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14. ABSTRACT

Dwight D. Eisenhower Army Medical Center provides healthcare to service members and their family members. Access to healthcare has been brought to the forefront of priorities amongst treatment facilities in the Army Medical Department. Patients failing to attend their scheduled appointments waste valuable healthcare resources, deny other patients needing healthcare access, decrease revenue and productivity for the healthcare organization, and possibly place their health at risk. This study examined attributes of patients and appointments to see if there were factors associated with no-show appointments. Factors examined were patient gender, age, branch of service, enrollment status, and beneficiary status. Appointment factors included time of day, weekday, and season. Descriptive statistics and a binary logistic regression were the statistics used to determine predictive factors of no-shows. This study analyzed 510,123 outpatient appointments from FY 2009. DDEAMC's outpatient no-show rate was 9.1%. The statistically significant factors produced from the binary logistic regression were age, day of the week, branch of service, and beneficiary category. The descriptive statistics helped develop recommendations to decrease no-show appointments.

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Army-Baylor University Graduate Program in Health Care and Business Administration

Statistical Analysis of Appointment No-Show Rates in Primary and Specialty Care Clinics at Dwight D. Eisenhower Army Medical Center

Presented to A. David Mangelsdorff, Ph.D., M.P.H.

In partial fulfillment of the requirements for
HCA 5661: Administrative Residency: Completion of the Army-Baylor University
Graduate Program in Health and Business Administration

By
Bradford T. Membel Jr.

Fort Sam Houston, TX
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Abstract

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Disclaimer

The views expressed in this study are those of the author and do not reflect the official policy or position of Dwight D. Eisenhower Army Medical Center, the Department of the Army, the Department of Defense, or the United States Government.

Statement of Ethical Conduct in Research

Patient confidentiality was strictly adhered to during this research study. Patients' medical information was protected at all times, and under no circumstances will it be discussed or released to any outside agency.

Introduction

Conditions that Prompted the Study

In March 2009, the United States Army Surgeon General published an operation order (OPORD) that called for all military treatment facilities (MTF) to implement access to care metrics and procedures. One of the key metric goals in the OPORD was to reduce no-show rates in the MTF to no greater than five percent. The intent of this OPORD was to ensure that every MTF was meeting the access to care standards mandated by TRICARE. Dwight D. Eisenhower Army Medical Center (DDEAMC) is a military hospital and a teaching facility. DDEAMC scheduled over 500,000 outpatient visits in fiscal year 2009. The no-show rate for DDEAMC was between 8 and 10%. With so many visits annually, finding a way to reduce no-shows or finding ways to fill missed or cancelled slots is essential to providing quality healthcare for beneficiaries and educational opportunities for residents.

Purpose Statement

The purpose of this study is to provide an analysis of the no-show rates at DDEAMC's Primary and Specialty care clinics. This study will provide predictors of no-shows, identify clinics with high no-show rates and recommend ideas on how to lower no-show rates, increase productivity, and increase DDEAMC's financial solvency.

Statement of the Problem and Research Question

Healthcare organizations (federal, military, and private sector) all face financial and resource constraints and pressures to reduce costs and improve the quality of care delivered. When a patient fails to attend a scheduled appointment the cascade of effects exponentially grows, often without the full knowledge of the patient or the provider. The patient who misses an appointment may be unaware that the human resources provided to a military hospital are linked to the amount of care provided or how their health may be impacted. Providers understand the ramifications of no-shows on their patients but may not fully realize the second and third order effects of this phenomenon.

MTF Commanders need information on the access to care in their respective facilities. This information helps guide policy, effort, and resources in order to increase beneficiaries' ability to access the military health system.

The research question for this study is, what are the factors associated with no-show appointments?

Literature Review

Department of Defense Healthcare Delivery

The Department of Defense (DOD) provides healthcare for uniformed service members, their dependents, retirees, and their dependants through the Military Health System (MHS). The MHS's mission is to provide optimal Health Services in support of our nation's military mission—anytime, anywhere. The MHS is capable of performing world class healthcare to armed forces personnel in environments ranging from fixed facilities in the Continental United States to global military operations as well as family members of active duty service members, retirees and their families. The MHS facilitates a ready to deploy force by coordinating behavioral health, preventive medicine, individual physical performance, and combat casualty care (MHS, 2009).

The MHS consists of military healthcare providers, medical educators, medical researchers and their support personnel. The MHS infrastructure includes the Office of the Assistant Secretary of Defense for Health Affairs, the medical departments of the respective armed forces, the Joint Chief of Staff, the command surgeons, and the TRICARE service network, consisting of civilian and military healthcare providers, facilities, ancillary services, and pharmacies (MHS, 2009).

TRICARE is a component of the MHS. TRICARE leverages the numerous healthcare resources from the uniformed armed services,

networked civilian healthcare providers, hospitals and other healthcare facilities, medical suppliers, and other ancillary healthcare providers in order to provide access to all eligible beneficiaries while supporting the medical mission in support of combat and other contingency operations. TRICARE's mission is, "To enhance the Department of Defense and our nation's security by providing health support for the full range of military operations and sustaining the health of all those entrusted to our care (TRICARE, 2009)". TRICARE is responsible for the direct and indirect healthcare for approximately 9.5 million beneficiaries. TRICARE uses 59 military hospitals, 413 military medical clinics, 413 military dental clinics, and the colossal civilian network healthcare provider system to provide world-class healthcare to eligible beneficiaries and maintain the medical readiness for the armed forces (TRICARE, 2009).

The TRICARE Management Agency (TMA) manages TRICARE. TMA, the operational arm of TRICARE, is responsible for executing the budget, policies and the delivery of healthcare. TMA manages the three CONUS geographic regions (North, South, and West) through its regional offices. The regions Each of the regions or areas provides oversight of healthcare operations and healthcare administration manages healthcare contracts within the region, supports MTF Commanders, and funds new initiatives to improve efficiency and increase quality of care (TMA, 2009).

TRICARE has several plans available for beneficiaries depending on their status. TRICARE provides the Prime, Standard, and Extra healthcare plans. TRICARE Prime is comparable to a civilian managed care option. Beneficiaries choosing this option are assigned a primary care manager (PCM) who provides all primary care and coordinates for any specialty or ancillary needs that are not provided at their respective locations. Prime enrollees receive appointments within certain time requirements determined by the acuity of the patient's healthcare complaint. Active duty service members and their families have no out of pocket expenses as long as they receive care from their PCM or through a referral for specialty care. Active duty service members and activated Reserve and National Guard Soldiers are required to enroll in TRICARE Prime (TRICARE, 2009).

