

Summer 8-3-2022

Increasing Appointment Adherence in Patients with Diabetes Mellitus via Appointment Reminders and Patient Education

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DOI: <https://doi.org/10.46409/sr.RHKU8033>



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Guy, L. (2022). *Increasing Appointment Adherence in Patients with Diabetes Mellitus via Appointment Reminders and Patient Education*. [Doctoral project, University of St Augustine for Health Sciences]. SOAR @ USA: Student Scholarly Projects Collection. <https://doi.org/10.46409/sr.RHKU8033>

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**Increasing Appointment Adherence in Patients with Diabetes
Mellitus via Appointment Reminders and Patient Education**

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This Manuscript Partially Fulfills the Requirements for the
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Approved: July 17, 2022

Abstract

Practice Problem: Appointment no-shows and nonadherence have been an organization-wide concern within the project setting, resulting in increased healthcare costs and workload while disrupting the continuity of patient care.

PICOT: The PICOT question that guided this project was: In adult diabetic patients ages 19-99 (P), how do appointment reminders by nursing staff and patient education related to appointment adherence (I) compared to the current practice of appointment reminders by administrative assistants and no patient education related to appointment adherence (C) affect appointment adherence rates (O) within ten weeks (T)?

Evidence: Current evidence demonstrates that patient appointment reminders improve appointment adherence rates. The evidence supported the practice change project through the use of patient appointment reminders to decrease appointment no-shows and overall healthcare costs.

Intervention: The evidence-based practice change project utilized patient appointment reminders that included an education component related to the benefits of appointment adherence. The project change included the utilization of a nursing staff member to contact patients in one endocrinology clinic in a small, rural Southern Indiana hospital.

Outcome: The project results demonstrated that appointment reminders were effective in increasing appointment adherence rates in the project clinic.

Conclusion: Evidence supports the use of patient appointment reminders which correlates to improved appointment adherence rates. The patient appointment reminders conducted by nursing staff during this DNP practice change project demonstrated an increase in appointment adherence rates within the project clinic.

Increasing appointment adherence in patients with Diabetes Mellitus via appointment reminders and patient education

Appointment no-shows and nonadherence are problems that affect all key stakeholders within the healthcare setting. Patients' overall health is affected by disruptions in their care. Studies have demonstrated that patients are at increased risk for hospitalization following missed appointments (Nutti et al., 2014). Family members are affected by the possibility of deteriorating health conditions of their loved ones. The healthcare system is burdened by wasted healthcare revenue and inappropriate care at a rate of approximately \$150 billion annually (Stewart, 2019). Society is burdened by increased healthcare costs and expenditures to insurance companies.

The purpose of this DNP evidence-based practice change project was to increase appointment adherence in adult diabetic patients with specific changes in appointment reminders and patient education. The PICOT question inquired whether nurse-led patient appointment reminders with an education component added affected appointment adherence. The project was guided by the PICOT question, the evidence-based practice framework, and the change theory.

Significance of the Practice Problem

Appointment no-shows range from 10% to 50% across global settings (Mohammadi et al., 2018). The average rate of missed appointments is approximately 27% in the United States (Mohammadi et al., 2018). One study estimated that appointment no-shows and late cancellations accounted for 31.1% of overall scheduled appointments in a single community hospital. This was estimated to have cost the organization approximately \$3 million in one year (Kheirkhah et al., 2016).

In addition to the costs of appointment no-shows to the healthcare system, which is estimated to be approximately \$150 billion annually, single-physician medical practices are

impacted. The average cost of appointment no-shows for single-physician practices is estimated to be approximately \$150,000 annually (Stewart, 2019). Moreover, appointment no-shows increase other patients' wait times while increasing inappropriate emergency room visits, suboptimal care results, and overall healthcare costs (Marbough et al., 2020).

Appointment no-shows interfere with healthcare providers' efforts to monitor and provide appropriate care. In a cohort study by Nuti et al. (2014), data from over 8,000 adult diabetic patients in a medical center in Indiana were reviewed. The outcomes were reviewed from patient hospitalizations and/or emergency department visits within six months of patients' last scheduled primary care appointments. The evidence demonstrated that appointment no-shows increased the overall risk of hospitalizations among diabetic patients due to inconsistent care.

PICOT Question

The PICOT question that guided this evidence-based practice project was: In adult diabetic patients ages 19-99 (P), how do appointment reminders by nursing staff and patient education related to appointment adherence (I) compared to the current practice of appointment reminders by an administrative assistant and no patient education related to appointment adherence (C) affect appointment adherence rates (O) within ten weeks (T)?

Population

The population base in which this evidence-based practice project occurred consisted of adult diabetic patients over the age of nineteen who sought care at a rural endocrinology clinic based in southern Indiana. The healthcare providers of the clinic had noted an increase in appointment no-shows over the past few years. Therefore, the issue of appointment no-shows also became an organization-wide concern in the chosen project setting. The evidence-based

practice change project focused on modifying the current methodology applied to patient appointment reminders to improve appointment adherence rates.

Intervention

The practice change project was based on the increasing rates of appointment no-shows within the endocrinology clinic and the entire organization. There were no inherent risks to the patients from this project. The intervention focused on changing the clinic's practices related to patient appointment reminders. This practice included a telephone reminder from a single administrative assistant when the time was available. There were no documented or provided patient education components related to the benefits of appointment compliance.

As previously stated, appointment no-shows increase healthcare costs and decrease patient health outcomes (Stewart, 2019; Marbough et al, 2020). Therefore, this proposed practice change project was guided by the Johns Hopkins Evidence-Based Practice Framework utilizing the identified PICOT question, the evidence obtained, and the translation of the evidence into practice. The project change incorporated the utilization of a nursing team member to conduct patient appointment reminder calls within 24 to 48 hours of patient appointments as compared to the clinic's prior practice of an administrative assistant calling patients as time permitted.

Comparison

The focus of the practice change project included a comparison of the clinic's standard procedure of an administrative assistant calling patients with basic appointment reminders to the utilization of a nursing staff member calling patients with appointment reminders while providing education related to the importance of appointment adherence. An administrative assistant had previously conducted the patient appointment reminders when they had available time. However, there were days noted when no appointment reminder calls were completed.

Furthermore, patients received no education related to the importance of appointment adherence in the control of their blood glucose levels and diabetic monitoring.

Outcome

The desired outcome of the project was to reduce the number of appointment no-shows. The healthcare providers within the organization and endocrinology clinic had previously noted an increase in appointment no-show rates within the past few years. These rates ranged from 5-to 10% monthly as noted by the clinic's practice manager. The appointment no-show rates had averaged 8-to 12% when monitored by the DNP student project manager.

