Understanding, Predicting, & Reducing Appointment No-Shows in a Military Medical Treatment Facility

Andrew H. Bertrand

U.S. Army-Baylor University Master of Health Care Administration Graduate Program

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ABSTRACT

Appointment non-compliance can disrupt the efficient operation of a medical facility. At Naval Hospital, Camp Lejeune, the appointment non-compliance rate for 1999 was 11.3%. Although not markedly high, Naval Hospital leaders believed more could be done to increase appointment compliance. The goal of this study was to identify potential predictors of appointment no-shows at the Naval Hospital and suggest methods to effectively address the issue.

Appointment interval, age, and gender were selected as potential predictors of appointment non-compliance following a comprehensive review of the literature. Chi-square tests were performed on each predictor against the dependent variable outcome. Outcome defined as whether a patient kept or no-showed for an appointment. Clinic type and branch of service were also analyzed as variables, but only for their descriptive value. Significant differences between the dependent variable and all the predictors were identified ($p < .0001$). A CHAID analysis was then performed on each predictor to detect interactions and rank predictor significance.

According to the results of this study, Naval Hospital, Camp Lejeune should implement a computer-generated appointment reminder system as an effective measure against appointment non-compliance. The system would not only counter the problem of forgetfulness; it would also offer patients an easy way to cancel appointments at the touch of a button, circumventing an often difficult and cumbersome centralized appointment system.

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INTRODUCTION

Conditions which prompted the study

Despite years of extensive research on the issue, the number of appointment no-shows continues to rise in most health care settings (Garuda, Javalgi, and Talluri, 1998).

Recent changes in the financing and delivery of health care in the United States have compounded the problem. The evolution from fee-for-service to managed care has led to a focus on operational efficiency to curb the perpetually rising costs of providing health services (Feldstein, 1996). This new mandate for better efficiency means health care leaders must develop methods to reduce appointment non-compliance.

The transition to managed care in the United States did not exclude the military health care system. Concerns about the effect of appointment no-shows in military health care were not as prevalent prior to TRICARE. During this time, military hospitals and clinics did not incur the costs of sending patients to civilian providers. The majority of these costs were paid at higher levels while patients made up the difference through deductibles, co-pays and supplemental insurance.

Appointment no-shows can jeopardize the operational efficiency of a medical facility (Smith and Yawn, 1994). Providers for example, are unable to effectively treat and monitor those who miss appointments. Vital resources are wasted while untreated conditions become worse. (Mirotznik, Ginzler, Zagon, and Baptiste, 1998; Koren, Bartel, and Corliss, 1994). Patients with chronic conditions who miss appointments risk the most (Deyo and Inui, 1980).

Appointment no-shows disrupt the patient-provider relationship; denying others access and diminishing the level of quality (Koren et al., 1994; Barron, 1980). In the military's managed care system (a.k.a. TRICARE), appointment no-shows could result in unnecessary patient referrals to a provider network. If no appointments are available at the primary treatment facility, then patients are referred to the network. This is arguably the most substantial cost issue the military health system will face as a consequence of appointment non-compliance. Decreasing appointment no-shows would ideally open more appointment slots, thereby decreasing the number of network referrals.

The military's deliberate transition toward capitated financing effectively terminated the old way of doing business - a way which provided hospital commanders additional dollars to support higher utilization without valid justification (Office

of the Deputy Assistant Secretary of Defense (TRICARE Management Activity), 1998).

The modified capitation model (a.k.a. revised financing), the principal reason appointment no-shows now concern leaders within the military health system, is now the primary financing component of the TRICARE program. With revised financing, the costs of network services are paid by the individual military hospitals and clinics. Revised financing is the precursor to enrollment based capitation (EBC). Under EBC, the military health care system will operate like a Health Maintenance Organization (HMO). Military hospitals and clinics will receive funding based on the number of enrolled beneficiaries (capitation). Operating under a fixed amount of annual funds will force facilities to reevaluate how they do business.

For the first time in its history, the military health system is being exposed to the same financial risks that civilian health care systems now face. Hospital commanders must now increase member enrollment to maximize per-member-per-month (PMPM) revenue, which will eventually be distributed by DoD/Health Affairs (TRICARE Management Activity, 1998).

Appointment no-shows became an issue at Naval Hospital, Camp Lejeune North Carolina (Naval Hospital) for three primary reasons (See Appendix A for a brief description of the Naval Hospital). First, the local Health Care Consumer Council - a

group of military retirees and dependents - believes that no-shows decrease access to care. The Council wants to implement a stand-by program to decrease the number of no-show appointments and improve access.

Secondly and as previously stated, the cost of revised financing will rise if patients are displaced to the network as a result of appointment no-shows. For example, depending on the appointment type, providers must see TRICARE Prime beneficiaries within a specific time frame. Providers are required to refer patients to the network if access standards cannot be met at the military treatment facility (typically because the MTF is at maximum capacity). Therefore, appointment no-shows restrict the number of appointments available, resulting in increased numbers of network referrals.

