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The Impact of Digital Self-Scheduling on No-Show Event Rates in Outpatient Clinics

Karen M. Marhefka
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral study by

Karen M. Marhefka

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Review Committee
Dr. Warren McDonald, Committee Chairperson, Health Sciences Faculty
Dr. Miriam Ross, Committee Member, Health Sciences Faculty
Dr. Rabeh Hijazi, University Reviewer, Health Sciences Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
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Abstract

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Karen M. Marhefka

MHA, Worcester State University, 2007

BS, East Carolina University, 1983

Doctoral Study Submitted in Partial Fulfillment

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Abstract

The failure of patients to keep scheduled appointments results in significant loss of revenue due to decreased administrative efficiency, expensive clinical resource time, disruptive continuity of care between the patient and the provider, and reduced quality of care. The purpose of this quantitative study was to explore the use of digital self-scheduling as an emerging alternative to traditional office-assisted scheduling methods and determine if its use has an impact on reducing the occurrence of no-show events. The theoretical framework used for the study was the Consumer Behavior Theory. Three years of deidentified secondary data were collected from a large, adult primary care clinic, part of an integrated academic health system in the northeastern United States, in order to probe differences in the clinic's no-show rates, before and after the implementation of digital self-scheduling. Using chi-square tests for independence, the study revealed a decrease in the no-show rate after digital self-scheduling was implemented. In addition, the no-show rate was lower for appointments that were scheduled using digital self-scheduling versus appointments that were scheduled using traditional office-assisted scheduling. The result of this study contributes to positive social change by acknowledging that patients are consumers who thrive on the digital convenience that they already experience in their daily lives and contributes to enhancing patient and provider communications. The use of digital self-scheduling and other digital transformation tools contributes to the holistic improvement of the patient experience and in increasing provider and care setting support staff satisfaction.

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Dedication

I dedicate this body of work to my parents who have never failed in letting me know that I have their support, their love and their unwavering faith in my ability to succeed against incredible odds. To my brother and my sisters who have had my back for over 50 years (and counting) and to special family and friends near and far, on earth and in heaven, who have cheered me on with relentless positivity and constant words of encouragement, I thank you all.

To my grandsons Roman, Ian, Ashton, Lincoln, Ellis, and Brecken who have all taken turns at sitting patiently by my side while I finished endless rounds of "Mimi homework", you now have my full attention for sleepovers and snuggles. To my children Jay, Matt, Ryan, and Caroline and their spouses Katie, Randi, Debby and Alex, you have all given me pass after pass on nights, weekends and holidays when my time was filled with research instead of filled with family fun. Mom/K/Mimi is back so let's all get on a boat, pop open some Veuve Clicquot and celebrate.

And finally, I dedicate this to my husband John. Without you, none of this would have been possible, none of it. I did not just step off that cliff decades ago, I dove headfirst and you have been catching me ever since. I love you.

"After a while you learn that even sunshine burns if you get too much. So, you plant your own garden and decorate your own soul, instead of waiting for someone to bring you flowers. And you learn that you really can endure... that you really are strong, and you really do have worth. And you learn and learn... with every goodbye you learn."
Veronica A. Shoffstall.

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Section 1: Foundation of the Study and Literature Review

Introduction

In 2019, landmark federal reform legislation enacted since 2009 continues to modernize healthcare delivery organizations with digital technologies that began with the adoption of electronic health records (EHRs) in both the acute and ambulatory care delivery arenas. The American Recovery and Reinvestment Act , and its Health Information Technology and Economic and Clinical Health Act provision, established the Centers for Medicare and Medicaid's (CMS) Meaningful Use of EHRs Incentive Programs (Blumenthal & Tavenner, 2010).

Approximately $22 billion of incentive payments were made available to eligible physicians and provider organizations that successfully met the objectives for EHR implementation. As of February 2019, $35 billion had been released for payment, resulting in 96% of provider organizations and 78% of physicians now using certified EHR technology (CMS, 2019). Efforts such as these supported the goal of achieving the Institute of Medicine's (IOM), six aims for improving care-delivery quality: making it safe, equitable, effective, patient-centered, timely, and efficient (IOM, 2001). The IOM also introduced the Evidence Communication Innovation Collaborative, which explored obstacles, solutions, and strategies to enhance patient involvement in healthcare (IOM, 2013).

Federally funded, value-based care programs that have reimbursement implications from Medicare and other insurers and are tied to reported metrics, mandate the measurement of the patient experience in both the acute care and ambulatory settings. In place since 2008, the Hospital Consumer Assessment of Healthcare Providers and

Systems (HCAHPS) survey measures the patient's assessment of their hospital experience and the Physician Quality Reporting System (PQRS) contains like metrics for the ambulatory experience (Mehta, 2015).

Program payment incentives and penalties are strong motivators for healthcare administrators and providers to continually strategize to increase patient satisfaction. In addition to federally mandated initiatives, the emergence of consumerism in healthcare is playing a significant role in emphasizing the need to incorporate web-based convenience tools for patients in order to ease burdensome administrative activities and thus benefit both patient and provider (Beckers Hospital Review, 2015).

The impact of both the federal government and consumer pressure on increasing patient satisfaction dictates that healthcare administrators and clinicians focus on initiatives that improve patient engagement and experience while continuing the transition to a culture of patient-centeredness, which is deemed essential to improving the value of healthcare (Vogus & McClelland, 2016).

Given that 77% of all American adults use a smart phone device on a daily basis (Smith, 2017), patients-as-consumers are embracing the convenience and the ability to take a more active role in managing their own health via the use of digital tools that support the ability to self-manage when they choose to see their providers in the outpatient setting. As a result, patient use of digital self-scheduling as an alternative scheduling modality to traditional office-assisted scheduling in the outpatient arena is growing quickly. According to a 2018 article in Modern Healthcare, it was predicted that in 2019 approximately 64% of patients would schedule their own appointments digitally compared to just 34% in 2016 (Arndt, 2018). By placing more and more control of the

healthcare journey in the hands of the patient, there is likely to be less patient friction and less debate as to whose time is more valuable, the patient's or the provider's.

Indicative of this debate is the occurrence of no-show events. An appointment status of "no-show" is logged when a patient does not arrive for a scheduled appointment or procedure and has given no advance notice of their intent to be absent (Kheirkhah, Feng, Travis, Tavakoli-Tabasi, & Sharafkhaneh, 2016). These events negatively impact revenue and the overall operations of the care delivery setting. Digital self-scheduling is a significant "patient satisfier" that also improves the efficiency of the care facility (Patel & Brombach, 2016). Determining the relationship between digital self-scheduling and the occurrence of no-show events may help to reduce the no-show rate and improve the financial and operational health of the care delivery setting.

No-show events have plagued the healthcare industry for decades and occur regularly across the entire spectrum of healthcare delivery. Their negative financial and operational impacts continue to make an industry priority out of increasing no-show rates, no-show event tracking, and corrective interventions (Mazaheri Habibi et al., 2018).

High volumes of no-show events are most common in nonurgent office settings; they occur in general medicine and primary care practices as well as in specialty and surgical practices. In the United States, the average no-show rate in a general medicine ambulatory clinic ranges between 10% and 40% (Drewek, Mirea, & Adelson, 2017). No-show events, wherever they occur, create a decrease in office efficiency, increase the cost of office support and clinical resources, decrease the level of control of the waiting room

volume and flow, and increase overall patient and provider dissatisfaction (Mazaheri Habibi et al., 2018).

Implications for patients who do not show up for their appointments include delayed disease detection and patient safety concerns when care protocols are not followed as scheduled (Kheirkhah, Feng, Travis, Tavakoli-Tabasi, & Sharafkhaneh, 2016). Missed appointments also create an increase in visits to more expensive urgent care or emergency room facilities due to interruption in the continuity of care and treatment plans (Nguyen & DeJesus, 2010).

There are many reasons why patients miss appointments: a lack of reliable transportation, forgetfulness, competing priorities for time, cost, lengthy appointment lead times, and seasonal weather circumstances (Chong & Fantl, 2017). Social determinants also play a role, and include age, gender, socioeconomic status, language barriers, and race (Kheirkhah, Feng, Travis, Tavakoli-Tabasi, & Sharafkhaneh, 2016). Finally, emotional barriers are also a consideration and include (a) fear of hearing bad news, (b) a predisposition to being disrespected and having to accept the reality of long waits and inconvenient appointment times, and (c) a lack of understanding how a clinic operates and assuming that not showing up for an appointment will help reduce clinic overcrowding (Lacy, Paulman, Reuter, & Lovejoy, 2004; Gupta & Denton, 2008).

There is a significant cost to the care delivery site when no-show events occur. By using the average cost of an appointment, a care delivery site can approximate the revenue loss due to no-show events over time. A 2015 study of a large clinic system revealed that, in over a 12-year period, the mean no-show rate was 18.8% at a cost of

$22.7 million when using $196 as the average cost per encounter (Kheirkhah, Feng, Travis, Tavakoli-Tabasi, & Sharafkhaneh, 2016).

