Improving Outpatient Psychiatric Appointment Attendance

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Abstract

Mental health issues are a growing concern for individuals and the public. When patients do not attend their mental health appointments they place themselves at risk for poor health outcomes including worsening of symptoms, relapse, hospitalization, or danger to self and other behaviors. The breadth, background, and significance of this issue were investigated to determine a clinically relevant PICOT question. These elements of the PICOT question were investigated and high-quality evidence was gathered, analyzed, and synthesized in order to develop recommendations for an evidence-based project to help with no-shows at a non-profit integrated healthcare organization that is experiencing a high incidence of no-shows. The Quality Health Outcomes Model and Ottawa Model of Research Use guide the implementation and monitoring of the project. A chart review was completed in order to understand the impact of a novel automated reminder system on the no-show rate for all psychiatric appointments for 18 months. Additionally, demographic and appointment information was gathered to identify trends in the data and factors related to appointment status. The no-show rate significantly increased in 2019 with the new reminder system. No-shows occurred significantly more in males, tele-medicine appointments, and hospital discharge appointments. There were significant differences in no-show rates observed between reported races, with different providers, and at different practice locations. This gap analysis has provided insight into further projects and work to be completed in order to decrease no-shows, improve treatment compliance, produce better health outcomes, and increase revenue for this organization.

Keywords: psychiatry, mental health, health appointment, attendance, no-show, SMS, text message

Improving Outpatient Psychiatric Appointment Attendance

Mental illness has been a steadily growing concern for the public and health organizations. When patients fail to attend their outpatient psychiatric appointments, they place themselves at risk for poor health outcomes and place a strain on health systems. Patient no-shows occur when patients do not attend their scheduled appointments; they do not provide any contact with the clinic, and/ or cancel prior to the appointment time. No-shows create problems for patients, providers, and key stakeholders that need to be addressed with evidence-based interventions. In order to understand the significance of this issue, the background and factors associated with psychiatric appointment attendance must be investigated. A thorough literature search was conducted to find the best evidence-based interventions to solve this healthcare issue. This evidence was synthesized and critiqued in order to assess the efficacy and feasibility of different interventions. Based on these findings, interventions are proposed along with the guiding conceptual model, plan for implementation, and the implications of such a project.

Problem Statement

Mental illnesses are affecting more and more people each year. In the United States (U.S.), an estimated 18.6% of adults experience a mental illness in a given year and the lifetime prevalence of mental illness for adolescents is 49.5% (National Institute of Mental Health [NIMH], 2017). Suicide is the 10th leading cause of death in the U.S. and the rate has been steadily increasing for the last 20 years (NIMH, 2018). According to the Arizona Department of Health Services (ADHS) (2018), the suicide rate in Arizona has also increased over time with 18 suicides per 100,000 deaths in 2017. Mental Health America (2018) currently ranks Arizona 39th out of the 50 states and the District of Columbia for mental healthcare access due to the high prevalence of mental illness and the poor access to quality care for adults and children.

Patients must attend their outpatient behavioral health appointments in order to receive the assessments and treatments necessary to address their mental illnesses. Research has been conducted regarding no-shows in a variety of healthcare settings. Patient no-shows have a profoundly negative impact on patient health and healthcare organization productivity (Molfenter, 2013). No-shows occur in all health settings but are especially prevalent in behavioral healthcare with no-show rates ranging from 10-50% in this setting (Dieren, Rijckmans, Mathijssen, Lobbestael, & Arntz, 2013). Clients who no-show may have poor medication adherence that results in increased symptoms, relapse, and hospitalization (Gajwani, 2014). Patients who do not adhere to their medications are at increased risk for negative health outcomes and providers are unable to treat these patients unless they attend their appointments. The problem of no-shows must be addressed in order to decrease the burden that mental illness places on individuals and the public.

Purpose and Rationale

The purpose of this paper is to fully describe the problem of patient no-shows to their outpatient psychiatric appointments, to discuss the contributing factors related to patient no-shows, and describe the gap analysis project completed that was informed by this evidence. If patients do not attend their appointments, they cannot receive the treatments for their mental illnesses. Missed appointments cause poor patient outcomes, missed medications, delays in the identification of relapse, increased wait time for appointments, increased cost of delivery of care, underutilization of resources, increased hospitalizations, and decreased patient satisfaction (Clouse, Williams, & Harmon, 2015; Maughan & Pearce, 2015; McLean et al., 2016; Snyder & George, 2015). Therefore, evidence-based interventions must be reviewed and implemented to help patients improve their appointment attendance.

Background and Significance

Mental illnesses can cause significant distress and strain on individuals and their communities. Close to one in five adults in the U.S. suffers from a mental illness and those with serious mental illness (SMI) die approximately 25 years earlier than those without mental illness (National Alliance on Mental Illness [NAMI], n.d.). Debilitating mental disorders place those afflicted in a vulnerable state. Neuropsychiatric disorders are the leading cause of disability in the U.S. and serious mental illness costs $193.2 billion in lost earnings each year (NAMI, n.d.; Office of Disease Prevention and Health Promotion [ODPHP], 2019). Outpatient behavioral health clinics provide the least restrictive treatment for those with mental illnesses, but failure to attend these appointment places patients at risk for hospitalization, relapse, and delay in care.

Reasons for Non-Attendance

Understanding the reasons patients do not attend their scheduled psychiatric appointments is the first step towards identifying interventions to address no-shows. Studies have found many different factors that contribute to psychiatric appointment no-shows including: the patient writing the appointment down erroneously, lack of transportation, patient forgetting appointment, decreased desire to attend appointment, mental health stigma, low socioeconomic status (SES), cultural barriers, and the patient being hospitalized (Cheng, Huang, Tsang, & Lin, 2014; Clouse et al., 2015; Long, Sakauye, Chisty, & Upton, 2016; Stein et al., 2014). Clearly, the reasons for no-shows to psychiatric appointments vary, and targeted, evidence-based interventions are necessary to address them.

Interventions

There are many interventions that have been tested and studied to ascertain if they improve psychiatric appointment attendance. Patient engagement strategies such as motivational

interviewing and contingency management can be costly and require a significant amount of time from trained staff (Chiappetta, Stark, Mahmoud, Bahnsen, & Mitchell, 2018; Molfenter, 2013). There is a paucity of evidence for these innovative interventions. In contrast, there is a broad base of evidence that supports the use of telephone calls to increase appointment attendance because it is an easy, cost-effective intervention (McLean et al., 2016). However, healthcare staff time is limited and there are many people that do not answer their phones and/or do not have voicemail set up. Recently, many studies have found short message service (SMS) messages, also known as text messages, to be another simple and even more cost effective reminder system for psychiatric patients (Berrouiguet, Baca-Garcia, Brandt, Walter, & Courtet, 2016; Boksmati, Butler-Henderson, Anderson, & Sahama, 2016; Kunigiri, Gajebasia, & Sallah, 2014; Moran, O'Loughlin, & Kelly, 2018). Both phone call and text message reminders increase appointment attendance and cancellations, which allows patients to be rescheduled and appointments to be given to other patients, increasing overall patients seen (McLean et al., 2016).

Forgetting the appointment is one of the leading reasons that patients no-show to health appointments (Maughan & Pearce, 2015). For those patients who miss their appointments due to forgetting or misplacing their appointment time, phone reminders can be an effective way to increase their appointment attendance. Using multiple communication methods can be an effective method to reduce no-shows (Maughan & Pearce, 2015). Specifically, text message reminders are a promising intervention due to the ease of use and the accessibility of the reminder for patients. Text messaging can be an automated process, therefore decreasing the use of valuable staff time. Text-message reminders have resulted in a decrease of no-shows by as much as 25% (Sims et al., 2012). Text message reminders are a promising intervention that can

increase appointment attendance, help patients have better health outcomes, and decrease their chance of relapse and hospitalization.

Health Initiatives and Quality Measures

There are numerous health initiatives and quality measures aimed at increasing appointment attendance. The "Mental Health and Mental Disorders" topic in Healthy People 2020 has many objectives targeted at treatment expansion to increase the number of people receiving treatment for mental disorders (ODPHP, 2019). Both inpatient and outpatient clinics have value-based measures, where they can receive incentives for patients attending post-hospitalization discharge appointments, and for reducing hospital readmissions. There are some quality indicators from the Center for Quality Assessment and Improvement in Mental Health (CQAIMH) regarding mental health appointment attendance and the no-show rate (CQAIMH, n.d.). No-shows are an important topic in mental healthcare because they have such an impact on patient health. Substance Abuse and Mental Health Services Administration (SAMHSA) has a strategic plan for FY2019-FY2023 that includes an objective to "facilitate access to quality care through services expansion, outreach, and engagement" (SAHMSA, 2018, p. 12). SAHMSA supports the use of evidence-based practices to achieve their objectives. Therefore, implementing an intervention to improve mental health attendance would be a step towards "Addressing Serious Mental Illness and Serious Emotional Disturbances," their second priority area in their strategic plan (SAHMSA, 2018, p. 10). National health organizations encourage the use of evidence-based practices to help improve access to quality mental health care. Improving psychiatric appointment attendance using innovative interventions will allow more patients to receive the care they deserve.

