized.¹²

integrated within Community Mental Health Centers can not only improve medication adherence, but also reduce the need for other expensive healthcare services such as hospitalization and emergency department utilization.⁹

DISPENSING FREQUENCY

Determining the proper medication, combination of medications, and dosage for mental health patients can be a complex process. Changes forced by side-effects and non-response can be costly; therefore, establishing a baseline therapy is critical. As a result, Genoa Healthcare takes a specialized approach that includes close consultation with convenient, co-located prescribers, unique packaging, timely refills, and credits for unused medications that have not left the pharmacy's control (which helps to reduce waste and provide cost efficiencies). In collaboration with the prescriber, Genoa Healthcare pharmacists identify patients who may require frequent medication changes or have adherence issues. When this happens, Genoa Healthcare pharmacists work with the prescribers to determine what frequency of dispensing is most beneficial to the patient. In some cases, a prescriber may want a patient to only receive a 7-day or shorter supply of their medications. This allows for frequent monitoring of side-effects and efficacy, ensures minimal gaps in treatment, and minimizes cost in the event that the prescription must be changed after a brief period. After the patient is stabilized on a medication and the prescriber and pharmacist determine the patient can handle a 30-day supply, a medication will be dispensed.

CONVENIENT ADHERENCE PACKAGING

Genoa Healthcare helped develop the specialized convenient adherence packaging system (Figure 2) that is widely utilized today. This packaging has clearly labeled color-coded blister packs. Each dose is labeled by day and time, such as "Tues Morning," "Tues Noon," and "Tues Bedtime." The packaging is perforated and organized to allow a patient to tear off one or more doses as a convenient travel pack. This system makes adherence easier for patients who are taking multiple medications at various intervals during the day, or for patients who need clear, concise instructions because of their health conditions.



FIGURE 2:
Convenient Adherence
Packaging

REFILL REMINDER CALLS

When it is time to refill the prescription, Genoa Healthcare offers personalized reminder phone calls staffed by Genoa Healthcare pharmacists and pharmacy technicians. Patients are able to discuss concerns or ask questions about their medications from their home environment.

These staff members are trained to contact a patient's case manager in the event that there is any concern or the patient is not reachable. Although this is time-consuming, it helps to ensure continued adherence for an at-risk population. Furthermore, it is one more interaction between the patient and Genoa Healthcare's staff.

REFILL SYNCHRONIZATION

Genoa Healthcare is a full-service pharmacy and has the ability to fill all of a patient's medications, not just psychiatric medications. Therefore, when necessary, our pharmacists work with patients and providers to synchronize refills. This allows patients to refill all their medications at the same time. Filling all medications at the same time creates less confusion for our patients and can provide cost savings. Furthermore, since transportation is often an issue for the patients we serve, this "one-time pickup" reduces the chance of a gap in treatment for all medications.

LONG-ACTING INJECTIBLE (LAI) ANTIPSYCHOTICS

Only 1 of 6 adherent depot (long-acting injectable antipsychotics) users was admitted to the hospital, compared to 5 of 6 non-adherent depot users.¹³ Long-acting injectables can be good for some patients that forget to take their medications, but still require help being adherent. The combination of a long-acting injectable and a Genoa Healthcare pharmacy can help with this adherence. The pharmacist works with the patient to counsel and monitor the use of the medication and conducts refill reminder calls reminding patients to come in for the next injection. An on-site pharmacy can allow the immediate administration of an LAI when a decision is made to start this type of treatment. Many LAIs have prior authorization requirements. As an on-site pharmacy we can help quickly resolve these prior authorizations and get the medication administered to the patient as soon as possible.

CLOZAPINE MONITORING

Severe and persistent mental illnesses such as schizophrenia can be difficult to manage, and often require the use of specialized medications. Some patients may try and fail multiple therapies throughout the course of their illness, and success with any one particular therapy is not easy to predict. One antipsychotic medication that is indicated for treatment-resistant schizophrenia is the drug Clozapine. Unfortunately, this medication also can cause serious side effects that require frequent and on-going blood monitoring. This requirement poses an additional adherence challenge because patients need to have their blood drawn regularly.

Genoa Healthcare can provide assistance and simplify the process for those consumers taking Clozapine through our Clozapine Monitoring Program. Genoa Healthcare staff can proactively notify consumers, case managers, and other providers of labs that need to be drawn to prevent lapses in therapy. Our phlebotomists perform blood draws, send the samples to the lab, and then the results are sent to our pharmacy. Our pharmacists will enter required lab results into the Clozapine registry, and review those results to dispense accordingly.

PUTTING PHARMACEUTICAL SAMPLES TO GOOD USE

Today, many mental health medications are available generically. However, when these are unsuccessful, a brand medication is prescribed and frequently the costs can be a significant barrier for those uninsured or underinsured. The use of samples is a positive resource for uninsured or underinsured individuals to remain adherent. Samples serve as an important bridge to Patient Assistance Programs and help prevent the uninsured from experiencing a gap in therapy without causing a financial hardship. However, these samples are typically provided to the doctor's office or clinic by pharmaceutical companies, and are labeled not-for-resale.