TRICARE Standard and Extra are fee for service plans that are available to dependents of active duty, retirees, and their families throughout the United States. Care is made available to any provider who is authorized through TRICARE. However, care at MTFs is made available only on a space available basis. Referrals are not needed with the exception of few services or procedures. If care is sought through a non-network healthcare provider the Standard option is used. If a network provider is used the Extra option in enforced and they will process the medical claim for you. TRICARE Extra carries less out of pocket

expense for services. With TRICARE Standard and Extra fees and co-pays vary with beneficiary status, active or retired (TRICARE, 2009).

Access to Care Campaign

In March 2009, the Office of the Army Surgeon General issued an OPORD titled Access to Care Campaign. The OPORD directed attention to the fact that beneficiaries did not have the expected access to care. Specifically, patients were having a hard time finding needed appointments. The mission was that the Medical Command (MEDCOM) would improve its access to care for enrolled beneficiaries no later than March 2010. Key to this mission is patient appointing/access and schedule/template management. In order to fulfill this mission implementation of the MHS Guide to Access Success was included in the OPORD (MEDCOM, 2009).

The MHS Guide to Access Success communicates the roles, responsibilities, definitions, and matrices for implementing, sustaining, and implementing the MTF's Access to Care program. One of the key metrics addressed in the guide is the MTF's no-show rate. The guide states that MTF's should strive for a no-show rate of no greater than five percent. The main purpose of this document is to remove barriers to entry into the MHS, its

MTFs, and its network providers (Military Health System's Guide, 2008).

Barriers to Entry in Healthcare

Barriers to entry to primary care often are cited for people not using their PCM or seeking care at the nearest emergency room (ER). Rust, Ye, Daniels Adesunloye and Fryer (2008) found that 20% of civilian people surveyed said that they had utilized the ER at least once in the previous year. Almost 21% of people claiming to have a regular, non-ER source of medical care said they used the ER in the previous year. More than 10% of people with a usual source of care reported at least one barrier to entry. Barriers to entry include but are not limited to: an inability to get through on the telephone, appointment was not available in a timely manner, extended waits in the provider's office, and lack of transportation. No-show rates take potential access and diminish effective access to care often driving people to the emergency room (Rust, Ye, Baltrus, Daniels, Adesunloye & Fryer, 2008).

No-show rates and associated issues

One of the largest issues in healthcare today is the use of resources and its ever growing cost. Patients who no-show for their appointments waste clerical and provider resources and

disrupt patient flow. Patients are considered no-shows when they fail to keep their scheduled appointment or fail to cancel early enough for another patient to be scheduled. This phenomenon has been an issue for considerable time and has far reaching consequences. Patients that no-show have adverse effects on themselves and other patients needing appointments. Patient failure to keep appointments impacts healthcare, provider efficiency, and learning opportunities for providers in training (Lacy, Paulman, Reuter & Lovejoy, 2004).

Appointments that are missed or cancelled impact access to care by wasting needed and expected appointments. They also contribute to poor follow-up care that may affect treatment of long-term diseases. The implications of no-shows are not evident immediately however, over time no-shows can have detrimental effects on provider's ability to sustain their practice. No-show or cancelled appointments increase rework of the clerical staff and also increase inefficiency (Whittle, Schectman, Lu, Baar, Mayo-Smith, 2008).

No-show appointments have a negative effect on the health of patients. Schectman, Schorling, and Voss (2008) found that adherence to appointments was a strong predictor of metabolic control in diabetics. The rate or frequency of appointments showed no relationship with diabetic control. However, diabetic patients who missed less than five percent of their appointments

had substantially better blood glucose levels than those who missed twenty percent or more of their appointments.

The lost time associated with a no-show appointment is unrecoverable from a provider's point of view. Remaining financially solvent and cost containment continue to apply pressure on provider offices. Missed appointments only exacerbate the stress placed on provider offices. Some diseases require follow-up maintenance care and or repeat appointments over long periods of time. When patients fail to attend their scheduled appointments there may be a serious decrement on the healthcare benefit provided (Bean & Talaga, 1992).

Some healthcare providers have implemented processes to help mitigate no-shows. Many clinics allow walk-in patients to fill the appointments of no-show patients. This process does allow some recovery of missed revenue however, it does not completely alleviate all of the missed opportunity for patient care and compensation. Clinics that use walk-ins generally cannot fill all no-show appointments diminishing productivity and efficiency. Walk-in appointment charges are less than scheduled appointments also contributing to decreased revenue. Even with 100% of all no-show appointments being filled with walk-in patients, provider offices still lose revenue (Moore, Wilson-Witherspoon, & Probst, 2001).

Patients who fail to attend their appointments increase the rework of clerical and healthcare provider staff. When a patient no-shows the clerical staff must note that the patient did not attend and try to find a walk-in patient to fill the unattended slot. Next, Neal, Hussain-Gambles, Allgar, Lawlor, and Dempsey (2005) found that almost all no-show patients returned for care within three months, half returned within two weeks, again work for clerical staff to find and book another appointment.

No-shows at teaching facilities cripple the ability for doctors in training to receive the maximum benefit of their training experience. Moore et al. (2001) found no-show rates in a family practice residency practice were higher for residents than they were for faculty. No-show rates were 27.5%, 29.7%, and 26.8% for first, second, and third year resident respectively. No-show rates for faculty providers were 20.2%. These missed opportunities for residents have significant impact on their medical education.

Attributes of No-Show Patients and Appointments

Research on missed or no-show appointments has been quite extensive. Research has shown that follow-up or established patients have a higher rate of non-attendance than new patients. A possible explanation is that follow-up patients felt that there were no change in their condition and additional

appointments were not as important (Franzco, J., Franzco, S. & Franzco, J., 2005). However, Moore et al. (2001) conducted a study of no-shows in a family practice clinic showing that new patients were more likely to no-show than patients who had previously seen a provider.

Studies of no-shows regarding gender have produced contradicting results as well. Cohen, Kaplan, Kraus, Rubinstein and Vardy (2006) found that women have higher rates of non-attendance than men. One explanation is that women have traditionally served as the primary caregiver of children in many cultures. Women may have a propensity of missing their appointments in order to care for their children. However, Moore et al. (2001) showed that women were more likely to attend their appointments in a family practice setting.

The age of patients has shown to be a factor in predicting no-shows. Franzco et al. (2005) found that pediatric patients have significantly higher no-show rates than adult patients and younger adults are more prone to missing their appointments than are older adults. This might be because parents believed their child's condition was not severe enough to keep the appointment. A possible explanation for why older adults keep a larger percentage of their appointments is poorer health and a greater need for medical treatment. Younger adults may find conflicts with work, family and other obligations (Cohen & Vardy, 2006).