Those with mental illnesses are suffering from debilitating disorders and there are ways that their access to care can be improved by increasing their appointment attendance. There is

evidence that supports the use of different interventions to decrease psychiatric appointment no-shows (Berrouiguet et al., 2016; Boksmati et al., 2016; Chiappetta et al., 2018; Kunigiri et al., 2014; Molfenter, 2013; Moran et al., 2018). Forgetting appointments is a leading cause of no-shows. Therefore, multiple appointment reminders using different communication interventions may be the best strategy to improve appointment attendance. Limited healthcare provider time and resource scarcity lends support for the use of automated phone and text messaging interventions. Although there have been varying levels of significant data, text-messages can improve no-show rates and promote positive health outcomes. National organizations provide a considerable amount of data that shows that mental illnesses are placing significant strain on the public that can only be alleviated by the utilization of cost-effective, evidence-based interventions.

Internal Evidence

An outpatient behavioral health clinic that provides psychiatric and primary care services in Pinal County and to other rural counties in Arizona is currently experiencing high rates of no-shows to their psychiatric appointments. Staff report that no-shows are a significant problem, but they do not have a formal process of tracking no-shows. This organization previously utilized their front desk staff to make in-person phone call appointment reminders. This process was costly and they were experiencing high levels of no-shows. The organization began implementing an automated telephone and text message reminder system in January 2019. However, they have not measured the effects of this innovative intervention or the factors that contribute to their no-show problem. The electronic health record (EHR) can be used to abstract the no-show rate, appointment information, and demographic data. Patients, providers, and healthcare systems are affected by no-shows. When patients fail to attend their appointments, the opportunity to express their concerns, renew medications, and receive care is lost. Moreover, healthcare providers' time is wasted,

preventing them from assessing patients and providing the necessary interventions. Systems are affected because patients end up hospitalized more, more resources are needed to find and treat patients, and there are increased costs for taxpayers, insurances companies, and healthcare organizations.

PICOT Question

This scholarly inquiry has led to the highly relevant PICOT question in order to perform a thorough gap analysis of their no-show problem: in an outpatient behavioral health clinic (P), how do automated telephone and text message reminders (I) compared to in-person telephone reminders (C), affect psychiatric appointment attendance (O) over a 16 month period (T)?

Search Strategy

An extensive search of three databases was conducted in order to obtain the most recent high-quality literature regarding the elements of this PICOT question. The databases-CINAHL, PubMed, and PsychINFO were chosen for this literature search due to their applicability to the population, intervention, and outcomes of interest. Each of the databases was searched using combinations of these key terms: *psychiatry, mental health, health appointment, attendance, no-show, SMS,* and *text message.* Inclusion criteria limited the searches to quantitative articles, published dates ranging from 2014-2019, English language, full text, and peer-reviewed journals. Combinations of key words and limiters were used to access articles. Using the databases-CINAHL, PubMed, and PsychINFO, a total of 163 articles were reviewed.

Exclusion criteria included narrative articles, studies that did not include PICOT elements, unpublished work, and studies not included in limits. In addition to the database searches, searches of grey literature, Google Scholar, and academic books were completed to broaden the understanding of the topics, though results were not appropriate for this review.

Ultimately, ten studies were chosen and evaluated for their feasibility and application to this project.

Critical Appraisal and Synthesis

Melnyk and Fineout-Overholt's (2015) rapid critical appraisal checklists for quantitative studies were used to evaluate the ten studies depending on their study design. Key elements of the studies were abstracted and presented in a table (see Table 1). Of the ten studies, two are systematic reviews, one is a meta-analysis, one is a meta-review, one is a randomized-controlled trail, and five are observational, descriptive, or cohort studies (see Table 2). Thus, half of the studies are high quality evidence. All of the studies have an adequate sample size. Some of the studies included a majority women or majority men. Three of the studies disclosed their funding sources. However, none of the studies disclosed any bias and no biases were recognized.

There is a high level of heterogeneity between the quantitative studies and within the studies included in the reviews and analyses. There were differences in the study designs, interventions, and outcomes of interest (see Table 1). Not all of the studies were in the outpatient mental health settings and the systematic reviews and meta-analyses included various mental health and physical healthcare organizations. This lends evidence that it may be useful in an integrated healthcare organization. The studies also differed in their populations of interest in terms of the ages, gender, and disorders investigated. However, all but one of the studies included appointment attendance as their outcome of measure (see Table 2). All five of the articles that investigated text messages reminders for improving attendance found that they significantly increased appointment attendance. Three of the articles involved phone call interventions and two of these found that phone calls were effective for improving appointment attendance (see Table 2). Two of the articles applied interventions to help with first appointment

attendance only. One of the studies found that text messages are a feasible and acceptable intervention to healthcare staff and patients. Text messages are cost effective, unlike more labor intensive phone call engagement techniques used in one of the studies.

Standardized measurement tools were not used in the studies. All of the studies that measured appointment attendance compared the rates of attendance before and after the introduction of the interventions. Descriptive statistics were used to determine the demographics of the participants as well as the appointment attendance rates, but the studies differed greatly on the statistical tests used to determine if these results were significant (see Table 1,2).

Conclusion

Poor psychiatric appointment attendance is a large problem in healthcare today that results in poor health outcomes, decreased productivity, and lost resources. This literature search shows that there are a variety of effective interventions for this issue. However, some of these are more labor and resource intensive than others. Text-message and phone call intervention techniques have been effective in a variety of ways, in numerous healthcare settings. They have shown to improve treatment adherence, including appointment attendance. The evidence in this search supports the use of SMS and phone call interventions to remind patients of their appointments as a feasible and cost effective method of increasing outpatient psychiatric appointment attendance that is acceptable to patients and healthcare staff. However, due to the complex issues related to no-shows, the factors linked to this organization's no-shows should be investigated.

Conceptual Framework

The Quality Health Outcomes Model provides framework for the application of the evidence to practice. This model is an extension of Donabedian's framework of structure,

process, and outcome (Mitchell, Ferketich, & Jennings, 1998). According to this model, there is a feedback loop that occurs between clients, the health system, and health interventions (Mitchell, Ferketich, & Jennings, 1998). There is no direct connection between the health interventions and outcomes (see Appendix A). Rather, the interventions and outcomes have reciprocal relationships with the client and the system characteristics. Therefore, the efficacy of the intervention and the degree of the outcome is mediated by the client and system (Mitchell, Ferketich, & Jennings, 1998). Health organizations and interventions should integrate bio-psycho-social aspects of health and illness in order to achieve better health outcomes. These health outcomes can be measured based on how they contribute to "achievement of appropriate self-care, demonstration of health-promoting behaviors, health-related quality of life, perception of being well-cared-for, and symptom management" (Mitchell, Ferketich, & Jennings, 1998, p. 45). This model is applicable to this project and can act as a guide to the implementation an evaluation of a quality, evidence-based intervention.

EBP Model

The Ottawa Model of Research Use has been chosen as a tool to evaluate an innovative intervention used to increase outpatient psychiatric appointment attendance (NCCMT, 2017). This six-stage model would be useful for this healthcare problem and organization because this strategy involves setting the stage for change, choosing an innovation, assessing the barriers and facilitators for the intervention, providing support for the organization to implement the intervention, monitoring the implementation, and then evaluating the outcomes (NCCMT, 2017). This model also shares some of the characteristics of Donabedian's work about quality care in the context of social factors (McDonald, Graham, & Grimshaw, 2004). This is a useful model for helping to translate research into practice in a large healthcare setting because it can be applied to

any level of care. Like the Quality Health Outcomes Model, this model shows that the elements influence each other (see Appendix B). This reminder intervention was implemented by technical leadership, carried out by office staff, and delivered directly to the patients. The success of the intervention will require active support by the adopters of the evidence-based intervention as well as acceptability by the clients. The organization is in the early stages of implementing the intervention so this gap analysis will focus on assessing factors affecting intervention and evaluating the outcomes of the intervention. The chosen organization is invested in improving this issue and this process allows for careful and thoughtful implementation of an intervention.

Applying Evidence to Practice

This synthesis of evidence has led to the proposal of an evidence based project. Text message and telephone reminders are a feasible and cost-effective way to reduce no-shows and increase outpatient mental health appointment attendance. Patients, office staff, behavioral health providers, insurance companies, and organization leadership are all stakeholders that would benefit from an intervention that increases appointment attendance. Automated text message reminders and phone call reminders were implemented in January of 2019 to allow medical assistants and office personnel to use their time for patient care instead of making phone call reminders. Text messages and phone calls were sent 24-72 hours prior to scheduled appointment to allow the patient to assess their schedule and cancel appointment if necessary. This would allow office staff to fill these cancelled appointments with patients waiting to be seen or patients on a walk-in basis. This intervention was implemented using the current EHR software as a cost-effective way to help patients remember their appointments and as a way to easily cancel and reschedule their appointments as necessary. Although this intervention was implemented, data

has not been collected to measure the efficacy of the new reminder system compared to the previous reminder system of having office staff call the patients personally. Essential data to be collected would be the total number of appointments, the number of kept appointments, and the number of no-shows prior to and during the implementation period. A gap analysis should be implemented to understand how the gender, age, location, type of appointment, provider, and whether the appointment is face-to-face or telehealth relate to appointment status. This would allow stakeholders to see the impact that the intervention has had on clinic appointment attendance and inform further interventions that may be necessary to further impact no-show rate.

