

**A Phone Reminder System to Improve Adherence to Long-Acting Injectable Medications.**

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**Author Note**

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### Abstract

**Problem & Purpose:** A small, outpatient mental health clinic (OMHC) identified poor attendance for patients receiving a long-acting injectable (LAI) on a walk-in basis. Site data reviewed for August and September 2022 identified an average 20% “no show” rate with some weeks as high as 46%. Current literature has shown that missed appointments contribute to poorer patient outcomes and an increase in morbidity and mortality. **Purpose:** The purpose of this project was to implement and evaluate the effectiveness of electronic appointment reminders for long-acting injectable appointments in an OMHC. **Methods:** Implementation was from September 4, 2023, to December 11, 2023. An electronic reminder, text or phone call based on client preference, was sent to all clients due for an injection in addition to pre-existing reminder cards. A list was generated weekly by the injection nurse identifying those who were due for injections and sent to front desk staff to send out reminders. The nurse asked the clients if they received the reminder and recorded this information in a survey in a secure, HIPAA protected database (REDCap) using a secure URL. Data collected included the number of individuals due for an injection that week, those who received their electronic reminders, those who did not receive their reminders, and those who attended. **Results:** Data collected showed approximately 50% (n=21) of clients did not receive the reminder, despite 100% of clients being sent an electronic reminder. An average of 80% (n=21) of clients attended each week for their LAI. Electronic reminders may not have been received due to incorrect contact information or difficulty reaching group home residents. **Conclusions:** Reminders were more useful for outpatient clients than group-home residents, as group home residents were less likely to have a dedicated phone line or email.

*Keywords:* electronic reminder, long-acting injectables, outpatient mental health clinic

### **A Phone Reminder System to Improve Adherence to Long-Acting Injectable Medications**

Appointment adherence is imperative in maintaining psychiatric stability in many adults receiving treatment for mental health disorders. Avoiding the interruption in administration of long acting injectables (LAIs) is an important treatment modality for maintenance of psychiatric disorders. According to McQueenie et al. (2019), individuals diagnosed with one or more mental health disorders who miss multiple appointments per year have greater risk of mortality including unnatural causes such as suicide.

An outpatient mental health clinic (OMHC) identified the long-acting injectable clinic as an area in need of improvement and specifically wanted to address how to increase the number of individuals who receive their injections in a timely manner. Data collected and reviewed by the nurse who administers the injections for the site from August 2022 (n=109) and September 2022 (n=98) indicated that each week about 20% of clients did not show up the week that their injection was due, with some weeks as high as 46% of individuals being a “no show.” At the initiation of the project, there was no written policy for when the injection nurse reached out to the client to remind them that they were overdue for their injections, rather it was expected that the provider would notice that the person was non-compliant with their medication. Before implementation of this project, there was no specific policy or protocol in place for reporting missed injections. The nurse who administered the injections did report that after two missed injection clinics in a row, the nurse would often reach out to the provider to notify them of the missed injection and to the client to remind them to come for their injection because there is no specific protocol or policy in place.

Following the original process, after the injection was administered, the clients were provided with a written appointment reminder card with the date of their next due injection.

There were no other appointment reminders in place for the LAI clinic. The nurse sent the weekly list of clients who were due for their LAI to the front desk, so the front desk staff were aware of who to expect that week. In the original process, no electronic reminders were sent by the front desk for injections. The nurse was allotted 10 hours per week for injections and this time included the time spent tracking, ordering, administering, requesting refills, and documenting the injections. A theme identified within the root cause analysis was the lack of clear policies and plans for how and when to contact an individual to remind them of upcoming appointments and to prompt them to come in to receive the injection (Figure 1).

The purpose of this quality improvement project was to implement and evaluate the effectiveness of electronic appointment reminders for long-acting injectable appointments in an outpatient mental health clinic.

### **Available Knowledge**

A review (Table 1) and synthesis of the literature (Table 2) demonstrated a strong correlation between the use of electronic reminders and appointment adherence. A systematic review of available literature related to electronic reminders found that clinic attendance was improved by 11% on average using text message appointment reminders (Kashgary, et al., 2017). Teo et al. (2021) conducted a study in the Veterans Affairs system to determine what qualities made appointment reminders more helpful and what made them less effective. They found that simple, clear reminders were most effective and electronic reminders are effective.

Current evidence supports the use of electronic reminders as a cost-effective way of improving appointment attendance rates in similar clinics, which supports the use of these electronic reminders in the quality improvement project (Blaauw, et al., 2019). Being proactive by utilizing appointment reminder calls, including voicemail messages, has been shown to help with

appointment compliance and decrease no show rates (Teo, et al, 2017). Evidence clearly demonstrates that missed appointments contribute to poorer patient outcomes and an increase in morbidity and mortality such as increased emergency department visits, hospitalizations resulting in increased spending and overall poorer patient outcomes (Blaauw, et al., 2019, Kashgary, et al., 2017, Kravariti, et al, 2018, McQueenie, et al, 2019, & Teo, et al, 2017).

### **Rationale**

The PARiHS (Promoting Action on Research Implementation in Health Services) framework, shown in Figure 2, was utilized for this project. The elements included in the framework include evidence, context, and facilitation. Using the three elements of the PARiHS framework provided a guideline for the implementation and helped identify areas where the project could be modified and improved. The evidence was based on knowledge and research, the context was where the project was occurring, and the facilitation was the process by which the Quality improvement project lead (QIPL) educated and assisted stakeholders with creating buy-in for the project (Kitson, et al., 1998). Each of these elements was significant in the successful implementation (SI) and required a rating to be assigned as part of the evaluation (Helfrich, 2007). The use of the PARiHS framework allowed for review of the implementation of the project and or identifying specific areas which required improvement which is important in this project.

The purpose of this quality improvement (QI) -project was to implement and evaluate the effectiveness of electronic appointment reminders for long-acting injectable appointments in an outpatient mental health clinic.

### **Methods**

#### *Context*

Implementation of this project was identified as a priority by the injection nurse and providers after anecdotal evidence was presented by the injection nurse regarding the number of clients who missed their injections each week. The injection nurse estimated that some weeks, up to 50% of clients missed their injections. Review of two months of data in 2022 supported this claim, with an average of almost 30% (n=109) of injections being marked as “no shows” each week. This organization is a smaller, independent non-profit organization that requires special attention to use of financial, personnel, and time resources due to financial constraints and overtime pay limitations.

When the project was presented to the front desk staff, who were responsible for sending the electronic reminders, it was met with a positive response. The injection nurse also shared a similar response to the plan, and this was important because they were responsible for obtaining and submitting the information about the appointment attendance and electronic reminders. The organization, including providers, the injection nurse, and administrative staff, recognized the increased costs associated with missed appointments and the evidence supporting the use of electronic reminders. The OMHC had utilized electronic reminders for medication management and therapy appointments for five years but had not used them for the long-acting injectable clinic. There were no additional costs or new skills needed to extend these reminders to the long-acting injection clinic.