Another contributor to patient no-shows is the time between making the appointment and the actual appointment date. Whittle et al. 2008 found that no-show rates increased from 12% from a one-day interval to 20% for a 15-day interval. When no-show rates and scheduling intervals were examined for a 30-day period there was a very strong correlation. However, there was no significant correlation between times greater than one month. The results of this study predict that if scheduling intervals were kept to seven days that there would be 17.3% decrease in no-shows.

Locally, clerical errors also account for a good number of no-shows. Franzco et al. (2005) found that several respondents surveyed said they called and cancelled but, their appointment status was never changed. Telephone contact with patients can alleviate significant numbers of no-shows however, patients not updating their contact information (phone number and address) deny healthcare providers the ability to remind patients of appointments and update them with important healthcare information. This is a simple but often overlooked solution to decreasing no-show rates.

Neal et al. (2005) conducted a study of missed appointments. It showed several instances of the practice or clinic being responsible for missed appointments. Several reasons cited by patients were not being able to get through to

cancel, they had previously cancelled their appointment, they did not have an appointment to begin with, or the wrong time and date was communicated by the clinic. While patients blame the clinic for the miscommunication the practice staff blames the patient not clinic error for the missed appointment.

Patients have cited several reasons for non-compliance with their scheduled appointments. Lacy et al. (2004) found that patients cited emotional and psychological barriers, feelings of patient's beliefs and time were being disrespected, and a lack of trust and understanding of appointments are scheduled contributed for their reasons for appointment no-shows. Patients felt that the psychological stress of seeing a provider was greater than the benefit that would be received from the visit. Self-resolving symptoms also contributed to no-shows. Patients who wait in the waiting and examination room often take it as a lack of respect for their time. Patients also claim ignorance as to the operations of a medical clinic. A significant amount of patients believe that if a patient misses an appointment that the providers simply go to the next patient. Some patients believe that a missed appointment is actually a benefit to the provider and their staff.

Health insurance and income level play a large role in patient compliance with appointments. Having commercial health insurance and a higher level of income increases the level of

patient compliance (Guse, Richardson, Carle & Schmidt, 2003). Satiani, Miller, and Patel (2009) found insurance status to be the largest predictor of no-show rates.

The one attribute of no-show patients that has little or no contradiction is previously missed appointments. Neal et al. (2005) showed that patients who have missed an appointment within the previous 12 months have a higher probability of missing another appointment. A review of no-show research collected evidence that at least three other studies supported the hypothesis that previous no-shows were good predictors of appointment non-compliance (Bean & Talaga, 1992).

No-Show Solutions

Limited resources and pressure to contain costs make finding solutions for no-shows a priority in order to deliver high quality care and reduce costs. Several interventions have been implemented and studied in the effort to reduce no-show appointments. Solutions range from reminding the patient within a few days of the appointment to educating patients on the negative effects of no-shows as they leave their appointment.

The first step in reducing no-shows in a practice or clinic is an articulate, widely disseminated no-show policy. The policy should be explained to the patient when the appointment is made and followed up through a mailed notification. Some practices

have patients sign contracts explaining the patient's responsibility to attend scheduled appointments and participate in their healthcare outcome. Next, set an acceptable number of no-show appointments and the consequences of exceeding the thresholds. Allowances must be made for at least one or two missed appointments a year as unexpected events happen to almost everyone. Policies must state that future appointments will not be scheduled until a payment, if required for missing an appointment, is made. Finally, convey the reason for the no-show policy is to prevent loss of appointment times to patients who need them and help contain the cost of healthcare (Buppert, 2009).

While evaluating possible solutions to no-show rates there are several issues that must be examined. Before implementation of no-show reducing policies matters of legality, adherence to policies, and mandates set by higher governing bodies must be analyzed. Next, a business case analysis must be completed to ensure the solution costs are not greater than the anticipated benefits. Another issue that bears consideration is the political viability of the solutions. The feasibility of the proposed solutions and obstacles to implementation must be examined and accounted for. Finally, we must contemplate if the proposed solution will enhance all of the clinics' access to care or only a select few (Quinn, 2007).

A frequently used method to decrease no-shows is mailed appointment reminders. Mailed reminders are generally sent to patients within a week as a reminder of their appointments. The reminder contains Health Insurance Portability and Accountability Act (HIPAA) compliant information about time and location. In outpatient procedure or follow-up appointments some discussion about the procedure or treatment may be added to help ease patient concerns. Mailings in one study reduced no-shows by 11.7 percent (Denberg, Coombes, Byers, Marcus, Feinberg, Steiner & Ahnen, 2006). Jayaram, Rattehalli, and Kader (2008) showed a decrease of nine percent after reminder letter mailings were implemented. This study's findings suggest that reminder letters helped patients who might have forgotten their appointment cancel them before twenty-four hours and thus enabled clinics to fill those appointments. The key advantages to mailed appointment reminders are the simplicity, cost, and effectiveness (Jayaram et al, 2008). Quattlebaum, Darden, and Sperry (1991) found that for every dollar spent on the delivery of appointment reminders $7.50 of no-show recovery revenue was generated.

Automated reminders that call patients to remind them of their upcoming appoints have been cited repeatedly. Automated phone systems call the patient or their guardian with seventy-two hours of the appointment and remind them of their

appointment. A highly effective reminder system comes with a cancellation option during the phone call. The most effective system utilizes the cancellation phone call to remove the patient from their slotted appointment opening the appointment for another patient (Quinn, 2007). Telephone reminder systems not only decrease no-show rates they also raise the appointment cancellation rate increasing the number of available appointments. Satiani et al. (2009) showed a telephone reminder system yielding a higher no-show rate for those who received telephone reminders versus patients who did not elect to receive a reminder. It can be argued that patients not opting for reminders are a more compliant group of patient compared to those who felt they needed a reminder. Simply calling patients the day before their appointment is viable. Johnson, Mold, and Pontious (2007) saw a 16% decrease in no-shows following the implementation of phone call reminders.

There are several options for reminding patients of their appointments in order to reduce no show rates. Although text messaging appointment reminders in the U.S. is gaining momentum, it is currently used in other countries. O'Connor, Bond, Saunders, Mohammad, O'Dwyer, Daly, Regan, and Phelan (2009) conducted a study in Europe showing that patients preferred to receive text messages (50%) as their primary notification.

Telephone calls (26%) and postal reminders (25%) were second and third respectively in the order of preference.

Reducing the interval from the creation to the actual appointment is one possible solution for no-shows. Benjamin-Bauman, Reiss, and Baily, (1984) produced research showing a direct correlation between the interval between creation and actual appointment time and no-show rates. Appointments that are one to seven days from the actual appointment show significantly higher rates than those appointments where the interval is fourteen to twenty-one days. Whittle et al. (2008) posited that a policy that limits the interval between creation of and actual appointments may not be feasible. Patients may want an appointment that is longer in length due to scheduling conflicts or personal desire. Not accommodating these patients may discourage patients and cause them to seek care elsewhere.