Implications of Proposed Project

Automated appointment reminders were implemented to decrease the no-show rate. However, this outpatient health organization has not measured the impact that this intervention has had on the appointment attendance rate. Once the no-show rate has been compared pre- and post- the automated reminder system and the factors contributing to no-shows are analyzed, further gaps in care can be identified. The findings from this gap analysis can be used to inform further interventions that have the potential to decrease no-shows further and improve patient outcomes.

Methods

A gap analysis was performed in order to identify if there is a significant difference in the no-show rate when comparing in-person phone call reminders and automated text-message and phone call reminders. Additionally, demographic and appointment information was collected and analyzed to see factors that align with appointment attendance. IRB approval was obtained on 9/14/2019. The EHR system eClinical Works was used and data was abstracted and de-identified

to protect the clients of this organization and then the data was transferred to statistical software. Data from all of the psychiatric appointments from January 1st -October 1st of 2018 was compared to January 1st -October 1st of 2019. The population of patients includes adults and children with varying race. Data from over 40,000 psychiatric appointments was collected. The number of appointments, number of no-shows, and the number of kept appointments were kept. The gap analysis data also included the day of appointment, age of client, gender of client, location of appointment, type of appointment (initial, hospital discharge, or follow-up), psychiatric provider, and method of appointment (face-to-face or telehealth). No funding was received for this project.

A chart review was completed to abstract data from the EHR. Chart reviews are an effective way to collect data for quality assessment purposes and the results from these studies can be used to inform future studies (Vassar & Holzmann, 2013). Data was abstracted and imported into Microsoft Excel and descriptive statistics were performed. Data for cancelled and rescheduled appointments was removed from the data bank. There were some appointments for lab draws and other types of appointments that were also removed from the data prior to analysis so only psychiatric appointment data was present. SPSS software was used to do descriptive and inferential statistics. Analysis included two proportions z-test to see if there was a significant change in the no-show rate with the two appointment reminder systems. Chi-squared analysis was used to see if there are statistically significant differences in the no-show rates for demographic and appointment type variables. Pearson correlation was used to see the correlation between age and no-show rate.

Results

In 2018, there were 15,291 appointments with the status “no-show” or “show.” An appointment is considered a no-show when the patient does not show up to their appointment or they are late and the staff is unable to accommodate them in the schedule. The majority of the sample reported their gender as female (53.3%) and there were 7,139 appointments with reported gender as male (46.7%) (see Table 3). The majority of the sample reported White as their race (83%) (see Table 5). Mean age undeterminable because ages 70 and over were coded as unknown due to protected information. Most of the appointments were medication checks via tele-medicine (57.8%) (see Table 9). A medication check (med-check) appointment is an appointment with an established patient for discussing ongoing use of psychopharmacology. Individual provider no-show rates and location no-show rates were also collected for 2018. These findings are described; however, specific data was not included to protect the anonymity of the organization.

In 2019, there were 14,885 appointments with the status “no-show” or “show.” The majority of the sample reported their gender as female (54.6%) and there were 6,764 appointments with reported gender as male (45.4%) (see Table 4). The majority of the sample reported White as their race (79.8%) (see Table 6). Mean age undeterminable because ages 70 and over were coded as unknown due to protected information. Most of the appointments were medication checks via tele-medicine (43.7%) (see Table 10). Individual provider no-show rates and location no-show rates were also collected for 2019. These findings are described; however, specific data was not included to protect the anonymity of the organization.

No-Show Rate

The no-show rate in 2018 was 24% with the use of in-person telephone reminders made by staff members. In 2019, the no-show rate increased to 25.9% using the novel automated

reminder system. A two proportions z-test demonstrated that the increase in the no-show rate was statistically significant ($z = -3.814$, $p < 0.001$).

Patient no-shows. In 2018, 51.7% of patients had zero no-shows, 27.7% of patients had one- now show, 12% had two no-shows, and 8.5% had three or more no-shows. In 2019, 50.6% of patients had zero no-shows, 31.9% of patients had one no-show, 11.3% had two no-shows, and 6.1% had three or more no-shows.

Demographic Variables

Reported gender. A chi-square test of independence demonstrated that there was a significant relationship between reported gender and appointment show rate in 2018, $\chi 2$ (1, N = 15291) = 10.645, p = .001. Whereas 77% of females showed up, 74.7% of males showed up for their psychiatric appointments (see Table 3).

A chi-square test of independence demonstrated that there was a significant relationship between reported gender and appointment show rate in 2019, $\chi 2$ (1, N = 14885) = 9.961, p = .002. Whereas 75.2% of females showed up, 72.9% of males showed up for their psychiatric appointments (see Table 4).

Race. A chi-square test of independence demonstrated that there was a significant relationship between reported race and appointment show rate in 2018, $\chi 2$ (20, N = 15291) = 529.991, $p < .001$. No-show rates for each race ranged from 17.7% for Asian population to 33.3% for the Hispanic population (see Table 5).

A chi-square test of independence demonstrated that there was a significant relationship between reported race and appointment show rate in 2019, $\chi 2$ (20, N = 14885) = 488.951, $p <$ .001. No-show rates for each race ranged from 20.7% for Asian population to 41.5% for the Hispanic population (see Table 6).

Age. A Pearson correlation was performed between age (in years) and appointment status (no-show vs. show) for 2018. Only appointments for persons age 69 and under were included due to older adults' age being unknown for privacy reasons. The correlation was positive and significant, r = .042, $p < .001$ (see Table 7). This demonstrates that as clients' age increased, they were more likely to show up.

A Pearson correlation was performed between age (in years) and appointment status (no-show vs. show) for 2019. Only appointments for persons age 69 and under were included due to older adults' age being unknown for privacy reasons. The correlation was positive and significant, r = .058, $p < .001$ (see Table 8). This demonstrates that as clients' age increased, they were more likely to show up.

Appointment Variables

Visit type. A chi-square test of independence demonstrated that there was a significant relationship between appointment type and appointment show rate in 2018, $\chi 2$ (3, N = 15291) = 71.304, $p < .001$. Patients were more likely to show up to traditional in-person appointments compared to tele-medicine appointments. Patients were less likely to attend appointments that were initial evaluations (see Table 9).

A chi-square test of independence demonstrated that there was a significant relationship between appointment type and appointment show rate in 2019, $\chi 2$ (4, N = 14885) = 229.690, $p < .001$. Patients were more likely to show up to traditional in-person appointments compared to tele-medicine appointments (see Table 10). In 2019, hospital discharge appointments were also recorded and the no-show rate was significantly higher for this appointment type (37.8%).

Psychiatric provider. A chi-square test of independence demonstrated that there was a significant relationship between psychiatric providers and appointment show rate in 2018, $\chi 2$

(19, N = 15291) = 180.014, $p < .001$. Provider no-show rates ranged from 14.5% to 30.5% (four outlier values were omitted for providers who only had one appointment recorded.)

A chi-square test of independence demonstrated that there was a significant relationship between psychiatric providers and appointment show rate in 2019, $\chi 2$ (11, N = 14885) = 116.495, $p < .001$. Provider no-show rates ranged from 18.6% to 31.7% (one outlier value was omitted for a provider due to having very small number of appointments).

Location. A chi-square test of independence demonstrated that there was a significant relationship between appointment location and appointment show rate in 2018, $\chi 2$ (14, N = 15291) = 284.685, $p < .001$. Provider no-show rates ranged from 13.7% to 33.1% (four outlier values were omitted for locations that had small number of appointments recorded.)

A chi-square test of independence demonstrated that there was a significant relationship between appointment location and appointment show rate in 2019, $\chi 2$ (15, N = 14885) = 239.058, $p < .001$. Provider no-show rates ranged from 17.8% to 32.5% (seven outlier values were omitted for locations that had small number of appointments recorded).

Discussion

With the new automated text message and phone call appointment reminder system, the no-show rate for psychiatric appointments increased. There may be other factors affecting the clients' ability to access care or issues with the automated reminder system. Although the research shows that forgetting the appointment is a common cause of no-shows, the other factors like language or cultural barriers, socioeconomic status (SES), transportation, diagnoses, employment, appointment timing, social support, and mental health stigma may have a larger influence on show rate for this population (Cheng, et al., 2014; Long et al., 2016; Stein et al, 2014). Multi-modal interventions may be better for addressing the complex issues related to no-

shows. One outpatient psychiatric clinic used increased patient education, clinic environment improvements, personal appointment reminders, and no-show policy changes to reduce their no-show rate significantly (Gajwani, 2014). A factor related to increased patient engagement and decreased no-shows is having assertive outreach staff (Stein et al., 2014). Stein et al. (2014) report that having outreach staff increases client connectedness to services due to better community integration which can reduce mental health stigma. Boksmati et al. (2016) posit that psychiatric patients may benefit from more personalized reminders. Interventions should be targeted at meeting the population's specific needs.