Samples distributed by physicians' offices are frequently unlabeled, which could cause the medication to do more harm than good. Furthermore, samples distributed by doctors would not be included in a patient's computerized pharmacy record. As a result, drug interactions or other potential medication problems could occur. Samples are physically segregated from Genoa Healthcare's commercial stock and perpetually inventoried in order to ensure appropriate distribution.

Genoa Healthcare pharmacies innovatively use pharmaceutical samples. These samples are provided to patients at no charge, with no fee to Medicaid or other payers, and no charge to the clinic. Since Genoa Healthcare pharmacies are co-located within the facility, where allowed by state law or regulation, Genoa Healthcare can take control of these samples on behalf of the doctor or clinic. Our pharmacies can separately store and correctly label the samples, distribute them to patients as appropriate, and make sure these prescriptions are properly reflected in the patient record. By doing so, the collaborative efforts of Genoa Healthcare and the Community Mental Health Centers keep non-Medicaid patients on their medications and off Medicaid, and offer starter doses to patients who have applied for Medicaid and are awaiting approval.

PATIENT ASSISTANCE PROGRAM SUPPORT

Pharmaceutical companies offer Patient Assistance Programs to serve those who have either inadequate pharmacy insurance or no pharmacy insurance at all. These programs, in states where allowed, provide free brand name medications for qualified patients who apply. Unfortunately, this application process is complicated, especially for those with mental health issues creating a barrier to a very important program. Genoa Healthcare addresses this problem by identifying eligible patients,



Pharmaceutical Samples

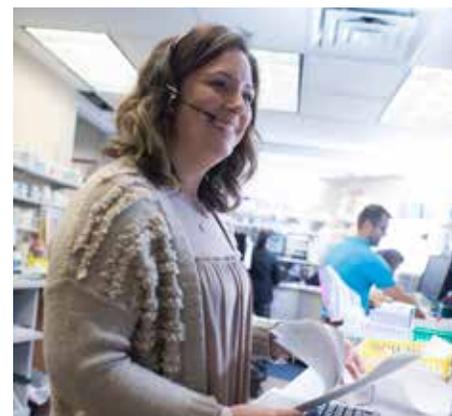
helping these patients with their initial applications, and assisting them with re-application. Once the patient assistance products arrive, Genoa Healthcare pharmacies store, inventory, and if applicable dispense the medications pursuant to a prescriber's order. Genoa Healthcare pharmacists even go as far as budget counseling to try to keep patients from choosing between their medication and other critical aspects of life, such as food. These are powerful tools in helping these at-risk individuals to remain adherent, and not end up in the hospital or emergency room.

PRIOR AUTHORIZATION ASSISTANCE

Prior Authorization can be effective in managing costs on a population basis. It can also be a barrier to consistent quality care for mental health patients. Genoa Healthcare has, once again, developed services to ensure that patients receive appropriate care in accordance with all payer rules.

In the commercial setting it is unclear who is responsible to seek prior authorization when required by the payer. In some cases the patient, the doctor or the pharmacy may be required to take that action. Due to the special circumstances presented with mental health patients, Genoa Healthcare accepts this responsibility on behalf of all parties. Providing this coordinated effort to care reduces the confusion and communication challenges created by the Prior Authorization process used by payers.

Genoa Healthcare pharmacists are mental health experts so they know the most efficient ways to manage the Prior Authorization approval process for this specialized clientele, regardless of the payer. By actively ensuring that prior authorizations are handled in a timely fashion, Genoa Healthcare's approach further improves medication access, adherence, patient care and clinical outcomes. Genoa Healthcare accomplishes this in a way that is consistent with what each payer requires.



Prior Authorization

ENHANCED COMMUNICATION WITH PROVIDERS AND PATIENTS

Another way to overcome adherence barriers is to educate both the patient and the care providers regarding solutions to these barriers. When the pharmacy is integrated into the clinic setting, pharmacists have an opportunity to become part of the patient's care team and can help identify and resolve medication issues efficiently.⁹ As part of the treatment team, Genoa Healthcare pharmacists conduct educational services for staff about the importance of medication adherence and the solutions we provide. Our staff also educates each patient on an individual basis about their care and treatments.

Studies have shown that rates of medication non-adherence among outpatients with schizophrenia have been found to approach 50 percent during the first year after hospital discharge.⁶ This may be in part due to the patient having to self-manage a complicated medication regimen. Genoa Healthcare pharmacists may help by working closely with each individual patient to counsel them regarding medication instructions, side effects, and answer any question they may have. Due to our closed door status and lower prescription volume,

Genoa Healthcare pharmacists spend time getting to know their patients, and vice versa, which builds trust. Our pharmacists are specially trained in mental health and work closely with their patients to help them understand the value of their treatment.