Timeline

The monitoring period of the project consisted of three months of daily documentation of appointment no-show rates to figure monthly averages. The implementation and analysis periods focused on ten weeks of obtaining a thorough measurement of the appointment no-show rates with the added project change. Thereafter, the following eight weeks consisted of the project's dissemination and sustainability measurement periods. Sustainability has been predicted to be maintained through staff feedback and follow-up by the practice manager during subsequent staff meetings.

Evidence-Based Practice Framework & Change Theory

Utilizing the Johns Hopkins Evidence-Based Practice Framework, the development of the project focused on the issues related to appointment nonadherence and the promotion and importance of appointment compliance. The framework guided the project through a problem-solving approach related to the practice question, the evidence obtained, and the translation of the evidence into practice (Dang et al., 2022). In addition, the framework guided the project and provided answers to the PICOT question regarding the importance of patient appointment

adherence in maintaining and improving overall patient health. The framework steered the evidence obtained into promoting practice change. The proposed practice changes to increase appointment adherence are, therefore, expected to be incorporated into routine practice within the clinic (Dearholt & Dang, 2012).

The PICOT question assisted in guiding the processes of the practice change project. This PICOT question originated from the needs of the project organization's endocrinology specialty clinic. There had been increasing concern from the clinic staff members, providers, and the organization related to appointment no-show rates. The entirety of the organization had been experiencing a notable amount of appointment noncompliance. The no-show rate had been noted to be approximately 8% monthly. Therefore, the rates, effects, and causes of patient no-shows were of high interest to this project. Additionally, possibilities related to the change project interventions had been discussed, explored, and reviewed with the healthcare providers of the clinic and the clinical practice manager.

A thorough literature search and review were conducted for evidence related to appointment noncompliance. The implementation of the project included changing the patient appointment reminders and education related to appointment compliance from the ancillary staff to the nursing staff. Additionally, this intervention guided the data collection, organization, and presentation of the evidence (Dang & Dearholt, 2019). A nursing staff member called the clinic's patients 24 to 48 hours before their appointments and provided patient education related to the importance of appointment adherence on diabetes control and overall health.

Change Theory

The change theory that served as the foundation for the project was Kotter's 8-Step Change Model. The steps described in this model include: 1) creating a sense of urgency, 2)

forming a coalition by obtaining buy-in from staff members, 3) creating a vision for change with a purpose and goal, 4) communicating the vision, 5) empowering staff members, 6) generating short-term wins with achievable goals, 7) building on change, and 8) sustaining change (Aziz, 2017). The change theory was applied to the project in creating a sense of urgency by demonstrating how appointment no-shows were affecting the organization's revenue.

Furthermore, the theory guided the project in building a coalition by creating a revised system of appointment reminders that improved appointment adherence and patient outcomes. The theory guided the project change in forming a strategic vision and initiatives through the utilization of a revision in the organization's culture related to appointment reminders. Thus, the project interventions assisted in recruiting volunteers to help in the installation of the change in appointment reminders based on improved outcomes. The changes involved enabled action and removed barriers to change by improving patient health and the organization's revenue through increased appointment compliance. Additionally, the changes generated short-term wins by documenting progress and improvement through the monitoring of increased appointment compliance percentages by the DNP student project manager. The practice change sustained acceleration by documenting and sharing the improvements in patient appointment compliance with the stakeholders. Moreover, the project instituted and sustained change based on the improved outcomes for patients' overall health and the organization's revenue (Kotter, n.d.).

Evidence Search Strategy

The initial literature review utilizing the University of St. Augustine's library and conducted through EBSCOhost's digital database yielded over 38,000 articles. The evidence search strategy included a database search of five individual databases including CINAHL, ProQuest, PubMed, Google Scholar, and Ovid. The search terms included Medical Subject

Headings (MeSH) of ('no-show patient') and non-MeSH Headings of ('appointment adherence' and 'appointment compliance' and 'appointment reminders' and 'appointment no-show'). The keywords utilized for the search in CINAHL included appointment no-shows or noncompliance or nonadherence AND appointment compliance or adherence or engagement AND appointment reminders. This search yielded fifteen articles. The keywords in ProQuest included appointment no-shows versus appointment compliance with appointment reminders and patient education in adult patients which yielded thirty-eight articles. The keywords utilized in PubMed included appointment no-shows AND appointment reminders AND patient education which yielded three articles. The keywords utilized in Google Scholar's reviewed articles included appointment no-shows versus appointment compliance with appointment reminders for the years 2019 to 2021 yielded thirty-six articles. The keywords utilized in Ovid included appointment no-shows and appointment reminders for diabetic patients which yielded three articles.

Advanced searches of full-text, abstract-included articles were conducted. The date limits were set between 2014-2021 for each of the databases. English-language articles of various quantitative and qualitative designs were included if they investigated the effectiveness of outpatient appointment reminders, appointment attendance behaviors related to reminder systems, or appointment attendance. Articles excluded included those before 2014, those not in English, and those that did not fit the project specifics such as articles focusing on pediatric patients, telemedicine, and most specialties areas other than endocrinology. Six duplicate articles were excluded.

Evidence Search Results

The search of the databases yielded ninety-five articles between the years 2014 to 2021 and 2019 to 2021 in Google Scholar. The search of CINAHL yielded fifteen articles. ProQuest