The outcomes for 2018 and 2019 were very similar for the demographic and appointment variables. For both years the majority of the patients did not have any no-shows. The population of patients that had repeated no-shows may not have reliable cell phone technology and this could be linked to SES. Interventions are needed that specifically target the population with chronic no-shows. No-shows can be a reflection of the state of patient access to care. Access to care is dependent on the individual and the service environment (Werlen, Gjukaj, Mohler-Kuo, & Puhan, 2019). Factors such as SES, perceived health care needs, ability to pay for and engage in care, and location of client and services all affect mental health care access (Werlen, Gjukaj, Mohler-Kuo, & Puhan, 2019).

There were no-show rate differences between ages, genders, and races. Older adults and females had better attendance for both reminder systems. This is similar to findings in a study of patients with serious mental illness that found that patients who were younger, Hispanic, and had poor social support were more likely to miss their initial appointments at a psychiatric outpatient clinic (Kruse, Rohland, & Wu, 2002). For the present project, the text message reminders were available in English and Spanish only, and this depends on the patients recorded preference in

the EHR. Therefore, there may be some cultural barriers for those who have another primary language or if their preferences were not accurate in the system. Another study of missed psychologist appointments found that younger age, race identified as black, government insurance, lower income, probable depression, sleep issues, and poor math and reading ability were variables associated with increased no-show behavior (Miller-Matero, Clark, Dubaybo, & Willens, 2016).

Significant differences in the no-show rate were present between different locations and providers. This may be attributed to different practice styles of the providers or different levels of engagement and education. This organization serves many rural areas so distance to the clinic may also be a barrier to care. SES differences may also be factors here depending on the location of the patients. Although this is one organization, the demographics of each clinic may be different and this may contribute to the differences in no-show rate.

There were also significant differences between in-person and tele-medicine appointments. Studies of no-show rates between these two types of appointments have differing results. A study of outpatient specialist appointments found no difference in attendance rates between tele-medicine and in-person appointments (Greenup, Best, Page, & Potts, 2019). While another study of a psychiatric appointments revealed a higher no-show rate with in-person appointments compared to tele-medicine appointments (Leigh, Cruz, & Mallios, 2009). There are many factors related to the success of tele-medicine. The client needs to have access to equipment for the tele-medicine technology and have a reliable internet connection. Some tele-medicine appointments can be completed at home or work and others still require the patient to come to a clinic site. The rate for tele-medicine appointments may be higher for this organization due to the patient still being required to come to a clinical site to use the tele-medicine

technology. Alternatives to this procedure would be using a HIPAA compliant technology that the patients could access from their devices from the location of their choice.

This gap analysis identified a significant issue with patient hospital discharge appointments. The no-show rate for this type of appointment was 37.8% and this is much higher than the overall no-show rate for 2019 (see Table 2). This is especially concerning because patients are extremely vulnerable during the post-hospitalization period. Cheng et al. (2014) found that among patients with schizophrenia, male patients, those discharged from inpatient hospitalization with a first generation antipsychotic, those with comorbid alcohol use disorder, and those who are discharged against medical advice (AMA) were more likely to miss their hospital discharge appointments. Miller and Abrose (2019) report that longer interval between discharge and appointment can also decrease attendance for these appointments. They suggest post hospital discharge appointment be made within two weeks of discharge and giving special attention to patients with risk factors such as discharging AMA or having an involuntary discharge, those with issues related to social support, and those with comorbid substance problems (Miller & Ambrose, 2019). Additionally, the patient should be given clinic contact information and the patient's contact information should be collected prior to discharge (Miller & Ambrose, 2019). Involving family members in discharge planning is another intervention that significantly impacted post-hospitalization follow-up care for psychiatric patients with serious mental illness (Haselden et al., 2019).

The rate of failed messages and calls were not analyzed for this project. There may be failed messages and phone calls affecting the no-show rate. With in-person phone calls, the staff member would be able to find out that a phone number was not active or incorrect and they could take steps to fix this. However, it is not clear whether a procedure exists for staff to identify and

correct inaccurate phone numbers. Therefore, if there are reporting errors with the phone numbers, some clients may not receive a reminder at all. More investigation is needed to determine the fail rate for automated phone call and text message reminders and the procedures for identifying and correcting these. No-show policy and procedure changes should be transparent to both staff and patients (Miller& Ambrose, 2019). Despite possible issues with the automated reminder system, the organization reported that this reminder system results in cost savings for them when compared to the previous system of having staff make the reminder phone calls. With further investigations and improvements of the automated system, the no-show rate has the potential to improve.

Recommendations for Further Study

More investigation into the possible faults of the automated reminder system is needed to determine if the system is not working optimally and causing clients to miss out on appointment reminders. Assessing the use of cell phone technology in the population could provide insight about who may not have been receiving the reminders. One study found that there were significantly more appointment cancellations which allowed their staff to fill those appointment slots and result in more patients being seen (Moran et al., 2018). This variable was not included in this project but it may be valuable to see if this population shared this phenomena.

A future project could survey the population of persons who have no-showed to determine the most common reasons for no-show behavior. Variables such as transportation, distance from clinic, SES, type of insurance, appointment timing, and diagnoses are all variables that can be evaluated further. Future interventions for no-shows should be targeted at these populations and causes in order to alleviate these barriers.

Decreasing the no-show rate can potentially result in improved health outcomes, decreased hospitalizations, and increased treatment and medication compliance. These outcomes could be tracked in order to identify the impact the no-shows have on them. Further study could investigate provider and staff satisfaction with the new reminder system because their perspectives can inform future interventions (Boksmati et al., 2016; Jones, Lekhak, & Kaewluang, 2014). Although the staff report that the automated system is much more cost-effective, investigation into the effect of the intervention on company revenue would be valuable. Miller and Abrose (2019) propose positive reinforcement strategies as an area for further research. Research should be done to determine if certain incentives can increase appointment attendance. Individual organizations should explore which no-show factors are affecting their clients the most and use the most fitting evidence-based intervention.

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Table 1

Evaluation Table

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
Berrouiguet, S. (2016). Fundamentals for future mobile-health (mHealth): A systematic review of mobile phone and web-based text messaging in mental health. **Funding:** Not disclosed **Bias:** None recognized **Country:** France	Inferred to be Health Outcomes and Impact Assessment	**Design:** SR of RCTs and NRCTs **Purpose:** To review the applications of SMS messaging in mental health care	**N:** 36 **DS:** PubMed, PsycINFO, Cochrane, Scopus, Embase, and Web of Sciences **Inclusion Criteria:** Studies where SMS was used to promote mental health with prevention or monitoring strategies **Exclusion Criteria:** Surveys about how participants felt about SMS for a specific medical application, studies that used MSM or other phone apps	**IV:** SMS interventions **DV1:** Treatment adherence **DV2:** Feasibility and acceptability of SMS	Satisfaction questionnaires, Descriptive statistical data	Two authors reviewed studies against the inclusion criteria and then categorized articles by methodology, health conditions, applications and purpose.	**DV1**: 5 studies investigated SMS reminder interventions with pts with schizophrenia, substance abuse, affective d/os, eating disorders, PTSD, and related d/os, found that text message interventions resulted in significant improvement in medication adherence, appointment attendance, and doing leisure activities **DV2**: 35/36 studies concluded that SMS was	**LOE:** I **Strengths:** Wide range of mental health settings and mental health populations. Many of the studies were RCTs. **Weaknesses:** Heterogeneity of studies. Descriptive review, lower than MA. Only some of the studies were directly about SMS appointment reminder. Measures were self-reported (subject to bias). **Conclusions:** SMS reminders are effective for improving treatment adherence, including appointment attendance. SMS interventions are cost effective and widely accepted by pts and caregivers. **Feasibility/Applicability to pt. population:** SMS reminder interventions have been used in a variety of mental health settings and is a feasible and acceptable

Key: AMSTAR-A Measurement Tool to Assess Systematic Reviews; **CC-** chief complaint; **CG-** control group; **DB-** databases searched; **d/o-** disorder; **DV**-dependent variable; **IV**- independent variable; **MA-** meta-analysis; **MR-**meta-review; **MSM-** multimedia messaging service; **n/a**- not applicable; **NRCT-** non-randomized controlled trial; **OR-** odds ratio; **PRISMA-** Preferred Reporting Items for Systematic Reviews and Meta-Analyses; **pt-** patient; **PTSD-** posttraumatic stress disorder**; RCT-** randomized controlled trial; **RR-** risk ratio; **SMS-** short message service; **SR-** systematic review; **w/o-** without

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
							accepted by patients	intervention to increase treatment adherence, including increasing appointment attendance

