11-22-2019

A Quality Improvement Study on Missed Appointment Management in Primary Care

Aunye' Dina Amos
University of Missouri-St. Louis, aday8c@mail.umsl.edu

A Quality Improvement Study on Missed Appointment Management in Primary Care

Aunye' D. Amos

A.S. in Nursing, St. Louis Community College-Forest Park, 2011
B.S. in Nursing, University of Missouri-St. Louis, 2014

A Dissertation Submitted to The Graduate School at the University of Missouri-St. Louis
in partial fulfillment of the requirements for the degree
Doctor of Nursing Practice with an emphasis in Adult-Gerontology Nurse Practitioner

December
2019

Advisory Committee

Dr. Laura Kuensting, DNP, APRN, PCNS-BC, CPNP, CPEN
Chairperson

Dr. Carla Beckerle, DNP, APRN, ANP-BC

Dr. David L. Mitchell, M.D.

A Quality Improvement Study on Missed Appointment Management in Primary Care

---

Doctor of Nursing Practice Project Presented to the

Faculty of Graduate Studies

University of Missouri-St. Louis

In Partial Fulfillment of the Requirements

for the Degree of Doctor of Nursing Practice

by

AUNYE' D. AMOS, BSN, RN

Laura Kuensting, DNP, APRN, PCNS-BC, CPNP, CPEN (Chair)

Carla Beckerle, DNP, APRN, APN-BC (Committee)

David L. Mitchell, MD (Committee)

DECEMBER 2019

Abstract

Problem: Patients who miss appointments have poorer health outcomes and increase costs for medical care. The purpose of this quality improvement study was to evaluate the effects of missed appointments on patients' outcomes for diabetes mellitus, and resulting financial losses to a private primary care practice.

Method: A quality improvement initiative with a retrospective review of patients over a six-month period in 2018 (before) and 2019 (after a missed appointment fee was implemented). All adult patients, aged 18-92 years, were included. For those with diabetes, a HbA1c for each patient who kept or missed their appointment was recorded.

Results: Of all scheduled appointments (*N=8,535)*, there were 439 missed appointments (5.1%). There were 495 (*n=495*) appointments a diagnosis of diabetes. The HbA1c and age had a very strong inverse relationship, indicating as age increased, HbA1c decreased (p=.000). Those who completed their appointment had significantly lower HbA1c values by 0.7 mmol/mol than those who missed appointments. Unemployed females with private insurance and employed males with Medicare were more likely to have a lower HgA1c value (p=.005). Males kept an appointment more frequently than females (x^2=.703, df=1). There was minimal lost revenue between the two cohorts ($1,280).

Implications for Practice: Diabetic patients who kept their appointments had lower HbA1c values, however, a missed appointment fee may not influence a patient's reason for missing the appointment.

A Quality Improvement Study on Missed Appointment Management in Primary Care

Routine practice of preventative medicine and management of chronic and acute conditions requires maintenance of scheduled appointments to meet the healthcare needs of patients (Clarke, Bourn, Skoufalos, Beck, & Castillo, 2017). One common area of concern in primary care offices occurs when patients do not attend their scheduled appointments. The average missed appointment rate in ambulatory clinics in the United States can vary between 10% and 40% (Drewek, Mirea, & Adelson, 2017). A "missed" appointment is defined as an appointment where a patient did not appear and did not cancel before the scheduled time (Kheirkhah, Feng, Travis, Tavakoli-Tabasi, & Sharafkhaneh, 2016). Missing scheduled appointments can have a negative effect on patients and additionally, the clinical practices (Gebhart, 2017).

Missed appointments may compromise patient safety, medication adherence, patient education, patient treatment, and overall quality of care (Nguyen, DeJesus, & Wieland, 2011). Furthermore, missed appointments may adversely affect patient care when patients are not monitored in managing their chronic condition, resulting in less control of their chronic illness. Patients who frequently miss appointments were less likely to be up-to-date with age-appropriate preventive health services or have less control of their blood sugar (Nguyen, et al., 2011). Consequently, missed appointments increase rates of emergency department (ED) or urgent care visits and result in more hospitalizations (Gajwani & Khatri, 2014; Hwang et al., 2015; Nguyen & DeJesus, 2010; Nuti et al., 2012).

Missed appointments are costly to a healthcare provider's practice as evidenced by reduced revenue (Wiley, 2015). The financial estimate of missed appointments is

more than a $150 billion a year cost to the healthcare industry (Ekram, 2016). For a private practice averaging 100 patients per day over a five-day period, at an appointment cost of $100, a 10% missed appointment rate would result in a $20,000 per month revenue loss. The financial costs associated with missed appointments can negatively impact private practices resulting in decreased services to remain fiscally solvent.

This quality improvement initiative will be conducted at a rural, Midwestern, private family practice to examine missed appointment rates. Although the clinic's current missed appointment rate is 8-10% (below the national average of 10% to 40%), the financial burden on the practice may be affecting patient health outcomes. Each missed visit at the practice costs an average of $80 per visit resulting in a financial loss of $3,200 or more per month, and an annual average loss of approximately $40,000. However, pre-appointment reminder calls are made and 30% of the missed appointments are rescheduled within a week, decreasing the annual revenue loss to about $28,000 annually. The majority of missed appointments at this clinic occur early in the morning or at the end of the day. The effects on health outcomes for patients is unknown.

The purpose of this quality improvement study was to evaluate the effects of missed appointments on patient health outcomes for the chronic health condition, namely diabetes mellitus and financial losses to the private practice. The overall aim of this study was to decrease the overall number of missed appointments by 5% and improve glycemic control for those with diabetes mellitus over a six-month period. The practice of pre-appointment reminder calls and rescheduling missed appointments within a week continued, but an additional financial fee for the missed appointment was implemented in 2019. Outcome measures of interest included the number of scheduled appointments; the

number of missed appointments; financial reimbursement for the completed or missed appointment; a final or working diagnosis for the completed or missed visit; and for diabetic patients, the last documented hemoglobin A1C (HbgA1c). The questions for study were: In a rural Midwestern private family practice, in patients aged 18-years or older with a scheduled appointment between January 1, 2018 – June 30, 2018 compared to the same time frame in 2019:

1) how did the implementation of a missed appointment fee (2019) compared with no fee (2018) affect the rate of missed appointments over a six-month time period?
2) were patients with diabetes mellitus who missed an appointment compared to those who completed an appointment at greater risk for poorly controlled diabetes?
3) what was the average revenue generated or lost for a scheduled or missed appointment in 2018 when compared to 2019?

Review of Literature

Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, Cochrane Library, EBSCO, PubMed, UMSL library, and Google Scholar databases were searched using the terms: *missed appointments, no-show, missed appointment management, missed appointment fees, reducing missed appointments,* and *missed appointment management in primary care*. Inclusion criteria were patients 18-99 years, publications with missed appointment interventions, missed appointment patient outcomes, demographics of missed appointment patients, and etiology for missed appointments. Exclusion criteria were publications related to non-clinic related

healthcare management and those with only pediatrics or specialty patients studied. For this literature review, 42 publications were selected.