Popular methods used to curb no-show events have included appointment reminder letters that are sent to the patient via direct mail, reminder telephone calls that are automated or personal, text message reminders sent to mobile devices, email reminders, and charging the patient for the missed appointment (Berg et al., 2011). For the last two decades, the most popular method is the use of phone call reminders made by a clinic staff member directly to the patient versus a less personal automated phone message. A 2010 study of over 12,000 outpatients showed that groups of patients who received a personalized phone call reminder had a 13% no-show rate versus a 17.3% no-show rate for patients who received an automated phone message reminder (Parikh et al., 2010).

There are also deterrents to missed appointments. One example is to reduce the lead time between appointments since it has been shown that too much time in between initial appointment and the follow-up (>30 days) increases the likelihood of a no-show event. Another example is to charge a fee for the missed appointment (Drewek, Mirea, & Adelson, 2017).

While many of these methods have proven successful in reducing the number of no-show events, it remains important for care delivery organizations to implement solutions that are cost-effective, while continuing to complement the culture and workflow of the care delivery environment. The thinking is changing as patient-centered care models continue to take precedence over more traditional models. Strategies that make it easier for patients to keep their appointments, and thus increase patient

satisfaction, are taking precedence over strategies that focus on decreasing no-show events as a revenue metric for the provider or facility. This approach is in line with adhering to a more patient-centered care philosophy instead of a provider-centered one (Reese, 2016).

Given the emergence of consumerism in the healthcare industry, there is a need to consider alternative methods that focus on patient appointment management. Providing tools that are easy, convenient, and efficient, and that afford the patient more control of the appointment process, is likely to result in the patient being more proactive with timely cancelation and rescheduling of the appointment rather than missing the appointment and not providing notice of the intent to not keep it (McNeill, 2016).

This study serves to help in understanding the impact of digital self-scheduling on patient appointment management and its effectiveness in the reduction of patient no-shows. According to the literature review, numerous studies explore the efficacy of digital self-scheduling but very few that equate the use of digital self-scheduling as a contributor to reducing the no-show rate (Zhao, Yoo, Lavoie, Lavoie, & Simoes, 2017).

With the emerging use of web-based patient portals, patients have more power to control their healthcare. (Kang, 2017). Digital self-scheduling tools are often made available through these portals. These types of tools are on the rise as consumerism increases the pressure on care delivery organizations to make things more convenient for patients and to encourage them to take part in managing their healthcare journey (James, 2018). Digital self-scheduling also creates a feeling of responsibility in the patient for managing that appointment, thereby reducing the potential for a no-show event (Riddell, 2012).

The benefits of digital self-scheduling are bi-directional and include the ability for the patient to choose a physician based on preference for gender, specialty, education, and patient reviews. The patient can also complete required forms online as well as verify, reschedule, or cancel the appointment without having to place a phone call. The care area also benefits from the ability to reduce costly resources associated with patient appointment management as well as improving both patient and provider satisfaction which are significant metrics used to determine potential for care setting expansion (Gupta & Denton, 2008).

While the benefits of these digital tools are numerous, so too are the barriers. Patient appointment scheduling is extremely complex and involves the balancing of clinical criteria, acuity, patient needs, with organizational resources, structure, and culture. As a result, transitioning to a digital self-scheduling modality can be disruptive to the care area (Zhao, Yoo, Lavoie, Lavoie, & Simoes, 2017). Even so, digital self-scheduling is quickly becoming a necessary and integral part of the emerging culture of patient-centeredness and it is supporting the active involvement of patients in managing their care journey (Tzelepis, Sanson-Fisher, Zucca, & Fradgley, 2015).

This study focused on the use of these digital self-scheduling tools and the impact they may have in reducing no-show events and in providing the valuable information healthcare administrators need when determining the most effective methods for improving appointment adherence and responding to the needs of digitally savvy patients as consumers. Section 1 of this study includes the problem statement, purpose, research questions and hypotheses, theoretical foundation, nature of the study, literature search

strategy, literature review, definitions, assumptions, scope and delimitations, significance, and summary.

Problem Statement

A patient's failure to attend a scheduled appointment without notice to the providers' office is known in the industry as a no-show event. These events lead to longer than necessary wait times for new patients and loss of revenue at the care delivery site due to reduced volumes and the inefficient use of expensive resources (Mazaheri Habibi et al., 2018). Traditional office-assisted scheduling dictates that the care delivery setting maintains control of all aspects of the patient's appointment. That control is lost when the patient does not show.

The healthcare industry is striving to adhere to a more patient-centered care philosophy instead of a provider-centered one (Reese, 2016). By providing the patient with tools that are easy, convenient, and efficient, and that support more control of their appointment process, the patient is likely to be more proactive and timely cancel and reschedule the appointment rather than miss it without providing notice (McNeill, 2016).

The literature revealed an abundance of research on the effectiveness of interventions to prevent no-show events. Although, as with traditional appointment management methods, these interventions are also based on the care delivery setting continuing to maintain control of the processes. There is a gap in the literature on the introduction of digital self-scheduling technology and whether its tools have significantly decreased no-show rates, thereby increasing revenue and enhancing the patient experience (Brandenburg, Gabow, Steele, Toussaint, &Tyson, 2015).

Purpose of Study

The purpose of this quantitative study was to explore the use of digital self-scheduling as an emerging alternative to traditional office-assisted scheduling methods and to determine if it reduces no-show events. Any reduction in the no-show rate improves the financial and operational health of the care delivery setting. By implementing digital self-scheduling tools that support the patient with having more control of their appointment process, the patient is likely to be more proactive with timely cancelation and rescheduling of the appointment rather than creating a no-show event (McNeill, 2016).

Appointment data were collected from a large, adult primary care clinic, part of an integrated academic health system in the northeastern U. S. This clinic, like many across the country, recently implemented digital self-scheduling as an option. Therefore, the clinic has a pre- and post-implementation period. The clinic appointments have descriptive variables that support the analysis of any differences in the no-show rate since the self-scheduling tool was implemented. The dependent variable was the appointment status and the independent variable was the scheduling modality used to make the appointment. Appointment status reflects the appointment resolution as *arrived, completed, not seen by provider, canceled,* or *no-show*. Scheduling modality reflects the method used to schedule the appointment as *digital self-scheduling* or *traditional office-assisted scheduling*. The pre- and post-implementation, digital, self-scheduling time period was included as a descriptive variable. Table 1 includes these variables and their definitions.

Table 1

Study Variables and Operational Definitions

Variable name	Variable type	Variable definition
Appointment status	Dependent	Indicator of the appointment resolution that includes arrived, completed, not seen by provider, canceled, or no-show
Scheduling modality	Independent	Indicator of the method used to schedule the appointment as digital self-scheduling or traditional office-assisted scheduling
Pre- and post-digital self-scheduling time period	Descriptive	Serves to establish the number of appointments scheduled pre- and post-implementation of digital self-scheduling

Research Questions and Hypotheses

The following research questions, and null and alternative hypotheses, were used:

Research Question 1: Is there a relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling?

$H_1$1 –There is no relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

$H_0$1 – There is a relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

Research Question 2: Is there a relationship between traditional office-assisted scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling?

$H_1$2 – There is no relationship between traditional office-assisted scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

$H_0$2 – There is a relationship between traditional office-assisted scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

Theoretical Foundation

The theoretical foundation chosen for this study, CBT, was chosen to provide a foundation for the research regarding the patient's use of a digital self-scheduling tool for managing appointments and its effect on no-show event rates. CBT is a framework that focuses on the consumer adoption of innovations. According to Botha and Adkins (2005), the consumer puts a great deal of thought into the decision to use an innovation. Once the decision is made, the consumer's committed use of the innovation would be an acknowledgement of the effort undertaken to consider its use and therefore continued use is expected (Botha & Atkins, 2005). For this research, the consumer is the patient and the innovation is digital self-scheduling. The reasoning behind this framework is the belief that patients, seen as consumers who use innovative tools to garner more control over their appointment scheduling process, are less likely to create an event that they do not show up for. Kaine pointed out that "the fundamental factor influencing the decision to adopt an innovation is the extent to which the innovation can contribute to better

satisfying the needs of the purchaser" (Kaine, 2004). This is true for the evolving consumerism movement in healthcare and how important it has become to respond to the needs of the patient as a consumer in the way that other industries have done.

Nature of the Study

In this quantitative study, I analyzed secondary data to test the hypotheses stated in the research questions. No-show events (identified by a "no-show" appointment status for appointments that occurred before and then after the implementation of digital self-scheduling as an alternative scheduling modality) were analyzed over time in order to realize the impact of these tools on the no-show rate. Quantitative research focuses on testing hypotheses by statistically analyzing variables to show their relationship to the hypotheses (Martin & Bridgmon, 2012). Chi-square tests for independence were used to test the data given the test's logical process of using an equation to express a relationship between a variable of interest and a predictor variable (Montgomery, 2013). The dependent variable was the appointment status and the independent variable was the scheduling modality. Appointment status reflected the appointment resolution as *arrived, completed, not seen by provider*, *canceled,* or *no-show*. Scheduling modality reflected the method used to schedule the appointment as *digital self-scheduling* or *traditional office-assisted scheduling*. The pre- and post-implementation period was included as a descriptive variable in order to identify appointments that were scheduled before—and then after—the implementation of digital self-scheduling. This study used appointment data from a large, adult primary care clinic that included appointments scheduled two years before the implementation of digital self-scheduling and 1 year after the implementation.