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
Boksmati, N. (2016). The effectiveness of SMS reminders on appointment attendance: A meta-analysis. **Funding:** Not disclosed **Bias:** None recognized **Country:** Australia	Inferred to be Quality Health Outcomes Model	**Design:** MA of RCTs and observational studies **Purpose:** Determine is SMS reminders are effective for decreasing appointment non-attendance and if this effectiveness has improved	**N:** 28 **DS:** OvidSP, PubMed, EMBASE, CINAHL **Inclusion Criteria:** Studies of SMS against CG, written or translated in English, scholarly journal with full text, published January 2005-January 2015 **Exclusion Criteria:** Technology other than SMS, attendance w/o SIS reminders, did not examine impact on attendance rates	**IV:** SMS appointment reminders **DV1:** Healthcare appointment attendance Rate **Definitions:** Attendance rate- % of patients attending scheduled appointment	Comprehensive MA design Pooled OR for RCTs Modified version of quality scoring rubric tested and reported by Hasvold and Wootton Random variable estimate used when I^2 was moderate	PRISMA guidelines for article selection only Frequency Analysis Pooled OR of RCTs was 1.62 (1.35-1.94)	**DV1**: Pooled OR of RCTs was 1.62 (1.35-1.94).	**LOE:** I **Strengths:** 13/28 studies were RCTs. Moderate heterogeneity of RCTs. Overall quality of RCTs and observational studies was moderate. **Weaknesses:** Heterogeneity of observational studies. Need further research to determine best timing and frequency of SMS reminders. RCTs had smaller sample sizes than the observational studies. All healthcare settings, not just mental health settings. Did not discuss adverse complications of using SMS reminders. **Conclusions:** SMS appointment reminders are effective and operative method to reduce healthcare appointment no-shows. Positive pooled OR indicates SMS reminders are beneficial for helping pts

Key: AMSTAR-A Measurement Tool to Assess Systematic Reviews; **CC-** chief complaint; **CG-** control group; **DB-** databases searched; **d/o-** disorder; **DV-**dependent variable; **IV**- independent variable; **MA-** meta-analysis; **MR-**meta-review; **MSM-** multimedia messaging service; **n/a**- not applicable; **NRCT-** non-randomized controlled trial; **OR-** odds ratio; **PRISMA-** Preferred Reporting Items for Systematic Reviews and Meta-Analyses; **pt-** patient; **PTSD-** posttraumatic stress disorder**; RCT-** randomized controlled trial; **RR-** risk ratio; **SMS-** short message service; **SR-** systematic review; **w/o-** without

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
								attend health care appointments. **Feasibility/Applicability to pt. population:** SMS reminders are effective across all ages in different healthcare settings. Although it was not just in mental healthcare, these results can be applied to an integrated care setting.
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**
Chong, W. (2017). Does a phone call reminder by a provider influence the 'no-show' rate at a urogynecology procedural outpatient clinic? **Funding:** Not disclosed **Bias:** None recognized **Country:** United States	Inferred to be Health Outcomes and Impact Assessment	**Design:** Quantitative study, retrospective cohort study **Purpose:** Assess impact of phone call reminder before appointment on 'no-show' rate	**N:**91 records Group1 n=49 Group 2 n=42 **Setting**: Urogynecology procedural outpatient clinic **Sample Demographics:** 21+ yrs of age **Inclusion Criteria:**21+ yrs of age, appointment between May 2015-August 2016, Group 1-no reminder call Group 2-received reminder call	**IV:** pre-appointment phone call reminder made one day before appointment **DV1:** 'no-show' rate **Definitions:**no-show- pt who does not attend appointment Phone reminder-included appointment time, clinic location, and importance of keeping	Data extraction from medical records from May 2015-August 2016	SAS 9.3 Descriptive statistics Chi-square Fisher's exact test	**DV1**: No statistical difference found in clinic attendance between those who received a phone call and those who did not (Group 1 = 18.4%, Group 2 = 16.7%, p = 0.83)	**LOE:** IV **Strengths:** Sample groups were homogenous **Weaknesses:** Small sample size, different population of interest **Conclusions:** phone call reminders did not make a significant difference in clinic attendance **Feasibility/Applicability to pt. population:** Population of interest has used in person phone reminders in the past, this is the control group of PICOT, though these results are not generalizable to population or setting of interest

Key: AMSTAR-A Measurement Tool to Assess Systematic Reviews; **CC-** chief complaint; **CG-** control group; **DB-** databases searched; **d/o-** disorder; **DV**-dependent variable; **IV**- independent variable; **MA-** meta-analysis; **MR-**meta-review; **MSM-** multimedia messaging service; **n/a**- not applicable; **NRCT-** non-randomized controlled trial; **OR-** odds ratio; **PRISMA-** Preferred Reporting Items for Systematic Reviews and Meta-Analyses; **pt-** patient; **PTSD-** posttraumatic stress disorder**; RCT-** randomized controlled trial; **RR-** risk ratio; **SMS-** short message service; **SR-** systematic review; **w/o-** without

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
			Exclusion Criteria: Appointments outside of time frame, pts below age 21	appointment to determine diagnosis of pt				

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
Clouse, K. (2017). Improving the no-show rate of new patients in outpatient psychiatric practice: An advance practice nurse-initiated telephone engagement protocol quality improvement project. **Funding:** No external or intramural funding received. **Bias:** None recognized **Country:** United States	King's Theory of Goal Attainment	**Design:** Quality Improvement Project, Observational Quantitative Study **Purpose:** Implement a telephone intervention to improve no-show rate to initial appointments	**N:** 18 **n:** 15 **Setting**: Outpatient mental health clinic in the South **Sample Demographics:** 22% male, mean age 56 **Inclusion Criteria:** Age 19 and older, with mental health issues or caregivers of those with dementia **Exclusion Criteria:** Those with CC of pain management, age less than 19	**IV:** Telephone engagement protocol **DV1:** Attendance rates/No-shows to intake appointment **Definitions:** No-show-Pts who fail to attend their scheduled appointments	Descriptive statistics	SPSS 22.0 used to run descriptive statistics on demographic information and no-show rate	**DV1**: 12 (80%) of the participants who received both calls attended their intake appointment. There was a 7% improvement in no-show rate compared to same time period the previous year	**LOE:** V **Strengths:** Significant difference in no-show rate. Findings are consistent with previous studies of engagement strategies to improve no-shows. **Weaknesses:** Small sample size, homogenous. Results not generalizable to other clinics. No control group. Refers to intake appointments only. **Conclusions:** This is an effective intervention but is timely and not cost-effective. **Feasibility/Applicability to pt. population:** This intervention improves delivery of care and is patient-centered. Data is applicable to pt population,

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Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
			Attrition: 16% (only 15 received both calls)					however not a feasible intervention.
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**
Jones, K. (2014). Using mobile phones and short message service to deliver self-management interventions for chronic conditions: A meta-review. **Funding:** Supported by the Sarah Cole Hirsh Institute for Best Nursing Practices Based on Evidence **Bias:** None recognized **Country:** United States	Inferred to be Self-management	**Design:** MR **Purpose:** To review and evaluate the evidence on the use of mobile phones and SMS to deliver self-management interventions for chronic illnesses	**N:**11 **DS:** PubMed (Medline, Cochrane Database of Systematic Reviews (CDSR), CINAHL (EBSCO), Web of Science **Inclusion Criteria:** SRs or MAs published between 2000-2012, English language, self-management intervention delivered via mobile phone or SMS **Exclusion Criteria:** Studies not fitting inclusion criteria	**IV:** Self-management interventions **DV1:** Treatment adherence to appointments	Varied based on SR and MA in the review	AMSTAR by two independent reviewers	**DV1**: SMS messages are effective for improving appointment adherence. Did not specify actual results from studies, only conclusions.	**LOE:** I **Strengths:** All studies were SR or MA. 4 were Cochrane reviews. **Weaknesses:** Only 4/11 studies were Cochrane reviews and considered high-quality, Many of the studies were from countries other than the US, the studies did not describe the interventions in detail or the timing of the interventions. Heterogeneity of the studies. **Conclusions:** Mobile phones and SMS messages are effective for increasing adherence to medication and appointments. **Feasibility/Applicability to pt. population:** Supports the use of SMS messages for appointment adherence, but they had varying populations and clinical settings and included varying chronic illness, no just mental illnesses.