Patients miss appointments for various reasons. Some reasons include lack of motivation in seeking medical care, emotional barriers, feelings of disrespect by the healthcare system, appointment time, day of the week, payment for services, and transportation (Lacy, Paulman, Reuter, & Lovejoy, 2004). Taber, Leyva, and Persoskie (2015) found patients believed seeking medical care was often unnecessary, citing concerns about doctors who might prescribe unnecessary tests or medications, and doctors who cared more about money than patients themselves. In fact, Taber et al. (2015) found patients thought seeking medical attention was unnecessary and reporting their medical problems would improve over time on their own or they were not ill enough to need treatment. Additionally, negative emotions such as fear of the unknown, or receiving bad news could prohibit patients from seeking care (Lacy et al., 2004).

Payment for services may be another reason for patients to miss their appointment. Medicaid, which provides coverage for low-income patients (13%) and self-pay patients (8%), have been reported to have a much higher rate of missed appointments than the general population (Norris et al., 2012). This implies those with private insurance and Medicare were more likely to schedule and keep appointments; whereas, patients who were self-pay, uninsured, or who had Medicaid were less likely to keep their scheduled appointments (Norris et al., 2012).

Additional reasons patients do not compete their scheduled appointment include scheduling problems, forgetting the appointment, remaining home to care for an unwell family member, and difficulties finding childcare (Hertz, 2018). George and Rubin

(2003) reported findings from a postal questionnaire sent to those with consecutive missed appointments from five local practices. They found 34% of patients "forgot" the appointment, 12% said it was a scheduling error from the practice, 12% reported there had been a misunderstanding regarding the date/time of the appointment, and 9% reported reasons such as traffic, oversleeping, and hospital admission for missing a scheduled appointment (George &Rubin, 2003). Of the 158 patients with missed appointments, 50 had forgotten to cancel or had not considered it, 18 reported they tried to call, but the telephone was busy, and 34 gave other reasons (George & Rubin, 2003). Hence, missed appointments occur for reasons ranging from personal to sources beyond the person's control.

Reportedly, the missed appointment rate in a United States primary care practice can vary from as little as 5% to as much as 55% (George & Rubin, 2003). While many studies have evaluated patient and practice factors for missed appointments, few studies have discussed the impact on patient health. One study found patients with at least one long-term, chronic condition who failed to attend appointments were at risk for premature death (McQueenie, Ellis, McConnachie, Wilson, & Williamson, 2019). Over a three-year period, this Scottish study examined the effects of missed primary care appointments on mortality in those with long-term mental and/or physical health conditions (McQueenie et al., 2019). Their findings demonstrated patients with chronic conditions had an increased risk for missing general practice appointments (despite controlling for the number of appointments made), and they were at a significantly higher risk of death (McQueenie et al., 2019). Finally, patients with long-term mental health conditions who missed more than two appointments per year had a greater than eight-fold increased risk

for death when compared to those who did not miss appointments (McQueenie et al., 2019). These findings were obtained in a country with a universal healthcare system and may not be applicable to the United States healthcare system which does not provide easy access to healthcare for all of its citizens. Regardless, even with access to healthcare, patients with chronic conditions who miss scheduled appointments with a primary care provider appear to be at risk for enhanced mortality.

Patients with diabetes may be at risk for poor glycemic control. A high-risk diabetes study done by Schectman, Schorling, & Voss (2008), found for each 10% increment in missed appointment rate, the odds of good glycemic control decreased 1.12 times and the odds of poor glycemic control increased 1.24 times. Similarly, diabetic patients who missed more than 30% of scheduled appointments had a mean HgbA1c 0.70 to 0.79 points higher than those who were attending their appointments, were less likely to monitor their daily blood glucose, and had poorer adherence to oral glycemic control medication refilling (Vijayan, 2014; Weingarten, Meyer, & Schneid, 1997). Adherence to scheduled appointments, independent of visit frequency, was a strong predictor of diabetes metabolic control (Schectman et al., 2008).

In any patient, differences in demographic variables may affect appointment completion. Demographic findings of missed appointments varied depending on differences in sample populations, medical specialties, and geographic regions (LaGanga & Lawrence, 2007). However, age, gender, and the type of health insurance (if any) have been consistently correlated with the missed appointment rates (Vijayan, 2014). Smith and Yawn (1994) studied a family medicine practice and found younger patients, 20- to 39-years of age, were less likely to keep appointments (30.7%); whereas, patients over

40-years were more likely to attend their scheduled appointment. The 40- to 59- year old age group missed appointments 19.6% of the time, and the 60-year old and older group missed their appointments only 9.1% of the time (Smith & Yawn, 1994). In another study, Ellis, McQueenie, McConnachie, Wilson, and Williamson (2017) found women used general practice services more often than men. When controlling for the number of appointments made, men missed a higher number of appointments for all appointments made (Ellis et al., 2017). Vikander et al. (1986) found missed appointments often reflected life circumstances for the population studied. Those who were poor, unemployed, or from single-parent families were found to miss more appointments (Vikander et al., 1986). Individuals living within underserved communities were three-times more likely to miss their appointment for follow-up healthcare management than those who lived in more affluent areas (DuMontier, 2013). The age, gender, and socioeconomic factors affecting a person appear to influence the ability of a person to complete scheduled healthcare appointments with a provider.

There have been several strategies utilized to reduce missed appointment rates in healthcare offices. These commonly include providing patient reminders through the use of phone calls, email and patient internet portals, and applying missed appointment fees. Pre-appointment reminder calls may be helpful in reducing missed appointment rates according to a study done by Molfenter (2013) who found the use of pre-appointment reminder calls in an addiction treatment program decreased missed appointment rates by 19%. Since forgetfulness is a frequent reason for patients to miss an appointment, Kaplan-Lewis & Percac-Lima (2013) also found reminding patients of their upcoming appointments through phone, text, mail, and email may assist in reducing missed

appointments. In another study by Siwicki (2018), the advanced practice registered nurse (APRN) obstetrics and gynecology (OB-GYN) practice in New Hampshire used a text message strategy. Text messages were sent when the patient scheduled their appointment, twenty-four hours before the appointment, and one-hour before the appointment which resulted in a reduction of missed appointments by 60% (Siwicki, 2018). Hence, some form of appointment reminder may reduce the number of missed appointments from forgetfulness.

Another effective means to decrease missed appointment rates may be to assign a financial fee for patients who miss an appointment (Vijayan, 2014). Bech (2005) explained the purpose of charging a fee was to optimize health care resources by keeping the practice fiscally sound. According to the Medical Group Management Association (MGMA, 2017), a practice may legally charge a full or partial appointment fee for a missed appointment. In general, modest fees ($35-50) are meant as a deterrent to missed appointments rather than recouping financial losses (Keohane, 2007). Ultimately a reduction in missed appointments should enable healthcare providers to monitor a patient's health condition more effectively.

Studies have been performed examining the effects of enforcing a financial penalty for missed appointments (Mantyjarvi, 1994; Lesaca 1995; Farro, 2013). Overall, a missed appointment fee for those patients who missed their appointment reduced the missed appointment rate (Farro, 2013). Mantyjarvi (1994) found the missed appointment rate decreased from 6.4% to 5.5% after the implementation of a missed appointment fee in an ophthalmological out-patient department. Lesaca (1995) found the missed appointment rate decreased from 20.1% to 9.27% for mental health patients. Wesch,

Lutzker, Frisch, and Dillon (1985) found implementing a service fee of $3 at a student health clinic if the patients failed to either cancel or reschedule their appointments decreased the missed appointment rate from 18% to 10%. While these studies provide evidence of a reduction in missed appointments from a financial cost incurred by missed appointment, there was no evidence to demonstrate improved health outcomes.