Literature Search Strategy

Research for the literature review was conducted by dividing the review into the following seven categories: why appointment no-show events occur, predictors of no-show events, the prominent impacts of no-show events, popular interventions to inhibit no-show events, the changing role of the patient as a consumer, the introduction and adoption of patient portal and self-scheduling tools, and the correlation between digital self-scheduling and its potential effect on no-show events.

The following databases were searched: Google Scholar, ProQuest, ScienceDirect, PubMed, Medline, and SAGE Journals. The keywords and phrases used: *no-show rates, primary care clinic scheduling, the cost of missed primary care appointments, automated reminder calling systems, online scheduling systems, patient portals,* and *patient appointment management*. Healthcare Financial Management Association (HFMA) and the Medical Group Management Association (MGMA) white papers were important to the study. When looking at patients-as-consumers who prefer to use digital interventions at their own convenience to manage clinic appointments, articles were found by using key words and phrases that included patient portal, patient self - scheduling, and patients as consumers.

Once articles were located, they were read, categorized and added to the literature review matrix. The citations within each article were also reviewed and related articles were added as appropriate. Timeframes included studies that were primarily published within the last ten years, although there are older references given the progression of patient appointment management refinements with the influence of technology. The review included both quantitative and qualitative studies.

Literature Review Related to Key Variables

A patient's failure to attend a scheduled appointment without notice to the provider office is logged as an appointment status of no-show, commonly referred to as a no-show event. No-show events lead to longer than necessary wait times for new patients and incur care delivery setting revenue losses due to reduced volumes and the inefficient use of expensive resources (Mazaheri Habibi et al., 2018). Traditional patient appointment scheduling methods dictate that the care delivery setting maintains control of all aspects of the patient's appointment. That control is lost when the patient does not show. In response, there are many effective interventions that are focused on the prevention of no-shows, although, as with traditional patient appointment management methods, these interventions are also based on the care delivery setting continuing to maintain control.

Given the emergence of consumerism and digital transformation in the healthcare industry, there is pressure to consider alternative scheduling methods that focus on the patient having more control in managing their appointments. Providing tools that are easy, convenient, efficient and support allowing the patient to have more control of the appointment process is likely to result in the patient being more proactive with timely cancelation and rescheduling of the appointment rather than missing the appointment and not providing notice of the intent to not keep it (McNeill, 2016).

This literature review provides comprehensive insight into the research related to patient appointment no-show events, methods used to prevent them and the impact that digital self-scheduling may have on patient appointment management and its effectiveness in the reduction of patient no-shows. This review is organized into 4

sections: the predictors and the impacts of no-show events and the interventions used to reduce them; the changing role of the patient as a consumer; the digital transformation in healthcare and the use of patient portals; digital self-scheduling and the correlation of self-scheduling and the effect on no-show events. Each section includes a summation of the research that was conducted on the topic for the section and supports the gap in the literature that directly associates the introduction of digital self-scheduling as an alternative scheduling modality to a reduction in appointment status of no-show.

The main objective of the literature review was to determine if digital self-scheduling has a positive impact on reducing no-show events. While there are many studies available that analyze the reasons for why no-show events occur as well as studies that measure the effectiveness of no-show event prevention methods, the literature review has shown that there are very few studies that specifically equate the use of digital self-scheduling as a contributor to reducing the no-show rate (Zhao, Yoo, Lavoie, Lavoie, & Simoes, 2017). Numerous researchers highlighted the negative financial, operational, and patient/provider satisfaction impacts that no-show events have on the care delivery setting, signaling the need for broadening the analysis of the impact of digital self-scheduling that supports the shift to a patient-centered philosophy instead of one that is provider centered (Reese, 2016).

No-Show Events

An appointment status of no-show is logged when a patient does not arrive for a scheduled appointment or procedure and has given no advance notice of their intent to be absent. These are often referred to as no-show events (Kheirkhah, Feng, Travis, Tavakoli-Tabasi, & Sharafkhaneh, 2016). There are many reasons why patients miss appointments.

These reasons are most often logistical due to a lack of reliable transportation, forgetfulness, competing priorities for time, cost, lengthy appointment lead times, and seasonal weather circumstances (Chong & Fantl, 2017). Social determinants also play a role in inhibiting appointment adherence. These include age, gender, socioeconomic status, language barriers, and race (Kheirkhah, Feng, Travis, Tavakoli-Tabasi, & Sharafkhaneh, 2016). Finally, emotional barriers are also a consideration for missed appointments and include fear of hearing bad news, a predisposition of being disrespected and having to accept the reality of long waits and inconvenient appointment times, and a lack of understanding in how a clinic operates and assuming that not showing up for an appointment will help reduce clinic overcrowding (Lacy, Paulman, Reuter, & Lovejoy, 2004; Gupta, Denton, 2008). A systemic review of studies that focused on exposing those reasons led to the conclusion that the most important factors influencing no-show events were lead time and prior no-show history (Dantas, Fleck, Cyrino Oliveira, & Hamacher, 2018). This is supported by a study conducted by Kaplan-Lewis and Percac-Lima (2013) concluding that the two most common reasons for missing an appointment were forgetting and miscommunication. If appointments are scheduled too far in advance with little or no communication about the pending appointment, the no-show event is likely to occur. Interesting factors that were mentioned less prominently included a perceived disrespect for a patient's cultural beliefs and a patient's lack of understanding of how appointment scheduling works (Shimotsu et al., 2016). Traditional appointment scheduling methods were discussed in a systematic literature review conducted by Cayirli and Veral (2003) and revealed that there was a changing expectation in what patients' value most about their appointment management

experience. These expectations included honoring the time of the appointment and provider medical proficiency.

Several studies focused on the predictors of no-shows. Miller, Chae, Peterson, and Ko (2015) concluded that age, race, and income were significantly related to why a patient will no-show serially and Shimotsu et al., (2016) concluded that race/ethnicity categories of Hispanic/Latino, American Indian/Alaskan Native and Black/African American patients were significantly associated with no-show occurrences as compared to White non-Hispanic patients. Statistical modeling can also be useful in predicting patients' probabilities of no-showing to their next medical appointments. Combining patient no-show models with advanced scheduling methods can serve to improve daily clinic volume and efficiency (Daggy et al., 2010). To better understand appointment adherence issues in underserved populations, Mohammadi, Wu, Turkcan, Toscos, and Doebbeling (2018) used predictive modeling techniques to help prioritize the design and implementation of no-show occurrence interventions that could improve timely access to care.

The impact of no-show events is also prevalent in the research with the most significant being the creation of artificial access issues. Long waiting periods before the next available appointment contributes to the delay of the start of treatment or interrupts treatment protocols, most specifically for chronic illness and cancer. (Chand, Kamble, Diwan, Mahobia, & Chand, 2017). Another study highlighted the potential for a correlation between no-show events in a primary care clinic and increased visits to the emergency department (ED). The study demonstrated that the higher rate of no-shows

and shorter affiliation with the clinic are independently associated with an increase in ED visits (Nguyen and DeJesus, 2010).

The cost of no-shows was also prevalent in the literature. Gier (2017) stated that the average no-show rate nationwide is 30% and the average cost of single no-show is $200, signaling a total cost of missed healthcare appointments at $150 billion per year. A 2015 study involving a large clinic system revealed that, in over a 12 year period, the mean no-show rate for the system was 18.8% and that the cost of these no-shows was $22.7 million when using $196 as the average cost per encounter (Kheirkhah, Feng, Travis, Tavakoli-Tabasi, & Sharafkhaneh, 2016). Berg et al., (2011) measured the cost of no-shows while factoring in the cost of traditional interventions and the effect on the expected net gain when appointment overbooking is used. The study emphasized that the cost of no-show interventions may be more expensive than the revenue loss realized as a result of missed appointments.

Much of the literature on no-show events focused on the interventions used to help prevent them. Popular methods used to curb no-show events have included appointment reminder letters that are sent to the patient via direct mail, reminder telephone calls that are automated or in person, text message reminders sent to mobile devices, email reminders, and charging the patient for the missed appointment (Berg et al., 2011). Several studies were found that focused on the most popular no-show intervention, reminder calls. Reminder calls are made by a clinic staff member directly to the patient or delivered to the patient via an automated phone message. A 2010 study of over 12,000 outpatients showed that groups of patients who received a personalized phone call reminder had a 13% no-show rate versus a 17.3% no-show rate with patients

who received an automated phone message reminder (Parikh et al., 2010). Another study that focused on missed appointments and the type of reminder message delivery used indicated that the type of reminder had a significant impact on attendance. Reminders delivered by a live person had the lowest no-show rate (3%), then message or voice mail reminders (24%) and calls with no answer (39%). Appointment attendance rates were considerably higher when there was a live contact (Teo, Forsberg, Marsh, Saha, & Dobscha, 2017). Several studies that focused on the use of reminder systems that included calls and letters but did not focus on the separate types of reminder calls, concluded that the reminder systems did not significantly reduce the no-show rate (Kheirkhah et al., 2016; Chong & Fantl, 2017). Lead time to appointment was studied as an indicator of no-show events by Drewek, Mirea, and Adelson (2017). Their research concluded that the overall rate of no-shows was significantly lower at 23% for visits scheduled within 0 to 30 days compared with 47% for visits scheduled more than 31 days prior. Sorita, Funakoshi, Kashan, Young, and Park (2014) investigated whether decreasing the number of prescription refills affects the occurrence of no-show events, given that patients who previously failed to keep their appointments frequently came to the care setting when they needed a refill for their prescription. Their conclusions were that a decrease in the number of refills did not significantly reduce the no-show events.