Optimizing and reducing clinic appointment errors can significantly reduce no-shows. Franzco et al. (2005) showed that when one clinic studied their no-show rate they noticed they were significantly higher than similar clinics. This forced the clinic to look internally and reengineer their policies and procedures for appointing patients. First, the clinic ensured cancelled appointments were removed from the schedule and opened for another patient. Next, patient data, address and phone number were updated and checked during every visit. This ensured

that reminders and phone calls were being delivered to the right person. Finally, a policy was implemented to ensure chronic non-compliers received a phone call the day before the appointment as a reminder.

Almost every medical clinic has patients who no-show for appointments. Overbooking appointments is one option available to increase productivity and access to care. Satiani et al. (2009) showed that overbooking does not address the true causes of no-shows, it is a way to mitigate its effects. Random overbooking without management or analysis may increase wait times, patient dissatisfaction and overhead costs in the way of overtime. However, there are ways to properly employ overbooking to enhance productivity and access. Recent models have shown that overbooking with analysis and management can lead to increased productivity and patient access. LaGanga and Lawrence (2007) found that overbooking could be very productive. The study yielded several intriguing results. First, scheduling complexity increases when using overbooking to compensate for no-shows. Second, overbooking can significantly improve clinic productivity and patient access to care. Finally, overbooking provides the most utility when clinics are larger in size, no-show rates are higher, and variability in service is decreased.

The best way to reduce no-shows may not be the implementation of a single solution. Johnson et al. (2007)

posited that the best way to reduce no-shows may be the combination of well-established methods that are carried out consistently and effectively.

Advanced Access

Advanced Access is a proposed solution in order to meet patient demand and alleviate no-shows and clerical overhead. The main goal of advanced access is to meet demand with supply resulting in same or next day appointments with the PCM or PCM team. One of the major assumptions is that patient demand is predictable after thorough analysis. Many practices offer a same day appointment for acute appointments however, advanced access offers nearly same day availability for all appointments (Bundy, Randolph, Murray, Anderson & Margolis, 2005).

Having same day access has several advantages. First, when patients feel they can receive care without overcoming barriers to access demand decreases. Second, continuity of care is often correlated with patient and provider satisfaction. Finally, allowing patient flow to dictate supply reduces clerical overhead such as making telephone calls, triaging scheduling, and rescheduling. Implementing advanced access requires leadership, a well-communicated implementation plan, analysis of data, and constant review of metrics (Tantau, 2009).

Murray & Tantau (2000) theorized that there are three pillars of implementing advanced access: capacity, continuity, and demand and supply equilibrium. Capacity is defined as the availability of appointments for the demand for each provider as well as the practice. Continuity is the matching of the patient to their PCM or, when unavailable, a provider in the PCM team. Demand and supply equilibrium is the need to seek balance between supply and demand not only at the onset of but constant reevaluation over time.

There are five instrumental changes that coincide with the three pillars of implementing Advanced Access. First, a commitment from leadership and staff must be made on the process of increasing capacity. An Advanced Access Model means doing all necessary medical care in one visit, not several consecutive visits creating capacity in the future. Second, there must be an aggressive effort to eliminate the backlog of appointments. Providers may have to see more patients for six to eight weeks in order to decrease latent appointments. Third, use fewer types of appointments. Many types of appointments lead to variability and error. Reducing types of appointments to PCM, PCM Team, and unestablished patient are viable examples. Next, develop contingency plans for when supply may be diminished. Providers will take vacation, get sick, or patient demand may unexpectedly spike. These contingencies must be planned for with PCM teams

and bringing in additional providers if needed. Finally, reduce demand for unnecessary visits. Previously mentioned were to make each visit more comprehensive reducing need for future appointments (Murray & Tantau, 2000).

Measuring the effectiveness of advanced access is imperative to its success. (Gupta, Potthoff, Blowers & Corlett, 2006) suggested that performance metrics are invaluable to the implementation and maintenance of advanced access scheduling. The first matrices are used to measure the daily demand for appointments. First, a daily average of demand must be measured. This can be ascertained through the average number of calls per provider. The patient wait time for each visit must also be measured. Second, the daily average of supply must be measured. The daily average available slots per provider must be measured and added to the number of slots that are worked into the provider's schedule. This number provides the daily average number of available slots. A ratio of the supply and demand will show excess capacity per provider. Ratios over 100% show excess and ratios less than 100% show need for additional capacity.

Quality metrics are as, if not more, valuable as capacity metrics. A ratio of same day patients who see their PCM is important. This is a measure of continuity. The ratio a provider sees of patients seen in the same day although they are not enrolled in their panel is also important. This is a measure of

access rather than continuity. These quality metrics can provide actionable information as to the balance of access and continuity measures in a practice (Gupta et al., 2006).

Bundy et al. (2005) found that Advanced Access has yielded several positive results upon implementation in a variety of practice settings. One clinic found that the third available appointment time was decreased from 36 to four days. No-shows were decreased by almost 33% and overall patient satisfaction increased from 45 to 61%. Two multi-specialty clinics implemented advanced access with success. For an ENT clinic, surgeries lasting longer than one hour, wait days were reduced from 58 to two days. Routine care delays were reduced from 25 days to eight days, with many providers with zero wait days. The imaging clinic reduced wait times to zero days (Tantau, 2009). One family practice clinic increased productivity by 20%, patient wait time for appointments was decreased by 70%, and time for patients in the clinic was decreased by 50%. Patient satisfaction was not empirically tested however, was significantly higher based off of feedback and comments. Provider satisfaction, again not empirically tested, was higher due to the positive feedback from patients (Shulkin, 2006). These results are impressive however, they are not the whole story.

Mehrotra, Keehl-Markowitz, and Ayanian (2008) discovered that advanced access's results are either short-lived or do not produce the reduction on no-show rates that were expected. In a review of practices that had implemented advanced access, one study found that none of the practice was able to maintain their improvements and no consistent improvements were found in patient and provider satisfaction. Bennett and Baxley (2009) studied a family practice clinic that implemented advanced access. The results showed no decrease in the no-show rate although the third available appointment time was decreased.

Mehrotra et al. (2008) cited several barriers to implementing advanced access. First, extended provider leaves and absences cause disparities in the supply of health care. Motivating remaining providers to pick up the needed supply in the way of additional appointments is difficult and hard to maintain for long periods of time. Second, assessing demand is arduous. Practices must have patient rosters and panels that are maintained. The ability to accurately measure panels is instrumental to successful implementation. Finally, some providers felt that same day appointments are unnecessary and therefore were not fully convinced that the goal of advanced access was worthwhile.