The OMHC currently administers the injections at a “walk-in” style LAI clinic on Thursday of each week. Clients are not considered late for their injection until they miss two “walk-in” days, Thursday to Thursday, because they have a full week span to receive their injection. This week timeframe is important because the assigned injection nurse will not begin to reach out until after the client is a “no show” for the week. There are no scheduled

appointments, however in the pre-implementation current process the injection nurse provided a written appointment reminder to each client including their next injection date (Figure 3). The site does have the capability to send electronic reminders and utilizes this for psychiatric medication management and therapy appointments but not for injections. These electronic reminders, either a text, phone call or email, selected by the client, are currently sent out by the front desk staff based on daily appointment lists.

### ***Intervention***

The purpose of this project was to implement an electronic appointment reminder system in the outpatient mental health clinic to determine if this can improve appointment attendance for LAI injections. Since the evidence has shown electronic reminders via email, text message or phone call improve appointment attendance rates, the intervention included the utilization of one or more of the methods based on the client's identified preference, which is already selected in their electronic medical record.

In the post-implementation plan, each week on Monday, or the first day of the week the clinic is open if it is closed for a holiday or emergency closure, the injection nurse sent a list of clients due for injections that week to the front desk staff via email. Four front desk staff received this list each week, a manager, assistant manager, and two front desk staff. This list was sent to notify the front desk staff of who to expect each week. The intervention change occurred when the front desk manager and assistant manager reviewed the list and sent the electronic reminder for the LAI appointments (Figure 4). Tracking of receipt of the electronic reminders was done when the clients arrived for their injection and was recorded by the injection nurse. The nurse asked the clients when they attended their appointments if they received their electronic reminders that week. The nurse recorded this as a "yes" or "no" in the injection note. Only the

number of yes or no responses were entered into the Weekly Injection Report Tool (Appendix A) through a URL into REDCap, a secure, HIPAA compliant, password protected server with dual authentication. The nurse also reported how many individuals were due for their injections that week and how many people came for their injections that week as total numbers and entered the numbers into REDCap.

### *Measurement*

During the initial implementation of the project, a URL link was found to be easier to use for the injection nurse and the change from the original plan to use a QR code was made to improve buy-in. The nurse found the URL being emailed each week was less time consuming and they were more familiar with this type of survey than the QR code. The Weekly Injection Report Tool (Appendix A) was designed to avoid the use of any patient protected information. The change to using a URL was made, and no other barriers have been identified by the project lead or reported by the participants. A survey link containing the weekly injection report tool was sent to the injection nurse each week to be completed on the day of the walk-in clinic, usually Thursday, although the date changed if the clinic was closed for any reason.

The structure goal for this project was that 100% of clients will be sent an electronic reminder of their LAI appointment over the next 14 weeks. Structure measurement included the use of a “yes” or “no” question regarding receipt of their electronic reminders, asked of the clients when they arrive for their injection. Data collected was used to create a percentage using the number of electronic reminders sent (numerator) over the number of clients on the injection list (denominator).

The process goal was 100% of clients will receive an electronic reminder of their upcoming LAI appointment over the next 14 weeks. Data collected generated a percentage using



the number of clients who received their electronic reminders divided by the number of clients who were sent a reminder. The outcome measure for this project was 100% of clients due for their LAI will receive their LAI after receiving an electronic reminder over the next 14 weeks and a percentage was generated using the number of clients who attended for their injection divided by the number of clients who were on the list to receive their injection.

### ***Ethics***

This quality improvement project was conducted under a Non-human Subject's Research determination from the Human Research Protections Office (HRPO) of the UMSOM Institutional Review Board. The organization does not have an institutional review board (IRB) or ethics board and accepted the University of Maryland's IRB. Data was collected in a secure, private office and submitted securely through a URL link to REDCap, a secure, HIPAA compliant, password protected server with dual authentication. No client identifiers were used, minimizing the risk of loss of confidentiality.

Ethical considerations include the project lead is an employee of the agency, has occasionally worked on the injection unit of the clinic, and has overlap with clients who are included in the project. To avoid ethical conflicts and bias during the project implementation, the project lead was not assigned to cover the injection unit. Additionally, the project lead was not assigned to collect or enter data and the injection nurse entered all collected data using a URL into REDCap.

### **Results**

During the project implementation, the injection nurse collected data using the weekly injection report tool (Appendix A). Data collected included how many clients received an

electronic reminder, how many clients did not receive an electronic reminder, and how many clients attended the clinic. Percentages were calculated for the number of clients sent an electronic reminder divided by the number of clients on the list due to attend, percentage of reminders received divided by the numbers of reminders sent, and the percentage of clients who received an injection as the number of clients who attended the clinic divided by the number of clients due to attend.

During the fourteen weeks of data collection, 100% of clients were sent an electronic reminder (Figure 5). The median number of clients sent reminders each week was 20.5. The lowest number of electronic reminders sent was in week 8, with 14 clients being sent a reminder. Week 12 was a week following a holiday, so there were 32 clients sent reminders. This high number of clients was likely due to poorer attendance the previous week due to the holiday. During the implementation, 100% of the clients listed on the weekly injection list were sent an electronic reminder to their selected method of communication.

Data collection demonstrated that less than 100% of clients received their electronic reminders each week (Figure 6). Week five of data collection saw the lowest percentage of electronic reminders being received for a full week, 34.80% (n=8) with the total number of clients attending (n=23). Week 12, a shortened week where the OMHC was closed on Thursday due to a holiday, had the lowest total received electronic reminders, with 11% (n=1). The greatest week of electronic reminders received is week seven, with 55.60% (n=10).

During the weeks of data collection, there was less than a 100% attendance for the clinic each week (Figure 7). The median attendance was 80% during the data collection period, with a goal of 100%. Week 7 had the highest attendance of the entire data collection period with 95% (n= 18) of clients due for the clinic attending. Week twelve was a week where Thursday, the

standard walk-in injection day, fell on a holiday. During this shortened week, attendance for the clinic was the lowest (n=9), with 39% of those due for an LAI attending the clinic, but it was attributed to the holiday disruption.

### **Discussion**

During the implementation of the QI project, 100% of clients were sent their electronic reminders based on the weekly injection list. At no point during the data collection of the QI project was the goal of 100% of clients attending or receiving their electronic reminders met, even with all clients on the list being sent an electronic reminder. Failing to meet the goals of 100% for receiving the reminders or attending the clinic, may have indicated that many individuals were not receiving electronic reminders. Anecdotally, discussion between the QIPL and the clients and injection nurse have indicated that many clients, particularly the clients who reside in group homes, were not receiving the reminders.

Descriptive data showed that there was a significant gap between the number of clients coming for their LAI and receiving the electronic reminders. Two possible causes for the client not receiving their electronic reminders were identified, one cause was that some of the clients receiving an LAI reside in a psychiatric residential program group home and they do not have a dedicated phone line or personal cell phone. While some of this could be inaccurate contact information, further intervention with additional follow-up for identifying the cause would be helpful for better understanding how to improve people receiving the electronic reminders.