Another no-show event reduction intervention mentioned in the literature that is gaining popularity is charging the patient if the appointment is missed without notification within an agreed upon timeframe. Patient education, documentation, and transparency regarding this intervention is essential in maintaining a relationship that is based on mutual respect for time for both the patient and the provider. One study reported

that no-show events were reduced from 8.7% to 1.7% when this intervention was used as part of a practice-improvement project to reduce no-show rates (Eichmiller, 2014). Several researchers examined the change in the occurrence of no-show events when clinic hours were offered in the evenings as compared to traditional daytime clinic hours. One study reported that an evening clinic had a show rate of 94% compared with the daytime clinic show rate of 76%, concluding that an after-hours appointment option is desirable option for patients who must prioritize family and work commitments (Siegel, Kist, Ingram, & Kirk, 2014). Berg et al. (2011) examined the effects of overbooking appointments as a mitigation strategy to reduce revenue loss due to no-show events. The study concluded that overbooking had a positive effect on reducing revenue loss and is less expensive than the traditional interventions. With transportation barriers noted throughout the literature as a significant factor in why patients miss appointments without timely notification, several studies examined the effectiveness of nonemergency medical transportation programs and the use of popular rideshare based transportation services. Abraham (2018) reported that a large medical clinic reduced the no-show event rate by 27% by offering transportation services to patients who had missed appointments in the past. Alternatively, another study conducted at the University of Pennsylvania (Penn Medicine) concluded that the introduction of ridesharing services to ensure transportation to the appointment had no effect on reducing the no-show rate (Chaiyachati et al., 2018). There were several studies that examined the effects of using a variety of interventions to reduce the no-show event rate. One study examined the introduction of several interventions in phases. These interventions included reminder calls, patient education via phone and in person on the importance of appointment adherence, and an institutional

awareness and integration of interventions across all practices that focused on patient-centeredness and a respect for patient values, preferences, and needs (Mehra et al., 2018).

Inconsistent findings and notable gaps were realized in the literature when reviewing studies and informative papers on no-show events. The variety of care settings locations, care setting services, and socioeconomic characteristics of the patient populations served significantly contributed to the outcomes of no-show interventions, establishing difficulty in comparing results and in making generalized conclusions on why no-shows occur and interventions that have made a significant difference in the no-show rate. Notable gaps included studies that were inherently focused on patient needs and preferences versus revenue loss prevention tactics that served the care setting needs first.

The Case for Patient Engagement

The literature supports the premise that patient-centered care models continue to take precedence over more traditional models. Patient convenience strategies that make it easier for patients to keep their appointments, therefore increasing patient satisfaction, are taking precedence over strategies that focus on decreasing no-show events as a revenue metric for the provider or facility. This approach is in line with adhering to a more patient centered care philosophy instead of a provider centered one (Reese, 2016). This philosophy was first initiated by the Institute of Medicine's (IOM), now the National Academy of Medicine, six aims for improvement in care-delivery quality, making it: safe, equitable, effective, patient-centered, timely, and efficient (IOM, 2001). The IOM also introduced the Evidence Communication Innovation Collaborative, which explored obstacles, solutions, and strategies to enhance patient involvement in healthcare (IOM,

2013). A literature review conducted to explore the essential role of patients in assessing patient-centered care, informing on quality improvement efforts based on the IOM patient-centeredness dimension, and the importance of patient satisfaction measures in building a patient-centered care culture, revealed that patients are best positioned to determine whether care aligns with values, preferences, and needs. (Tzelepis, Sanson-Fisher, Zucca, & Fradgley (2015).

Measuring the effectiveness of these improvements and the ability to qualify for federal payment incentives, specifically with patient experience, entice organizations to look carefully at the results of the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey that measures the patient's assessment of their hospital experience and the Physician Quality Reporting System (PQRS) that contains like measures for the ambulatory experience (Mehta, 2015). The literature also points out that surveys such as HCAHPS and PQRS are an indirect measurement of patient expectations while a more direct survey tool such as Press Ganey elicits more direct results (Brandenburg, Gabow, Steele, Toussaint, & Tyson, 2015). Survey results from any of these tools are strong motivators for healthcare administrators and providers to continually strategize to increase patient satisfaction.

The emergence of consumerism in healthcare is playing a significant role in emphasizing the need to incorporate web-based convenience tools for patients in order to ease burdensome administrative activities that benefit both patient and provider (Beckers Hospital Review, 2015). The impact of both federal and consumer pressure on increasing patient satisfaction dictates that healthcare administrators and clinicians focus on initiatives that improve patient engagement and experience while continuing the

transition to a culture of patient-centeredness and consumerism, deemed essential to improving the value of healthcare (Vogus & McClelland, 2016). The literature revealed a developing definition of the patient as a consumer. The Beckers Hospital Review article (2015) highlighted that a patient is a consumer of healthcare services, but a consumer is not always a patient. Patients receive care and follow a treatment plan based on a diagnostic discovery while consumers take on the overall accountability for their healthcare journey by making choices regarding where they will seek care and how much they are willing to pay for it. While only 15% of the population is in a patient state at any given time, 85% of the population are acting as consumers where the drivers of their health status are based on things that have little to do with clinical information.

Several articles point to the importance of patient engagement and how the use of patient-focused technology that has infiltrated the healthcare industry is changing patient behavior. Patients now expect collaboration with clinical professionals and are taking part in addressing how transformational efforts be shaped from the perspective of the patient and not the provider. These changes that are built around improving patient engagement are welcome changes for patients but prove difficult for providers of care who are tasked with changing mindsets from traditional care models to new paradigm of patient centeredness (James, 2018; Dixon-Fyle, Gandhi, Pellathy, & Spatharou, 2012).

The Adoption of Patient Portals

As the healthcare industry adopts technology that enables caregivers to digitally connect with patients and vice-versa, more power is placed in the patient's hands regarding their ability to have more control more over their healthcare (Kang, 2017). Digital self-scheduling tools are often made available through these portals. These types

of tools are on the rise as patient centeredness and the influence of consumerism increases the pressure on care delivery organizations to make things more convenient for patients and encourage taking part in managing their healthcare journey (James, 2018).

Portal use by patients is on the rise and the literature review produced many studies that concentrated on patient and provider adoption of the portals. Several studies focused on the factors that are driving or prohibiting this adoption and include analysis of initial and sustained use of the portal, the patient's perceptions of online portals, and the influence of demographic variables in determining utilization of the portals (Peacock et al., 2017; Oest, Hightower, & Krasowski, 2018; Woods et al., 2017). The literature review also revealed several white papers that provide insight into the difficulties of implementing a patient portal and the logistical and cultural toll it takes on the care setting resources as more administrative control is shifted to the patient with these digital tools (Kang, 2017). Peacock et al. (2017) conducted a survey that was focused on describing patient perceptions and utilization of online personal health information (PHI) portals and found that almost all survey respondents considered online PHI access important, but the communication of the existence of the portal and the offer to help access it by the health care provider was very low. The study also revealed that there were no differences across race or ethnicity in importance of access, black and Hispanic respondents were significantly less likely to be offered access (Peacock et al., 2017). Another study looked deeper into the demographic variables that influenced the frequency at which patients activated and accessed their clinical information via an online portal. Higher rates of activation and usage of the patient portal were associated with females, White/non-Hispanic race, younger adults, and geographic location that is closer

to the care delivery site (Oest, Hightower, & Krasowski, 2018). In another study, researchers focused on portal usage after activation. Woods et al. (2017) conducted a study that analyzed patient factors associated with short and long-term portal usage. They found there was consistently high usage rates short and long-term and that there were no significant differences in portal logins by age, gender, education, marital status, race/ethnicity, or distance to care facility (Woods et al., 2017). Kang (2017) explored the steps necessary to launching a patient portal successfully. The white paper emphasized that the portal should become part of the regular experience in the care setting patient engagement strategy and that the entire care setting staff sees themselves as ambassadors for encouraging patients to use the portal (Kang, 2017).

These studies and white papers independently strive to answer questions regarding communication and patient awareness of the existence of the portal, patients who are most likely to use the portal, and how often patients access the portal once activation is established. There is a gap in the literature that examines the effectiveness of portal adoption by taking all aspects of these three domains into account and analyzing how portal adoption can be improved and sustained.

Digital Self-Scheduling

Digital self-scheduling tools are often made available through patient portals. These types of tools, offered as an alternative scheduling modality, are on the rise as consumerism increases the pressure on care delivery organizations to make things more convenient for patients and encourage taking part in managing their healthcare journey (James, 2018). Digital self-scheduling also creates a feeling of responsibility within the

patient for managing that appointment, thereby reducing the potential for creating a no-show event (Riddell, 2012).