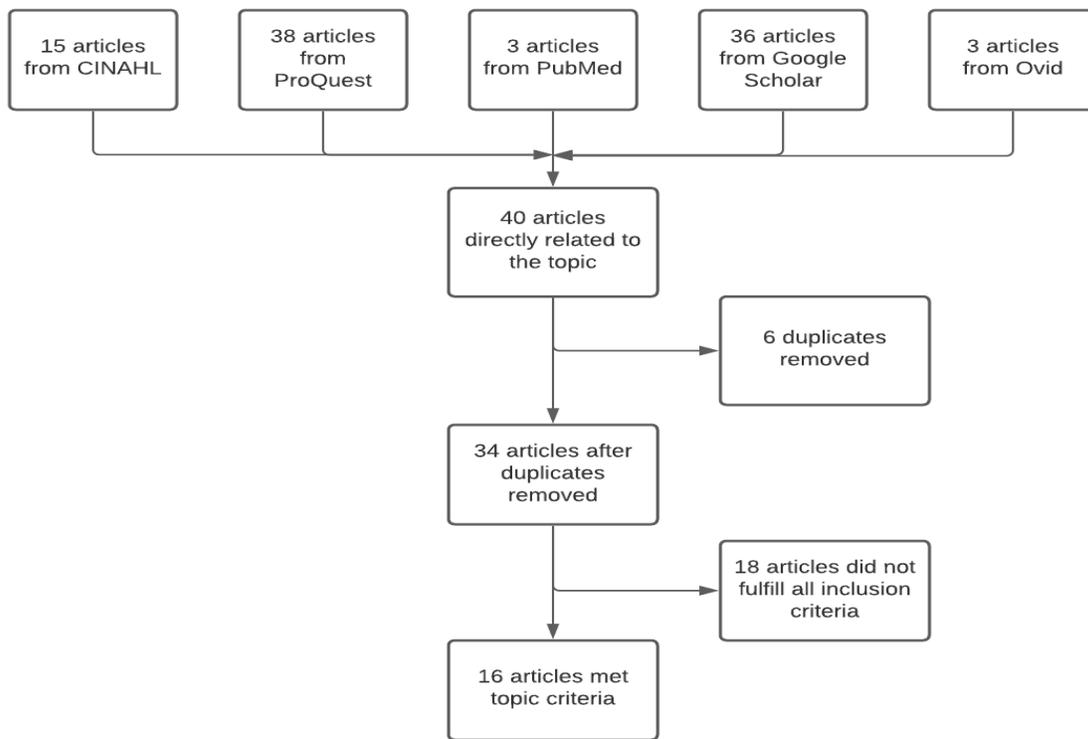
yielded thirty-eight articles, PubMed yielded three articles, Google Scholar yielded thirty-six articles, and Ovid yielded three articles. Many of these articles did not directly apply to the PICOT question. Thus, the results were narrowed down to articles that were relevant to the project topic such as increasing appointment adherence and appointment no-shows. Articles were excluded if they were relative only to specific patient populations such as pediatrics, telemedicine, and most specialty areas other than endocrinology. Separate tables were created for the primary research articles and systematic reviews that were selected for the project (see Appendices A and B).

The search was narrowed down to sixteen full-text articles relevant to the project that were also within the specified search topics. Seven of the selected articles were systematic reviews and one also included a randomized control trial. These articles were of various evidence levels from I to III based on the Johns Hopkins Nursing Evidence-Based Practice Appendix C: Evidence Level and Quality Guide. These articles were of high and good quality with consistent results and sufficient sample sizes for the study designs (Dang & Dearholt, 2017).

Five of the systematic review articles were evidence level III on the Johns Hopkins EBP Model. These articles contained high-quality information and included definitive conclusions and recommendations based on comprehensive literature reviews. They also contained thorough references to scientific evidence (Dang & Dearholt, 2017). Two of the systematic review articles were evidence level III with good quality information.

The chosen mixed-method design study containing the randomized control trial was an evidence level II. One cluster randomized control trial was evidence level I with high-quality information. Two multi-level analyses were evidence level III. One retrospective cohort study, one case study, and three continuous quality improvement projects were evidence level III with

good quality information. These were non-experimental studies that had reasonably consistent results, fairly definitive conclusions, and reasonably consistent recommendations based on a fairly comprehensive literature review with some reference to scientific evidence (Johns Hopkins Hospital/Johns Hopkins University, n.d.). The recommendations gathered from the articles were based on the obtained information demonstrating that appointment reminders increased appointment adherence.



Themes with Practice Recommendations

The synthesis of sixteen project-related articles considered to be of good quality and conducted by student review revealed themes of patient appointment reminders improving patient appointment adherence. The main ideas, design, and quality grading are noted in Appendix A. The summary of systematic reviews is noted in Appendix B.

The evidence obtained from the literature described, compared, and contrasted the themes related to the benefits of appointment adherence and the risks of appointment noncompliance. The themes also include evidence-based strategies related to improving patient appointment compliance. The identified themes and studies were related to appointment no-shows, appointment noncompliance, appointment adherence, and appointment reminders and are components of the PICOT question.

Appointment No-Shows and Noncompliance

A systematic review by Crable et al. (2021) demonstrated that there were certain demographics of patients that were more frequently no-shows to appointments. This often included geriatric patients, those without transportation, those without insurance, and those that had behavioral, emotional, or cognitive issues (Crable et al., 2021). Additionally, a selected retrospective cohort study demonstrated that patients more frequently do not show up for their appointments during the winter months of December, January, and February (Woojin & Fentl, 2017).

A selected multi-level analysis demonstrated that there may be gaps in care related to the need for appointment reminders and patient education specifically tailored for diabetic patients. Patients often have varied reasoning for appointment no-shows. This analysis determined that education absorption was low among patients newly diagnosed with Type 2 diabetes mellitus. Thus, these patients may often feel overwhelmed and in denial of their chronic diagnoses which may increase nonadherence in care (Winkley et al., 2016).

Appointment Adherence

In an interventional study, patient education related to appointment adherence and helping patients in achieving health goals along with appointment reminders improved

appointment adherence (Mehra et al., 2018). In addition, DuMontier et al. (2013), described the effectiveness of a multi-method intervention which included appointment reminders and calling patients who were no-shows with scripted calls to discuss the negative effects of missed appointments to the clinic and their general health. However, there needs to be understanding from healthcare professionals related to the no-show phenomena and to improve strategies for reducing appointment nonadherence (Mattheus, 2017; Marbough et al., 2020).

Appointment Reminders

The synthesis of evidence revealed that patient appointment reminders decreased appointment no-shows (Crangle et al., 2021; Mirarchi, 2014; Nuti et al., 2015; Woods, 2011). One quality improvement study determined that appointment reminders had a significant impact on patient appointment adherence. It was also noted by the researchers that speaking with live patients for appointment reminders carried a no-show rate of approximately 3%. Appointment reminders left on patients' voicemails had no-show rates of up to 24%. Patients who did not answer and were not left messages had no-show rates of up to 39% (Teo et al., 2017).

In an unblinded randomized control trial (RTC) by Coma et al. (2019), it was determined that electronic appointment reminder systems had an effectiveness rate of 20.6%. The literature review conducted during the RTC of sixty-one clinical trials analyzing patient reminders systems demonstrated improvement in appointment adherence rates from 12% to 14%. However, other studies have shown improvement rates of around 4.2% which suggests variability across similar studies (Coma et al., 2019).