Even with the less QI project not meeting the goal of 100% of clients receiving their electronic reminder and attending for their injection each week, the facility plans to continue with the intervention due to positive anecdotal feedback, limited costs to implement and potential for improved attendance based on prior literature and research. The addition of a client

verification system for receipt of reminder may prove valuable as well as sending out more than one reminder, for example one week prior to the date and one day prior to the date.

This QI project could have limited internal validity due to possible imprecision in the project design such as the use of the nurse to collect data. The possibility of bias can exist when having an invested party attempting to collect data and have “better outcomes.” The project was reviewed, and attempts were made to minimize the potential of bias and imprecision in design during the pre-implementation phase. The attempts included ensuring that the QIPL was not assigned to give injections if the regular injection nurse was unavailable and ensuring that the QIPL was not collecting or entering data using the Weekly injection report tool.

### **Conclusion**

Adherence to medications and appointments is a known factor in improving patient outcomes and the usefulness of this project may be limited to facilities that do not utilize appointments for their long-acting injectables, but it. The implementation of the electronic reminders was met with anecdotal positive feedback from clients. One client stated that “I’m really glad that you all started doing these texts things. They help me remember better than the cards.” The anecdotal feedback was met with enthusiasm by the injection nurse and relayed to the QIPL and was a strong support for the continued use of the intervention.

The cost to implement this intervention was zero, as many of the intervention steps were already in place and only required minimum modification to current processes in place. The changes to the intervention did not result in any overtime or unnecessary expenses. The return of investment for this project was not measured but could be estimated using the increased attendance to other appointments including therapy and medication management due to improved stability for the clients. Additional QI projects could include extending this project to

assess the return on investment, identifying the best type of electronic reminder for patient attendance and updating patient's preferred method of contact.

Utilization of the of many systems already in place in the OMHC, such as the ability to send electronic reminders, an assigned injection nurse, and the use of the list of clients due for injections each week already being generated made this QI project a cost-effective project. This QI project was easily adopted into the routine with little modification to the processes already in place, which also contributed to the facility deciding to adopt and use this intervention.

### References

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**Table 1**  
*Literature Evidence Review*

<p>Blaauw, E., Riemersma, Y., Hartsuiker, C., Hoiting, J., &amp; Venema, S. (2019). The influence of a short message service reminder on non-attendance in addiction care. <i>Substance Use &amp; Misuse</i>, 54(14), 2420–2424. <a href="https://doi-org.proxy-hs.researchport.umd.edu/10.1080/10826084.2019.1650774">https://doi-org.proxy-hs.researchport.umd.edu/10.1080/10826084.2019.1650774</a></p> <p>Level: IIB – Assigned this rating because this is a quantitative study with a large sample size. The intervention was specific to the proposed topic. Fairly consistent results.</p>					
Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions
<p>The purpose of this study was to determine if short message (SMS) reminders could improve appointment attendance in individuals receiving outpatient substance use treatment.</p> <p>The researchers expected a lower non-attendance rate in individuals who received a short message service (SMS) reminder. They also hypothesized that SMS would be more effective for follow-up appointments than the initial intake appointments.</p>	<p>Explanatory, quantitative study</p>	<p>Sampling: Purposeful Setting: Netherlands Specialized Substance Use Clinic Participants: 12,797 unique clients Total of 193,474 appointments 28,086 intake appointments 165,388 follow up (treatment) appointments. 76.9% men.  Ages 10 to 89 years old (Average 38.45 years). Excluded: Group treatment contacts, medication assisted</p>	<p>Registrations of appointments were gathered for two years prior to SMS and two years after implementation for adults and 1 year before and after for the children due to late adoption of SMS.</p> <p>Demographics were gathered and appointments were classified as either intake or follow up.</p> <p>Group 1- SMS was sent before the appointment. Group 2- SMS was not sent before the appointment.</p>	<p>Non-attendance: “not showing up at an appointment with a practitioner regardless of the reason”</p> <p>Appointments were coded as attended (1) or non-attended (2)</p>	<p>Conclusion: Individuals who received an SMS message reminder for appointments showed lower non-attendance, although it may not be statistically significant and further research is indicated.</p>



		treatment appointments (MAT), and inclement ways.			
<p>Kashgary, A., Alsolaimani, R., Mosli, M., &amp; Faraj, S. (2017). The role of mobile devices in doctor-patient communication: A systematic review and meta-analysis. <i>Journal of Telemedicine and Telecare</i>, 23(8), 693–700. <a href="https://doi-org.proxy-hs.researchport.umd.edu/10.1177/1357633X16661604">https://doi-org.proxy-hs.researchport.umd.edu/10.1177/1357633X16661604</a></p> <p>Level: IIIA- Assigned rating as this was a systematic review with meta-analysis. High quality articles with definitive conclusions.</p>					
Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions
<p>The purpose of this study was to look at the health outcomes associated with the use of mobile devices, particularly SMS, in patient-doctor communication.</p>	<p>Systematic review with meta-analysis.</p>	<p>A review was conducted of the following databases, including MEDLINE, EMBASE, PsycINFO, Global Health, and Cochrane CENTRAL. Searches for clinical trials that investigated mobile-device technology in any facet of doctor–patient communication published between 1990 and April 2015.</p> <p>Inclusion: Calls or SMS via a mobile device had to be the only intervention in the trial arm.</p> <p>Exclusion: Duplicates, abstracts only, study protocols, reviews, eliminated by title and abstract. Excluded studies on smartphone applications. Combined mobile technology and other interventions not used in control group were also excluded.</p> <p>Sixty-two articles met inclusion criteria: 23 articles investigated mobile appointment reminder technologies, 19 investigated medication adherence, 20 investigated disease-control interventions, and two investigated test-result reporting.</p>	<p>A meta-analysis was performed where appropriate.</p> <p>Comparison of clients who received appointment reminders and those who received no intervention.</p> <p>Additionally mobile interventions were compared to no intervention for medication adherence.</p>	<p>Systematic review of evidence looked at how appointment attendance compared with clients who received no appointment reminders and those who received a reminder.</p>	<p>Mobile-device technologies- specifically SMS reminders- provides a moderate but significant improvement in in appointment attendance and medication adherence. More research is needed to continue to identify ways mobile technologies can improve health outcomes.</p> <p>Clients who received an appointment reminder were 10% less likely to miss an appointment.</p> <p>Ten of 20 studies examining disease control reported statistically significant reductions in clinically meaningful endpoints.</p> <p>Of particular interest, clinic attendance was improved by 11% on average by the uses of text message appointment reminders.</p>

		Heterogeneity: Determined using the I 2 statistic and by visually examining funnel plots.			
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Kravariti, E., Reeve-Mates, C., Da Gama Pires, R., Tsakanikos, E., Hayes, D., Renshaw, S., McAllister, S., Bhavsar, V., Patterson, P., Daley, E., Stewart, J., Pritchard, M., Shetty, H., Ramsay, R., Perez-Iglesias, R., & McGuire, P. (2018). Effectiveness of automated appointment reminders in psychosis community services: A randomised controlled trial. *BJPsych Open*, 4(1), 15–17. <https://doi-org.proxy-hs.researchport.umd.edu/10.1192/bjo.2017.7>

Level: IB – Assigned rating as this is a randomized control trial with small sample size. Generalizable with fairly definitive conclusions and recommendations.

Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions
<p>The purpose of this study was to report on the use of SMS reminders in individuals with psychosis in the community and their appointment compliance.</p> <p>The researchers hypothesized that patients receiving SMS reminders would miss fewer appointments compared with the controls.</p>	<p>Open-label randomized Control Trial with parallel group design.</p>	<p>Sampling Technique: randomized using an online tool.</p> <p>Eligible Participants: Mobile phone ownership, ability to make decisions, willingness to participate and signed consent.</p> <p>Setting: Outpatient mental health clinic in London serving adults.</p> <p>Excluded: Unable to consent or unwilling to participate. No mobile phone.</p> <p>Accepted: 95 included total, but only n=75 had appointments during the Feb-July interval.</p> <p>Control: 49 allocated to</p>	<p>Participants were randomly assigned to received or not receiving a text message appointment reminder 7 days and 1 day before in addition to all participants receiving the standard practice reminders of a letter.</p> <p>An automated reminder was sent to those in the intervention arm. Data was anonymous and collected from February 2014-July 2014 with analysis occurring between September 2014 and March 2015.</p>	<p>Comparison of attended or missed appointments with stratification of diagnosis.</p>	<p>Marked improvement in appointment attendance in those who received SMS reminders versus those who did not.</p> <p>Further research is indicated as there was some imbalance in the number of appointments even with balanced allocation.</p>

		<p>control arm and 14 did not have an appointment. End 35 control.</p> <p>Intervention: 46 included in the intervention and 6 did not have appointments. End 40 intervention.</p> <p>Power Analysis: N=75</p> <p>Group Homogeneity: Similar in diagnosis but adjustments were made and compared, but demographics were limited due to deidentified data.</p>			
<p>Low, P. T., Ng, C. G., Kadir, M. S., &amp; Tang, S. L. (2021). Reminder through mobile messaging application improves outpatient attendance and medication adherence among patients with depression: An open-label randomised controlled trial. <i>The Medical Journal of Malaysia</i>, 76(5), 617–623.</p> <p>Level: IB- Assigned this rating as this a randomized control trial with an appropriate sample size. Findings are fairly consistent and provide some recommendations. There were a number of identified limitations.</p>					
<p><b>Purpose or Hypothesis</b></p>	<p><b>Type of Evidence and Research Design</b></p>	<p><b>Sample (population, size, setting)</b></p>	<p><b>Intervention Procedures</b></p>	<p><b>Primary Outcome/Measures</b></p>	<p><b>Results Conclusions</b></p>

<p>The primary goal of this study was to assess the use of text messages on outpatient attendance rates and medication adherence. Secondary goals included determining changes in depression severity, identify reasons for missed appointments and preferences of treatment reminders.</p>	<p>Open-label, Randomized control trial</p>	<p>Sampling Technique: randomized.</p> <p>Eligible Participants: n=193 Adults over age 18 and newly diagnosed with major depressive disorder (MDD) and prescribed at least one antidepressant. Must be capable of reading and understanding either English or Bahasa Malaysia, own a smartphone, and consented to the study.</p> <p>Setting: Two outpatient psychiatric settings in Malaysia between February and June 2020</p> <p>Excluded: Severe psychiatric or medical conditions which could impact their cognitive function or physical abilities.</p> <p>Accepted: n=183</p> <p>Control: n=91 (3 withdrew before the end of the study n=88)</p> <p>Intervention: n=92 (1 withdrew before the end of the study n=91)</p> <p>Group homogeneity: Similar gender make-up in control and intervention group.</p>	<p>Intervention group received both reminder types- medication adherence mobile messages and the control group received no messages.</p> <p>Attendance was tracked and the intervention group received one reminder for rescheduling.</p>	<p>Primary outcomes were attendance rates and medication adhere using a BARS. Attendance was determined by dividing the number of appointments by the number of missed appointments. Appointments cancelled by the clinician were removed from the analysis.</p> <p>Secondary studies looked at changes in the MADRS scale.</p>	<p>This study demonstrated that reminders using mobile messaging are effective in improving outpatient appointment and medication adherence. The intervention group was 20% higher than the control group with attendance at two months.</p> <p>Limitations included no confirmation receipts required, COVID-19 lock-down and treatment queries were limited.</p> <p>Future research recommendations include larger sample size, more diversity in diagnosis.</p>
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		Diagnosis MDD. Similar demographics including education, occupation, ethnicity and marital status.			
<p>Teo, A. R., Metcalf, E. E., Strange, W., Call, A. A., Tuepker, A., Dobscha, S. K., &amp; Kaboli, P. J. (2021). Enhancing usability of appointment reminders: qualitative interviews of patients receiving care in the Veterans Health Administration. <i>Journal of general internal medicine</i>, 36, 121-128.</p> <p>Level: IIIB- Assigned this rating as this study was a qualitative analysis. The sample size was small, but the results are generalizable. Results were reasonably consistent and supported by the evidence.</p>					
<b>Purpose or Hypothesis</b>	<b>Type of Evidence and Research Design</b>	<b>Sample (population, size, setting)</b>	<b>Intervention Procedures</b>	<b>Primary Outcome/Measures</b>	<b>Results Conclusions</b>

<p>The purpose of this study was to review the client’s perceptions and experience of appointment reminders.</p>	<p>Qualitative Analysis Collected as part of randomized controlled pragmatic clinical trial.</p>	<p>Sampling Technique: Purposeful sampling</p> <p>Setting: Department of Veteran’s Affairs hospital and satellite clinics.</p> <p>n=27 patients</p> <p>VA clients who had at least one upcoming appointment at primary or mental health care in VA Portland Health Care System. Recruitment of individuals with diversity across characteristics of interest.</p> <p>In-person interviews conducted March – July 2019.</p> <p>Ages 34 to 75</p> <p>67% male</p> <p>78% white</p>	<p>Interviews conducted in five continuous waves using semi-structured interview questions. Interviews were reviewed for themes and quotations that recognized the themes of limitations, strategies, and recommendations.</p> <p>All but two interviews were audio recorded and transcribed. Participants were compensated \$20.</p>	<p>Limitations of current reminders include excessive information, frustrating telephone systems when returning calls, missing or unclear instructions in reminders and reminder fatigues.</p> <p>Identified strategies for appointment compliance included use of a calendar, combined strategies, highlighting and piggybacking.</p>	<p>Appointment reminders are useful in preventing “no show” cancellations but there are changes that need to be made to be more useful for clients.</p>
<p>Thomas, I. F., Lawani, A. O., &amp; James, B. O. (2017). Effect of short message service reminders on clinic attendance among outpatients with psychosis at a psychiatric hospital in Nigeria. <i>Psychiatric Services</i>, 68(1), 75–80. <a href="https://doi-org.proxy-hs.researchport.umd.edu/10.1176/appi.ps.201500514">https://doi-org.proxy-hs.researchport.umd.edu/10.1176/appi.ps.201500514</a></p> <p>Level: IB- Assigned this level for a randomized control trial with an appropriate sample size. Well supported by evidence but significant limitations were noted with recommendations for further research. May not be generalizable due to location and first onset psychosis.</p>					
<p><b>Purpose or Hypothesis</b></p>	<p><b>Type of Evidence and Research Design</b></p>	<p><b>Sample (population, size, setting)</b></p>	<p><b>Intervention Procedures</b></p>	<p><b>Primary Outcome/Measures</b></p>	<p><b>Results Conclusions</b></p>