Contrary to additional fees, Daggy et al. (2011) argued charging a fee was a less desirable solution for patients because this could further limit access to care for patients with limited incomes while adversely affecting their health outcomes. Bech (2005) reported evidence of the effectiveness of charging a missed appointment fee is minimal, and there is a need to justify these charges with well-designed, randomized control trials assessing the long-term efficacy of this practice in different settings. Consequently, the effectiveness of missed appointment fees is disputed due to gaps in the literature and lack of robust scientific studies (Vijayan, 2014).

The Health Belief Model (HBM) will be used as the framework to study the effects of a missed appointment fee on patient outcomes, especially diabetes mellitus, in a rural primary care clinic in the Midwest. The HBM was developed to understand the adoption or rejection of disease prevention strategies for the early detection of disease (LaMorte, 2018). Later uses of the model in nursing were for patients' responses to symptoms and compliance with medical treatments and preventive health care practices (LaMorte, 2018). This framework will guide the project to examine predictive factors of patients who miss scheduled appointments. Two basic components of health-related behavior in the HBM are the desire to avoid illness, or to get well from illness. In addition, the belief a specific health action will prevent, or cure a disease is acknowledged. The individual

chooses a course of action dependent on their perceptions of benefits and barriers related to health behavior (LaMorte, 2018).

Method

Design

A descriptive, observational design was utilized for this quality improvement initiative. A retrospective medical record review was conducted to assess the rate of scheduled and missed appointments from January 1, 2018 through June 30, 2018 and again from January 1, 2019 through June 30, 2019 when a missed appointment fee was implemented. Of particular interest were those patients with diabetes mellitus as glycemic control for this chronic condition was evaluated between those who kept their appointments and those who missed appointments.

Setting

This study was conducted in a privately-owned, family medicine primary care practice located in a rural Midwestern town within a population of nearly 13,000 residents. The practice accepted most private insurance, Medicare, Medicaid, and self-paying patients. This practice had over 1,500 patients of diverse ages, genders, races, and ethnicities. The practice was established in 2004 consisting of one primary care physician and one medical assistant. The practice used an electronic health record to maintain patient records.

Sample

A convenience sample of all scheduled patient appointments between the dates of January 1, 2018, to June 30, 2018, and January 1, 2019, to June 30, 2019. Scheduled patient appointments were defined as an annual exam, medication refill, chronic

condition follow-up (especially diabetes mellitus), emergency department follow-up, acute illness/injury, and consultations/forms. Inclusion criterial were patients at least 18-years of age or older with a diagnosis of diabetes mellitus. Exclusion criteria were those under age 18-years, non-scheduled or walk-in visits, and missed appointments due to a patient being deceased, or no diagnosis of diabetes mellitus

Data Collection/Analysis

Data was collected via a retrospective electronic medical record (EMR) review. Demographic data included gender, age, zip code, insurance or payor for services, and employment status. In addition, the number of scheduled appointments; the number of missed appointments; financial reimbursement for the scheduled or missed appointment; a final or working diagnosis for the completed or missed visit; and for diabetic patients, the documented Hgb A1C at the visit was recorded for the 2018 and 2019 cohorts. All data was de-identified by coding each individual numerically at 18-1, 18-2, etc., for the 2018 cohort, and 19-1, 19-2, etc., for the 2019 cohort. All data was contained on a password-protected computer and password-protected portable drive and retained by the primary investigator (PI) for a period of seven years. Descriptive statistics, Pearson correlation, independent sample *t* tests, three-way ANOVA, and chi-square were calculated for analysis of the data.

Approval Process

Approval was received from the practice site in September 2018. The doctor of nursing practice (DNP) committee approval and university institutional review board (IRB) approvals were obtained in October 2019.

Procedures

A quality improvement team was comprised of the practice physician, medical assistant, and PI. An initial meeting was held to discuss the problem of missed appointments. Current methods were reviewed including an appointment reminder call three-days prior to a scheduled appointment and appointment rescheduling within one-week. Also, the implementation of a missed appointment fee was debated. The decision was made to continue to current process, but implement a missed appointment fee. While patient records would be reviewed in 2018 before the implementation of a missed appointment fee and 2019 after the missed appointment fee implementation, the diabetic patient population was chosen as the chronic disease of interest for evaluation of glycemic control, a primary health outcome.

Results

In 2018, there were 4,389 scheduled appointments, 191 missed appointments, and 64 patients who repeatedly missed appointments. In 2019, there were 4,146 scheduled appointments, 175 missed appointments, and 57 patients who repeatedly missed appointments. Hence, the total number of scheduled appointments was 8,535 (N=8,535). During the study periods in 2018 and 2019, a total of 236 (N=236) were identified to have a diagnosis of diabetes mellitus. The majority of diabetic patients were of male gender (n=139, 58.9%), with females comprising 41.1% (n=97) of the sample. The diabetic sample age ranged from 31-to 92 years, with an average age of 60.1-years (SD=12.38). The majority of diabetic patients ranged in ages of 51-60 years (n=73, 30.9%) with other age range groups of 31-40 years (n=14, 5.9%), 41-50 years (n=38, 16.1%), 61-70 years (n=58, 24.6%), 71-80 years (n=43, 18.2%), 81-90 years (n=8, 3.4%), and 91-100 years (n=2, 0.8%). The majority of diabetic patients lived in the 62221 zip

code (*n*=44, 18.6%) with other zip codes of 11780 (*n*=1, 0.4%), 32539 (*n*=1, 0.4%), 45103 (*n*=1, 0.4%), 61802 (*n*=1, 0.4%), 62025 (*n*=4, 1.7%) 62034 (*n*=3, 1.2%) 62040 (*n*=1, 0.4%), 62062 (*n*=3, 1.3%), 62095 (*n*=3, 1.3%), 62203 (*n*=1, 0.4%), 62206 (*n*=4, 1.7%), 62207 (*n*=2, 0.8%), 62208 (*n*=28, 11.9%), 62214 (*n*=1, 0.4%), 62220 (*n*=11, 4.7%), 62223 (*n*=14, 5.9%), 62226 (*n*=43, 18.2%), 62232 (*n*=6, 2.5%), 62234 (*n*=2, 0.8%), 62239 (*n*=2, 0.8%), 62243 (*n*=2, 0.8%), 62245 (*n*=1, 0.4%), 62254 (*n*=5, 2.1%), 62255 (*n*=1, 0.4%), 62257 (*n*=1, 0.4%), 62258 (*n*=2, 0.8%), 62260 (*n*=2, 0.8%), 62264 (*n*=1, 0.4%), 62265 (*n*=1, 0.4%), 62269 (*n*=29, 12.3%), 62271 (*n*=2, 0.8%), 62278 (*n*=1, 0.4%), 62286 (*n*=2, 0.8%), 62293 (*n*=1, 0.4%), 62294 (*n*=2, 0.8%), 62298 (*n*=3, 1.3%), 63070 (*n*=1, 0.4%), 63135 (*n*=1, 0.4%), 36136 (*n*=1, 0.4%), and 63301 (*n*=1, 0.4%). The majority of diabetic patients had private insurance (*n*=159, 67.4%), with Medicare comprising of 27.1% (*n*=64), self-pay (*n*=12, 5.1%), and Medicaid (*n=1*, 0.4%). The majority of diabetic patients were employed (*n*=164, 69.5%), with retired patients at 22.9% (*n*=54), and unemployed (*n*=18, 7.6%).