FLEXIBLE DELIVERY OPTIONS

Another common barrier to medication adherence is simply the ability to travel to the pharmacy to pick up the medications. Many individuals with a mental illness also struggle with reliable transportation, and getting a ride or taking a bus to a pharmacy can be a significant barrier to obtaining their medications. Therefore, Genoa Healthcare offers dependable delivery and mailing services as a solution to this challenge. Medications can be mailed directly to consumers' homes or delivered to centers, case managers, home health and nursing agencies, residential organizations, or community support programs. By offering flexible, no cost, delivery and mail options, Genoa Healthcare is able to reduce any transportation barriers resulting in improved medication adherence.

REPORTING: THE RIGHT INFORMATION AT THE RIGHT TIME

Genoa Healthcare has developed unique, high-value reporting capabilities in order to provide the best possible care to patients. This reporting provides real, actionable information to doctors and case managers. As with other aspects of our service, Genoa Healthcare's reporting capabilities are tailored to the needs of the mental health clinicians. They are designed to allow easy identification of patients who are at risk for complications or treatment failure, and their associated costs. Genoa Healthcare provides doctors, nurses and case managers with online accessible and/or paper reports generated by the pharmacist. Genoa Healthcare applies our innate understanding of mental health and close communication with caregivers on-site to minimize the false positives that plague other reports within the healthcare system. In other healthcare systems, prescribers get a lot of externally created reports, but they are not as effective or tailored as those Genoa Healthcare provides in person.

GENOA ONLINE MEDANALYZER

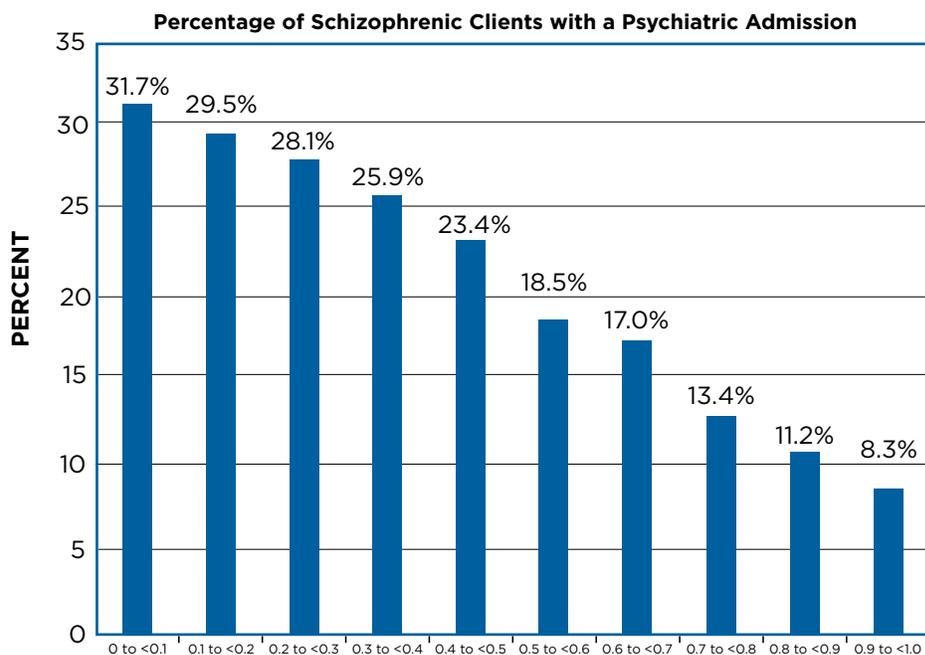
Genoa Online is a set of secure online tools designed to help assess which patients might not be using their medications the way their physician prescribed them. In this changing healthcare environment everyone is viewed and measured on their ability to produce outcomes. Genoa Healthcare wanted to improve the ways that we can help identify trends or individual patients that might be at a higher risk of re-hospitalization due to an issue of medication adherence. The answer was to develop a part of Genoa Online called MedAnalyzer.

With MedAnalyzer, partner mental health centers can look up relevant and succinct clinical information in real-time, and conduct a pharmacy business review with a

system that is flexible and customizable. The first two clinical reports measure drug utilization including Medication Possession Ratio (MPR) and Gap in Treatment. MPR is a common measure of patient medication adherence. Studies have shown its correlation to re-hospitalization rates.

A score of 1.0 is the perfectly adherent patient who picks up every refill on time (e.g. a 30 day supply picked up every 30 days, 30 over 30 equals 1.0), whereas a patient who picks up a 30 day supply every 60 days scores a MPR of 0.50 (30 over 60 equals 0.50). A lower score means lower adherence which increases the risk of relapse or re-hospitalization. Figure 3 provides a graphic overview of the relationship between MPR and psychiatric re-hospitalization rates.¹⁴

FIGURE 3: MPR Range and Psychiatric Admissions



Poorly adherent schizophrenic clients are more likely to have a psychiatric admission.