<p>The purpose of this study was to determine if individuals with first-break psychosis who received services at an outpatient clinic were more likely to attend their follow up appointment after receiving an SMS reminder. They hypothesized that an appointment attendance rate of 85% could be reached with the SMS intervention.</p>	<p>Randomized controlled trial.</p>	<p>Sampling Technique: randomization</p> <p>Eligible Participants: Individuals aged 18 to 64 who are receiving treatment for their first episode psychosis who never sought treatment at an appropriate psychiatric treatment facility. They must be able to consent, have a working cell phone, could read, and understand a text message written in English. n=200</p> <p>Setting: Tertiary psychiatric clinic in Nigeria.</p> <p>Excluded: Required acute, inpatient psychiatric care, severe medical comorbidity or required care in between their scheduled appointment due to acuity.</p> <p>Accepted: n=192</p> <p>Control: n=95</p> <p>Intervention: n=97</p> <p>Group Homogeneity: Both groups are comparable in age, gender, education, symptomology, and severity of disease.</p>	<p>Both groups received appointment reminder cards, but the intervention group also received SMS text reminders of their upcoming appointments five and three days before the appointment.</p>	<p>The primary outcome measured was the number of missed follow up appointments.</p>	<p>Individuals who received SMS reminders were almost twice as likely to attend their appointment when compared with the control group. These text message reminders improve clinic attendance among individuals during their first psychotic break.</p> <p>Limitations included being unable to verify receipt of the messages. Also access to care may be limited in Africa and applicable only to those who receive care at a psychiatric hospital. Telephone calls may also be more effective but were not studied in this trial. Specific only to first episode psychosis, requiring further research for other diagnoses.</p>
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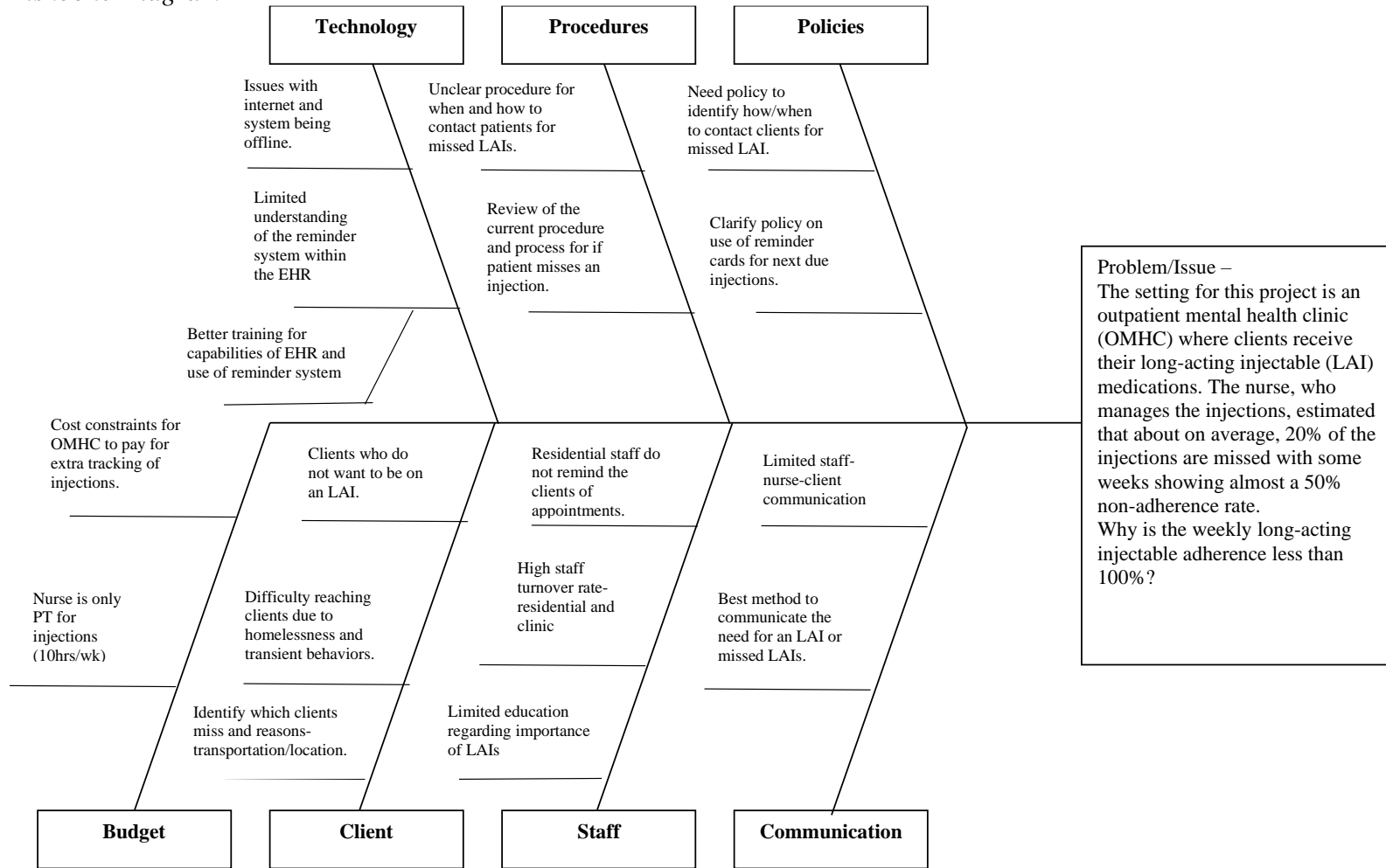
**Table 2**  
*Evidence Synthesis Table*