A selected systematic review revealed that researchers had evaluated the effectiveness of appointment reminders with realist principles. They have deemed that certain appointment reminders may not be optimal based on the needs of some patients including literacy, mental

capacity, and comprehension abilities. It was determined that stronger interventions such as repeating reminders, assisting with rescheduling, and tailoring reminder systems to the needs of patients may be required. However, it should be considered that complete appointment attendance is unlikely and that some patients may find reminders annoying and/or confusing (McLean et al., 2016).

Another systematic review determined that patient appointment navigators and appointment reminders conducted one week before appointments increased attendance rates significantly. Patients who did not show up for their appointments were called to see how they were doing. Hence, non-attendance rates decreased from 30% to 21% and patient satisfaction rates increased (Brewster et al., 2020).

Practice Recommendations

The review of the literature answered the PICOT question by supporting appointment reminder implementation as appropriate for evidence-based practice project change strategies. This evidence-based practice change project evaluated the endocrinology clinic's adherence to utilizing patient reminders. Thus, the project included modifying the clinic's appointment reminder system by incorporating patient education from a nursing staff member related to the health benefits and importance of appointment adherence. The scripted phone calls were typically conducted in the morning for each patient and lasted under two to three minutes each. The entire process took a nursing staff member approximately 30 minutes or less on most days (see Appendix C).

Percentage rates of appointment no-shows were calculated monthly for three months during the project pre-implementation phase. Percentages were then calculated for ten weeks during the project implementation phase to monitor the effectiveness and sustainability of the

project. Utilizing multi-dimensional interventions to increase appointment adherence moved the project away from the simple appointment reminder system currently in use within the organization to a more structured, supportive system. Collaboration with the clinic's nursing staff members ensured the restructuring of the reminders and is expected to become a part of the clinic's routine practices. Additionally, these interventions were designed to examine the issues of appointment nonadherence. The interventions then more effectively addressed the issues and increased communication with the relevant key stakeholders (Brewster et al., 2020).

Setting, Stakeholders, and Systems Change

The project setting for the evidence-based practice change project was the endocrinology clinic within a 74-bed, rural community hospital in Southwestern Indiana. The typical endocrinology patients in this setting are Type 2 diabetics between the ages of 35-65 years of age. The organization is a not-for-profit, county-owned hospital. The setting contains an acute care unit, an obstetrics unit, an intensive care unit, an inpatient rehabilitation unit, and a behavioral health center. The organization also has specialty clinics in urology, cardiology, oncology, podiatry, nephrology, wound care, pulmonology, and endocrinology. Additionally, the organization owns and operates several primary care clinics in two other counties as well as a quick care clinic (DCH, 2021).

Leadership Team

The leadership team of the project setting consists of the chief executive officer (CEO), the chief nursing officer (CNO), the chief financial officer (CFO), and the chief operating officer (COO). The organization's need in addressing appointment adherence was determined by the project clinic's endocrinologist, the endocrinology nurse practitioner, and the clinical practice manager. The nursing staff of the project clinic implemented the practice change intervention.

Organizational Culture

The mission of the organization is to improve the health of the people who live in their communities by providing superior medical care. The organization strives to ensure access to care by working with local agencies to meet community health needs. It also works to teach healthy lifestyles to communities. The vision of the organization is to be the community's choice in health care. Furthermore, the organization's values include demonstrating a willing attitude, embracing excellence in customer service, communicating openly and honestly, accepting responsibility for actions, appreciating the customers and stakeholders, showing consideration for all those involved with care, and fulfilling obligations and duties at all times (DCH, 2021).

Stakeholders

The implementation of the evidence-based project interventions, the success of the project, and the sustainability of the project were dependent on the perceptions of the key stakeholders. The key stakeholders included the individuals or groups who were affected by or had an interest in the project outcome (Moran et al., 2014). Thus, the stakeholders for this evidence-based practice project consisted of the organization's upper management, practice manager, healthcare providers, and staff members. Other key stakeholders for the project included the DNP student, the endocrinology patients, and the supervising university.

The practice change project required the acceptance and buy-in of all of the stakeholders for successful implementation and outcomes. The clinical staff and the project organization had been negatively impacted by the effects of patient appointment nonadherence. Therefore, the organization's leaders recognized the need to increase appointment adherence. A determination was made that patient appointment nonadherence had caused a loss of revenue for the project

clinic and organization. Additionally, appointment no-shows had also impacted patient outcomes due to disruptions in care.

The clinic's staff members had been striving to maintain a positive healthcare environment and encourage new patient referrals. However, the continued number of appointment no-shows and nonadherent patients had continued to be a detriment to the organization. These numbers had decreased productivity and revenue for the clinic and the organization.

Systems Change

The practice change project impacted the organization by improving overall patient care and revenue. The project also impacted the population health of the community by improving continuity of care and overall patient outcomes. Additionally, the project worked to promote and facilitate patient engagement in their health care needs (Edwards et al., 2018).

Strengths, Weaknesses, Opportunities, and Threats

A Strength, Weakness, Opportunity, and Threat Analysis (SWOT) was conducted to identify the internal strengths, weaknesses, external opportunities, and threats that might impact the facility's readiness to implement the proposed change (Moran et al., 2014) (See Appendix D). An emphasis on improving the organization's staff member partnerships often demonstrates the positive impacts on the healthcare delivery system. However, the SWOT analysis of the project organization demonstrated that the internal strengths included an engaged endocrinology healthcare staff and an organizational desire for improvement in overall patient care. Internal weaknesses included frequent nurse turnover and a newer management team within the last three to five years. External opportunities included optimizing nursing staff to contact patients for appointment reminders and educating patients on appointment adherence and improved patient

outcomes. External threats included increased workloads for the nursing staff members who are often working short-staffed. The external threats also included the possibility of decreased buy-in from the patients and nursing staff members over time.

The micro-level system changes included changes in the patient appointment reminders system. The nursing staff of the endocrinology clinic contacted and educated the patients regarding the values of appointment adherence. The project provided meaningful interactions. The meso-level system changes improved patient education regarding appointment adherence and reduced appointment no-shows within the organization. Moreover, the macro-level system changes focused on the population health of the community. The improvement in appointment adherence rates is expected to improve overall patient health while also improving the revenue for the organization (Serpa & Ferreira, 2019).

Implementation

The implementation plan for the practice change project included a planning and monitoring period of patient appointment no-shows for the first twelve weeks. This planning and monitoring period allowed for numerical data to be collected related to the percentage of daily no-shows. These numbers were then calculated into monthly percentages. The average monthly no-show ranged from 8-to 10%.

The objectives of the practice change project were to significantly decrease patient appointment no-shows by:

- 1) Reminding patients of appointments through nurse-led patient education regarding the health benefits of diabetes and appointment adherence.
- 2) Providing improved patient appointment adherence rates and project sustainability for the clinic and organization.