The 2018 diabetic cohort had 32 patients who missed appointments and 4 patients who repeatedly missed appointments. The majority of the patients were of male gender (*n*=19, 59.4%), with females comprising 40.6% (*n*=13) of the sample. The age ranged from 32- to 83-years, with an average age of 54.5-years (*SD*=12.08). The majority of the 2018 diabetic cohort ranged in ages of 41-50 years (*n*=12, 37.5%) with other age range groups of 31-40 years (*n*=2, 6.3%), 51-60 years (*n*=10, 31.3%), 61-70 years (*n*=5, 15.6%), 71-80 years (*n*=2, 6.3%), and 81-90 years (*n*=1, 3.1%). The majority of diabetic patients lived in the 62221 zip code (*n*=7, 21.9%) with other zip codes of 11780 (*n*=1, 3.1%), 62034 (*n*=1, 3.1%), 62203 (*n*=1, 3.1%), 62206 (*n*=2, 6.3%), 62208 (*n*=1, 3.1%),

62214 (*n*=1, 3.1%), 62220 (*n*=4, 12.5%), 62223 (*n*=1, 3.1%), 62226 (*n*=3, 9.4%), 62232 (*n*=2, 6.3%), 62234 (*n*=1, 3.1%), 62239 (*n*=1, 3.1%), 62243 (*n*=1, 3.1%), 62245 (*n*=1, 3.1%), and 62269 (*n*=4, 12.5%). The majority of the 2018 cohort had private insurance (*n*=26, 81.3%), with Medicare comprising of 15.6% (*n*=5), and self-pay (*n*=1, 3.1%). The majority of the 2018 cohort were employed (*n*=25, 78.1%), with retired patients at 12.5% (*n*=4), and unemployed (*n*=3, 9.4%). The mean HbA1c for the 2018 cohort was 8.63% (*SD*=2.06) with a minimum HbA1c value of 5.6% and a maximum HbA1c value of >14.0%.

The 2019 diabetic cohort had a total of 29 patients who missed appointments and 5 patients who repeatedly missed appointments. The majority of the patients were of male gender (*n*=15, 51.7%), with females comprising 48.3% (*n*=14) of the sample. The age ranged from 32- to 92-years, with an average age of 56.2-years (*SD*=15.16). The majority of the 2019 diabetic cohort ranged in ages of 41-50 years (*n*=10, 34.5%) with other age range groups of 31-40 years (*n*=2, 6.9%), 51-60 years (*n*=7, 24.1%), 61-70 years (*n*=4, 13.8%), 71-80 years (*n*=4, 13.8%), 81-90 years (*n*=1, 3.4%), and 91-100 (*n*=1, 3.4%). The majority of diabetic patients lived in the 62269 zip code (*n*=7, 24.1%) with other zip codes of 32539 (*n*=1, 3.4%), 61802 (*n*=1, 3.4%) 62062 (*n*=1, 3.4%), 62206 (*n*=2, 6.9%), 62208 (*n*=6, 20.7%), 62220 (*n*=1, 3.4%), 62221 (*n*=3, 10.3%), 62226 (*n*=4, 13.8%), 62234 (*n*=1, 3.4%), 62254 (*n*=1, 3.4%), and 62258 (*n*=1, 3.4%). The majority of the 2019 cohort had private insurance (*n*=23, 79.3%), with Medicare comprising of 17.2% (*n*=5), and self-pay (*n*=1, 3.4%). The majority of the 2019 cohort were employed (*n*=21, 72.4%), with retired patients at 20.7% (*n*=6), and unemployed

(*n*=2, 6.9%). The mean HbA1c for the 2019 cohort was 8.36% (*SD*=2.01) with a minimum HbA1c value of 5.6% and a maximum HbA1c value of >14.0%.

Levels of HbA1c were evaluated for correlation between different age groups. Using a Pearson correlation since the relationship between each pair of variables was linear. A Pearson *r* correlation conducted between age and HbA1c results were statistically significant at the .05 level, (*r*= -.273, *p*=.000). The HbA1c and age had a very strong inverse relationship, indicating as age increased, HbA1c decreased (Appendix A).

An independent sample *t*-test was used to test for differences in genders. In the 2018 cohort, the HbA1c results for male patients was (*M*=8.1, *SD*=2.06) and female patients was (*M*=8.1, *SD*=1.95). The difference between male and female HbA1c means was not statistically significant at the .05 level. (*t*=-.203, *df*=157, *p*=.840). In the 2019 cohort, the HbA1c results for male patients was (*M*=7.8, *SD*=1.89) and female patients was (*M*=7.7, *SD*=2.05). The differences between male and female HbA1c means was not statistically significant at the .05 level (*t*=.213, *df*=183, *p*=.831). And, for the combined cohorts, the HbA1c results for male patients (*M*=8.0, *SD*=2.0) and female was (*M*= 7.8, *SD*=1.9) patients. The difference between the male and female means was not statistically significant at the .05 level (*t*=.732, *df*=234 *p*=.465).

Likewise, an independent samples *t*-test was conducted to examine the mean HbA1c of diabetic patients who completed their appointment and those who missed their appointments. In the 2018 cohort, the mean HbA1c of those who missed appointments (*M*=8.6, *SD*=2.06) was higher than those who kept their appointments (*M*=8.0, *SD*=2.00). The difference between the completed versus missed appointments means

was not statistically significant at the .05 level (t=1.703, df=157, p=.090). In the 2019 cohort, the mean HbA1c of those who missed appointments (M=8.4, SD=2.01) was higher than those who kept their appointments (M=7.6, SD=1.93). The difference between the completed versus missed appointment means was not statistically significant at the .05 level (t=1.802, df=183, p=.073). For the combined cohorts, the mean HbA1c of those who missed appointments (M=8.4, SD=1.83) was higher than those who kept their appointments (M=7.7, SD=1.92). The difference between the completed versus missed appointment means was statistically significant at the .05 level (t=2.196, df=234, p=.029). Those who completed their appointment had significantly lower HbA1c values by 0.7mmol/mol than those who missed appointments (Appendix B).