*Reference Valenstein M et al. Medical Care 2002;40:630-639

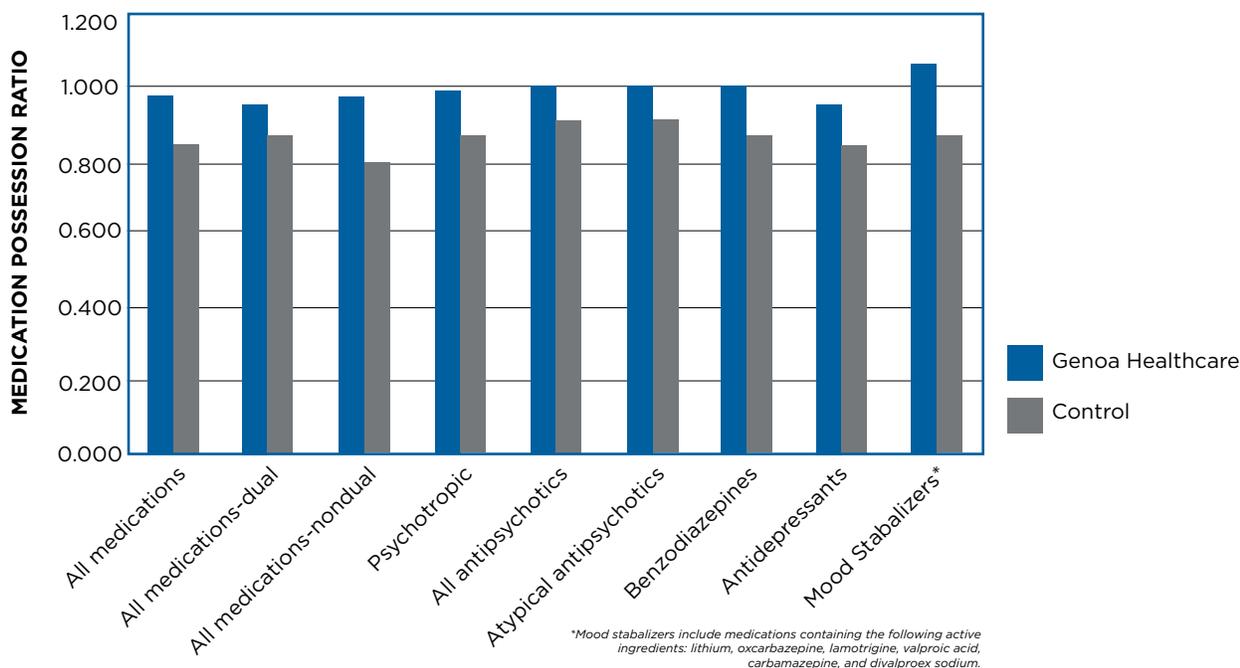
The second adherence report in MedAnalyzer reports on Gap. Gap is another common measurement of adherence which measures the gap between refills. This report can be used to identify patients that are not filling their medications on time. These reports give the clinic staff another tool to assist in determining if patients are following the agreed upon treatment plan. Research by Robert Boden in 2011 showed that, “for patients with recent-onset schizophrenia, the risk of re-hospitalization within 28 days was twice as high for those who demonstrated early non-adherence to medication, compared to patients who had no gap in antipsychotic treatment.”¹² This data is made available in real-time by logging into the MedAnalyzer system or the system can send it monthly in an email summary.

PART III: DIRECT EVIDENCE

In a recent study published by the Journal of Managed Care & Specialty Pharmacy, it was found that Genoa Healthcare pharmacies integrated within CMHCs not only can improve medication adherence but also can reduce the need for other expensive health care services.

Studies have identified many reasons for poor adherence to prescribed medications, including denial of illness, relationships with providers, and barriers to obtaining medication such as lack of transportation to a pharmacy. In the present study, we found that patients who accessed pharmacies that are on-site at CMHCs had better medication adherence fewer hospitalizations and ED visits, and reduced medical care costs compared with patients who used pharmacies in

FIGURE 4: Comparison of Medication Possession Ratio at End of Study



the community. The finding that patients who obtain medications at the in-house pharmacy had higher MPR scores, indicating superior adherence, than those who obtained medications at community pharmacies applied not only to the MPR score calculated for all medications, but also for specific classes of psychotropic medications (Figure 4).

To further elaborate on the effectiveness of Genoa Healthcare’s integrated model and the results of the above mentioned study, we will more closely review the two CMHCs in this study, who have been partners with Genoa Healthcare since 2006. The in-house pharmacies are located close to both the providers who are writing

prescriptions and the patients who need to fill them. Genoa Healthcare originally implemented this integrated model under the hypothesis that it may have a positive impact on adherence and outcomes due to increased levels of communication and coordination between pharmacy and provider, as well as convenience for the patient. Patients at the CMHCs have the choice to fill their medications at the in-house pharmacies or elsewhere.