- 3) Increasing productivity and revenue for the organization through increased patient appointment adherence.
- 4) Improving overall patient care and outcomes.

Kotter's 8-Step Change Model guided this evidence-based change project by capitalizing on this window of opportunity to decrease appointment no-shows within the endocrinology clinic and organization. The team members of the clinic worked together to direct their energies into encouraging patients to maintain appointment adherence. The change had the potential to benefit the clinic and organization by motivating patients to help to improve their overall health outcomes and satisfaction with the organization (Kotter, 2018). The Johns Hopkins EBP model described the necessity of securing adequate support and resources to implement a successful project (Johns Hopkins Medicine, n.d.).

Once approval was obtained from the university, the implementation and evaluation period consisted of ten weeks of observation following the planning and monitoring period. The objective of the implementation period was met through the use of the clinic's nursing staff to contact patients regarding their upcoming appointments within 24 to 48 hours. The staff also provided patient education regarding appointment adherence. The nursing staff, healthcare providers, and ancillary staff worked together to address this project change objective. The project coordinator then continued to monitor and calculate the number of appointment no-shows daily. After this monitoring period, the following eight weeks consisted of the project's dissemination and sustainability measurement periods (See Appendix E).

Budget

The project organization did not provide a project budget. This lack of budgeting required the project to remain net-neutral (See Table 1). Therefore, the project manager and voluntary

nursing staff conducted the project interventions. The DNP student project manager monitored the number of appointment no-shows, supported the nursing staff, collected the data, kept the project net-neutral, and communicated to the stakeholders weekly or bi-weekly. The costs related to the project were related to the time nursing staff spent calling and educating the clinic's patients regarding appointment adherence. However, the costs remained minimal in comparison to the potential savings and revenue for the organization.

Project Manager

The DNP student project manager led the interprofessional team by demonstrating a thorough knowledge of the evidence-based practice project's processes and phases. The project manager also led the interprofessional team in providing patient appointment reminders through the use of scripted phone calls. Furthermore, the project manager collected the project data, directed and supported the interprofessional team, communicated with the key stakeholders, and monitored compliance with the changes in the patient appointment reminders (Mansourimoayyed et al., 2020).

Evaluation

The appointment reminder interventions were implemented and evaluated through a pre- and post-implementation plan. The project began with three months of monitoring appointment adherence rates within the clinic. After this monitoring period, the project consisted of ten weeks of a nursing staff member calling patients with appointment reminders and providing education related to the importance of appointment adherence. The patients were then educated about the health benefits of maintaining stable blood glucose and hemoglobin A1c levels on overall health. The patient education changed slightly during the implementation phase into discussing pending lab work and needed clinical information before their appointments based on the clinic's needs.

The participants in the project included the DNP student project manager and the nursing staff of the endocrinology clinic. The percentages of the clinic's daily appointment no-shows were monitored by the DNP student project manager and calculated for ten weeks in Excel to determine the results of the evidence-based practice change project. The results of appointment adherent percentage rates were calculated pre-implementation, during the implementation, and with and without appointment reminders (See Appendix G).

The practice change project remained HIPAA compliant by focusing only on the number of appointment no-shows. No patient identifiers were utilized while monitoring the appointment adherence rates. The information was obtained from the electronic medical record system of the organization. Any data containing detailed patient information was stored on the healthcare organization's encrypted, HIPAA-compliant software. Furthermore, the data was collected utilizing secured access granted to the student project manager by the organization.

The data figures obtained were analyzed utilizing Intellectus software (2021). This software is a valid and reliable measurement tool that is utilized in the statistical analysis of data. The software has been shown to provide an efficient and effective interpretive analysis of complex data (Chen et al., 2018). Permission for this tool is within the public domain. The student project manager utilized inferential statistics to determine the effects of patient appointment reminders on appointment adherence. An independent samples *t*-test determined the results of the project change project pre-and post-intervention and with and without interventions (See Appendix F).

The three months of monitoring appointment no-show percentages prior to the project implementation were compared to the percentages calculated for the ten weeks during the implementation. The results were projected to demonstrate a statistically significant association

between appointment reminders and appointment adherence. Variations were considered statistically significant at $p < 0.05$ (Andrade, 2019).

Two-Tailed Independent Samples *t*-Test

A two-tailed independent samples *t*-test was conducted to examine whether the mean of the Appointment_no_show_percentages was significantly different between the No reminder and Reminder categories. A Shapiro-Wilk test was conducted to determine whether the Appointment_no_show_percentages could have been produced by a normal distribution for each category of the appointment reminders (Razali & Wah, 2011). The result of the Shapiro-Wilk test for the Appointment_no_show_percentages in the No reminder category was not significant based on an alpha value of .05, $W = 0.91$, $p = .206$. This result suggested that a normal distribution could not be ruled out as the underlying distribution for the Appointment_no_show_percentages in the No reminder category. The result of the Shapiro-Wilk test for the Appointment_no_show_percentages in the Reminder category was not significant based on an alpha value of .05, $W = 0.92$, $p = .369$. This result suggested that a normal distribution could not be ruled out as the underlying distribution for the Appointment_no_show_percentages in the Reminder category. The Shapiro-Wilk test was not significant for either the No reminder or Reminder categories, thus indicating the normality assumption was met.

Homogeneity of Variance

A Levene's test was conducted to assess whether the variance of the Appointment_no_show_percentages was equal between the categories of the appointment reminders. The result of Levene's test for the Appointment_no_show_percentages was not significant based on an alpha value of .05, $F(1, 20) = 2.28$, $p = .147$. This result suggested that

the variance of the Appointment_no_show_percentages may be equal for each category of the appointment reminders, thus indicating that the assumption of homogeneity of variance was met.

Results

The result of the two-tailed independent samples *t*-test was significant based on an alpha value of .05, $t(20) = 4.23$, $p < .001$, indicating that the null hypothesis could be rejected. This finding suggested the mean of Appointment_no_show_percentage was significantly different between the No reminder and Reminder categories. The results are presented in Table 2. A bar plot of the means is presented in Figure 1. From a clinical perspective, the percentages of patient appointment no-shows decreased significantly with appointment reminders. Thus, the direct result of the project's appointment reminders, nursing interventions, and education strategies was indicative of increased appointment adherence.