A factorial (three-way) analysis of variance (ANOVA) for gender, payor status, and employment status with the means of HgA1c was performed. In the 2018 cohort, employed males with private insurance had a HbA1c (M=8.2%, SD=1.80), employed males who were self-paying (M=9.5, SD=3.00), retired males with private insurance (M=6.7, SD=1.07), retired males with Medicare (M=7.5%, SD=2.38), unemployed males with private insurance (M=11.3, SD=2.08), employed males with Medicare (M=6.6, SD=1.15) and unemployed males who self-pay (M=6.0). Unemployed females with private insurance had a mean HbA1c (M=6.6%, SD=1.00), unemployed females with Medicare (M=7.2, SD=.26), employed females with private insurance (M=8.3%, SD=1.84), employed females with Medicare (M=8.5, SD=3.71), and retired females with Medicare (M=8.1, SD=2.29), retired females with private insurance (M=8.5, SD=.35), employed females who are self-pay (M=8.6, SD=.17), and employed females with Medicaid (M=10.7). An interaction effect was significant at the .05 level between gender

and employment status (F[12,144]=5.885, *p*=.003). Hence, employed males and unemployed females were more likely to have lower HbA1c value. Payor and employment status were also statistically significant at the .05 level (F[12,144]=3.184, *p*=.026). Hence, patients who are employed and have Medicare were more likely to have a lower HbA1c value. There was no effects of gender, payor, employment status on HbA1c separately, and no significant interaction effects between gender and payor, and gender, payor and employment combined, on HbA1c. A Post Hoc test was calculated between each measurement to examine the differences among the variables. There was no statistical differences in the variables.

In the 2019 cohort, employed males with private insurance had a HbA1c (*M*=8.0, *SD*=1.84), unemployed males with private insurance (*M*=9.5, *SD*=3.97), retired males with private insurance (*M*=7.3, *SD*=1.34), employed males with Medicare (*M*=6.5, *SD*=.81), retired males with Medicare (*M*=7.8, *SD*=2.21), employed males who were self-paying (*M*=8.2, *SD*=1.64), retired males who are self-paying (*M*=7.0). Employed females with private insurance had a HbA1c (*M*=8.0%, *SD*=2.03), unemployed females with private insurance (*M*=6.4, *SD*=.63), retired females with private insurance (*M*=8.6, *SD*=3.79), employed females with Medicare (*M*=8.6, *SD*=3.64), employed females who are self-paying (*M*=7.7, *SD*=1.00), unemployed females with Medicare (*M*=7.0, *SD*=.26), and retired females with Medicare (*M*=7.3%, *SD*=1.97). An interaction effect was significant at the .05 level between gender and employment status (F[12, 171]=3.57, *p*=.030). Hence, employed males with Medicare were more likely to have a lower HbA1c value. An interaction effect was also significant at the .05 level between gender, payor, and employment status combined (F[12,171]=4.10, *p*=.044). Hence, employed

males with Medicare are more likely to have a lower HbA1c value. Furthermore, a Post Hoc test was calculated between each measurement to examine the differences among the variables. There were no differences between variables that were significant.

For the combined cohorts, unemployed males with private insurance had a HbA1c (M=10.1%, SD=2.57), employed males with private insurance (M=8.3%, SD=1.86), retired males with private insurance (M=7.0%, SD=1.41), employed males with Medicare (M=6.6%, SD=.86), retired males with Medicare (M=7.4%, SD=2.08), unemployed males who were self-paying (M=6.0%), employed males who were self-paying (M=9.1%, SD=2.56), retired males who were self-paying (M=7.1%), unemployed females with private insurance (M=6.6%, SD=.72), employed females with private insurance (M=8.1, SD=1.85), retired females with private insurance (M=7.8%, SD=1.78), unemployed females with Medicare (M=7.0%, SD=.25), employed females with Medicare (M=8.0%, SD=3.00), retired females with Medicare (M=7.4%, SD=1.93), employed females who were self-paying (M=8.1, SD=.23), and employed females with Medicaid (M=10.7%). There was no effect between HbA1c and gender (p=.086). There was no effect between HbA1c and payor status (p=.215). HbA1c and employment status had no effect (p=.213). An interaction effect was only significant at the 0.5 level between gender and employment status (F[12, 220]=5.44, p=.005). Hence, unemployed females with private insurance were more likely to have lower HbA1C values (M=6.6%, SD=.72*)*. There were no effects of gender, payor, employment status on HbA1c, and no significant interaction effects between gender and payor, payor and employment, and gender, payor, and employment combined, on HbA1c. Furthermore, a Post Hoc test was calculated between each measurement to examine the differences among the variables.

There was only a statistically significant difference in HbA1c levels in the retired population aged 65-years and older (p=.031) when compared to the employed and unemployed populations. Consequently, retirees were more likely to have lower HbA1c values than younger people regardless of employment status.

A chi-square test of independence was performed to evaluate if gender affected a diabetic patient's tendency to keep their appointment (n=236). In the 2018 cohort, 62.9% were men and 37.1% were women. Overall, 81% of the men and 78% of the women kept their scheduled appointments. Although the odds of keeping an appointment among male patients were .830 times greater than those of female patients, the gender difference for probability of keeping an appointment was not statistically significant. In the 2019 cohort, 57.3% were men and 42.7% were women. Overall, 85.8% of the men and 82.3% of the women kept their scheduled appointments. The gender difference for probability for keeping an appointment was not statistically significant. The odds of keeping an appointment among male patients were .765 times greater than those of female patients. For the combined cohort, 58.9% were men and 41.1% were women. Overall, 79.9% of the men and 75.3% of the women kept their scheduled appointments. The gender difference for probability of keeping an appointment was not statistically significant. The odds of keeping an appointment among male patients were .767 times greater than those of female patients.

An independent samples t-test was conducted for the means of missed appointments before (2018 cohort) and after the implementation of a missed appointment fee (2019 cohort). The missed appointment rates between the 2018 cohort (M=31.12, SD=4.26) and 2019 cohort (M=28.5, SD=2.88) was not statistically significant at the .05

level (t=1.27, df=10, p=0.233) indicating the missed appointment fee did not affect the rate of missed appointments. The lost revenue in 2018 from missed visits was $14,960. The lost revenue in 2019 from missed appointments was $13,680. In total, 9 patients paid the missed visit fee (Appendix C).

Discussion

Diabetic patients who kept their appointments had lower HbA1c values, however, a missed appointment fee may not influence a patient's reason for missing the appointment. The difference in the number of missed appointments between 2018 and 2019 was 16 despite the implementation of a missed appointment fee, however, strategies such as email and telephone reminders may have influenced this. When divided by month, the average missed appointment rate in 2018 was 4.35% or 32 missed appointments per month, while the average missed appointment rate in 2019 when a missed appointment fee was implemented was 4.22% or 29 missed appointments per month. The implementation of a missed appointment fee (2019) compared with no fee (2018) did not significantly affect the overall rate of missed appointments.

Patients with diabetes mellitus who missed an appointment when compared to those who completed an appointment were found to be at greater risk for poorly controlled diabetes. About 78% of diabetic patients kept their appointments (n=184) and had an average HbA1c of 7.7% while 22% of diabetic patients missed at least one appointment (n=52) and had an average HbA1c of 8.4%. There was a statistically significant difference in the means of HbA1c of diabetic patients who kept their appointments versus those who missed their appointments (p=.025). Furthermore, those

who completed their appointment had a significantly lower HbA1c values by 0.7mmol/mol than those who missed appointments.

The average revenue generated or lost for a scheduled or missed appointment in 2018 when compared to 2019 found the financial loss due to missed appointments for the 2018 cohort was $14,960, while the financial loss due to missed appointments for the 2019 cohort was $13,680. This was an 8.56% or $1,280 difference in the revenue lost between the two time periods. The implementation of a missed appointment fee collection resulted in a reimbursement of $750 which may have been lost without a fee.