Key: AMSTAR-A Measurement Tool to Assess Systematic Reviews; **CC-** chief complaint; **CG-** control group; **DB-** databases searched; **d/o-** disorder; **DV**-dependent variable; **IV**- independent variable; **MA-** meta-analysis; **MR-**meta-review; **MSM-** multimedia messaging service; **n/a**- not applicable; **NRCT-** non-randomized controlled trial; **OR-** odds ratio; **PRISMA-** Preferred Reporting Items for Systematic Reviews and Meta-Analyses; **pt-** patient; **PTSD-** posttraumatic stress disorder**; RCT-** randomized controlled trial; **RR-** risk ratio; **SMS-** short message service; **SR-** systematic review; **w/o-** without

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**
Kauppi, K. (2015). Mobile phone text message reminder Measuring preferences of people with antipsychotic medication. **Funding:** Not disclosed **Bias:** None recognized **Country:** Finland	Inferred to be Health Outcomes and Impact Assessment	**Design:** Randomized quantitative study **Purpose:** Examine the relationship between demographics and the tailored SMS messages pts select	**N:**562 **Setting**:24 sites and 45 psychiatric hospitals in Finland **Sample Demographics:** Majority female (53%), single, with schizophrenia or mood disorders (65%) **Inclusion Criteria:** pts close to being discharged from hospital, with mobile phone, can read and understand Finnish, able and gave consent **Exclusion Criteria:** forensic and those in respite care	**IV:** Demographics **DV1:** Tailored messages pts chose **DV2:** timing of messages **Definitions:** Demographics-age, gender, marital status, diagnosis, Tailored message-Reminders for medication, appointments, or free time	Demographics survey, Survey to choose messages	Descriptive Statistics and Poisson regression models	**DV1**: Older men wanted fewer messages, older women wanted more messages, older singles wanted more messages than younger singles, older married pts wanted fewer than younger married pts, 23/562 pts wanted to stop getting the messages **DV2:** Most pts chose to receive messages at the beginning of the week, 1-6 times monthly, in the morning	**LOE:** V **Strengths:** Large study sample, controlled **Weaknesses:** They had compulsory choices for 2 messages, may not represent all seriously mentally ill population **Conclusions:** Messages are well received by pts and pts differ on their choices of timing and message content based on their demographics **Feasibility/Applicability to pt. population:** Feasible intervention but a different population of choice
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**

Key: AMSTAR-A Measurement Tool to Assess Systematic Reviews; **CC-** chief complaint; **CG-** control group; **DB-** databases searched; **d/o-** disorder; **DV**-dependent variable; **IV**- independent variable; **MA-** meta-analysis; **MR-**meta-review; **MSM-** multimedia messaging service; **n/a**- not applicable; **NRCT-** non-randomized controlled trial; **OR-** odds ratio; **PRISMA-** Preferred Reporting Items for Systematic Reviews and Meta-Analyses; **pt-** patient; **PTSD-** posttraumatic stress disorder**; RCT-** randomized controlled trial; **RR-** risk ratio; **SMS-** short message service; **SR-** systematic review; **w/o-** without

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
Moran, L. (2018). The effect of SMS (text message) reminders on attendance at a community adult mental health service clinic: Do SMS reminders really increase attendance? **Funding:** Not disclosed **Bias:** None Recognized **Country:** Ireland	Inferred to be Health Outcomes and Impact Assessment	**Design:** Longitudinal Quantitative Study, Pre and post design **Purpose:** To determine if SMS reminders prior to appointment improved appointment attendance	**Group A N:** 2170 **Group B N:** 2092 **Group C N:** 2474 **Setting**: Outpatient Community Adult Mental Health Clinic **Sample Demographics:** Adults **Inclusion Criteria:** Three groups-(a) immediately before introduction of SMS reminders, (b) immediately after introduction of SMS reminders, and (c) 2.5 years after introduction of SMS reminders	**IV:** Automated SMS reminders **DV1:** Non-attendance rate **Definitions:** Non-attendance-people who failed to attend or cancel their appointments prior to appointment time	Manual data abstraction of hand written clinic diary	Descriptive statistics, Z-tests	**Group a-DV1**: 22.2% non-attendance rate **Group b-DV1**: 13.9% non-attendance rate overall, significant decrease after the introduction (Z-score=7.1465, $p<0.001$) **Group c-DV1**: 19.3% non-attendance rate, still lower than pre-intervention rate (Z-score=2.2247, $p=0.01321$)	**LOE:** V **Strengths:** Similar setting to population of interest, pre- and post- intervention data **Weaknesses:** Not RCT, no information about demographics of patients **Conclusions:** SMS reminders are effective for improving attendance and cancellations of appointments **Feasibility/Applicability to pt. population:** This would be feasible to implement and it is applicable to the setting and population of interest

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
Robotham, D. (2016). Using digital	Inferred to be Health Outcomes and	**Design:** SR and MA	**N:** 26	**IV:** Electronic text notifications	2 independent reviewers	Cochrane Handbook for Systematic	**DV1**: pts who received text notifications	**LOE:** I

Key: AMSTAR-A Measurement Tool to Assess Systematic Reviews; **CC-** chief complaint; **CG-** control group; **DB-** databases searched; **d/o-** disorder; **DV**-dependent variable; **IV**- independent variable; **MA-** meta-analysis; **MR-**meta-review; **MSM-** multimedia messaging service; **n/a**- not applicable; **NRCT-** non-randomized controlled trial; **OR-** odds ratio; **PRISMA-** Preferred Reporting Items for Systematic Reviews and Meta-Analyses; **pt-** patient; **PTSD-** posttraumatic stress disorder**; RCT-** randomized controlled trial; **RR-** risk ratio; **SMS-** short message service; **SR-** systematic review; **w/o-** without

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
notifications to improve attendance in clinic: Systematic review and meta-analysis. **Funding:** National Institute for Health Research Mental Health Biomedical Research Centre at South London, Maudsley National Health Service Foundation Trust **Bias:** None recognized **Country:** United Kingdom	Impact Assessment	**Purpose:** Assess the impact of electronic text notifications on clinic attendance in relation to study quality and how SMS notifications can be optimized	**DS**: MEDLINE, EMBASE, PsycINFO, Web of Science, Cochrane Database of Systematic Reviews **Inclusion Criteria:** SR or MA studies from 2005-2015, quantitative studies with randomization used to allocate intervention, control group was 'no reminder', data from conference presentations w/o full text, or text reminder compared to voice reminder **Exclusion Criteria:** Studies published prior to 2005, studies lacking sufficient information	**DV1:** Rate of attendance/non-attendance at health care appointments **Definitions:** written messages sent via SMS, email, or instant messaging application from service provider to pt to help pts remember, cancel, or reschedule their appointments	Cochrane Handbook for Systematic Reviews of Interventions PRISMA	Reviews of Interventions Pooled Effect Sizes Interstudy Heterogeneity Funnel plots, Egger's test, and non-parametric 'trim nd fill' method to test publication bias Stata (V11.2, StatCorp) used to carry out analyses	were 23% more likely to attend appointment (RR=1.23, 67% vs. 54%) and 25% less likely to no-show (RR=.75, 15% vs 21%), multiple notifications were more effective then single notifications, voice notifications were more effective than text notification at improving attendance	**Strengths:** Findings similar to previous studies, **Weaknesses:** Studies of a variety of healthcare settings not just mental health, moderate heterogeneity of studies **Conclusions:** Electronic text notifications improve clinic attendance and decrease no-shows **Feasibility/Applicability to pt. population:** Text notifications are cost effective and increase appointment attendance, 2 or more notifications increase attendance by as much as 19% versus 1 notification
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**

Key: AMSTAR-A Measurement Tool to Assess Systematic Reviews; **CC-** chief complaint; **CG-** control group; **DB-** databases searched; **d/o-** disorder; **DV-**dependent variable; **IV**- independent variable; **MA-** meta-analysis; **MR-**meta-review; **MSM-** multimedia messaging service; **n/a**- not applicable; **NRCT-** non-randomized controlled trial; **OR-** odds ratio; **PRISMA-** Preferred Reporting Items for Systematic Reviews and Meta-Analyses; **pt-** patient; **PTSD-** posttraumatic stress disorder**; RCT-** randomized controlled trial; **RR-** risk ratio; **SMS-** short message service; **SR-** systematic review; **w/o-** without

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
Teo, A. R. (2017). No-show rates when phone appointment reminders are not directly delivered. **Funding:** Supported by Veterans Health Administration HSR&D Career Development Award and HSR&D grant to the Center to Improve Veteran Involvement in Care **Bias:** None recognized. **Country:** United States	Inferred to be Health Outcomes and Impact Assessment	**Design:** Descriptive quantitative study **Purpose:** To determine how receiving phone appointment conversations affects appointment attendance rates	**N:** 250 **Setting**: Pacific Northwest, Outpatient clinic **Sample Demographics:** Primary care pts with depression at Veterans Health Administration, majority white males **Inclusion Criteria:** Had 1+ primary care visits, probably major depression, and at least one significant recent interpersonal relationship **Exclusion Criteria:** Hearing impairment, lack access to phone, or diagnosis of bipolar, psychosis, or neurocognitive d/o in the past 2 years	**IV:** Phone call reminder **DV1:** Appointment attendance	Data management program REDCap to track phone reminders	Descriptive statistics Relative Risk	**DV1**: 88% of pts who received phone reminders attended their appointments, live reminders had no-show rate of 3%, message or voice mail had no-show rate of 24%, and no answer had no show rate of 39%	**LOE:** V **Strengths:** Large sample, allowed for insight into quality improvement for specific practice **Weaknesses:** Not a randomized controlled study, not mental health population, population different from the present study population **Conclusions:** Appointment attendance is significantly higher when phone reminders are directly received by the pt **Feasibility/Applicability to pt. population:** Shows the importance of knowing whether or not the pt received the appointment reminder, findings not generalizable to study population
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**