Impact

The patient appointment reminders implemented during the practice change project demonstrated a positive impact on the appointment adherence rates within the project clinic. The changes made in the previous appointment reminders from an administrative assistant conducting the reminders when available to a nursing staff member contacting, reminding, and educating patients increased the appointment adherence within the clinic. The project change also resulted in data that revealed a positive correlation between the appointment reminders and the appointment adherence rates of the clinic. Accordingly, it is anticipated that the practice change will continue to drive the clinical significance of these rates.

The clinical leadership team of the project clinic acknowledged the statistical significance of the data. Therefore, the change in patient appointment reminders is anticipated to be incorporated into the clinic's daily workflow. The scripted calls utilized by the nursing staff may

then also be incorporated into other clinics and, eventually, all outpatient areas. The expansion of the practice change project to other outpatient units is vital in ensuring that patient appointment reminders become the standard of care throughout the organization.

The limitations of the project included a shortage of nursing staff members to participate in the patient appointment reminders. The primary nurse of the clinic often had little extra time to complete appointment reminders. Furthermore, the resignation of the primary nurse and the clinic's nurse practitioner changed some of the priorities within the clinic. These resignations also increased the workload of the clinic's remaining staff members which made the project implementation and maintenance increasingly challenging. However, newly hired nursing staff members are expected to be trained in continuing the project's patient appointment reminders.

The practice change project allowed for early appointment communication and intervention as needed by the clinic's nursing staff. Thus, the project's implemented appointment reminders increased and enhanced communication between the clinic's nursing staff and its patients. Consequently, it is anticipated that the practice change will improve overall patient health and, potentially, decrease hospitalizations. This will continue to be monitored by the clinical management of the organization.

Dissemination Plan

The evidence-based project's key message aligned with the interested stakeholders of the project. The dissemination of the project results targeted the intended audience including the key stakeholders, the organization's leadership, the department's leadership, and the clinic's staff members. The project results were presented to the clinic's leadership including the unit manager, endocrinologist, and endocrinology nurse practitioner. There was a separate presentation to the clinic's staff members who were participants in the project to allow for

discussion of the practice change. This presentation demonstrated the significance of the project's overall impact on the patients, clinic staff members, and the organization (Johns Hopkins Hospital/Johns Hopkins University, 2017).

The project's key messages were presented in writing to the organization's management. A PowerPoint and poster presentation were prepared for the organization's leadership and project preceptor. This information was shared with the project's stakeholders at a clinical staff meeting.

Following peer review, a manuscript of submission will be sent to the *Journal of Nursing Care Quality*. This professional journal focuses on nursing leadership and evidence-based practices for improving patient care. This evidence-based project paper will also be submitted to The Scholarship and Open Access Repository (SOAR) for the University of St. Augustine for Health Sciences. SOAR further disseminates students' scholarly work to promote professional discoverability.

Plans for Sustainability

The plans for the project's sustainability include maintaining the practice change in patient appointment reminders by a nursing staff member. The nursing manager will continue to discuss the results of the practice change and appointment adherence rates at the clinic's monthly staff meetings. There will be continuing input from the clinic's staff regarding the sustainability of the practice change. There will also be ongoing discussions among the staff members related to the overall effectiveness of the practice change.

Conclusion

Appointment no-shows and nonadherence are significant issues within the healthcare system. The disruptions in the continuity of care from appointment nonadherence negatively affect patients' overall health. Studies have demonstrated that appointment nonadherence

increases the likelihood of hospitalizations and other adverse patient outcomes (Nutti et al., 2014). Appointment no-shows and nonadherence create a large financial burden on the healthcare system. Additionally, appointment nonadherence wastes potential revenue for healthcare providers and organizations. Finally, appointment nonadherence causes society to be burdened by increasing healthcare costs and higher rates in health insurance premiums (Stewart, 2019).

The purpose of this evidence-based practice change project was to increase appointment adherence, improve patient health, and benefit the organization's revenue. The patient appointment reminders completed by the nursing staff during the practice change project demonstrated an increase in appointment adherence rates within the endocrinology clinic. The success of the project was measured by a statistical analysis that utilized Intellicus Statistics. The results of the analysis supported the use of the practice change project intervention within the organization to improve appointment adherence rates. Furthermore, the project demonstrated a clinical significance in appointment adherence rates which is expected to lead to a higher quality of patient care, improved overall patient health outcomes, and increased revenue for the organization.

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Table 1

Budget

EXPENSES		REVENUE	
Direct		Billing	N/A
Salary and benefits	\$25/day	Grants	N/A
Supplies	\$0	Institutional budget support	N/A
Services	\$0		
Statistician	N/A		
Evaluation Tools (public domain)	Excel (per DNP Project Manager/Student) \$0		
Indirect			
Overhead	\$0		
Total Expenses	\$25/day	Total Revenue	+\$125 for 1 appointment adherent patient per day
Net Balance			Potential revenue for +\$125 daily for 1 appointment adherent patient

Table 2

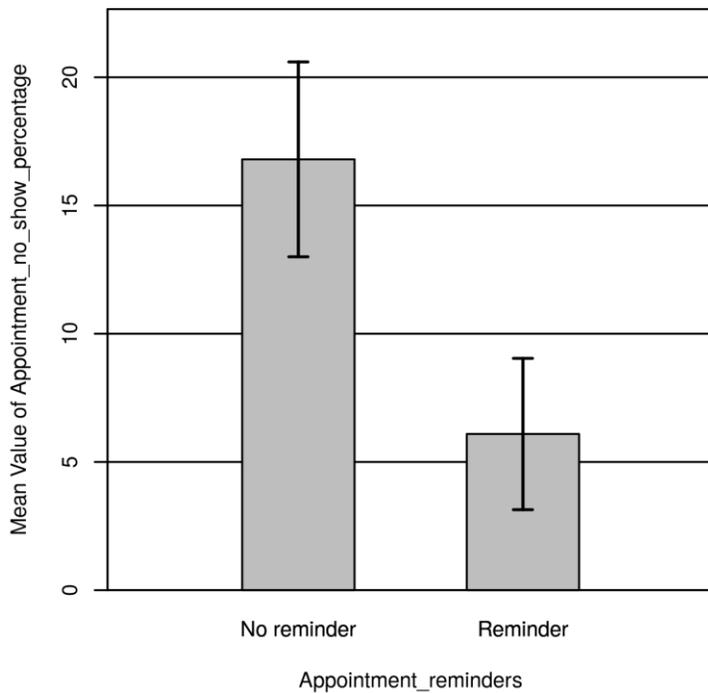
Two-Tailed Independent Samples t-Test for Appointment_no_show_percentage by Appointment_reminders

Variable	No reminder		Reminder		t	p	d
	M	SD	M	SD			
Appointment_no_show_percentages	16.80	6.72	6.09	4.76	4.23	< .001	1.84

Note. N = 22. Degrees of Freedom for the t-statistic = 20. d represents Cohen's d.