DATA SOURCE

Data for this project consisted of Medicaid claims paid by Southwest Michigan Behavioral Health (SWMBH) for all (behavioral and nonbehavioral) inpatient and outpatient services as well as pharmacy prescriptions filled. Additionally, demographic data were obtained from state Medicaid administrative patient files. All patient data were de-identified. Because exact spend data at the claims level were not provided per the state's contract with SWMBH, we examined potential differences in health care costs between the groups by combining differences in hospitalization/Emergency Department (ED) rates with a per-episode cost estimate for the state of Michigan of \$2,086 per inpatient day for each hospitalization and \$1,233 per ED visit.^{15,16} The time period for the comparative analysis was based on use from April 1, 2014, through April 30, 2015.

SAMPLE SELECTION

For the primary study analysis, the study group was composed of an adult patient dataset from 1 of the 2 CMHCs that had filled at least two prescriptions for a specific medication from 1 of 2 Genoa Healthcare pharmacies located in a CMHC during the study period. A specific medication was defined as a unique formulation specific to the generic ingredient(s), route of administration, dosage form, and strength. A matched control group was composed of adult CMHC patients who had filled at least two prescriptions for a specific medication from a community pharmacy outside of a CMHC. In order to be included in the analysis, the study group dataset had to include patients who had filled at least 95 percent of their prescriptions for the specific medication at an in-house Genoa Healthcare pharmacy. The control group dataset included patients who had to have filled at least 95 percent of their prescriptions for the specific medication at an outside community pharmacy.

Each unique patient dataset from the treatment group was matched to a corresponding control group patient dataset prescribed the same medication based on minimum differences

across selected demographic, diagnostic, and utilization variables (see Table 1 on page 14), using a modified version of the Gale-Shapley algorithm. Unique medication, sex, dual-eligible status, behavioral health diagnostic history and serious mental illness status, prior history of behavioral medication use, and prior hospital/ED use were matched exactly. After identifying potential matches based on the above attributes, we applied a second screening criterion such that a control group patient dataset needed to be within 1 standard deviation above or below the

matched treatment patient dataset on values for age, overall illness severity, and first prescription fill date during the study period. Goodness-of-fit was evaluated by testing for statistically significant differences between the two groups across the preselected matching variables. Among these matching variables were three measures of overall illness severity: the Charlson Comorbidity Index (CCI) and both the Prospective and the Concurrent scales of the Chronic Illness and Disability Payment System (CDPS).^{17,18}

TABLE 1: Comparison of Treatment and Control Across Matching Variables

Matching Characteristics	Control	Genoa (Treatment)	Net Difference	% Difference (Absolute Value)	P Value ^a
Patient-medication pairs, n	1,378	1,378			
Age (years)	45.1	45.3	0.2	1	0.003
Female, %	52	52	0	0	1.000
Proportion of population with diagnosis for serious mental illness, %	7	7	0	0	1.000
Proportion of population with diagnosis for ADHD, %	0	0	0	0	N/A
Proportion of population with diagnosis for anxiety, %	1	1	0	0	1.000
Proportion of population with diagnosis for bipolar disorder, %	1	1	0	0	1.000
Proportion of population with diagnosis for dementia, %	1	1	0	0	1.000
Proportion of population with diagnosis for depression, %	1	1	0	0	1.000
Proportion of population with diagnosis for developmental disorder or intellectual disability, %	5	5	0	0	1.000
Proportion of population with diagnosis for mood disorder, %	0	0	0	0	1.000
Proportion of population with diagnosis for other BH conditions, %	1	1	0	0	1.000
Proportion of population with diagnosis for PTSD, %	0	0	0	0	N/A
Proportion of population with diagnosis for schizophrenia or psychosis, %	6	6	0	0	1.000
Mean CCI score per capita	0.28	0.30	0.02	6	0.150
Mean CDPS score prospective per capita	0.96	0.98	0.03	3	0.008
Mean CDPS score concurrent per capita	1.12	1.16	0.04	4	0.015
Number of hospitalizations per capita	0.0007	0.0007	0.00	0	N/A
Total hospital LOS per capita	0.0022	0.0022	0.00	0	N/A
Number of hospitalizations per capita: behavioral	0.0007	0.0007	0.00	0	N/A
Hospital LOS per capital: behavioral	0.0000	0.0000	0.00	0	N/A
Number of hospitalizations per capita: nonbehavioral	0.0007	0.0007	0.00	0	N/A
Hospital LOS per capital: nonbehavioral	0.0022	0.0022	0.00	0	N/A
Number of ED visits per capita	0.0261	0.0261	0.00	0	N/A
Number of ED visits per capita: behavioral	0.0000	0.0000	0.00	0	N/A
Number of ED visits per capita: nonbehavioral	0.0261	0.0261	0.00	0	N/A
Number of behavioral medication prescribers per capita	0.21	0.21	0.00	0	N/A
Number of behavioral medication actives prescribed per capita	0.37	0.37	0.00	0	N/A

^a For chi-square tests where the variable had the same value across every subject in both groups, the P value cannot be computed. For the Wilcoxon signed rank test, where each pair is an exact match for the variable being evaluated, there is no difference between the paired observations, and the P value cannot be computed. "N/A" has been inserted in place of a P value, indicating a perfect match between groups for that variable.