In addition, gender, payor, and employment status were studied together to determine the affect (if any) on the mean HbA1c values. A significant interaction occurred between gender and employment status of the diabetic patients on the average HbA1c (p=.005). Unemployed males had the highest HbA1c average of 10.1%, followed by employed males with an average HbA1c of 9.1%. The highest HbA1c average in unemployed females was 7.0% and employed females was 8.1%. Unemployed females were more likely to have a lower HbA1c value (p=.005). Interestingly, unemployed females had a lower HbA1c than employed females, whereas unemployed males had a higher HbA1c than employed males. This difference cannot be explained, therefore, further study between these populations in the rural area is recommended.

Also, there was a moderate inverse relationship between age and HbA1c. As age increased, the HbA1c decreased. Consequently, retirees were more likely to have lower HbA1c values than younger people regardless of employment status (p=.031). This finding may be a result from retirees being able to keep their scheduled appointments and having more time to address their health needs, however, this warrants further study.

Finally, there was a statistical difference between male and female diabetic patients who kept their scheduled appointments. Males kept an appointment more frequently (47%) than females (30.9%) in the rural setting. This is in contrast to what was found in previous studies where females kept their scheduled appointments more often than men. Future study to compare urban and rural gender differences when keeping health appointments is needed.

The most important implication for practice from this study was to encourage diabetic patients to keep their scheduled appointments for a more controlled glycemic state. Scheduled appointments allowed for interviewing diabetic patients about their eating habits, frequency of checking their blood glucose, and medication adherence which are factors contributing to elevated HbA1c values and glycemic control. A missed appointment does not allow for adjustments in medications based on diet and blood sugar monitoring, ultimately affecting overall HbA1c values, or glycemic control.

A recommendation for future study is to compare urban versus rural diabetic populations. While this study was conducted in a rural populations, some findings were in contradiction to other studies completed in a more urbanized areas. Also, there was a gap in the literature regarding missed appointments and its impact on chronic health conditions such as hypertension, asthma, and others. In addition, a longitudinal study on the effects of missed appointments may be of value, especially for those with a chronic health condition. Further, studies conducted on missed appointment fees have been generally short-term evaluations of this proposed deterrent, therefore a long-term evaluation may be helpful. Finally, the use of different strategies to reduce the missed

appointment rate such as an email or text reminders, open scheduling, and a termination policy are recommended.

Conclusion

Keeping scheduled appointments, especially in diabetic patients, appears to have impacted glycemic control in the rural setting. A missed appointment fee was not found to be effective in this rural, primary care practice. The evaluation of scheduled appointments, missed appointments, and the impact of completed or missed appointments on patients with a chronic illness found positive effects when appointments were completed. Missed appointments can be an issue in primary care, both for providers and their patients. Those who have a chronic condition, such as diabetes, may be particularly susceptible for poor glycemic control when missing appointments.

References

Bech, M. (2005). The economics of non-attendance and the expected effect of charging a fine on non-attendees [Electronic version]. *Health Policy, 74*, 181-191. doi:10101 6/j.healthpol.2005.01.001

Clarke, J.L., Bourn, S., Skoufalos, A., Beck, E.H., & Castillo, D.J. (2017). An innovative approach to health care delivery for patients with chronic conditions. *Population Health Management, 20*(1), 23-30. doi:10.1089/pop.2016.0076

Daggy, J., Lawley, M., Willis, D., Thayer, D., Suelzer, C., DeLaurentis, P., . . . Sands, L. (2011). Using no-show modeling to improve clinic performance. *Health Informatics Journal, 16*(4), 246-259. doi:https://doi.org/10.1177/14604582103805 21

Drewek, R., Mirea, L., & Adelson, P.D. (2017). Lead time to appointment and no-show rates for new and follow-up patients in an ambulatory clinic. *The Health Care Manager, 36*(1), 4-9. doi:10.1097/hcm.0000000000000148

DuMontier, D., Rindfleisch, K., Pruszynski, J., & Frey, J.J. (2013). A multi-method intervention to reduce no-shows in an urban residency clinic. *Family Medicine, 45*(9), 634-641.

Ellis, D.A., McQueenie, R., McConnachie, A., Wilson, P., & Williamson, A.E. (2017). Demographics and practice factors predicting repeated non-attendance in primary care: A national retrospective cohort analysis. *The Lancet, 2*(12). doi:https://doi.or g/10.1016/S2468-2667(17)30217-7

Ekram, T. (2016). How much are cancelled appointments & no-shows costing you? In *Lumahealth*. Retrieved from https://www.lumahealth.io/blog/how-much-are-cancelled-appointments-no-shows-costing-you/

Farro, D.K. (2013). *The healthcare no-show reduction method*. (Unpublished doctoral dissertation, University of Utrecht, Utrecht, The Netherlands). Retrieved from https://dspace.library.uu.nl/handle/1874/282679

Gajwani, P., & Khatri, R. (2014). Can what we learned about reducing no-shows in our clinic work for you? *Current Psychiatry, 13*(9), 13-15, 22-24. Retrieved from https://www.mdedge.com/psychiatry/article/86564/practice-management/can-what-we-learned-about-reducing-no-shows-our-clinic

Gebhart, T., (2017). *No-show management in primary care: A quality improvement project.* (Unpublished doctoral dissertation, Oregon Health & Science University, Portland, Oregon). Retrieved from http://digitalcommons.ohsu.edu/etd/3923

George, A., & Rubin, G. (2003). Non-attendance in general practice: A systematic review and its implications for access to primary health care. *Family Practice*, *20*(2),178-184. doi:10.1093/fampra/20.2.178

Hertz, B.T. (2018). Transportation doesn't fix all no-show woes. In *ACP Internist*. Retrieved from https://acpinternist.org/archives/2018/11/transportation-doesnt-fix-all-no-show-woes.htm

Hwang, A.S., Atlas, S.J., Cronin, P., Ashburner, J.M., Shah, S.J., He, W., & Hong, C.S. (2015). Appointment "no-shows" are an independent predictor of subsequent quality of care and resource utilization outcomes. *Journal of General Internal Medicine*, *30*(10), 1426-1433. doi:10.1007/s11606-015-3252-3

Kaplan-Lewis, E., & Percac-Lima, S. (2013). No-show to primary care appointments: why patients do not come. *Journal of Primary Care & Community Health*, *4*(4), 251-255. doi:10.1177/2150131913498513

Keohane, P., American Academy of Professional Coders. (2007). How to bill for missed appointments. Retrieved from https://www.aapc.com/blog/2388-how-to-bill-for-missed-appointments/

Kheirkhan, P., Feng, Q., Travis, L., Tavakoli-Tabasi, S., & Sharafkhaneh, A. (2016). Prevalence, predictors and economic consequences of no-shows. BMC Health Services Research16(13). Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC471455/ pdf/12913_2015_Article_1243.pdf

Lacy, N.L., Paulman, A., Reuter, M.D., & Lovejoy, B. (2004). Why we don't come: patient perceptions on no-shows. *Annals of Family Medicine*, *2*(6), 541-545.