The benefits of digital self-scheduling are bidirectional and include the ability for the patient to filter physician choices based on preference for gender, specialty, education and patient reviews. The patient can also complete required appointment forms online as well as verify, reschedule or cancel the appointment without having to place a phone call. The care area also benefits from the ability to reduce costly resources associated with patient appointment management as well as improving both patient and provider satisfaction which are significant metrics used to determine potential for growth (Gupta & Denton, 2008). The literature review revealed a survey conducted by Accenture in 2016 that stated that by the end of 2019, 66% of U. S. health systems will offer digital self-scheduling tools and 64% of patients will schedule their appointments digitally for 38% of all appointments (Patel & Brombach, 2016). In order to satisfy the demand for digital self-scheduling, these tools are often made available through a health system's proprietary patient portal found on the organization's website or through a commercially available online scheduling service that can serve hospital and retail care settings (Arndt, 2018). One article emphasized the growing preference for software-as-a-service web-based scheduling tool versus the patient portal, highlighting the difficulty in using a portal and the need for a username and password (Health, 2018).

Zhao, Yoo, Lavoie, Lavoie, and Simoes (2017) conducted a systematic review of 36 articles to identify the benefits and barriers of implementing a web-based medical appointment scheduling and found that there is a growing trend for adoption of these tools with a variety of positive patient outcomes and the need for further studies that

focus on those outcomes. Researchers studying this topic found that web-based appointment self-scheduling tools offer a more patient-centered means to make appointments (Denizard-Thompson, 2011). Other researchers that focused on reduced waiting time for appointments cited that the most significant benefit of real-time scheduling is the ability to schedule and manage appointments at any time of the day or night as well as the increased ability to schedule highly desired same-day appointments (Zhang , Yu, & Yan, 2014; Sampson et al., 2008). Other researchers focused on the barriers involved in adopting web-based scheduling tools that include difficulty in transitioning away from legacy scheduling systems, exorbitant costs associated with the implementation of these digital tools, and loss of scheduling flexibility for the provider (Baldwin, 2001; Zhang, Yu, & Yan, 2014; Craig, 2007).

Only three studies were found that reported a direct association with digital self-scheduling and a reduction in no-show rates although two studies noted that traditional no-show event interventions remained in place as the web-based scheduling tool was deployed. Siddiqui and Rashid (2013) studied the non-attendance rates for appointments made online and found that they were much lower (6.9%) than non-attendance rates at dermatology clinics through traditional means. As a result of their research, Dartmouth-Hitchcock medical group reported a 42% reduction in no-shows after implementing the web-based scheduling tools that are embedded in the ”Patient Online” proprietary portal (Walters & Danis, 2003). Parmar, Large, Madden, and Das (2009) reported a 12.4% reduction in missed appointments when appointments were booked online using the “Choose and Book” system that is part of the National Health System (NHS) in the UK. Researchers interested in studying reduced length of time to new appointments compared

wait times for new appointments between private sector care settings and United States Department of Veterans Affairs Medical Centers (VA). The study compared wait times after access improvement interventions, that included web-based scheduling, were put in place at the VA. Although the wait times for the VA care settings were significantly lower than the public sector care settings, the study does not correlate these improved wait time interventions with a decrease in no-show events (Penn et al., 2019; Gutierrez, 2019).

Although the literature reveals strong evidence that digital self-scheduling is gaining momentum as a patient preferred scheduling modality option to manage non-urgent appointments, much of the research in this area is focused on identifying the barriers to adopting these systems by the care setting resources as well as to clarify the benefits to the patient who uses them.

The literature review also revealed a significant gap in that there were very few studies found in the research that associates the introduction of digital self-scheduling to an actual reduction in no-show events. The reason for this is likely due to the relative newness of adding digital self-scheduling tools as a scheduling modality as well as the realization that many of the traditional interventions used to inhibit no-show events continue to be used in parallel. This adds to the difficulty in determining if there is an actual association between digital self-scheduling and a reduced no-show rate or if there is increasing effectiveness in the use of traditional interventions.

Definition of Key Terms

Key terms used throughout this study are defined here, according to context and in support of clearly defining the purpose of this study.

Appointment no-show events: An appointment status of no-show is logged when a patient does not arrive for a scheduled appointment or procedure and has given no advance notice of their intent to be absent. These are often referred to as no-show events (Kheirkhah, Feng, Travis, Tavakoli-Tabasi, & Sharafkhaneh, 2016).

Patient-centeredness: An evolving approach to care with an emphasis on having respect for a patients' values and preferences along with the recognition of the importance of timely access to care and the effort to coordinate care at every point of transitions. This approach is in line with adhering to a more patient centered care philosophy instead of a provider centered one (Reese, 2016).

Patient portals: With only an internet connection required, a patient portal is a secure online website that gives patients access to personal health information from anywhere and at any time. As a result, as the healthcare industry adopts this type of technology that enables caregivers to digitally connect with patients and vice-versa, more power is placed in the patient's hands regarding their ability to have more control over their healthcare (Kang, 2017).

Digital self-Scheduling, online or *web-based scheduling:* A scheduling modality involving the use of digital tools that enable patients to conveniently schedule, change, or cancel medical appointments online without having to contact the care setting that is using more traditional means of communication. Providing tools that are easy, convenient, efficient and support allowing the patient to have more control of the appointment process is likely to result in the patient being more proactive with timely cancelation and rescheduling of the appointment rather than missing the appointment and not providing notice of the intent to not keep it (McNeill, 2016).

Traditional office-assisted or *standard scheduling:* A scheduling modality used when medical appointments are scheduled by trained medical office support staff either in-person with the patient or via telephone in response to a patient appointment request.

Assumptions

Several assumptions were made regarding the secondary data set used for this study. These same assumptions were also made regarding the limited research already conducted on the association of digital self-scheduling with no-show rates.

1. The data representing appointments that were scheduled and resolved by assigning an appointment status prior to the implementation of digital self-scheduling, using only office-assisted scheduling methods, was accurate and reliable.
2. The data representing appointments that were scheduled and resolved by assigning an appointment status post-implementation of digital self-scheduling, offering a choice of scheduling modalities of digital and traditional scheduling options to patients, was accurate and reliable.
3. The data representing the number of no-show events, as indicated by the appointment status, was from the same time periods as the data supplied in No. 1 and 2 above.
4. After implementing digital self-scheduling, traditional methods of scheduling appointments and the interventions put in place to reduce no-show events remained active.
5. Staff in the care setting were correctly following the clinic policies and procedures for identifying no-show events when they occurred, and correctly

indicated a “no-show” status as distinct from the other appointment statuses: arrived, completed, not seen by provider, or canceled.

Scope and Delimitations

For this study, the scope was limited to comparing the frequencies of no-show events for appointments scheduled via a digital self-scheduling modality and appointments scheduled using a traditional, office-assisted scheduling modality during a pre- and post-implementation time period. As noted in the Purpose of Study, the setting for this study was a large, adult, primary care clinic that is part of a large, integrated academic health system in the northeastern U. S. The population for this study included scheduled and resolved appointments spanning a 3-year period during which digital self-scheduling was introduced as an alternative at the beginning of the third year.

Delimitations mark the direction that the researcher takes in order to set the boundary points for the study. Elements of delimitations in a study include the intentionally excluded and included determinants used for the study as well as study variables and grounding principles (Creswell, 2014). For this study, inclusions were patients with appointments that were scheduled and resolved between October 1, 2017 and November 15, 2019. Exclusions were patients with appointments that were scheduled but had no resolution appointment status of arrived, completed, not seen by provider, canceled, or no-show. The reason for these inclusions and exclusions were to narrow the scope of the patient population to a segment of patient appointments that had the least amount of variability in the statuses of the appointments.

Significance, Summary, and Conclusions

Significance

The failure of patients to keep scheduled appointments results in significant loss of revenue as a result of decreased clinical office administrative efficiency, misuse of expensive clinical resource time, a disruption of the continuity of care between the patient and the provider, and an overall reduced quality of care (Sorita, Funakoshi, Kashan, Young, & Park, 2014). This is a common problem that plagues nearly every ambulatory clinical setting, which depends on the patient to follow through with keeping the appointment. Even though many automated tools and processes have been introduced over time in order to try to significantly reduce the no-show event rate, none have been shown to be effective.

With automation, it is clear that if changes are made to methods used to interact with patients—methods that acknowledge patients as consumers who thrive on digital convenience—a difference of behavior may be seen in how patients manage their appointments (Arndt, 2017). This study sought to provide insight into (a) the effectiveness of patients having more control over appointments with digital self-scheduling and (b) the potential for decreasing the likelihood that their appointments will result in no-shows.

An appointment status of no-show is logged when a patient does not arrive for a scheduled appointment or procedure and has given no advance notice of their intent to be absent. These are often referred to as no-show events (Kheirkhah, Feng, Travis, Tavakoli-Tabasi, & Sharafkhaneh, 2016). These events negatively impact revenue and overall operations of the care delivery setting. Evidence currently available confirms the use of

digital self-scheduling as an alternative scheduling modality to traditional office-assisted scheduling as being a significant patient satisfier while also improving the efficiency of the care facility (Patel & Brombach, 2016).

Summary and Conclusions

There were very few studies in the literature that associated the introduction of digital self-scheduling with a decrease in no-show rates; however, the literature does support the growing preference of patients for having more control in managing their appointments. This study is expected to contribute to the literature on evaluating the impact of digital tools that support improved and more convenient communication between the patient and the care setting. The knowledge gained from this study will promote positive social change by helping the health care administrator understand the impact that these digital tools are having in promoting a culture of patient-centeredness and in responding to the demands of patient consumerism.