Key: AMSTAR-A Measurement Tool to Assess Systematic Reviews; **CC-** chief complaint; **CG-** control group; **DB-** databases searched; **d/o-** disorder; **DV**-dependent variable; **IV**- independent variable; **MA-** meta-analysis; **MR-**meta-review; **MSM-** multimedia messaging service; **n/a**- not applicable; **NRCT-** non-randomized controlled trial; **OR-** odds ratio; **PRISMA-** Preferred Reporting Items for Systematic Reviews and Meta-Analyses; **pt-** patient; **PTSD-** posttraumatic stress disorder**; RCT-** randomized controlled trial; **RR-** risk ratio; **SMS-** short message service; **SR-** systematic review; **w/o-** without

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
Thomas, I. (2017). Effect of short message service reminders on clinic attendance among outpatients with psychosis at a psychiatric hospital in Nigeria. **Funding:** Not disclosed **Bias:** None recognized **Country:** Nigeria	Inferred to be Health Outcomes and Impact Assessment	**Design:** RCT **Purpose:** Determine if SMS reminders for appointments are effective at improving appointment attendance for pts experiencing first-episode psychosis	**N:** 200 **n:** 192 **Setting**: Outpatient psychiatric clinic **Sample Demographics:** Single, adults age 18-64, cared-for by first degree relative, mean age 33.7 **Inclusion Criteria:** Confirmed diagnosis of psychosis, gave consent, had a mobile phone, could read and understand message in English **Exclusion Criteria:** Pts who required inpatient treatment, required a referral to another facility, or sought treatment prior to scheduled appointment.	**IV:** SMS reminder sent 5 and 3 days before appointment **DV1:** Appointment attendance	Questionnaire to obtain demographics and illness characteristics SPSS 21	Pearson's chi-square for categorical variables Student's t test Mann-Whitney U test for continuous variables	**DV1**: 47% of participants in intervention group missed their appointment, and 62% of pts in control group miss their appointment (X^2 =4.07, df=1, p=.04).The change of pt attending appointment were significantly greater for pts who received SMS reminder (odds ratio [OR]=1.80, CI=1.02–3.19). Pts who received SMS reminder were 50% more likely to attend their appointment	**LOE:** III **Strengths:** Well controlled, used valid and reliable measures, good sample size **Weaknesses:** Small specific population of interest, may not be generalizable to other populations, some pts may not have received SMS messages that were sent, messages only sent for 1st clinic appointment **Conclusions:** Those who received the reminders were two times more likely to attend appointment, receiving the SMS message reduced risk of missing appointment by 50% **Feasibility/Applicability to pt. population:** SMS messages are effective, but the study results may not be generalized to the current population of interest. Only applies to first appointment attendance.

Key: AMSTAR-A Measurement Tool to Assess Systematic Reviews; **CC-** chief complaint; **CG-** control group; **DB-** databases searched; **d/o-** disorder; **DV**-dependent variable; **IV**- independent variable; **MA-** meta-analysis; **MR-**meta-review; **MSM-** multimedia messaging service; **n/a**- not applicable; **NRCT-** non-randomized controlled trial; **OR-** odds ratio; **PRISMA-** Preferred Reporting Items for Systematic Reviews and Meta-Analyses; **pt-** patient; **PTSD-** posttraumatic stress disorder**; RCT-** randomized controlled trial; **RR-** risk ratio; **SMS-** short message service; **SR-** systematic review; **w/o-** without

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
			Attrition: 8 pts required inpatient care or missing case files, thus were excluded					

Key: AMSTAR-A Measurement Tool to Assess Systematic Reviews; **CC-** chief complaint; **CG-** control group; **DB-** databases searched; **d/o-** disorder; **DV**-dependent variable; **IV**- independent variable; **MA-** meta-analysis; **MR-**meta-review; **MSM-** multimedia messaging service; **n/a**- not applicable; **NRCT-** non-randomized controlled trial; **OR-** odds ratio; **PRISMA-** Preferred Reporting Items for Systematic Reviews and Meta-Analyses; **pt-** patient; **PTSD-** posttraumatic stress disorder**; RCT-** randomized controlled trial; **RR-** risk ratio; **SMS-** short message service; **SR-** systematic review; **w/o-** without

Table 2

Synthesis Table

Author	Berrouiguet	Boksmati	Chong	Clouse	Jones	Kauppi	Moran	Robotham	Teo	Thomas
Year	2016	2016	2017	2017	2016	2015	2018	2016	2017	2017
Design/Level of Evidence:	SR/I	MA/I	Quantitative Study/IV	Quantitative Study/V	MR/I	Quantitative Study/V	Quantitative Study/V	SR+MA/I	Quantitative Study/V	RCT/III
Study Characteristics										
Demographics										
Age (Mean y.o.)	n/a	n/a	>60	56	n/a	38.6	Age 18+	n/a	55.8	33.7
Female (%)	n/a	n/a	100	78	n/a	53	Unknown	n/a	3	54
Setting:										
Outpatient Psychiatric Clinic				X			X			X
Outpatient Urogynecology Procedural Clinic			X							
Outpatient primary care clinic									X	
Various Health Settings	X	X			X	X		X		
Sample Size/ # of Studies Included	36 studies	28 studies	91	15	11 studies	562	6736	26 studies	250	192
Measurement Tools	Satisfaction Questionnaires	Quality scoring rubric	Data extraction from medical records	Descriptive statistics	Varied	Demographics Survey, Message Survey	Manual data abstraction	PRISMA Cochrane Handbook for SR of Interventions	Data management program REDCap	Questionnaires
Timing of Interventions (# days before appointment)	n/a	n/a	1	1	n/a	n/a	n/a	n/a	Friday before and the day of	3+5

Key: DV-dependent variable; **IV**- independent variable; **MA-** meta-analysis; **MR**-meta-review; **n/a**- not applicable; **RCT-** randomized controlled trial; **SMS-** short message service; **SR-** systematic review; **X-** variable used in study; * - clinically significant; ^ - positively correlated; ≠ - not clinically significant

IV – Interventions										
SMS Interventions	X									
SMS Appointment Reminders		X					X			X
Pre-appointment Phone Call			X						X	
Telephone Engagement Protocol				X						
Self-Management Interventions					X					
Demographics						X				
Electronic Text Notifications								X		
DV										
Appointment Attendance	X^*	X^*	X≠	X^*	X^*		X^*	X^*	X^*	X^*
Timing of Messages						X*				
Tailored Messages Pts Chose						X*				
Intake Appointment Attendance										
Treatment Adherence	X^*									
Feasibility and Acceptability of SMS	X^*									

Key: DV-dependent variable; **IV**- independent variable; **MA-** meta-analysis; **MR**-meta-review; **n/a**- not applicable; **RCT-** randomized controlled trial; **SMS-** short message service; **SR-** systematic review; **X-** variable used in study; * - clinically significant; ^ - positively correlated; ≠ - not clinically significant

Table 3

Appointment Status and Reported Gender 2018

			Appointment Status		
			No-Show	Show	Total
Gender	Female	Count	1875	6280	8155
		% within Gender	23.0%	77.0%	100.0%
	Male	Count	1802	5334	7136
		% within Gender	25.3%	74.7%	100.0%
Total		Count	3849	11614	15291
		% within Gender	24.0%	76.0%	100.0%

Table 4

Appointment Status and Reported Gender 2019

			Appointment Status		
			No-Show	Show	Total
Gender	Female	Count	2016	6105	8121
		% within Gender	24.8%	75.2%	100.0%
	Male	Count	1833	4931	6764
		% within Gender	27.1%	72.9%	100.0%
Total		Count	3849	11036	14885
		% within Gender	25.9%	74.1%	100.0%

Table 5

Appointment Status and Race 2018

			Appointment Status		
			No-Show	Show	Total
Race	Not Reported	Count	222	134	356
		% within Race	62.4%	37.6%	100.0%
	Black or African American	Count	230	579	809
		% within Race	28.4%	71.6%	100.0%
	American Indian or Alaska Native	Count	222	518	740
		% within Race	30.0%	70.0%	100.0%
	Asian	Count	23	107	130
		% within Race	17.7%	82.3%	100.0%
	Hispanic	Count	59	118	177
		% within Race	33.3%	66.7%	100.0%
	Native Hawaiian or Other Pacific Islander	Count	40	101	141
		% within Race	28.4%	71.6%	100.0%
	White	Count	2826	9868	12694
		% within Race	22.3%	77.7%	100.0%
	Other or Multiracial	Count	55	189	244
		% within Race	22.5%	77.4%	100.0%
Total		Count	3677	11614	15291
		% within Race	25.9%	74.1%	100.0%