Project Title: <b>A Phone Reminder System to Improve Adherence to Long-Acting Injectable Medications</b>			
JHNEBP Model Level	Total Number of Sources	Author and Quality Rating of each study	Synthesis of Findings
<p><b>Level I</b></p> <p>Experimental study · Randomized Controlled Trial (RCT) · Systematic review of RCTs with or without meta-analysis</p>	2	<p>Kravariti, et al.- B</p> <p>Thomas, et al.- B</p> <p>Low, et al.- B</p>	<p>Both studies demonstrated positive findings for the use of short messaging services (SMS) to support appointment attendance, demonstrating statistically significant improvement in appointment attendance. Both recognize the limitations of their RCT due to sample sizes. Thomas (2017) and Low (2021) mention concerns about specifics of the population as well as verification that messages were received/</p>
<p><b>Level II</b></p> <p>Quasi-experimental studies · Systematic review of a combination of RCTs and quasi-experimental studies, or quasi-experimental studies only, with or without meta-analysis</p>	1	<p>Blauuw, et al.- B</p>	<p>SMS reminders were associated with a statistically significant lower non-attendance rates than those who did not receive a reminder, with intake appointments showing a greater attendance rate. However, the rate of improvement was small and additional studies are recommended.</p>
<p><b>Level III</b></p> <p>Non-experimental study · Systematic review of a combination of RCTs, quasi-experimental, and non-experimental studies, or non-experimental studies only, with or without meta-analysis · Qualitative study or systematic review of qualitative studies with or without meta-synthesis</p>	3	<p>Kashgary, et al.- A</p> <p>Nokuthula, et al.- B</p> <p>Tofighi, et al.- B</p>	<p>Kashgary (2017) completed a large systematic review with metanalysis that demonstrated through the literature that mobile technologies, particularly SMS, provide a moderate but significant improvement in appointment attendance and medication adherence.</p> <p>Nokuthua (2021) and Tofighi (2017) both used feasibility studies to determine the usefulness of SMS for appointment reminders among other possible uses.</p>
<p><b>Level IV</b></p> <p>Opinion of respected authorities and/or reports of nationally recognized expert committees/consensus panels based on scientific evidence</p>	0		

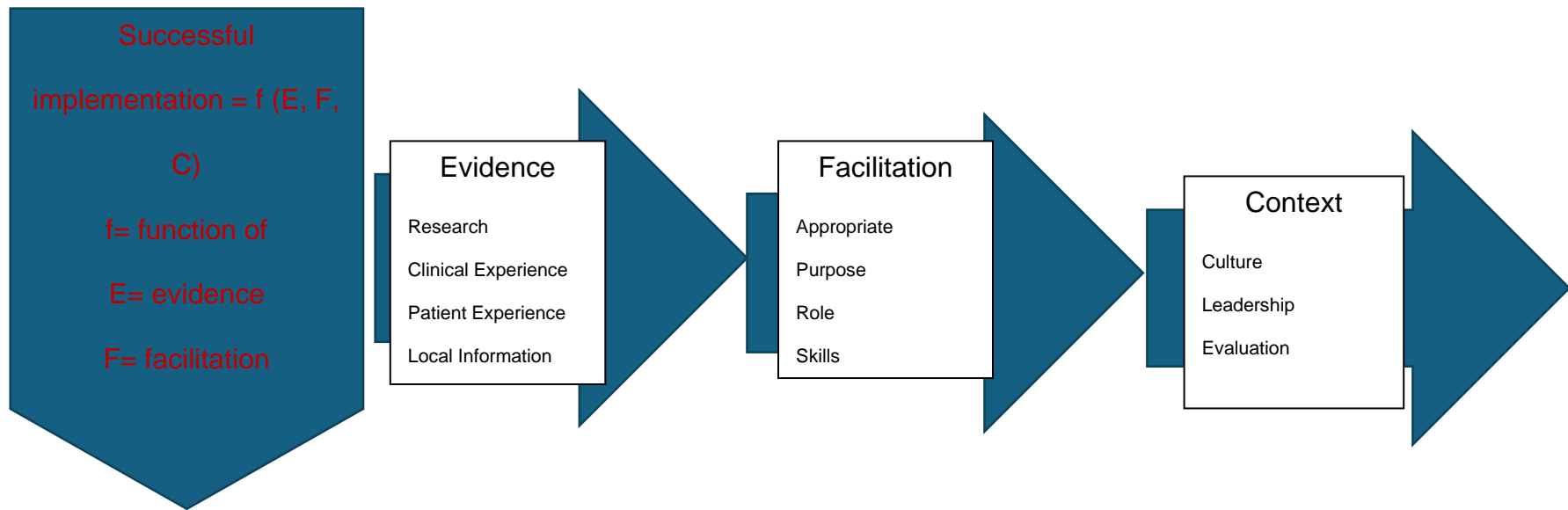


<p><b>Level V</b>                  Evidence obtained from literature reviews, quality improvement, program evaluation, financial evaluation, or case reports · Opinion of nationally recognized expert(s) based on experiential evidence</p>	<p>0</p>		
<p>Overall Quality Rating w/rational and Recommendation:</p>			
<p>Recommendations Based on Evidence Synthesis: Good and consistent evidence – practice change</p>			