ADHD = attention deficit hyperactivity disorder; BH = behavioral health; CCI = Charlson Comorbidity Index; CDPS = Chronic Illness and Disability Payment System; ED = emergency department; LOS = length of stay; PTSD = post-traumatic stress disorder.

ADHERENCE AND OUTCOMES MEASUREMENT

The primary analysis compared medication possession ratio (MPR), which is a measure of adherence that indicates gaps or oversupply in a patient's medication use history. MPR was calculated as of the end of the study period on all filled dates and days supply within a 1-year period ending 90 days before the end of the study period, for each unique medication. $MPR = (\text{total days supply} - \text{last supply}) / (\text{number of days from first fill date to last})$. Given that MPR is specific to a given medication, the subject of analysis in this study was the patient/medication pair, and in some cases a single patient was evaluated for several medications. A secondary analysis investigated rates of hospitalization and ED visits. Hospitalization and ED visits were identified based on inpatient and emergency revenue codes and Current Procedural Terminology, 4th Edition, codes. A single hospitalization and/or ED visit was counted once for each time an adult received inpatient or emergency care for any continuous period without a 1-day gap in inpatient or emergency care. These analyses were further broken down for behavioral and nonbehavioral hospitalizations and ED visits and for patients who were on all medications, on psychotropics, and psychotropic medication subclasses. Using an estimated cost of \$2,086 per hospital inpatient day and \$1,233 per ED visit, we extrapolated savings to payers for adults participating in Genoa Healthcare's in-house pharmacy program based on the difference between groups in hospitalization and ED rates.

STATISTICAL ANALYSIS

The Student's t-test statistic, single tailed, was used to compare MPR. In addition to comparing overall MPR between the groups, we separately compared MPR for several classes of medications and for dual-eligible and nondual-eligible adult datasets. The Wilcoxon sign rank test with continuity correction was used to evaluate per-member-per-month (PMPM) hospitalization and ED rates between the two groups for the outcomes period, with the alternative hypothesis being that the treatment group had the lesser PMPM rate.

The two-sided Wilcoxon sign rank test with continuity correction was used to compare the groups on the selected nondichotomous matching variables. Dichotomous matching variables were evaluated using the chi-square test. Statistical tests were performed using the R statistical programming language and Microsoft Excel. Excel was used for tabulating data and evaluating the t-test and the chi-square test, and R was used for calculating the Wilcoxon sign rank test. Statistical significance was set at $P < 0.050$ for all tests.

RESULTS

The matching process resulted in 1,378 unique patient-medication matches across the treatment group and the control groups. Tests for significant differences between groups indicated comparability across matching variables. Although four of the matching variables were statistically or nearly statistically significantly

different between groups, as can be seen in Table 1, the absolute differences in these measures (age, CCI, CDPSScore Prospective, CDPS Score Concurrent) were felt to be too small to warrant any statistical correction and introduced conservative bias, if any. Utilization variables used for matching, such as hospital/ED use, were based on a 3-month interval prior to the outcomes study period. Some patient datasets were excluded from the study for a variety of reasons documented in Table 2. Failure to identify a close match was the leading reason these datasets were excluded from the analysis. Analysis of adherence to medication as of the end of the study period showed that the MPR for the study group was higher than for the control group across all medication categories examined (see Table 3).

TABLE 2: Analysis Exclusions

Exclusion Status and Reason	Patient/Medication Regimens		Unique Patients	
	n	%	n	%
Drug not recognized	1	0.01	1	0.04
Has no baseline data to use for matching	20	0.24	5	0.20
Not an adult patient	600	7.06	179	7.13
Treatment group: not matched to a control subject	4,248	49.95	899	35.83
Treatment: fewer than 2 prescriptions from in-house Genoa pharmacy	2,257	26.54	929	37.03
Included in analysis	1,378	16.20	496	19.77
Total	8,504	100	2,509	100

TABLE 3: Comparison of Medication Possession Ratio Outcomes by Cohort-Medication Group

Drug Category	MPR Population Mean at End of Study		Number		P Value
	Genoa	Control	Genoa	Control	
All medications	0.957	0.819	973	973	<0.001
All medications: dual	0.944	0.872	238	238	<0.001
All medications: nondual	0.962	0.802	735	735	<0.001
Psychotropic	0.983	0.845	494	494	<0.001
All antipsychotics	1.001	0.867	136	136	<0.001
Atypical antipsychotics	1.000	0.871	132	132	<0.001
Benzodiazepines	1.000	0.834	65	65	<0.001
Antidepressants	0.946	0.816	154	154	<0.001
Mood stabilizers ^a	1.028	0.849	69	69	<0.001

^a Mood stabilizers include medications containing the following active ingredients: lithium, oxcarbazepine, lamotrigine, valproic acid, carbamazepine, and divalproex sodium. MPR = medication possession ratio.