Table 6

Appointment Status and Race 2019

			Appointment Status		
			No-Show	Show	Total
Race	Not Reported	Count	524	509	1033
		% within Race	50.7%	49.3%	100.0%
	Black or African American	Count	207	527	734
		% within Race	28.2%	71.8%	100.0%
	American Indian or Alaska Native	Count	213	433	646
		% within Race	32.9%	67.1%	100.0%
	Asian	Count	23	88	111
		% within Race	20.7%	79.3%	100.0%
	Hispanic	Count	80	113	193
		% within Race	41.5%	58.5%	100.0%
	Native Hawaiian or Other Pacific Islander	Count	19	35	54
		% within Race	35.2%	64.8%	100.0%
	White	Count	2720	9159	11879
		% within Race	22.9%	77.1%	100.0%
	Other or Multiracial	Count	63	172	235
		% within Race	26.8%	73.2%	100.0%
Total		Count	3849	11036	14885
		% within Race	25.9%	74.1%	100.0%

Table 7

Pearson Correlation for Appointment Status and Age 2018

		Age	Appointment Status
Age	Pearson Correlation	1	.042**
	Sig. (2-tailed)		.000
	N	19483	14586
Appointment Status	Pearson Correlation	.042**	1
	Sig. (2-tailed)	.000	
	N	14586	15291

**. Correlation is significant at the 0.01 level (2-tailed).

Table 8

Pearson Correlation for Appointment Status and Age 2019

		Age	Appointment Status
Age	Pearson Correlation	1	.058**
	Sig. (2-tailed)		.000
	N	18884	14273
Appointment Status	Pearson Correlation	.058**	1
	Sig. (2-tailed)	.000	
	N	14273	14885

**. Correlation is significant at the 0.01 level (2-tailed).

Table 9

Appointment Status and Visit Type 2018

			Appointment Status		
			No-Show	Show	Total
Visit Type	Initial Evaluation	Count	216	765	981
		% within Visit Type	22.0%	78.0%	100.0%
	Initial Evaluation Tele-Med	Count	434	1142	1576
		% within Visit Type	27.5%	72.5%	100.0%
	Med-Check	Count	755	3133	3888
		% within Visit Type	19.4%	80.6%	100.0%
	Med-Check Tele-Med	Count	2272	6547	8846
		% within Visit Type	25.7%	74.3%	100.0%
Total		Count	3677	11614	15291
		% within Visit Type	24.0%	76.0%	100.0%

Table 10

Appointment Status and Visit Type 2019

			Appointment Status		
			No-Show	Show	Total
Visit Type	Initial Evaluation	Count	285	731	1016
		% within Visit Type	28.1%	71.9%	100.0%
	Initial Evaluation Tele-Med	Count	484	869	1353
		% within Visit Type	35.8%	64.2%	100.0%
	Hospital Discharge	Count	298	490	788
		% within Visit Type	37.8%	62.2%	100.0%
	Med-Check	Count	1041	4185	5226
		% within Visit Type	19.9%	80.1%	100.0%
	Med-Check Tele-Med	Count	1741	4761	6502
		% within Visit Type	26.8%	73.2%	100.0%
Total		Count	3849	11036	14885
		% within Visit Type	25.9%	74.1%	100.0%

Appendix A

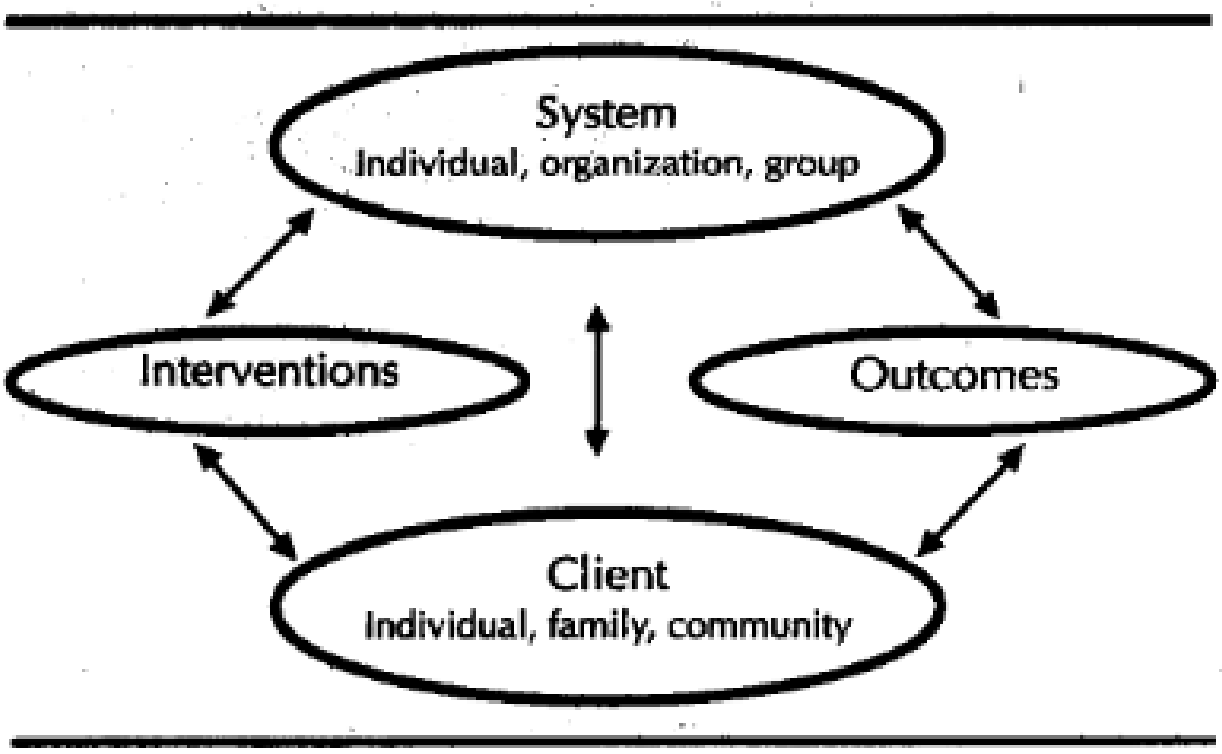

Figure 1. Quality health outcomes model (Mitchell, Ferketich, & Jennings, 1998).

Appendix B

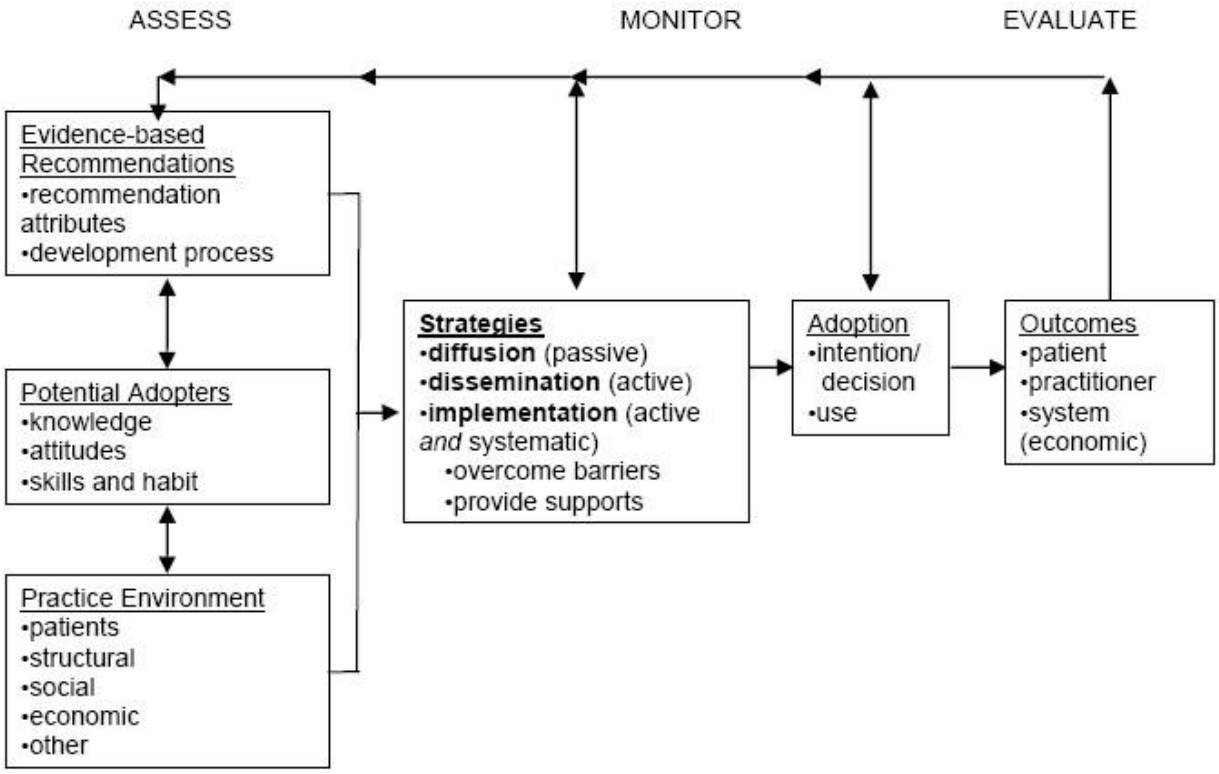

Figure 2. Ottawa Model of Research Use (Logan and Graham, 2003) as cited in McDonald, Graham, & Grimshaw, 2004.