Thirdly, what happens to those patients who do not show for follow-up appointments? It seems logical to conclude that patients who miss appointments place their health status at risk. Therefore, appointment non-compliance generates valid concerns about quality as well as the associated financial risk of an unchecked chronic condition (S. G. Ranck, personal communication, November 19, 1999).

Statement of the Problem

Preliminary appointment no-show data from the outpatient clinics at the Naval Hospital revealed an appointment no-show rate of 11.3% for fiscal year 1999 (Appendix B). The optometry clinic had the highest no-show rate for 1999 at 25.4% and the pediatrics clinic at 6.6% had the lowest.

The Naval Hospital has two primary care clinics. The hospital primary care clinic at the Naval Hospital and the Navy primary care clinic; a stand-alone facility located in Jacksonville NC. The staff at each primary care clinic provides the care for a majority of the Naval Hospital's beneficiaries. The fiscal year 1999 no-show rates at the two primary care clinics were 11.3% and 9% respectively (Composite Health Care System (CHCS) data). This amounted to 14,082 appointment no-shows out of 140,850 scheduled appointments for fiscal year 1999.

The military health system's revolutionary transition from a disease-based intervention system to a managed care prevention/focus-system requires military health care professionals to scrutinize the appointment no-show issue and identify more efficient methods for reducing non-compliance (Speights, 1997). The following literature review examines recent data, identifies current trends, and provides the framework for identifying, predicting and reducing the incidence

of appointment no shows at the Naval Hospital.

Literature Review

In 1980, Deyo and Inui found 87 articles on the subject of appointment non-compliance. Deyo and Inui stressed the need for more empirical research to identify better predictors and formulate a standard-model-framework to manage no-show behavior. Although current studies are more empirical, the results are mixed. Therefore, it's difficult to consolidate the results of these recent studies into a single standardized solution. The present managed care environment and the lack of effective solutions has fueled a continued interest in the subject of appointment non-compliance.

Hospital and clinic leaders need to develop site-specific plans that address appointment non-compliance. Not much data from military hospitals exists concerning appointment no-shows. The military health system did not closely scrutinize the appointment non-compliance issue prior to the advent of TRICARE. Fortunately, commonalties between civilian and military health systems, such as mutual accreditation requirements, means most of the general literature can apply to military health care facilities.

Definition

An "appointment no-show" (a.k.a "appointment non-compliance") describes a patient who fails to cancel and does not show for a scheduled appointment (Bean and Talaga, 1992; Dotter and Labbate, 1998). The definition changes as the required cancellation time prior to the appointment differs depending on the policy of the health care facility (Deyo and Inui, 1980). For example, a community hospital's policy may state that a patient who does not call at least two hours prior to the appointment will be marked as a no-show. The Naval Hospital - according to TRICARE access standards - requires patients to call at least twenty-four hours prior to the appointment to cancel. If the patient does not call within the required time, the appointment is marked as a no-show.

No-show rates

Missed appointments in general medical facilities average from 15 to 30% (Deyo and Inui, 1980). Macharia, Leon, Rowe, Stephenson, and Haynes (1992) observed 42% appointment no-shows in their study. Of those patients who missed or canceled appointments, 71% reschedule within four months while 52% of those who missed or canceled reschedule within two weeks (Dotter and Labbate, 1998).

Mental health clinics, hospitals, community medical and dental clinics, and pediatric clinics tend to have higher rates of appointment non-compliance (Bean and Talaga, 1995).

Of the 20 clinics at the Naval Hospital, the five with the highest no-show rates include optometry (25%), mental health (21.9%), sports medicine (20.9%), occupational therapy (20.5%), and chiropractic (18.2%). The 6 with the lowest rates include pediatrics (6.6%), Navy primary care (9.0%), urology (9.9%), obstetrics (10.3%), and general surgery (10.7%) (see Table 5 for a complete list of clinic appointment non-compliance rates).

Characteristics of appointment non-compliance

Deyo and Inui were among the first researchers to identify characteristics believed to predict appointment no-show behavior. They observed that age, socioeconomic status and educational level were the only consistently significant demographic variables reported in the literature. Further studies showed similar results. Younger patients of a lower socioeconomic class and level of education, were significantly more likely to miss an appointment. Other demographic markers - i.e. sex, marital status and race - were either less significant or showed mixed results (Barron, 1980; Goldman, Freidin, Cook, Eigner, and Grich, 1982).

Research indicated a higher rate of appointment no-shows among patients treated by junior medical students versus staff

providers (Deyo and Inui, 1980, Weingarten et al., 1997). With a new family practice residency program preparing to start at the Naval Hospital in June of 2000, this research outcome may warrant further analysis.

Previous appointment keeping, psychosocial problems, health care beliefs and an array of situational factors have all exhibited inconsistent predictive value in determining no-show behavior (Bean and Talaga, 1995).