These differences in MPR between the two groups were statistically significant in every comparison. Sample sizes for each medication category varied depending on data available and eligibility as of the end of the study period. MPR scores were calculated as the summation of a year’s data for each patient dataset. Adherence to all medications over the prior year was significantly higher for the study group

as of the final month of the study period. In addition to higher rates of adherence, lower rates of hospitalization and ED use were observed in the study group during the 13-month outcomes study period, particularly for behavioral services, among subsets of the total cohort (see Table 4) by medication group. Based on the difference in PMPM rates and an assumed cost of \$18,964 per behavioral hospitalization (\$2,086 per day for 9.09 days), approximately \$57 was saved per member-month or behavioral hospitalizations (\$56,892 per 1,000 member months) for the overall combined cohort of datasets representing individuals who filled medications included in the study at an integrated pharmacy. The study group is estimated to have saved approximately \$226,084 from hospitalization rate reductions over the course of the 3,974 member-months included in the outcomes period. Similarly, based on the difference in PMPM rates and an average cost of \$1,233 per ED visit, approximately \$1.23 was saved per member-month for behavioral ED visits (\$1,233 per 1,000 member-months) for patients who filled any prescription at an in-house Genoa Healthcare pharmacy. The study group is estimated to have saved approximately \$4,900 from ED reductions over the course of the 3,974 member-months included in the outcomes period.

TABLE 4:
Comparison of Utilization Outcomes Measures for All Medications Cohort-Medication Group^a

Measure	PMPM Rate		Rate per 1,000 Member-Months		Risk Ratio	P Value ^b
	Study	Control	Study	Control		
Number of hospitalizations	0.017	0.020	17	20	0.88	0.018
Number of hospitalizations: behavioral	0.004	0.007	4	7	0.60	0.001
Number of hospitalizations: nonbehavioral	0.013	0.013	13	13	1.03	0.384
Total hospital LOS	0.102	0.151	102	151	0.68	0.022
Total hospital LOS: behavioral	0.039	0.061	39	61	0.65	0.004
Total hospital LOS: nonbehavioral	0.063	0.090	63	90	0.70	0.291
Number of ED visits	0.082	0.087	82	87	0.95	0.025
Number of ED visits: behavioral	0.007	0.008	7	8	0.82	0.006
Number of ED visits: nonbehavioral	0.076	0.079	76	79	0.96	0.091

^a N = 496 patients with 1,378 medications.

^b Wilcoxon sign rank test.

ED = emergency department; LOS = length of stay; PMPM = per member per month.

The total savings estimate, which is based on the 19.8 percent of unique in-house Genoa Healthcare patients whose datasets were eligible for inclusion in the analysis, is approximately \$230,984 for the 13-month period from April 1, 2014, through April 30, 2015. We further divided the sample into medication subgroups representing only the patient datasets that included taking any psychotropic medication, any antipsychotic, any atypical antipsychotic, and any mood stabilizer. Analyses of hospitalization and ED visit rates were the same among each of these groups as for the entire sample (results available on request from authors).

CONCLUSION

Medication adherence can be a critical component in treating mental illnesses, as it impacts outcomes including hospitalization, emergency department utilization, and costs. The list of services outlined in Part II were specifically designed to address medication adherence and is only a subset of the services and benefits offered by Genoa Healthcare. This list is intended to provide an overview of several specific and meaningful ways that Genoa Healthcare pharmacies provide beneficial, life altering, services to the mental health community. These services increase adherence, decrease waste, lower healthcare costs, and provide concrete benefits to center's staff and patients.



Collectively these services are effective in helping mental health patients remain adherent to their medication regimen, avoid drug interactions, improve clinical outcomes, and avoid costly complications due to non-adherence or a gap in therapy. Genoa Healthcare strives to ensure that our patients do not endure job loss, hospitalization, incarceration, or homelessness due to a breakdown in their medication regimen. Mental health conditions are difficult to manage and the medications are expensive. Genoa Healthcare's services enhance the lives of the patients Genoa Healthcare serves. As healthcare continues to evolve towards outcome driven care and accountability, Genoa Healthcare's services translate directly to improved adherence and clinical outcomes.