Purpose

The purpose of this study is to provide a statistical analysis of appointment no-shows and cultivate feasible solutions to help increase patient access and productivity at DDEAMC. In order to do this a retrospective look at scheduled appointment data will be conducted and problem clinics and predictive factors will be identified. The null hypothesis is that the examined variables do not have an effect on DDEAMC no-show rates. The alternate hypothesis is that the examined variables do have an affect on DDEAMC no-show rates.

Methods and Procedures

This is a quantitative, retrospective look at DDEAMC's scheduled appointment data for fiscal year 2009 in order to find the factors associated with no-show appointments. This study will include all scheduled appointments that patients kept or failed to attend. Only data that includes scheduled appointments and their status of kept or no-show will be used. Significant factors and the clinics with the highest and lowest no-show rates will be examined.

Dependent and Independent Variables

Appointment status, kept or no-show, was the dependent variable. Specifically, the definition of a no-show appointment

is when a patient failed to attend their appointment or has cancelled their appointment less than 24 hours prior to the appointment. Several independent variables were used in this quantitative analysis. Patient demographic variables include: age, gender, beneficiary category, branch of service, and enrollment status. Appointment characteristics examined were the appointment date, appointment time of day, appointment day of week, and season of the year.

Data Analysis Techniques

Appointment data was retrieved from the Composite Health Care System (CHCS) for fiscal year 2009. Only scheduled appointments were examined. Emergency Room (ER), sick call and walk-in patient encounters were not examined because they were not scheduled and were not in the scope of this study. Appointments cancelled more than 24 hours out were not included in this analysis. All DDEAMC outpatient clinics were examined in this analysis. Every appointment examined was coded as a kept or no-show appointment.

A CHCS ad-hoc report was run by DDEAMC data analysts. The CHCS data was imported into an Excel database (ER, sick call, and walk-in appointments were removed from the data). This analysis examined 510,123 appointments, the remaining number of appointments. After, the remaining appointments were imported

into PASW Statistics 18.0, formerly SPSS. Data was then coded to identify characteristics of each category examined. Appointment date was the calendar date of the scheduled appointment. Appointment time was divided into two segments: 0700 to 1159 hours as morning and 1200 to 1600 hours as afternoon. Appointment day of week was labeled as the day of the week of the appointment, Monday through Sunday. Beneficiary Status was categorized into Active duty, Active duty family members, Retiree, Retiree family members and other. Branch of Service was categorized as Army, Air Force, Navy, Marines, Marines, Coast Guard or other. The sponsor's branch of service was used for the active duty, retired and both family member beneficiary categories. Age was divided into four categories; 0 to 17 years of age was labeled pediatric, 18 to 42 years of age was labeled as adult, 43 to 64 years of age was labeled as older adult, and 65 years of age and older was labeled as Medicare eligible.

Descriptive statistics were explored to show the distribution of appointments with respect to the individual independent variables. The distribution of no-show appointments with respect to the independent variables is found in Table 1.

Next a binary logistic regression examined which factors are statistically significant contributors to no-shows. The logistic regression identified which factors are associated with

no-show appointments and the odds that each factor contributes to no-show appointments.

Reliability and Validity

The reliability and validity of this study are essential in providing actionable information. CHCS is the sole source of data in order to increase reliability. This system is the health information system for healthcare used throughout the MHS. CHCS has many modules that comprise the system. For this study we used the Appointment Activity Tool to retrieve data regarding kept/no-show appointments. This source is the same data source that every medical department throughout the DOD uses to analyze data and make policy and procedure decisions. The sheer number of data points, over 500,000, and the interval period of the study, one complete fiscal year, help alleviate confounding factors from skewing data. Methods and techniques from previously published literature looking at no-shows were implemented to help ensure validity of this study. Additionally, operational definitions and variables will follow other academic literature on this topic. The definition of no-show is used from published literature. This was instrumental in the decision not to used patient or clinic cancelled appointments. Examined variables used in previous literature used in this analysis are age, gender, and appointment day and time.

Results

Overall, DDEAMC had an overall no-show rate of 9.1%. Of the 510,123 scheduled outpatient appointments examined 46,266 were considered to be no-shows.

Time of day

There were 317,156 (62.0%) morning appointments and 192,967 (38%) appointments in the afternoon. 30,651 appointments were no-showed in the morning (10.7%) and 15,615 were no-showed in the afternoon (8.8%). According to the binary logistic regression, the odds ratio of having a no-show appointment was 1.2 for mornings ($p<.01$).

Gender

Male patients accounted for 285,561 of all examined appointments at DDEAMC in fiscal year 2009. Females accounted for 224,562 during the same time period. The male patient no-show rate was 10.2% (26,341 missed appointments) and the female no-show rate was 9.7% (19,925 missed appointments). The statistically significant odds ratio for males missing appointments was .9 ($p<.01$).

Table 1. Distribution of Appointments

Category	Variable	Kept	No-Show	# of Appointments	% No-Show	% of appts
Time of Day						
	Morning	286505	30651	317156	9.7	62.2
	Afternoon	177352	15615	192967	8.1	37.8
Gender						
	Male	259220	26341	285561	9.2	56.0
	Female	204637	19925	224562	8.9	44.0
Day of Week						
	Monday	92593	10329	102922	10.0	20.2
	Tuesday	102967	10592	113559	9.3	22.3
	Wednesday	103720	9863	113583	8.7	22.3
	Thursday	80400	7618	88018	8.7	17.3
	Friday	77009	7422	84431	8.8	16.6
	Saturday	6216	442	6658	6.6	1.3
Age						
	Pediatric	45143	4392	49535	8.9	9.7
	Adult	256976	32373	289349	11.2	56.7
	Older Adult	112511	7363	119874	6.1	23.5
	Medicare Eligible	49227	2138	51365	4.2	10.1
Ben Cat						
	Active Duty	239915	28830	268745	10.7	52.7
	Family Member AD	76526	8332	84858	9.8	16.6
	Retired	58086	3269	61355	5.3	12.0
	Family Member Retired	82130	5531	87661	6.3	17.2
	Other Beneficiary	7200	304	7504	4.0	
Season						
	Fall	115602	11658	127260	9.2	25.0
	Winter	109163	10660	119823	8.9	23.5
	Spring	118581	11883	130464	9.1	25.6
	Summer	120511	12065	132576	9.1	26.0
Service Branch						
	Army	405065	42068	447133	9.4	87.7
	Air Force	21516	1288	22804	5.7	4.5
	Navy	25983	2134	28117	7.6	5.5
	Coast Guard	292	20	312	6.4	0.0
	Marines	6196	642	6838	9.4	1.3
	Other Service	4805	114	4919	2.3	1.0
Enrollment Status						
	Prime Enrollment	336107	32478	368585	8.8	72.25
	Plus Enrollment	46819	2082	48901	4.3	9.59
	Other Enrollment	80931	11706	92637	12.6	18.16

Day of the Week

Appointments were distributed as follows for the days of the week: Monday accounted for 20.2% of appointments, Tuesday accounted for 22.3% of appointments Wednesday accounted for 22.3% of appointments, Thursday accounted for 17.3% of appointments, Friday accounted for 16.6% of appointments, and Saturday accounted for 1% of appointments.