Figure 1

The mean of Appointment_no_show_percentage by levels of Appointment_reminders with 95.00% CI Error Bars



Appendix A

Summary of Primary Research Evidence

Citation	Design, Level Quality Grade	Sample Sample size	Intervention Comparison	Theoretical Foundation	Outcome Definition	Usefulness Results Key Findings
Mirarchi, F.M. (2014). Philadelphia College of Osteopathic Medicine.	Multi-interventional appointment reminders and cognitive therapy; mixed-method design Level III Quality B	194 randomly selected patients of an osteopathic health center	Reminders are considered the “gold standard” for improving appointment-keeping adherence.	Theory of Patient Engagement	Reminders are the “gold standard” for improving appointment-keeping adherence.	Limitations: Small sample size Overall, appointment reminders decrease the amounts of no-shows. The data displayed that MI-formatted reminders (80%) were not significantly better (p = .239) than non-MI-formatted letter reminders (75%), phone reminders (82%), or no reminders (66%).
Woods, R. (2011). <i>Nursing Economics</i> , 29(5), 278-282.	Quality Improvement Study Level III Quality B	2,270 patients of 4 V.A. clinics in NH	As evidenced by the 5-month study examining no-show rates in the ambulatory care setting in New Hampshire, making daily reminder phone calls to patients can significantly reduce no-show rates. There is no additional cost involved in making these phone calls as a staff member already employed in the clinic can make these calls	PDSA Cycle	Appointment reminders increase appointment adherence.	Appointment reminders increase appointment adherence.
Teo, Forsberg, et al., 2017. <i>American Psychiatric Services</i> , 68(11): 1098-1100.	CQI Study Level III Quality B	Cohort of 250 primary care patients in V.A. Health Care System	The type of reminder affected the rate of no-shows. Live reminders=3% no-show, message=24%, no answer=39%	Theory of Patient Engagement	Appointment reminders influence appointment attendance.	Limitations: Small sample size Appointment reminders influence appointment attendance and patient engagement. Live phone reminders were associated with the lowest no-show rate (3%), whereas no-show rates were significantly higher for message reminders (24%) and no answer (39%)
Coma, et al., 2019. <i>BMC Medical Informatics and Decision Making</i> , 19(1).	Unblinded cluster randomized clinical trial	Primary care physicians and nurses delivering care to people	Interventions led to a 20.6% improvement in adherence to clinical recommendations.	Clinical Performance Feedback Intervention Theory	Reminder systems featuring reminders on multiple clinical conditions can have	Limitations: Small sample size

	Level I Quality A	aged over 14 years at 283 primary care centers			a positive effect. Immediate reminders are more effective than periodic feedback, an important consideration for future decision support interventions	Reminders have positive effects on appointment adherence as well as the overall health of patients.
Mehra, et al., 2018. <i>Journal of the American Osteopathic Association</i> , 118, 77-84.	2-phase intervention to reduce no-show rates at an integrated care community osteopathic teaching health center Level III Quality B	27,826 appointments with 6147 no-shows in 2014 and 31,696 appointments with 5690 no-shows in 2015	Missed appointments were reduced with interventions such as eliciting reasons for no-shows/phone reminders	Theory of Reasoned Action	Steep decline in no-show rates after intervention implemented.	Appointment reminders will likely increase the rates of no-show patients. Interventions to decrease appointment nonadherence are vital to healthcare revenue.
Matheus, C. (2017). <i>Managerial Intervention Strategies to Reduce Patient No-Show Rates</i> . Walden University Dissertation.	Qualitative data collection Level III Quality B	Exploratory qualitative single case study; interviews with four healthcare administrators; literature review of 217 articles	Patient appointment reminders have shown to increase appointment adherence 34-44% in one RCT.	Theory of Planned Behavior	The literature review showed that appointment reminders improve appointment adherence or improve rescheduling.	Limitations: Small sample size; longer study time recommended Appointment reminders are necessary to help increase appointment adherence. Managerial interventions are useful in improving appointment adherence.
Marbouh, D., et al., 2020. <i>Risk Management and Healthcare Policy</i> , 13, 509-517.	Case study in radiology department Level III Quality B	Literature review and case study in large radiology department	Patients missed appointments for various reasons. Many solutions may be utilized to remedy such as reminder calls, fees, shortening times between appointments	Theory of Planned Behavior	Patients miss appointments for various, possibly preventable reasons.	Helping to understand the reasons for no-shows may help to alleviate this issue. Reducing the rate of patient no-shows, such as patient education, application of dynamic scheduling policies, and effective appointment reminder systems to patients.
Woojin C., & Fantl, J.A. (2017). <i>Urologic Nursing</i> , 37(6), 319-324.	Retrospective cohort study Level III Quality B	Medical records of all individuals >21 years of age for urodynamic testing between 5/2016-8/2016	More no-shows were recorded during winter months, March-April. This did not change even with reminder calls.	Theory of Planned Behavior	A major obstacle to cost-effective healthcare delivery and patient safety is patient failure to show for appt. Understanding the characteristics of patients who are likely to miss a scheduled medical appointment is important.	Limitations: small sample size. Appointment reminders are important to try to decrease no-show rates.

<p>Winkley, K., et al., 2016. <i>Patient Education & Counseling</i>, 99(1), 101-107.</p>	<p>Multi-level analysis of questionnaire data</p> <p>Level III</p> <p>Quality B</p>	<p>Cohort of 1626 newly diagnosed Type 2 DM patients</p>	<p>General practices where more people achieve HgbA1c target of <59 mmol/mol (7.5%) are perhaps more proactive in encouraging patients to attend and the better outcome may be related to the education itself and/or other aspects of care provided.</p>	<p>Theory of Patient Engagement</p>	<p>Attendees are more likely to be female, non-smokers with better HgbA1c. General practices achieving glycemic targets are more likely to have patients who attend education. This study suggests that more and further qualitative and quantitative studies on the barriers to attending diabetes education in general practice are needed.</p>	<p>Limitations: Small sample size</p> <p>More and further qualitative and quantitative studies on the barriers to attending diabetes education in general practice are needed.</p>
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Legend:

Appendix B

Summary of Systematic Reviews (SR)