LaMorte, W.W. (2018). The health belief model. In *Behavioral Change Models*. Retrieved from http://sphweb.bumc.bu.edu/otlt/MPH-Modules/SB/BehavioralChangeTheories/BehavioralChangeTheories2.html

LaGanga, L.R., & Lawrence, S.R. (2007). Clinic overbooking to improve patient access and increase provider productivity. *Decision Sciences, 38*(2), 251-276.

Lesaca, T. (1995). Assessing the influence of a no-show fee on patient compliance at a CMHC. *Administration and Policy in Mental Health*, *22*(6), 629-631.

Mantyjarvi, M. (1994). No-show patient in an ophthalmological out-patient department. *ACTA Ophthalmoligica*, *72*(1994), 284-289.

McQueenie, R., Ellis, D.A., McConnachie, A., Wilson, P., & Williamson, A.E. (2019). Morbidity, mortality and missed appointments in healthcare: A national retrospective data linkage study. *BMC Medicine*, *17*(2), 1-9. doi:https://doi.org/10.1186/s12916-018-1234-0

Medical Group Management Association. (2017). *Maximizing patient access and scheduling*. Retrieved from https://www.mgma.com/getattachment/Products/ / Products/Maximizing-Patient-Access-and-Scheduling/PatientAccessScheduling ResearchReport-INTER_FINAL.PDF.aspx

Molfenter, T. (2013). Reducing appointment no-shows: going from theory to practice. *Substance Use Misuse*, *48*(9), 743-749. doi:10.3109/10826084.2013.787098

Norris, J.B., Kumar, C., Chand, S., Moskowitz, H., Shade, S.A., & Willis, D.R. (2012). An empirical investigation into factors affecting patient cancellations and no-shows at outpatient clinics. *Decision Support Systems*, *2012*(10), 1-16. doi:http://dx.doi.org/10.1016/j.dss.2012.10.048

Nguyen, D.L. & DeJesus, R.S. (2010). Increased frequency of no-shows in residents' primary care clinic is associated with more visits to the emergency department. *Journal of Primary Care & Community Health, 1*(1), 8-11. http://doi.org/10.1177/2150131909359930

Nguyen, D.L., DeJesus, R.S., & Wieland, M.L. (2011). Missed appointments in a resident continuity clinic: patient characteristics and health care outcomes. *Journal of Graduate Medical Education, 3*(3), 350-355. doi:https://doi.org/10.4300/JGME-D-10-00199.1

Nuti, L.A, Lawley, M., Turkcan, A., Tian, Z., Zhang, L., Chang, K., Willis, D.R., Sand, L.P. (2012). No-shows to primary care appointments: Subsequent acute care utilizations among diabetic patients. *BMC Health Services Research, 12*(1), 304. http://doi.org/10.1186/1472-6963-12-304

Schectman, J.M., Schorling, J.B., & Voss, J.D. (2008). Appointment adherence and disparities in outcomes among patients with diabetes. *Journal of General Internal Medicine, 23*(10), 1685-1687. http://doi.org/10.1177/0009922815570613

Siwicki, B. (2018). *Patient engagement platform reduces patient no-shows by 60% at Bedford Commons OB-GYN* [Website]. Retrieved March 27, 2019, from https://www.healthcareitnews.com/news/patient-engagement-platform-reduces-patient-no-shows-60-bedford-commons-ob-gyn

Smith, C.M., & Yawn, B.P. (1994). Factors associated with appointment keeping in a family practice residency clinic. *The Journal of Family Practice,* 38(1), 25-29.

Taber, J.M., Leyva, B., & Persoskie, A. (2015). Why do people avoid medical care? A qualitative study using national data. *Journal of General Internal Medicine, 30*(3), 290-297. doi:101007/s11606-014-30089-1

Vikander, T., Parnicky, K., Demers, R., Frisof, K., Demers, P., & Chase, N. (1986). New-patient no-shows in an urban family practice center: analysis and intervention. *The Journal of Family Practice*, *22*(3), 263-268.

Vijayan, M. (2014). *No-shows: effectiveness of termination policy and review of best practices*, (Unpublished doctoral dissertation, Wright State University-Main Campus, Dayton, Ohio). Retrieved from https://corescholar.libraries.wright.edu/cgi/viewcontent.cgi?article=1117&context=mph

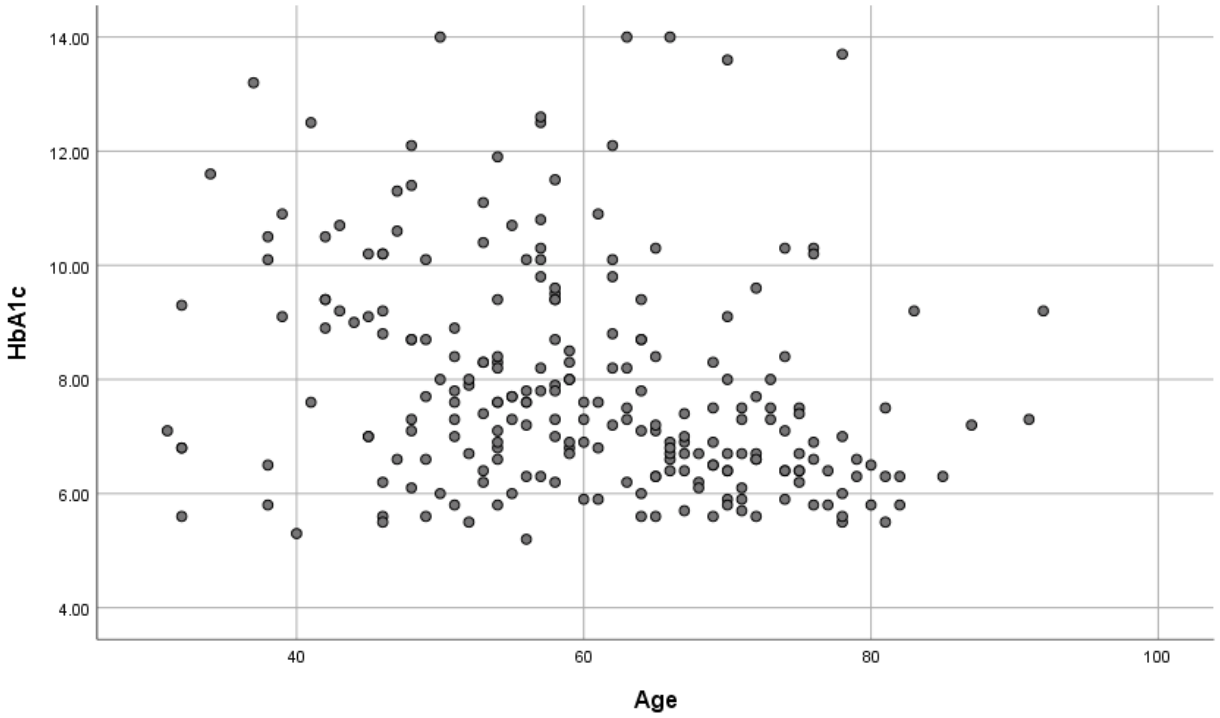
Weingarten, M., Meyer, D.L., & Schneid, J.A. (1997). Failed appointments in residency practices: who misses them and what providers are most affected? *Journal of the American Board of Family Practice, 10*(6), 407-411

Wesch, D., Lutzker, J.R., Frisch, L., & Dillon, M.M. (1985). Evaluating the impact of a service fee on patient compliance. *Journal of Behavioral Medicine, 10*(1987), 91-101.