No show rates were Monday 10.0% (10,329), Tuesday 9.3%, Wednesday 8.7%, Thursday 8.7%, Friday 8.8%, Saturday 6.6% and Sunday 0%. Odds ratios for days of the week were all statistically significant at the $p<.01$ level. Monday had the highest odds ratio at 1.7 and Thursday had the lowest odds of no-show at 1.4. Table 2 shows the variables, their level of statistical significance, and their odds ratio.

Age of Patient

Patients were divided by age into four categories: pediatric (17 and younger), adult (18-42), older adult (43 to 64), and Medicare eligible (65 and older). Pediatric patients accounted for 49,535 appointments (9.7%), adults had 289,439 (56.7%) appointments, older adults were scheduled for 119,874 (23.5%) appointments, and Medicare eligible patients had 51,365 (10.1%) appointments.

Table 2. Examined Variables and their Respective Odds Ratios

Variable	Sig.	Odds Ratio
Adult 18 to 42 years old	0	2.9
Pediatric	0	2.4
Monday	0	1.7
Adult 43 to 64 years old	0	1.7
Tuesday	0	1.6
Army	0	1.5
Friday	0	1.4
Wednesday	0	1.4
Thursday	0	1.4
Morning	0	1.2
Navy	0	1.20
Family Member Active Duty	0	1.2
Active Duty	0	1.1
Retired	0.1	1.1
Fall	0.5	1.0
Spring	0.8	1.0
Winter	0.2	1.0
Air_Force	0.3	1.0
Males	0	0.9
Plus	0.1	0.9
Prime	0	0.7

No show rates were 8.9% (pediatric), 11.2% (adult), 6.1% (older adult), and 4.2% (Medicare eligible) respectively. The odds ratio for pediatric no-show patients was 2.4 ($p<.01$), the adult ratio was 2.9 ($p<.01$), and the older adult ratio was 1.7($p<.01$).

Beneficiary Category

Active duty patients made up a majority of the appointments, 268,745. The no-show rate for Active duty appointments was 10.7%. Active duty family members were scheduled for 84,858 appointments in FY 09. Active duty family members no-showed for their appointments 9.8% of the time. Retired service members were scheduled for 61,355 appointments. Retirees had the second best appointment attendance rate with a 5% no-show rate. Retiree family members made up 87,661 appointments. Their no-show rate was 6.3%. The Other beneficiary category accounted for 7,504 appointments. The no-show rate for patients not fitting in the above listed categories was 4%. The odds ratios were statistically significant ($p<.01$) for active duty (1.1) and active duty family members (1.2) respectively.

Seasons

Appointments were very closely distributed throughout the four seasons. There were 127,260 appointments scheduled in the fall season, 11,658 (9.2%) appointments were categorized as no-shows. There were 119,823 appointments during the winter season. The no-show rate for the winter season was 8.9%. The spring season has 130,464 scheduled appointments. The no-show rate for spring was 9.0%. The summer season accounted for 132,576 appointments, 9.1% (12,065) were no-show appointments. The odds

ratios for the seasons category produced no statistically significant results.

Branch of Service

The Army had the most scheduled appointments (447,133) and the highest no-show rate, 9.4%. The Air Force was scheduled for 22,804 appointments and their no-show rate was 5.6%. Navy patients were scheduled for 28,117 appointments. The Navy no-show rate was 5.6%. The Marines were scheduled for 6,838 appointments, 642 (9.4%) were no-show appointments. The Coast Guard had the least number of appointments (312) and a no-show rate of 6%. The Other service branch category had 4,919 scheduled appointments with 114 (2.3%) no-shows.

The Army had the highest odds ratio for no-shows, 1.5($p<.01$), and the Air Force had the lowest significant ($p<.01$) result (1.2).

Enrollment Status

TRICARE Prime enrollment accounted for 368,585 (72%) of scheduled appointments. TRICARE Plus enrollees scheduled 48,901 (10%) appointments in FY 2009. The Other enrollment status had 92,637 (18%) scheduled appointments. Prime enrolled patients no-showed for 8.8% of their appointments. Plus enrolled patients had a no-show rate of 4.3%. The Other enrollment status had a

no-show rate of 12.6%. Prime enrollment had an odds ratio of .7($p<.01$).

I reject the null hypothesis and accept the alternate hypothesis. Individual variables do contribute to no-show appointments.

Discussion

The findings of this analysis posit that there are factors that contribute to the no-show rate of DDEAMC. DDEAMC had an overall no-show of 9%. Although the literature shows that several healthcare settings have higher rates, there is room for improvement. Improvement in no-shows can lead to increased access for patients and revenue for the medical center.

Several factors were included in this no-show analysis. Previously published literature helped focus this analysis on factors and attributes associated with no-show rates. Although the binary logistic regression yielded statistically significant results, further examination of the studied factors can lead to improvement in no-shows and patient access for DDEAMC.

DDEAMC scheduled over 62% of its outpatient appointments in the morning. The morning no-show rate was 9.7% while the afternoon rate was 8.1%. Scheduling practices could be changed so that providers have more administrative time in the morning and schedule more patient appointments in the afternoon in order to increase patient attendance for appointments. The binary

logistic regression showed a statistically significantly odds ratio of 1.2 for no-shows in the mornings.

Gender was another factor examined in this analysis. The literature on gender's role in no-shows is ambivalent. The results from this analysis maintain that gender is not a strong factor in influencing no-shows. Male patients no-showed 9.2% of the time while women were noncompliant 8.9% of the time. The regression produced a statistically significant ($p<.01$) odds ratio for males of .9.

No-show rates for days of the week were analyzed to see if trends could be identified. Monday had the highest no-show rate for the days examined (10%). Monday's odds ratio for no-shows was also the highest (1.67, $p<.01$). The no-show rate decreased from Tuesday to Thursday, 9.3% to 8.7%, but Friday's no-show rate was 8.8%. Saturday had the lowest rate at 6.6%. The odds ratios followed the same pattern as the no-show percentages.