**Figure 1**  
*Fishbone Diagram*



**Figure 2**  
 Framework  
 Promoting Action on Research Implementation in Health Services (PARiHS)

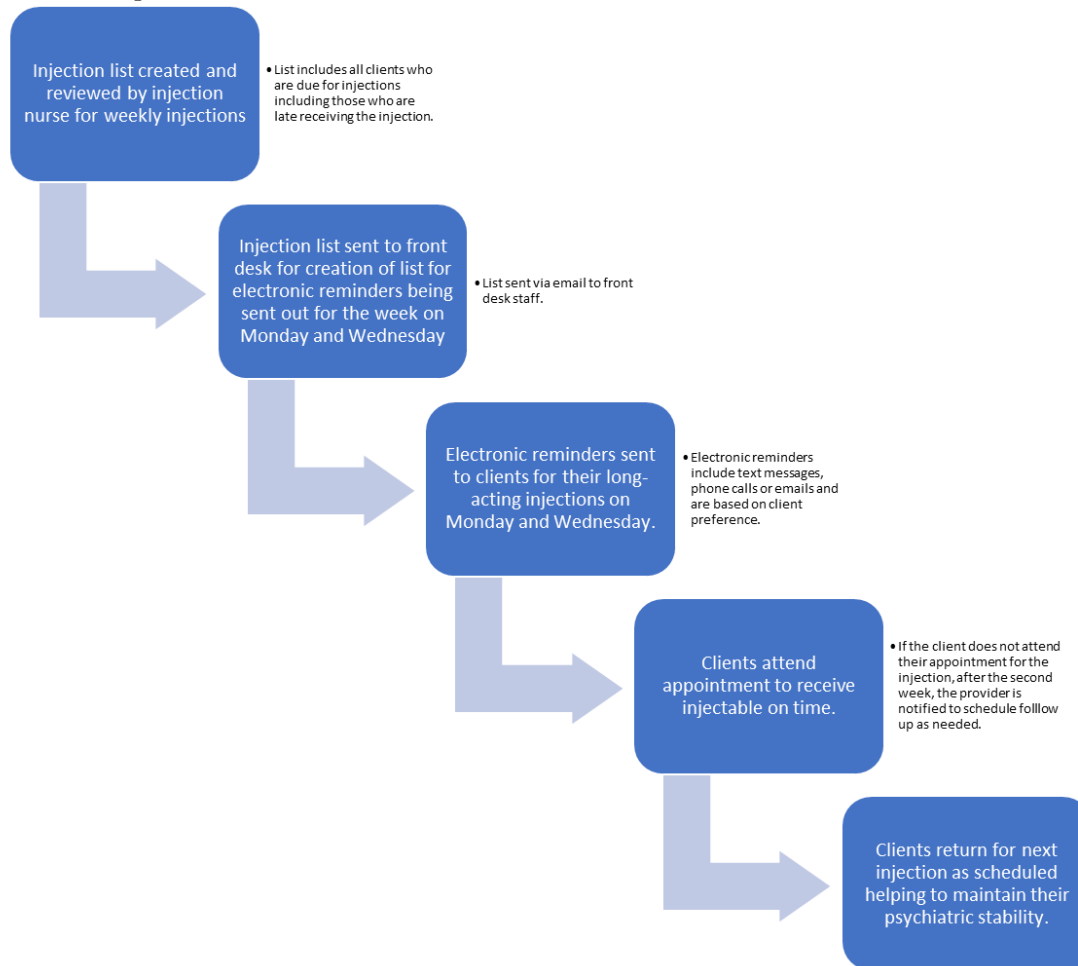


*Note.* Adapted from Kitson, et al. 1998, Enabling the Implementation of Evidence Based Practice: A Conceptual Framework.