In Section 2, I address the research design, how the data were collected and used, and the research method. In Section 3 I report on the results of study and what the findings mean. In Section 4, I report on (a) how these findings can be applied in professional practice to improve patient and provider communication and (b) the implications for positive social change.

Section 2: Research Design and Data Collection

Introduction

The purpose of this quantitative study was to explore the use of digital self-scheduling as an emerging alternative to traditional, office-assisted scheduling methods and to determine if its use reduces the number of no-show events. By implementing digital self-scheduling tools that support the patient with more control of her appointment process, the patient is likely to be more proactive with timely cancelation and rescheduling of the appointment rather than creating a no-show event (McNeill, 2016). The results of the study will help guide the implementation of strategies to reduce the no-show rate and therefore improve the financial and operational health of the care delivery setting. The dependent variable of the study was the appointment status and the independent variable was the scheduling modality. Appointment status reflects the appointment resolution as *arrived, completed, not seen by provider, canceled,* or *no-show*. Scheduling modality reflects the method used to schedule the appointment as *digital self-scheduling* or *traditional, office-assisted scheduling*. The pre- and post-implementation time period was included as a descriptive variable in order to identify appointments that were scheduled before, and then after, the implementation of digital self-scheduling. The literature review revealed that very few studies have explored digital self-scheduling and its limiting no-show events; however, the literature does support the increasing preference of patients for having more control in managing their appointments.

Research Design and Rationale

Quantitative research allows for the measurement and comparison of structured data in order to examine questions about a population (McCusker & Gunaydin, 2014).

This study was a retrospective quantitative analysis of secondary data used to test the hypotheses stated in the following research questions:

Research Question 1: Is there a relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling?

$H_1$1 –There is no relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

$H_0$1 – There is a relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

Research Question 2: Is there a relationship between traditional office-assisted scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling?

$H_1$2 – There is no relationship between traditional office-assisted scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

$H_0$2 – There is a relationship between traditional office-assisted scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

No-show rates from a large, adult outpatient primary care clinic were analyzed before and after the implementation of digital self-scheduling to determine if there was a relationship between digital self-scheduling and a decrease in the no-show rate. When studying the differences in the no-show rates, pre- and post the implementation of digital

self-scheduling and the scheduling modality used, Chi-square testing of independence was used to examine the relationship between the dependent and independent variables and in predicting the outcome of the dependent variable (Montgomery, 2013).

The dependent variable of the study is the appointment status and the independent variable is the scheduling modality that is used to schedule the appointment. Appointment status reflects the appointment resolution as *arrived, completed, not seen by provider, canceled, or no-show*. Scheduling modality reflects the method used to schedule the appointment as digital self-scheduling or traditional office-assisted scheduling. These categorical variables were analyzed to determine differences in no-show rates, pre- and post-implementation of digital self/scheduling as well as differences in no-show rates with the scheduling modality used to schedule the appointment.

The results of this study were used to enhance the knowledge on the increasing use of digital self-scheduling as a scheduling modality alternative for the patient and to inform the reader about any increase, decrease, or no change to the no-show rate resultant from the implementation of digital self-scheduling. The use of a quantitative approach for this study was appropriate given the use of secondary data and evidence of the use of this design in the few studies found in the literature review that compared no-show rates before and after the introduction of digital self-scheduling (Parmar, Large, Madden, and Das, 2009; Zhao, Yoo, Lavoie, Lavoie, & Simoes, 2017).

Methodology

Study Population

Appointment data to support the study was collected from a large, adult primary care clinic that is part of a large integrated academic health system in the northeastern U.

S. The clinic has an average appointment volume of 40,000 appointments per year. The clinic is staffed by 60 physicians, 5 advanced practice professionals, 9 nurses, and 15 resources serving as administrative support staff. The deidentified appointment data included all scheduled and resolved appointments from October 1, 2017 to November 15, 2019. Digital self-scheduling was implemented in the clinic on January 1, 2019.

Sampling and Sampling Procedures Used to Collect Data

The population for this study was a data set of all scheduled and resolved appointments from an adult primary care clinic spanning a three-year time period. The size of the data set, 129,205 appointments, did not require sampling since the secondary data were from a clinic within a single healthcare organization. Due to the manageable size of the data set, it was practical to gather specific data on each appointment, unlike secondary data that is drawn from publicly available national data banks.

Obtaining Permission for the Data

A formal request was made to the chief information office (CIO) of the healthcare organization for appointment data from the organization's largest adult primary care clinic. Included in the request was an explanation of the purpose of the study and the data requirements needed to conduct the analysis. A letter of approval was received from the CIO, granting permission to use the data in an analysis focused on determining if there is a relationship between digital self-scheduling and a decrease in the no-show rate by studying the differences in the no-show rates, pre- and post-implementation of digital self-scheduling and the scheduling modality used.

Power Analysis and Sample Size Estimation

Determining the appropriate population and sample size for this study was important to the overall understanding of the results. In order to determine the approximate size needed to enhance the validity of the outcomes, a statistical analysis was performed with the appropriate statistical calculator (Creative Research Systems, 2012). The calculations included a confidence level of 95% also known as the margin of error. The confidence interval was 5 and the population was 129,205, which represents approximately 40,000 appointments per year for the three years spanning October 1, 2017 to November 15, 2019. The analysis indicated that 383 appointments were needed for the study and since the population was approximately 129,205, the size of the population was sufficient.

Operationalization of Variables

One dependent and one independent variable were used in this research study along with a descriptive variable that served to define a time period for appointments that occurred pre- and post-implementation of digital self-scheduling. The dependent variable of the study was the appointment status and the independent variable was the scheduling modality that was used to schedule the appointment. The appointment status reflected the appointment resolution as *arrived, completed, not seen by provider, canceled, or no-show*. Scheduling modality reflected the method used to schedule the appointment as digital self-scheduling or traditional office-assisted scheduling.

Data Analysis Plan

The collected data were processed and analyzed using Microsoft Excel and IBM Statistical Package for the Social Sciences (SPSS), Version 25. SPSS is a tool used for

analyzing, interpreting, and understanding data used in research and is perfectly suited for the management and descriptive statistical analysis of social science data (Knapp, 2017).

Research Questions and Hypotheses

Research Question 1: Is there a relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling?

$H_1$1 –There is no relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

$H_0$1 – There is a relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

Research Question 2: Is there a relationship between traditional office-assisted scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling?

$H_1$2 – There is no relationship between traditional office-assisted scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

$H_0$2 – There is a relationship between traditional office-assisted scheduling and the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

Detailed Analysis Plan

In order to determine the most appropriate statistical test to use to answer the research questions and address the hypotheses for this study, the type of data, the sample

population, and the purpose of the study were considered. This study used one sample population for the purpose of looking for a relationship between two categorical variables. Based on this, chi-square test for independence was chosen to test for this relationship based on differences in the percentage of no-show events for appointments scheduled before and then after the implementation of digital self-scheduling and differences in the percentage of no-show events for appointments scheduled using traditional office-assisted scheduling versus appointments scheduled using digital self-scheduling. The chi-square statistical test is a nonparametric test designed to analyze group differences when the dependent variable is measured at a nominal level (McHugh, 2013). The chi-square test for independence is effective in examining the association between the dependent and independent variables and in predicting the outcome of the dependent variable (Montgomery, 2013). Results of the study were based on the conventional threshold for regression testing of 0.05 for the p-value.

Threats to Validity

The data for this study was collected from the organization's electronic health record (EHR) system as deidentified secondary data of appointments. The data were collected and then presented in Excel as codified and formatted responses to clinic appointment data fields in the EHR for the appointments that were scheduled and resolved from October 1, 2017 to November 15, 2019. Due to the codified nature of these attributes, consistency in their intended use is typically deemed reliable over time and response validity is assured since the codified responses are only intended to represent the variable that is being analyzed (Verheij, Curcin, Delaney, & McGilchrist, 2018).

A potential threat to the validity of the data is user error and the behavior of the person logging a response to an appointment data field. The response recording of a data field is typically completed by choosing an allowable codified response to an outcome. The threat to validity is if the response is the incorrect response. An example of this would be the coded response used to indicate the appointment status. An appointment status recorded as canceled is a valid codified response to an appointment status data field, indicating the patient has communicated a need to cancel the appointment prior to the appointment date. A threat to validity would be if this response is an *incorrect* response for an appointment that was completed or if the appointment resulted in a no-show. User training, data response guidelines, and frequent data response auditing ensure improved data validity (Verheij, Curcin, Delaney, & McGilchrist, 2018). Also, in addressing the relationship between the variables in this study, a significant value of $p < .05$ was utilized to minimize the threat to validity of the statistical conclusions.

Ethical Procedures

Approval to proceed with data collection for this study was obtained via the Walden University IRB application and approval process. The IRB approval number for this study is 01-09-20-0627752. No data were collected for this study prior to receiving IRB approval in adhering to the policies and procedures related to ethical standards in research as dictated by Walden. No human participants were used in this study. The data were appointment-based, not patient-based, and all data were deidentified. As a result, there were no risks for disclosure of patient protected health information in the data set used for this study. The data set was housed on a personal computer that is protected via

McAfee Security Scan Plus™ with backup secured via a cloud-based secure OneDrive account. The database will be permanently deleted at the conclusion of the study.