Friday had the lowest number of appointments during the weekday. One explanation could be the lack of available appointments either due to scheduling practices or provider desire to have administrative time on Fridays. Additional investigation into the small number of Friday appointments is warranted. In order to reduce the overall no-show rate increased emphasis should be placed on Monday's no-show appointments.

Leadership can utilize this information in order to find the equilibrium between meeting patient demand for appointments and scheduling for optimal patient attendance. Providers' schedules should be analyzed to ensure that the times and day of the week they are scheduled to see patients are congruent with patient demand and compliance. Saturday clinics should receive special attention. Although the number of Saturday appointments was considerably smaller than weekdays, the no-show rate was also considerably smaller. Saturday appointments may be an opportunity to achieve appointments for working families while almost ensuring attendance.

Age of patients in regards to no-show appointments has been documented in several research articles. The literature showed that younger adults and children have higher no-show rates than older adults and the elderly. In the data examined, pediatric patients and adults aged 18 to 43 and had the highest no-show rates, 8.9% and 11.2% respectively. The binary logistic regression showed that pediatric patients were 2.4 ($p<.01$) times and adults aged 18 to 43 years of age were 2.9 ($p<.01$) times more likely to be noncompliant with appointment attendance. In accordance with the current literature, adults aged 43 to 64 years old had a no-show rate of 6.1%, and adults aged 65 or older had the lowest no-show rate with 4.2%. The literature explains that younger adults have more complicated work and

personal schedules and do not value health related issues as much as older adults. Pediatric patients tend to have higher no-show rates because they rely on their parents for appointment attendance.

The patient's beneficiary category was another factor analyzed in the contribution of no-shows. Literature specifically related to beneficiary category for the MHS is limited. Active Duty service members comprised 52.7% of all appointments with a 10.7% no-show rate. Active Duty Family Members/Dependents had 16.6% of all appointments and no-showed 9.8%. Retired beneficiaries were scheduled for 12.0% of all appointments and no-showed only 5.3%. Retiree family members comprised 17.2% of all scheduled appointments with a 6.3% no-show rate. Active duty and Active Duty family members produced the only statistically significant ($p<.01$) odds ratios, 1.1 and 1.2 respectively. However, finding ways to enforce appointment attendance from military command channels could improve DDEAMC's overall no-show rate. MTFs need to partner with the Commanders of units they support in order to increase appointment attendance using the authority given to the military chain of command. Commanders can use discipline through the Uniform Code of Military Justice to reprimand service members who are noncompliant with appointment attendance. Education opportunities exist at family readiness groups where Commanders

meet with family members to discuss important issues at family readiness group meetings. This is an excellent opportunity to address appointment non-compliance and its consequences.

Seasons, or time of the year, were examined to see if no-shows were more prevalent during certain time intervals. The percentage of appointments and their respective no-show rates were closely distributed throughout the four seasons; fall, winter, spring, and summer. The binary logistic regression produced no statistically significant results. Given the results of this analysis, it is difficult to say that seasons have any affect on no-show rates.

Branch of Service was included in this analysis to contemplate how the individual service influences no-shows. The Army had both the largest percentage of appointments, 87.7%, and the highest no-show percentage, 9.4%. The Army had a statistically significant ($p<.01$) odds ratio of 1.5 for no-shows. The Navy had the second highest percentage of appointments (5.5%) and no-shows (7.6%). The Navy no-show analysis produced the only other statistically significant ($p<.01$) odds ratio of 1.2. The Air Force accounted for 4.5% of all scheduled appointments and its personnel failed to present for their appointments 5.7% of the time. Beneficiaries associated with the Marine Corps made up only 1.3% of all scheduled appoints. However, Marine Corps beneficiaries' no show

rate was 9.4%. DDEAMC's leaders should focus on how to improve Army personnel appointment compliance. Army personnel comprise the largest percentage of appointments and the highest no-show rates. Leaders may also find that communicating with Army leaders easier because of an enhanced understanding of culture and command structure.

TRICARE enrollment status was the final factor analyzed as a no-show contributor. TRICARE Prime enrollees accounted for almost 75% of all appointments and failed to comply 10% of their appointments. All active duty service members are required to enroll in TRICARE Prime. The odds ratio for TRICARE Prime was statistically significant ($p<.01$) at .88. The TRICARE Plus odds ratio was not statistically significant however, their no-show rate was the lowest at 4.3%. These results again highlight that age is an excellent predictor of no-shows. TRICARE Plus is only for beneficiaries 65 and older. These results show that older adults are more compliant than younger adults and children.

Limitations

Although this study may provide information to help reduce no-shows, its results may not be universally applicable. The data analyzed in this study are for DDEAMC. Different Army and other branches of service medical centers may operate and function differently than DDEAMC. DDEAMC has a population that may not be similar to other military or civilian medical

centers. DDEAMC is located on Fort Gordon, a signal (communications) training post, and therefore has a higher student population (transient) than it does permanent party. Next, this study only looks at one fiscal year's worth of data. A stronger study may include more than one fiscal year to analyze contributing factors and look for trends in no-shows. This study was a retrospective analysis of data extracted from CHCS and there was no interaction with patients. A survey given to a representative sample of patients may give insight as to why patients truly no-show. This analysis did not examine the interval between appointment creation date and the actual appointment. This interval has been cited as one of the strongest factors in no-shows. The analysis of no-shows did not tie any patients to the data. No examination of how many no-shows a particular patient was completed. Finally, there were no interventions in this study implemented in order to mitigate no-show rates. This means that there were no steps taken to help reduce no-shows, just an analysis to show contributing factors.

Recommendations

The literature reviewed in this study provides several excellent ways to reduce no-show rates. DDEAMC should identify beneficiaries with high no-show rates. Interviews and surveys of these beneficiaries could provide insight into why patients no-

show for appointments. Then DDEAMC could look at system wide changes to reduce no-shows.

DDEAMC should write and publish a no-show policy that explains how no-shows affect clinic operations, tolerance levels for no-show appointments, and consequences for multiple no-shows. The policy should be written so that all clinics have the same parameters. This will help reduce confusion from one clinic to the next and show that the entire facility operates as a cohesive unit.

Next, a myriad of no-show reminders should be used. Currently, DDEAMC uses a telephone reminder system that calls patients 48 hours before their appointment. Reminder letters should also be sent so that they arrive seven days before the appointment. Clerical staff should also call patients after they no-show to ensure they do not require medical attention and educate patients on the affects of no-shows.

DDEAMC should evaluate the feasibility and acceptability of utilizing overbook appointments during days and times where no-shows are increased. This should only be completed after extensive analysis. Overbooking appointments without analysis can lead to extended wait times and higher no-shows counteracting the desired effect. Mondays and mornings would be excellent times to pilot an overbooking strategy because of their high no-show rates.