Wiley, P. (2015). The high cost of no-show appointments. In *Opargo*. Retrieved from https://opargo.com/the-high-costs-of-no-show-appointment

Appendix A

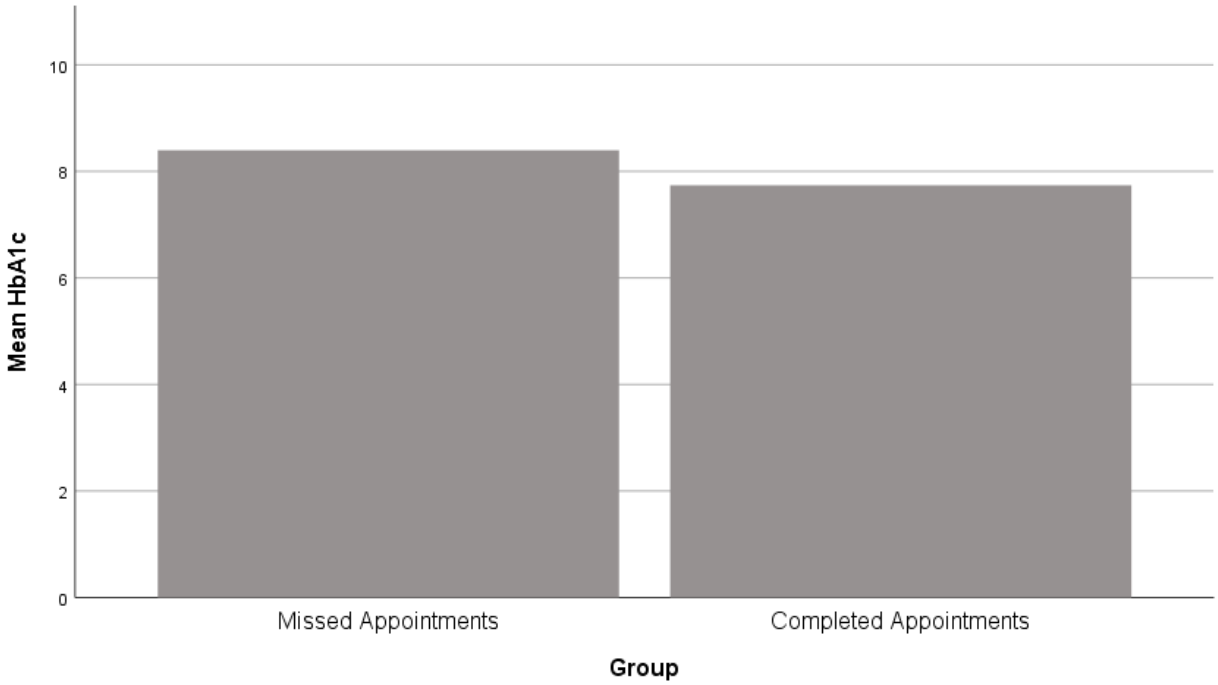
Figure1. Pearson correlation for age and HbA1c



Note. A Pearson *r* correlation conducted between age and HbA1c results were statistically significant at the .05 level, (*r*= -.273, *p*=.000). The HbA1c and age had a strong inverse relationship, indicating as age increased, HbA1c decreased.

Appendix B

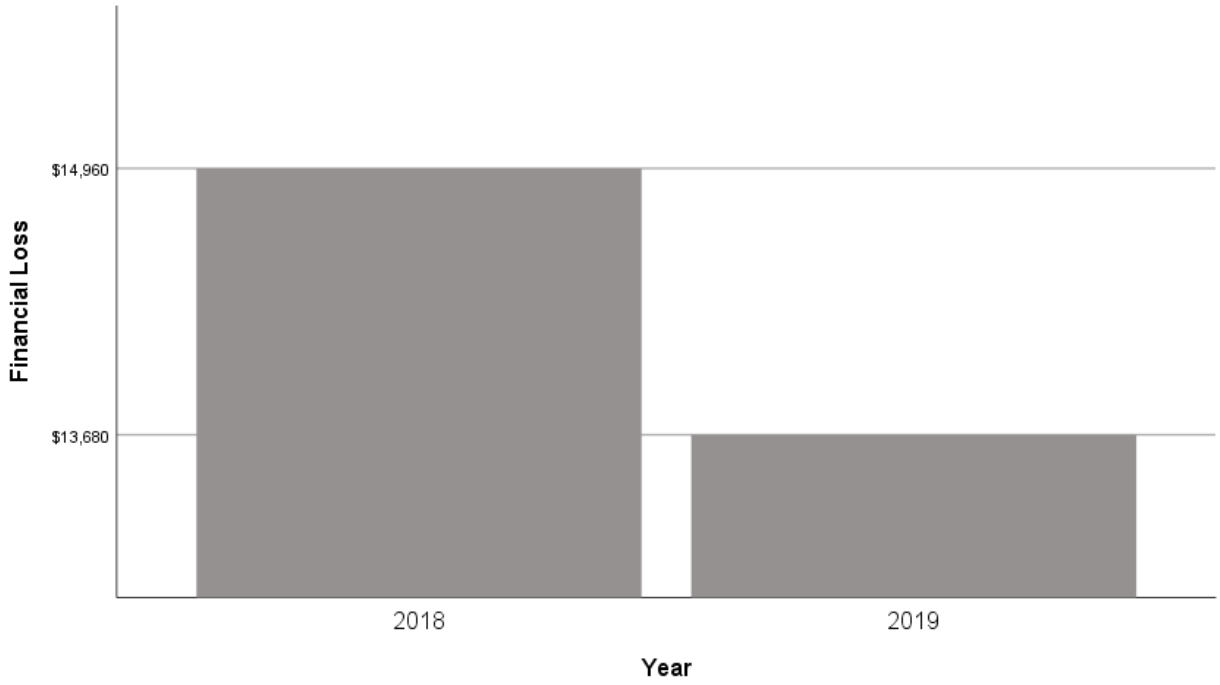
Figure 2. Mean HbA1c of Patients Who Missed And Completed Appointments



Note. For the combined cohorts from 2018 and 2019, the mean HbA1c of those who missed appointments (*M*=8.4, *SD*=1.83) was higher than those who kept their appointments (*M*=7.7, *SD*=1.92). The difference between the completed versus missed appointment means was statistically significant at the .05 level (*t*=2.196, *df*=234, *p*=.029). Those who completed their appointment had significantly lower HbA1c values by 0.7mmol/mol than those who missed appointments.

Appendix C

Figure 3. Financial Reimbursement Differences Between 2018 and 2019



Note. The missed appointment rates between the 2018 cohort (*M*=31.12, *SD*=4.26) and 2019 cohort (*M*=28.5, *SD*=2.88) was not statistically significant at the .05 level (*t*=1.27, *df*=10, *p*=0.233) indicating the missed appointment fee did not affect the rate of missed appointments. The lost revenue in 2018 from missed visits was $14,960. The lost revenue in 2019 from missed appointments was $13,680.