Summary

Section 2 was focused on describing the research rationale and design of this retrospective quantitative study. A description of the study population and any associated threats to the validity of the data were discussed including the rationalization for choosing chi square testing as appropriate for the analysis. Finally, confirmation from the IRB to proceed with data collection and analysis was acknowledged. In Section 3, the study's statistical findings are discussed and answers to the research questions are provided.

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this quantitative study was to explore the use of digital self-scheduling as an emerging alternative to traditional, office-assisted scheduling methods and determine if it reduces the occurrence of no-show events. Determining the relationship between digital self-scheduling and the occurrence of no-show events may help to reduce the no-show rate and improve the financial and operational health of the care delivery setting. The research questions and associated hypotheses that are the foundation of this study are as follows:

Research Question 1: Is there a relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling?

$H_1$1 –There is no relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

$H_0$1 – There is a relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

Research Question 2: Is there a relationship between traditional office-assisted scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling?

$H_1$2 – There is no relationship between traditional office-assisted scheduling and a decrease the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

$H_0$2 – There is a relationship between traditional office-assisted scheduling and a decrease the no-show rate for appointments scheduled post-implementation of digital self-scheduling.

To answer these research questions, secondary data were drawn from a large, adult primary care clinic, part of a large integrated academic health system in the northeastern U. S. Section 3 includes the results, findings and conclusions of the statistical analysis of this secondary data with tables that help explain the findings and the conclusions drawn from them.

Data Collection of Secondary Data Set

On October 1, 2017 a large, integrated academic health system in the northeastern U. S. implemented a new EHR system that included the use of digital self-scheduling for patients needing appointments in the health system's largest adult primary care clinic. With implementation of the EHR's scheduling module, all clinic appointment data attributes associated with appointment date—appointment status and appointment scheduling method—became available for reporting and analysis via the EHR's report-writing tool. For the purposes of this study, appointment data for all appointments scheduled and resolved between October 1, 2017 and November 15, 2019 were aggregated into a data set and placed in a spreadsheet for delivery and analysis. Digital self-scheduling was deemed fully operational in the clinic on January 1, 2019. As a result, January 1, 2019 is the date delimiter for categorizing appointments as being in the pre- or post-implementation period. The data set contained 129,205 appointments.

Discrepancies

As described in Section 2, the dependent variable of appointment status contains values of arrived, completed, not seen by provider, canceled, or no-show. After completing the initial secondary data set screening, it was determined that two of these values were extremely small in sample size and would be excluded from the analysis. These values are “arrived” (<1%) and “not being seen by a provider” (<1%).

Also, in order to answer the research questions appropriately, there was a need to clarify a pre- and post-implementation time period for appointments within the sample. Appointments with dates on or after January 1, 2019 were scheduled and resolved after the implementation of digital self-scheduling.

Baseline Descriptive and Demographic Characteristics of the Data

The data set is comprised of 129, 205 appointments that were scheduled and resolved between October 1, 2017 and November 15, 2019. The descriptive characteristics of the variables within the data set were assessed. Three variables were considered: the independent variable of how the appointment was scheduled via scheduling modality, the dependent variable of appointment status, and the pre- and post-implementation of digital self-scheduling time period. Table 2 contains the number of appointments scheduled and resolved before and after the implementation of digital self-scheduling, showing a slight disproportion with there being more appointments scheduled and resolved during the pre-implementation of digital self-scheduling.

Table 2

Frequency of Appointments, Pre- vs. Post-Implementation of Digital Self-scheduling

Digital Self-Scheduling	Frequency	Percent
Pre-Implementation	74,317	58
Post-Implementation	54,888	42

Additionally, the analysis of appointment status revealed that most of the appointments had a status of completed (63%) or canceled (29%) with very few appointments classified as no-shows (8%). There were two categories that were very small in sample size. These were appointments classified as not being seen by a provider (<1%) and appointments classified as arrived (<1%). These last two categories were excluded from the analysis. Table 3 contains the results of this categorization.

Table 3

Frequency of Appointment Status

Appointment Status	Frequency	Percent
No Show	9,865	8
Canceled	37,473	29
Not seen by provider	79	<1
Arrived	61	<1
Completed	81,727	63

For the purposes of this study and for testing if there is indeed a decrease in the percentage of no-show appointments in the post digital self-scheduling implementation period, all appointments other than no-shows were recoded as “other than no-show” in order to test for differences between the pre- and post-implementation period within the

data set. Table 4 contains the results of this recoded categorization of no-show and other than no-show.

Table 4

Frequency of Appointment Status: No Show vs. Other Than No-Show

Appointment Status	Frequency	Percent
No-show	9,865	8
Other than no-show	119,340	92

Table 5 contains the frequency of appointments scheduled using digital self-scheduling (online) and appointments scheduled via traditional office-assisted scheduling (standard).

Table 5

Online vs. Standard Appointment Scheduling

Scheduling Modality	Frequency	Percent
Online	797	0.60
Standard	128,408	99.40

Results

Research Question 1

Is there a relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling? A chi-square test for independence was used to test for differences in no-show rates in the time periods before and after the implementation of digital self-scheduling. There are a few assumptions associated with the chi-square test for independence. They include random samples, independent observations, and an assumption that there will be no less

than five data cases in a specific cell (McHugh, 2013). None of these assumptions were violated.

A chi-square test for independence indicated that there is a significant difference in the percentage of no-show appointments between the pre- and post- data collection period: $\chi^2(1, n = 129{,}205) = 8.59$, $p < 0.01$. The size of effect associated with this significant difference is small: $phi = -0.008$, $p < 0.01$. Table 6 contains the results of the test and shows that there is a decrease in the percentage of no-show appointments from the pre- (5%) to post-implementation (3%) data collection periods.

Table 6

Chi-Square Test for Independence: No-Show Percentage, Pre- vs. Post-Implementation

Appointment Status	Count Description	Pre-	Post-	Total
Other than no-show	Count	68504	50836	119340
	% within Appointment Status Recoded	57.40%	42.60%	100.00%
	% within Pre vs. Post Online Scheduling	92.20%	92.60%	92.40%
	% of Total	53.00%	39.30%	92.40%
No Show	Count	5813	4052	9865
	% within Appointment Status Recoded	58.90%	41.10%	100.00%
	% within Pre vs. Post Online Scheduling	7.80%	7.40%	7.60%
	% of Total	4.50%	3.10%	7.60%
Total	Count	74317	54888	129205
	% within Appointment Status Recoded	57.50%	42.50%	100.00%
	% within Pre vs. Post Online Scheduling	100.00%	100.00%	100.00%
	% of Total	57.50%	42.50%	100.00%

$H_1$1 –There is no relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling. Considering the statistically significant finding of a decrease in no-show rate post-implementation of digital self-scheduling, the Null Hypothesis in research question one will be rejected.

$H_0$1 – There is a relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling. Considering the statistically significant finding of a decrease in no-show rate post-implementation of digital self-scheduling, the Alternative Hypothesis in research question one will be accepted.

Research Question 2

Is there a relationship between traditional office-assisted scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling? A chi-square test for independence was used to test for differences in no show rates between appointments scheduled using digital self-scheduling (online) and traditional, office-assisted scheduling (standard) post-implementation of digital self-scheduling. The test revealed that there was a difference in the no-show rates between the different scheduling modalities during the post digital self-scheduling implementation time period: $\chi^2(1, n = 54{,}888) = 7.763$, $p < 0.01$. The size of the effect is small: *phi* = –0.012, $p < 0.01$. Table 6 contains the results of the test and shows that there is a difference in the percentage of no-show appointments between those scheduled via the standard scheduling method (7%) and those scheduled via the online scheduling method (0.10%) during the post-implementation time period. This data does have limitations in that the number of online appointments is small.

Table 7

Chi Square Test for Independence: No-Show Percentage – Online vs. Standard

Appointment Status	Count Description	Standard	Online	Total
Other than no-show	Count	50184	652	50836
	% within Appointment Status Recoded	98.70%	1.30%	100.00%
	% within Type of scheduling	92.60%	95.50%	92.60%
	% of Total	91.40%	1.20%	92.60%
No Show	Count	4021	31	4052
	% within Appointment Status Recoded	99.20%	0.80%	100.00%
	% within Type of scheduling	7.40%	4.50%	7.40%
	% of Total	7.30%	0.10%	7.40%
Total	Count	54205	683	54888
	% within Appointment Status Recoded	98.80%	1.20%	100.00%
	% within Type of scheduling	100.00%	100.00%	100.00%

$H_1$2 – There is no relationship between traditional office-assisted scheduling and the no-show rate for appointments scheduled post-implementation of digital self-scheduling. Considering the statistically significant finding of a large decrease in the no-show rate for appointments scheduled using digital self-scheduling and no apparent decrease in the no-show rate for appointments scheduled using traditional office-assisted scheduling, the Null Hypothesis in research question two will be retained.

$H_0$2 – There is a relationship between traditional office-assisted scheduling and the no-show rate for appointments scheduled post-implementation of digital self-scheduling. Considering the statistically significant finding of a large decrease in the no-show rate for appointments scheduled using digital self-scheduling and no apparent decrease in the no-show rate for appointments scheduled using traditional office-assisted scheduling, the Alternative Hypothesis in research question two will be rejected.