Leadership should look at the clinics, times, and attributes where no-show rates can be lowered and also where things are going well. Clinic leadership with associated low no-show rates should share their best practices and standardize operations where feasible. Clinics who maintain low no-show rates and high levels of productivity should be rewarded with budget augmentation and public recognition. Clinics that consistently have high no-show rates and low levels of productivity should be examined to see whether it is the environment of the clinic, the administrative function, or the patient perception of poor care that facilitates high no-show rates.

Advanced access should be evaluated to see if it is feasible to implement. If implemented properly, advanced access leverages provider supply in order to meet patient demand. There is almost no need for advanced scheduling of appointments. Appointments are available on the day patients require them. This concept has been shown to be successful given the right leadership and maintenance of analysis and provider buy in.

Recommendations for Further Study

One recommendation for further study is to look at no-show rates for all of the services: Army, Navy, and Air Force. All sizes of MTFs should be examined and a baseline of acceptable

measures established. MTFs and clinics with superior ratings could be indentified and their policies and procedures distributed and replicated throughout the MHS.

Another recommendation would be to implement a strong no-show policy and see the effects on no-show rates six months after implementation. The policy would have to be clear, concise, delineate consequences, and followed through on in order to be successful.

A study analyzing missed opportunities (no-show, patient cancellations, and clinic cancellations) would give an excellent view at improvements can be made in access and patient care. A study of this caliber would show not only what patient attributes affect barriers to care but what clinical attributes contribute to diminished access. This study would provide a 360-degree look at missed opportunities and provide steps to hold patients and providers accountable for healthcare that was not afforded the opportunity of taking place.

Finally, individual clinics should be analyzed to see if there are any best practices used to mitigate no-shows. An analysis of clinics with low no-show rates could help clinics throughout the medical center. Leaders who are able to maintain low no-show rates should teach lessons learned and help educate their colleagues on effective methods.

Conclusion

This study produced descriptive and predictive statistics on proposed contributing factors and recommendations on how to mitigate no-show appointments. Descriptive statistics were given for time of the day, gender, day of the week, age, beneficiary category, season, branch of service, and TRICARE enrollment status. The highest no-show rates were for adults (aged 18 to 42), active duty service members, and Mondays. The lowest no-show rates Sunday, the Other category for branch of service, and the Other beneficiary category.

The clinics with the highest no-show rate were mental health, psychiatry and physical therapy. The clinics with the lowest no-show rates were vascular radiology, hyberbarics, and orthotics. DDEAMC's overall no-show rate for scheduled outpatient visits was 9.1%. Appendix C shows the clinics with the highest and lowest no-show rates.

The binary logistic regression produced several statistically significant factors. The highest significant odds ratios were adults (aged 18 to 42), pediatric (0 to 18 years old) patients, Monday, adults (aged 43 to 64), and Tuesdays.

There are several recommended courses of action discussed in this study. First, a multi faceted reminder system comprised of mailed reminders, telephone calls, and no-show education. Second, implement a strong no-show policy that contains clearly

articulated criteria and consequences. A signed agreement between providers and patients can help hold both accountable for participating in the patient's healthcare. Next, minimize the interval between the creation date and the actual date of the appointment. Then, use overbooking in accordance with periods of high no-shows in order to minimize losses of valuable appointment slots. Finally, evaluate the feasibility of implementing advanced access within the parameters and regulations of the MHS and Army Medical Department.

This study is not the end of no-show research. There are several ways this study could be strengthened. First, a validated survey of patients could add insight into why patients no-show. Second, a statistical analysis of no-show rates in all MTFs, regardless of service, and the distribution of discovered best practices.

This study looked at scheduled appoints in all DDEAMC outpatient clinics. Leaders at DDEAMC can use the results and recommendations in order to minimize no-show appointments, increase the continuity of care, and increase productivity and efficiency at DDEAMC.

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Appendix A

Code Sheet for Predictive Factors of No-Shows

SPSS Variable	Variable Type	SPSS Data Code
Dependent Variable Appointment Status	Dichotomous	1=No-Show
Time of Day		
Morning	Dichotomous	1=Morning 0=Other
Afternoon	Dichotomous	1=Afternoon 0=Other
Gender		
Male	Dichotomous	1=Male 0=Other
Female	Dichotomous	1=Female 0=Other
Day of the Week		
Monday	Dichotomous	1=Monday 0=Other
Tuesday	Dichotomous	1=Tuesday 0=Other
Wednesday	Dichotomous	1=Wednesday 0=Other
Thursday	Dichotomous	1=Thursday 0=Other
Friday	Dichotomous	1=Friday 0=Other
Saturday	Dichotomous	1=Saturday 0=Other
Age of Patient		
Pediatric	Dichotomous	1=Pediatric 0=Other
Adult	Dichotomous	1=Adult 0=Other
Older Adult	Dichotomous	1=Older Adult 0=Other
Medicare Eligible	Dichotomous	1=Medicare Eligible 0=Other

Appendix A cont.

Enrollment Status		
Prime Enrollment	Dichotomous	1=Prime Enrollment 0=Other
Plus Enrollment	Dichotmous	1=Plus Enrollment 0=Other
Other Enrollment	Dichotmous	1=Other Enrollment 0=Other
Beneficiary Category		
Active Duty	Dichotomous	1=Active Duty 0=Other
Family Member AD	Dichotomous	1=Family Member AD 0=Other
Retired	Dichotomous	1=Retired 0=Other
Family Member Retired	Dichotomous	1=Family Member Retired 0=Other
Other Beneficiary	Dichotomous	1=Other Beneficiary 0=Other
Branch of Service		
Army	Dichotomous	1=Army 0=Other
Air Force	Dichotomous	1=Air Force 0=Other
Navy	Dichotomous	1=Navy 0=Other
Coast Guard	Dichotomous	1=Coast Guard 0=Other
Marines	Dichotomous	1=Marines 0=Other
Other Service	Dichotomous	1=Other Service 0=Other
Season		
Fall	Dichotomous	1=Fall 0=Other
Winter	Dichotomous	1=Winter 0=Other
Spring	Dichotomous	1=Spring 0=Other
Summer	Dichotomous	1=Summer 0=Other

Appendix B

Acronyms

AD	Active Duty
CHCS	Composite Health Care System
CONUS	Continental United States
DDEAMC	Dwight D. Eisenhower Army Medical Center
DOD	Department of Defense
ER	Emergency Room
FY	Fiscal Year
HIPAA	Health Insurance Portability and Accountability Act
MEDCOM	Medical Command
MHS	Military Health System
MTF	Military Treatment Facility
OPORD	Operation Order
PCM	Primary Care Manager
SPSS	Statistical Package for the Social Sciences
TMA	TRICARE Management Agency