CITATIONS

1. Key Issues in Outcomes Research-Medication Adherence: It's Importance in Cardiovascular Outcomes. P. Michael Ho, MD, PhD; Chris L. Bryson, MD, MS; John S. Rumsfeld, MD, PhD. American Heart Association Journals 2009; 119: 3028-3035. <http://circ.ahajournals.org/content/119/23/3028.full>
2. "Took All Pills." Lam YWF et al. Poster. 2003 Biennial ICOSR Meeting; Colorado Springs, CO. >70% of days (MEMS cap); Score >4 on clinician rating scale. Byerly M et al. Poster. 2003 APA Meeting; San Francisco, CA.
3. Adherence to Treatment With Antipsychotic Medication and Health Care Costs Among Medicaid Beneficiaries With Schizophrenia. Gilmer, Todd P., Ph.D, et al. Am J Psychiatry, April 2004; 692:6-8. <http://ajp.psychiatryonline.org/doi/abs/10.1176/appi.ajp.161.4.692>
4. Continuity of Antipsychotic Medications for Treatment of Schizophrenia-Financial Importance. 2012 National Committee for Quality Assurance. <http://www.ncqa.org/portals/0/PublicComment/HEDIS%202013%20products%20update/Use%20of%20Antipsychotics%20Medications%20for%20Schizophrenia%20Treatment.pdf>
5. 20 percent of US adults experienced mental illness in the past year, report says. SAMHSA News Release 11/27/12. <http://www.samhsa.gov/newsroom/advisories/1211273220.aspx>
6. Interventions to Improve Medication Adherence in Schizophrenia. Annette Zygmunt, Ph.D.; Mark Olfson, M.D.; Carol A. Boyer, Ph.D.; David Mechanic, Ph.D. Am J Psychiatry 2002; 159:1653-1654. <http://ajp.psychiatryonline.org/article.aspx?articleID=175798>
7. U.S. Department of Health & Human Services. (2012). Outcomes by 659 Schizophrenia and other psychotic disorders [Data file]. Retrieved from <http://hcupnet.ahrq.gov/Hcupnet.jsp?Id=BEA3B382A6CBD7CE&Form=DispTab&JS=Y&Action=Accept>
8. Improving Antipsychotic Adherence Among Patients With Schizophrenia: Savings for States. Zachary S. Predmore, Soeren Mattke M.D., D.Sc., Marcela Horvitz-Lennon, M.D., M.P.H. Economic Ground Rounds, April 2015; 343-345. <http://ps.psychiatryonline.org/doi/abs/10.1176/appi.ps.201400506>
9. Wright WA, Gorman JM, Odorzynski M, Peterson MJ, Clayton C. Integrated Pharmacies at Community Mental Health Centers: Medication Adherence and Outcomes. J Manag Care Spec Pharm. 2016 Nov;22(11):1330-1336.
10. Prescription Drug Trends. Kaiser Family Foundation. May 2010. <http://www.kff.org/rxdrugs/upload/3057-08.pdf>
11. CHARACTERIZING THE RELATIONSHIP BETWEEN INDIVIDUALS WITH MENTAL HEALTH CONDITIONS AND COMMUNITY PHARMACISTS. Published by CPNPF, December 2012. http://www.nami.org/template.cfm?Section=Top_Story&template=/ContentManagement/ContentDisplay.cfm&ContentID=148499&Istid=809
12. Medication Non-Adherence Doubles Risk of Rehospitalization for Schizophrenia Patients. Robert Bodén. Open Minds/Schizophrenia Research, October 2011. <http://www.openminds.com/market-intelligence/premium/omol/2011/111411mhcd1.htm#axzz2Jfo2NjCC>
13. Non-adherence to antipsychotic medication, relapse and rehospitalization in recent-onset schizophrenia. Gunnar Morken, Jan H Widen, and Rolf W Grawe. BioMed Central (BMC) Psychiatry 2008, 8:32. <http://www.biomedcentral.com/1471-244X/8/32/>
14. Pharmacy Data Identify Poorly Adherent Patients With Schizophrenia at Increased Risk for Admission. Valenstein. M et al. Medical Care 2002;40, 8:630-639. <http://www.ncbi.nlm.nih.gov/pubmed/12187177>
15. Kaiser Family Foundation. Hospital adjusted expenses per inpatient day. [Table time frame 2013]. 2015. Available at: <http://kff.org/other/state-indicator/expenses-per-inpatient-day/>. Accessed July 25, 2016.
16. Caldwell N, Srebotnjak T, Wang T, Hsia R. "How much will I get charged for this?" Patient charges for top ten diagnoses in the emergency department. PLoS One. 2013;8(2):e55491.
17. D'Hoore W, Bouckaert A, Tilquin C. Practical considerations on the use of the Charlson comorbidity index with administrative data bases. J Clin Epidemiol. 1996;49(12):1429-33.
18. University of California, San Diego. Chronic Illness and Disability Payment System. 2012. Available at: <http://cdps.ucsd.edu/>. Accessed July 25, 2016.

To learn more about Genoa Healthcare, contact us at (866) 763-2250 or info@genoahealthcare.com.

Genoa Healthcare and its respective marks are trademarks of Genoa Healthcare. All other brand or product names are trademarks or registered marks of their respective owners. Because we are continuously improving our products and services, Genoa Healthcare reserves the right to change specifications without prior notice. Genoa Healthcare is an equal opportunity employer.

The views and opinions expressed herein are not necessarily those of Genoa Healthcare, its employees, or others. Genoa Healthcare provides this white paper for informational purposes only. It is not intended as advice for a particular situation, nor is it intended to be legal or professional advice. Consult with an appropriate professional for your situation.

5/18 © 2018 Genoa Healthcare. 3140 Neil Armstrong Blvd. Suite 110, Eagan, MN 55121. All Rights Reserved.