Summary

The statistical analysis conducted on the data for Research Question 1 rejects the null hypothesis that there is no relationship between digital self-scheduling and a decrease in the no-show rate for appointments scheduled post-implementation of digital self-scheduling. For the analysis conducted on the data for Research Question 2, the null hypothesis that there is no relationship between traditional office-assisted scheduling and a decrease in the no-show rate for appointments scheduled after the implementation of digital self-scheduling is retained. Valuable information was learned from this analysis and Section 4 will discuss the interpretation of the findings, the limitations of the study, recommendations resultant from the study, and application of the study findings to professional practice and the implications for social change.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

The purpose of this quantitative study was to explore the use of digital self-scheduling as an emerging alternative to traditional, office-assisted scheduling methods and determine if its use reduces the number of no-show events. Any reduction in the no-show rate improves the financial and operational health of the care delivery setting.

The secondary data set used to answer the research questions was drawn from the appointment data in a large, adult primary care clinic, part of an integrated academic health system in the northeastern U. S. Statistical analyses for answering the two research questions was conducted in SPSS, version 25, with chi-square tests for independence. The findings revealed that implementation of digital self-scheduling was related to a decrease in the no-show rate while the use of traditional, office-assisted scheduling was not related to the decreased no-show rate for appointments scheduled after the implementation of digital self-scheduling.

Interpretation of the Findings

When comparing the no-show rate of appointments scheduled before the implementation of digital self-scheduling (5%) to the no-show rate of appointments scheduled after the implementation (3%), it can be inferred that the use of self-scheduling tool contributed to improved appointment management and therefore, reduced the number of no-show events. This supports what was found in the literature as outlined in Section 1 regarding patient preference of having the digital convenience for managing one’s health care journey, comparable to the convenience experienced as a retail consumer. This analysis has proven that providing tools that are easy, convenient, and

efficient, and that afford the patient more control over the appointment process, results in the patient being more proactive with timely cancelation and rescheduling of the appointment rather than missing the appointment and not providing notice of the intent to not keep it (McNeill, 2016). The results of this analysis also confirm what was revealed in studies that supported the introduction of digital self-scheduling. When used as a means of involving the patient more in their care journey and their having more ownership of the appointment scheduling, digital self-scheduling helps in reducing the instances of no-shows (Riddell, 2012).

By comparing no-show rates based on the appointments that were scheduled using traditional (7%) versus digital (.10%) modalities, it was also clear that the use of traditional scheduling did not decrease the no-show rate after digital self-scheduling was implemented. In fact, the no-show rate for this group of appointments appeared to increase when compared to the 5% no-show rate for all appointments scheduled during the time period before the implementation of digital self-scheduling.

It is worth noting that the number of appointments scheduled via digital self-scheduling in this analysis is quite small at only 652. This is only 1.2% of the appointments scheduled post digital self-scheduling implementation. The reasons for this low usage rate can be attributed to the relative newness of the self-scheduling option in this clinic and, as noted in the literature review, difficult to communicate and market in terms of its existence and the culture implications for the physicians and clinic support resources. Given the statistically significant results that digital self-scheduling is related to decreased no-show rates, it can be inferred that any increase in the use of this scheduling option will continue to contribute to the downward trend of the no-show rate.

Analysis of Findings to the Theoretical Framework

The consumer behavior theory is a framework that focuses on the consumer adoption of innovations. As stated by Botha and Adkins (2005), the consumer puts a great deal of thought into the decision to use the innovation. Once the decision is made, the committed use of the innovation is an acknowledgement of the effort undertaken to consider its use and therefore consistent engagement is expected (Botha & Atkins, 2005). Kaine points out that "the fundamental factor influencing the decision to adopt an innovation is the extent to which the innovation can contribute to better satisfying the needs of the purchaser" (Kaine, 2004). This is true for the evolving consumerism movement in healthcare and how important it has become to respond to the needs of the patient as a consumer in the way that other industries have. The CBT framework supports the belief that patients as consumers will choose to use innovative tools in order to garner more control over their appointment scheduling process and if the tool serves to satisfy the needs of the patient, it will be adopted more readily.

Limitations of the Study

As already stated, one limitation of this study was the small number of appointments scheduled using digital self-scheduling due to the short amount of time that the option became available for use (one year). A larger number would have provided a more proportionate analysis for comparison. A second limitation was in not being able to use other available appointment data points such as gender, age and financial class in order to enrich the analysis results for no-show events. These data points were not included as part of the research questions to be answered so they were not included in the analysis. A third limitation to the study was the inability to exclude the effect of any no-

show event interventions, such as reminder calls, that remained active during the time period of the study. Finally, as stated in the subsection, Threats to Validity, the data used in the analysis is susceptible to user error when logging a response for the appointment status. Response values are coded but the choice of which response to use based on the appointment outcome is a decision made by clinic resources. There was no guarantee that data field response guidelines were followed precisely 100% of the time.

Recommendations

The purpose of this quantitative study was to explore the use of digital self-scheduling as an emerging alternative to traditional office-assisted scheduling methods and determine if its use has an impact on reducing the occurrence of no-show events. Any reduction in the no-show rate improves the financial and operational health of the care delivery setting. A recommendation to enhance the research would be to replicate this analysis in a variety of care settings where digital self-scheduling has been available for longer period. Another recommendation would be to incorporate additional demographic data points into the research in order to enrich the analysis in the use of digital self-scheduling and to enhance implementation success.

Implications for Professional Practice and Social Change

Professional Practice

This study focused on the use of these digital self-scheduling tools, the impact they may have in reducing no-show events and in providing valuable insight to healthcare administrators with information they need when determining the most effective methods for improving appointment adherence along with responding to the needs of digital savvy patients as consumers.

Digital self-scheduling technology is not necessarily new to the healthcare arena. The literature revealed that many of these tools have been available for years but are primarily found embedded in complex patient portal technology and are therefore difficult to implement. The literature also confirms that digital self-scheduling takes a logistical and cultural toll on the care setting resources as more administrative control is shifted to the patient with these digital tools (Kang, 2017). Regardless, the proliferation of the use of digital self-scheduling is directly dependent on its inclusion into the overall strategy to digitally transform the patient access experience.

This study has proven that expanding the use of digital self-scheduling will support a decrease in the no-show rate which, in turn, will have a positive impact on revenue lost due to the occurrence of no-shows. Given the statistical significance that digital self-scheduling is related to a decrease in the no-show rate, it can be stated that the higher the percentage of appointments scheduled online, the lower the percentage of the no-show rate and in the revenue loss.

Positive Social Change

Acknowledging that the patient's needs supersede the needs of the provider is the definition of positive social change. The healthcare industry continues its difficult transformation from a volume-based business to a value-based, patient-centered institution by launching alternative payment and care delivery models and focusing on improving the patient and provider experience. Digital transformation in the healthcare arena delivers on positive social change through the implementation of tools that enhance patient communication while acknowledging patients as consumers who thrive on the digital convenience that they already experience with many things in their daily lives. An

improved patient access experience via the use of digital self-scheduling and other digital transformation tools will also increase provider satisfaction and holistically improve the culture of the clinical setting.

Conclusion

With the advent of consumerism infiltrating the healthcare industry, patients are demanding more and more control with managing their healthcare journey. Not only do healthcare administrators and leaders need to adjust organizational goals and objectives around this pivot but the pressure is on to quickly implement the technology that allows for more patient control of the appointment process.

Historically, the failure of patients to keep scheduled appointments, resulting in no-shows events, contributes to the significant loss of revenue to the organization as a result of expensive misuse of clinical resource time, decreased clinical office administrative efficiency, a disruption of the continuity of care between the patient and the provider, and an overall reduced quality of care. This study was conducted in order to explore the use of digital self-scheduling as an alternative to traditional office-assisted scheduling methods and confirms that its use does have an impact on reducing the occurrence of no-show events. Healthcare administrators have long been plagued with the challenge of reducing appointment no-show events and to avert the financial and clinical challenges that accompany them. Studies such as this provide necessary insight into the impact of digital self-scheduling tools in decreasing no-show rates and furthers the understanding of the positive social change these tools have in responding to patients as consumers.

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Appendix: Letter of Approval

[redacted]

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Date: 10/24/2019

Regarding: Request by Karen M. Marhefka to use Secondary Data for her dissertation

To Whom It May Concern,

Karen M. Marhefka has requested permission to use secondary data pertaining to the use of digital patient self-scheduling and its impact on the no-show rate. Ms. Marhefka will be using this data in research for her dissertation " The Impact of Digital Self-Scheduling on No-Show Event Rates in Outpatient Clinics" at Walden University.

The data requested consists of appointments that were scheduled and resolved (status of completed, canceled, or no-show) during a two-year time period where appointments were scheduled and resolved before and after the introduction of digital self-scheduling tools. Requested appointment variables included the following:

- Appointment Date
- Appointment Status (description and code)
- Appointment Visit Type
- Appointment Scheduling Method (description and code)
- Patient Age at the time of the appointment
- Patient Financial Class
- Patient Gender

I have reviewed this request to conduct the research and understand all data is de-identified and maintained as confidential information. Furthermore, this organization will not be identified, and results will be shared with the organization, if requested.

If you have any questions regarding this letter of approval, please feel free to contact me.

Sincerely,

[redacted]

[redacted]

[redacted]