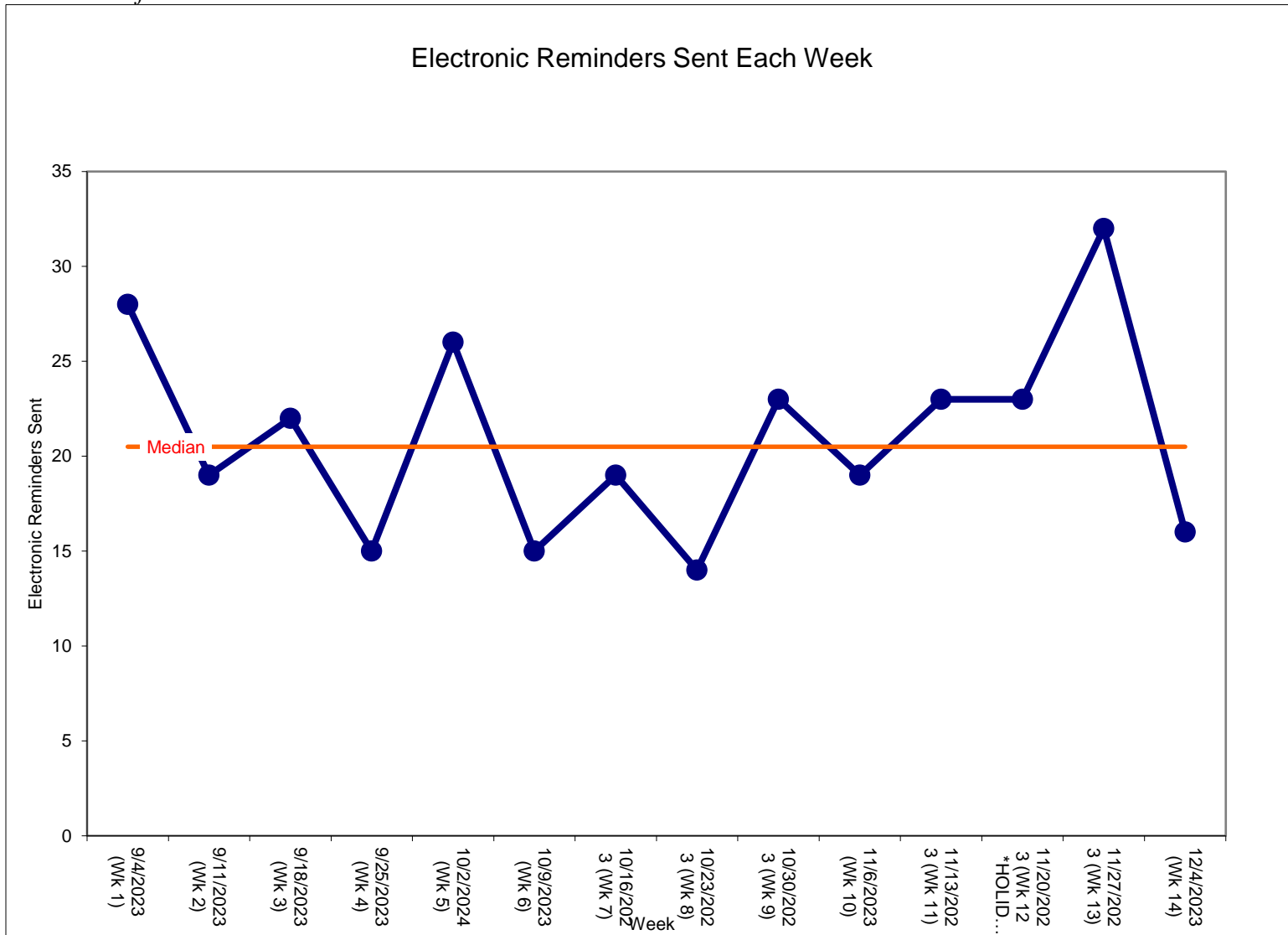
**Figure 3**  
*Current Process Map*



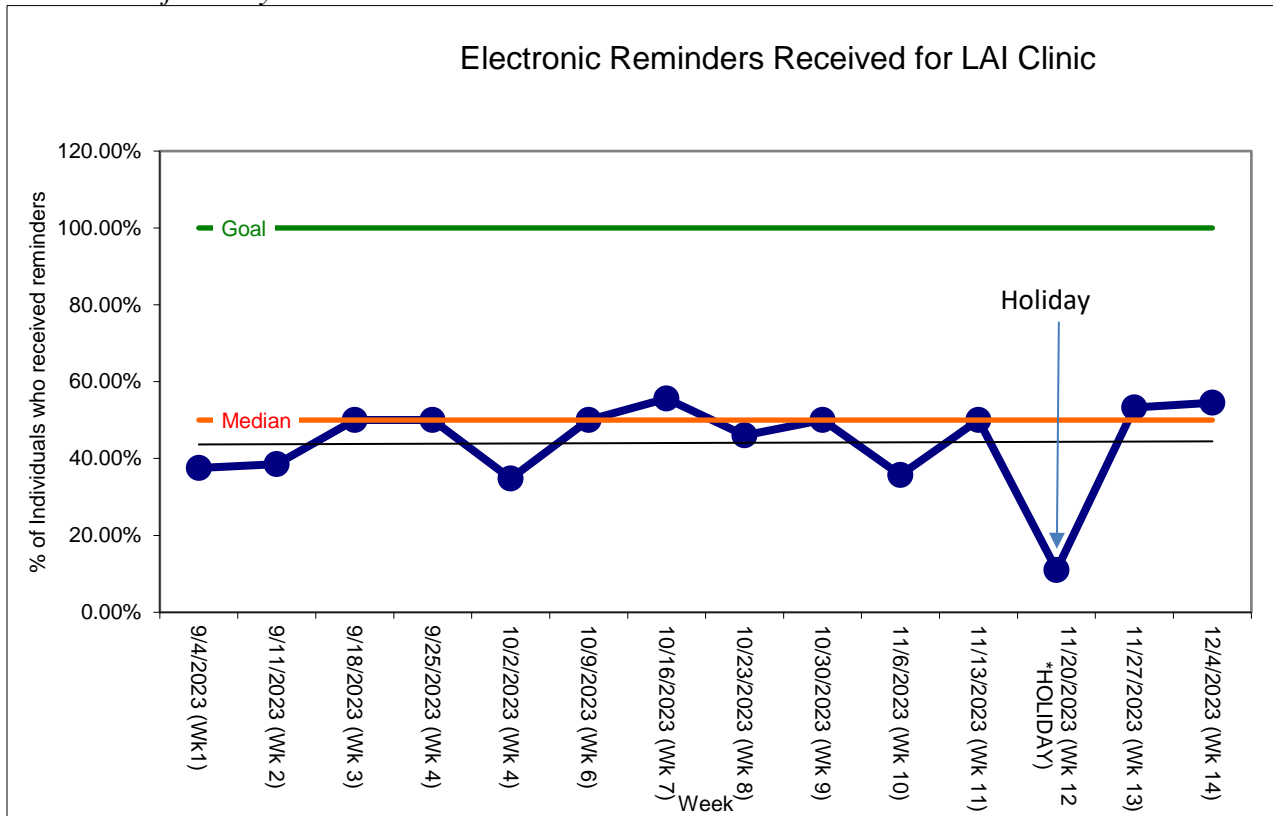
**Figure 4**  
*Desired Process Map*



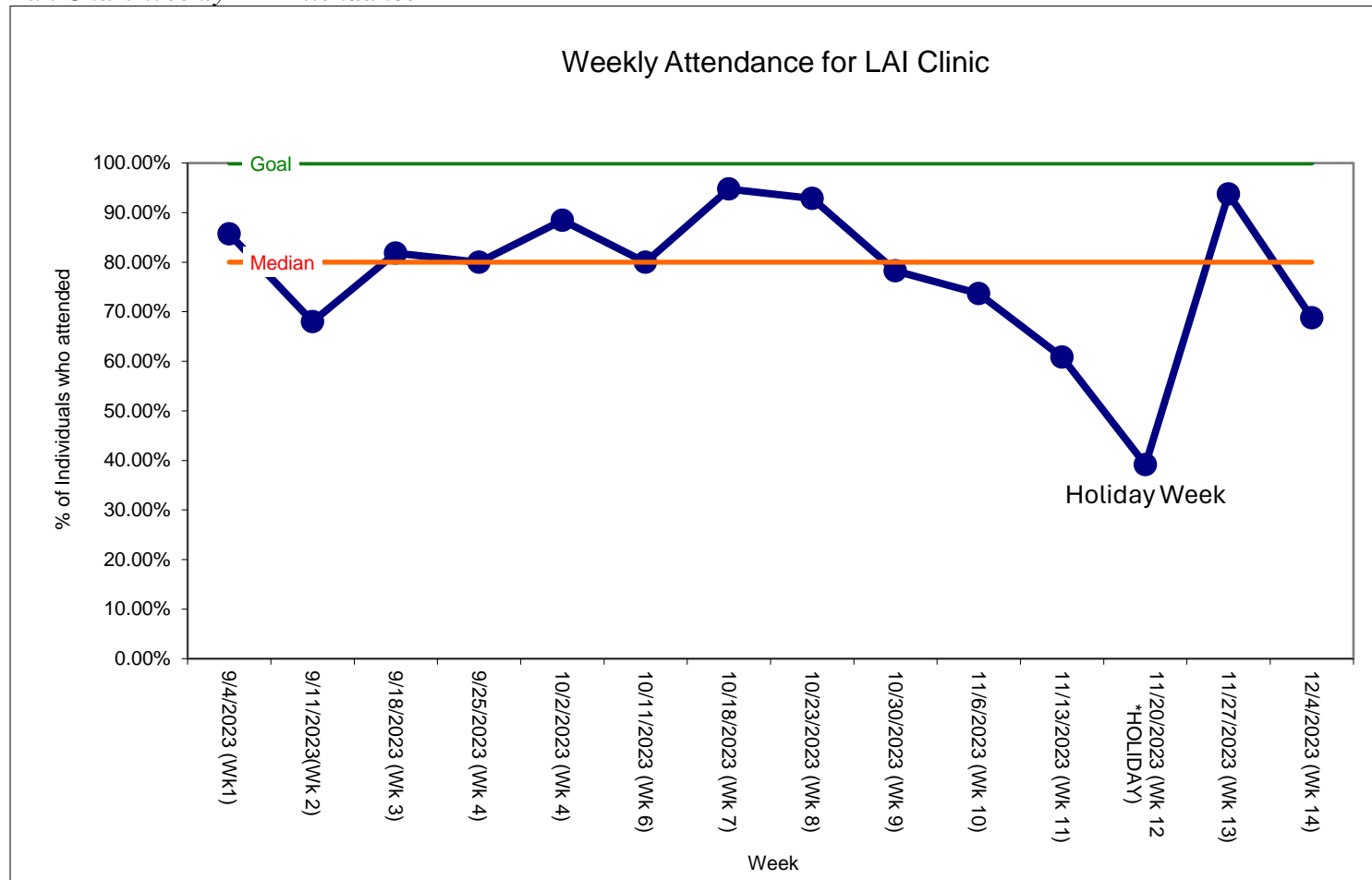
**Figure 5**  
*Run Chart of Electronic Reminders Sent*



**Figure 6**  
*Run Chart of Weekly Reminders Received*



**Figure 7**  
Run Chart Weekly LAI Attendance





**Appendix A**

*Measures- Weekly Injection Report Tool*

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**Weekly Injection Report Tool**

Page 1

Please complete the survey below.

Thank you!

- 
- 1) Was the injection list sent to the front desk staff?  Yes  
 No

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  - 2) How many clients received an electronic reminder? \_\_\_\_\_

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  - 3) How many clients did not receive an electronic reminder? \_\_\_\_\_

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  - 4) How many clients attended the clinic for the LAI? \_\_\_\_\_

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  - 5) How many clients were scheduled for injections this week? \_\_\_\_\_