Citation	Quality Grade	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Usefulness/ Recommendation/ Implications
Brewster et al., 2020. <i>Diabetic Medicine</i> , 37(9): 1427-1442.	A	Effects of appointment non-attendance on DM patients	CINAHL	appointment no-shows or noncompliance or nonadherence AND appointment compliance or adherence or engagement AND appointment reminders Abstract, English, 2014-2021	Non-attendants have >hgb A1c levels than attendees. Demonstrated > risks of hospitalization within 6 months. Provide increased access to information, increased appointment mediums, and patient navigators.	Health outcomes are poorer in non-attendees versus compliant patients. Young, adult, low-income smokers have > incidence of non-attendance.	Interventions such as appointment reminders to psych-social determinants are necessary to increase attendance or access to care
Crable, et al., 2021. <i>Journal of Evaluation in Clinical Practice</i> , 27(4): 965-975.	A	Effects of appointment reminders/interventions on adherence	ProQuest	appointment no-shows versus appointment compliance with appointment reminders and patient education in adult patients English, 2014-2021	Patients who received appointment reminders and interventions such as incentives were three times more likely to attend next appointments.	Missed appointments are problematic. Nine types of interventions were used to increase appointment compliance. No single one was clearly effective.	Appointment reminders are needed and necessary to help increase appointment adherence.
DuMontier, et al., 2013. <i>Family Medicine</i> , 45(9), 634-641.	A	Effects of appointment non-attendance on DM patients	CINAHL	appointment no-shows or noncompliance or nonadherence AND appointment compliance or adherence or engagement AND appointment reminders Abstract, English, 2014-2021	Cohort of 141 patients, identifying a large, at-risk population for no-shows, and using a multi-method approach to addressing the issue can show persistent improvement and could be used in other residency training and community clinic settings.	Limitations: Small sample size An urban family medicine residency teaching clinic with a large culturally diverse population of low-income patients struggled for decades with a persistent no-show rate of 15%--17% despite multiple attempts to remind patients or otherwise address the problem. After the intervention, the rates fell from 33% to 17.7% in the cohort. Appointment reminders decrease the rates of no-show patients.	After the intervention, the rate of no-show appointments in the cohort fell from 33.3% to 17.7%, and the overall clinic rate fell from 10% to 7%; this decrease persisted for the 33-month observation period after the intervention and has been maintained to this date.
Lee et al., 2019. <i>Singapore Medical Journal</i> ,	B	Effects of appointment reminders on adherence	PubMed	appointment no-shows AND appointment reminders AND patient education Abstract, English, 2014-2021	Patient adherence and no-shows are multi-factorial.	Improved patient-provider relationships increase appointment adherence among other issues.	

60(5); 216-223.							
McLean, et al., 2016. <i>Patient Pref.</i> 4(10); 479-499.	A	Effects of appointment reminders on adherence and optimizing strategies	PubMed	appointment no-shows AND appointment reminders AND patient education Abstract, English, 2014-2021	Patient appointment reminders are beneficial but not optimal.	Patient appointment reminders should be tailored to the needs of the consumers.	Patient appointment reminders should be tailored to the needs of the consumers.
Nuti, et al., 2015. <i>BMC Health Services Research</i> , 15.	B	Effects of appointment reminders/interventions on adherence	CINAHL	appointment no-shows or noncompliance or nonadherence AND appointment compliance or adherence or engagement AND appointment reminders Abstract, English, 2014-2021	Interventions from the simplest to the most complex such as text messages to web-based reminders increase appointment adherence and patient outcomes.	The literature review showed that most interventions can have a positive impact on clinical and behavioral outcomes for diabetes patients.	Appointment reminders are necessary to help increase appointment adherence.
Sun, et al., 2021. <i>BMJ Open Diabetes Res Care</i> , 9(1), e001819.	A	Effects of appointment adherence on DM patients	Ovid	appointment no-shows and appointment reminders for diabetic patients English, 2014-2021	Patients with T2DM who missed regular appointments had 24-64% greater odds of having poor glycemic outcomes than those who did not.	Missed appointments lead to poorer health outcomes, decreased patient outcomes, and increased costs of the healthcare system.	Missed appointments lead to poorer health outcomes, decreased patient outcomes, and increased costs of the healthcare system.

Legend:

Appendix C

Scripted Phone Call Format

Hello _____,

This is _____, a nurse at Dr. Lohano's (or Alicia Field's) Endocrinology Clinic. I am calling to remind you of your upcoming appointment on _____. Please obtain your labs 48-72 hours before your appointment (if applicable). Maintaining your appointment is vital to the monitoring and control of your blood sugar levels and the effects diabetes may have on your health. We look forward to seeing you on _____.

Thank you

Follow-up Call for Missed Appointments

Hello _____,

This is _____, a nurse at Dr. Lohano's (or Alicia Field's) Endocrinology Clinic. I am calling to check in on you since you missed your appointment on _____. We would like to reschedule an appointment with you. Monitoring and controlling your blood sugar levels are vital to your health and the potential effects of diabetes. Let us find a day and time that works best for you.

Thank you

Appendix D

SWOT Analysis

Strengths	Weaknesses	External Opportunities	Threats
Engaged endocrinology staff	Frequent nurse turnover	Optimizing nursing staff to contact and educate diabetic patients regarding appointment adherence	Increased workload for nursing staff
Organizational desire for improvement in patient care	Newer management team	Improved patient outcomes	Nurses working short-staffed
			Decreased buy-in from patients and nursing staff

Appendix F

Data Collection Tool for Evaluation

Intellectus Statistics: A paired independent samples <i>t</i> -test will determine the results of the project change project pre-and post-intervention.
3 months of patient no-show percentages prior to the intervention will be compared to the percentages calculated for the ten weeks following the intervention.
Results will show a statistically significant association between appointment reminders and appointment adherence.
Variations would be considered statistically significant at $p < 0.05$.

Appendix G

Intervention Monitoring

Date:	Percentage of no-shows before implementation	
9/30/2021	8%	
10/31/2021	10.6%	
11/30/2021	10.6%	
Implementation:	Implementation without phone reminders	Implementation with phone reminders
Week 1: 2/14/2022	22%	7%
Week 2: 2/21/2022	11.5%	8.5%
Week 3: 2/28/2022	12.5%	2.1%
Week 4: 3/7/2022	25.2%	7.1%
Week 5: 3/14/2022	25%	7.6%
Week 6: 3/21/2022	11.1%	0%
Week 7: 3/28/2022	4.7%	0%
Week 8: 4/4/2022	23.1%	13.3%
Week 9: 4/11/2022	23.1%	2.8%
Week 10: 4/18/2022	12.3%	11.5%