Poor communication accounts for nearly half of the reasons patients list for missing appointments. They either thought the appointment was cancelled, claimed not to know about the appointment, or were confused about the time. Fourteen percent of patients state they simply forgot about the appointment. Other frequent reasons patients gave for missing appointments include illness, lack of financial resources, lengthy wait time, traveling distance, restored health, ill family members, and transportation difficulties (Barron, 1980).

Overall satisfaction with previous appointments can affect no-show behavior (Goldman et al., 1982; Miller et al., 1995). Also, work related situations might present barriers to appointment keeping. In a study conducted at a military psychiatric clinic, appointments were purportedly missed 20% of the time because of work (Dotter and Labbate, 1998).

Interventions

Identifying and measuring the preceding characteristics of appointment non-compliance was fundamental to developing the following eight intervention strategies.

Mail/Phone Reminders. Telephone and mail reminders were studied extensively and shown to reduce appointment non-compliance by as much as 20 percent (Deyo and Inui, 1980; Bean and Talaga, 1992; Macharia et al., 1992; Campbell, Szilagyi, Rodewald, Doane, and Roghmann, 1994; Koren et al., 1994; Dini, Linkins, and Chaney, 1995). Prospective-mail-reminders are both effective and cost efficient if mailed four to seven days prior to the scheduled appointment, while retrospective reminders were found to be ineffective, especially if the health care facility already maintains a low rate of appointment non-compliance (Deyo and Inui, 1980; Bean and Talaga, 1995).

Over-scheduling. Better known as over-booking, over-scheduling revolves around the premise that a certain number of patients will miss their appointments. This involves predicting the appointment attendance characteristics of patients based on various demographic data and then scheduling accordingly (Deyo and Inui, 1980).

Although over-scheduling likely improves appointment compliance, it can also result in an overload of patients, thus longer waits, and a more stressful environment for the staff

(Deyo and Inui, 1980). Assuming they will be seen late, some patients may arrive late and possibly delay time sensitive procedures (Bean and Talaga, 1992).

Several probability techniques exist that aim to reduce the risks of over-scheduling (Barron, 1980; Bean and Talaga, 1992). Still, a patient with a perceived non-urgent condition may turn around and walk away when faced with the prospect of a crowded waiting room. Discretion should be of the highest priority when employing a method such as over-scheduling (Bean and Talaga, 1995).

An alternative to overbooking may be to implement a standby program. A standby program places walk-in patients into no-show appointment slots. This increases the number of filled appointments for the facility and benefits the standby patient by essentially providing a same day appointment. In contrast to over-scheduling, the appointment slot stays empty in a standby program pending confirmation of the appointment no-show. This avoids any risk of overbooking. One military optometry clinic recaptured 27% of its no-show appointments over a one year period after implementing a standby program (Wilford Hall, 1997).

Education. Interventions to improve appointment compliance by altering a patient's health beliefs have shown promise in several studies that utilize the health belief model (Bean and

Talaga, 1992). Mirotznik et al. found general health motivation, perceived severity and costs could affect appointment keeping. Earlier studies based on the health belief model show mixed results. Current studies show better validity, but further research to support these findings would be ideal. Utilizing the nursing staff, Internet web-sites, and brochures to address the preventative and intervention measures of common conditions among the patient population might also reduce appointment non-compliance (Garuda, 1998).

Single Provider. Patients seen by one provider versus several providers over a period of time will likely keep their appointments (Barron, 1980). Lovelock classified the interaction between a patient and provider as a membership relationship. To develop customer trust and loyalty, a provider must develop a formal ongoing relationship with the patient (Lovelock, 1983). Patients confident about their provider's abilities keep more appointments (Bean and Talaga, 1992)

The new "Primary Care Manager by Name" policy moves military health care toward a single provider system. The idea supports continuity of care by assigning the TRICARE Prime enrollee a single provider who will manage the entire spectrum of care for the duration of the enrollee's military assignment (D. C. Arthur, personal communication, December 7, 1999). Leaders in the military health system believe this new policy

will improve the quality of health care delivery, which in turn will improve the level of patient satisfaction.

A provider should always try to satisfy the patient (Bean and Talaga, 1992). Providers who display sensitivity toward their patients needs will likely increase appointment compliance (Barron, 1980).

Price. Non-refundable fees, pre-payment, partial pre-payment and other price strategies will reduce appointment breaking (Bean and Talaga, 1992). They may also annoy patients to such a degree it jeopardizes the vital membership relationship, especially with a single provider strategy such as a primary care manager by name policy (Garuda, 1998; Lovelock, 1983). Patients could negatively associate their provider with the price strategies.

Tricare enrollment fees and co-payments have already created a highly volatile political debate. With the military health system now moving toward a Primary Care Manager by Name policy, price strategy options in this acutely sensitive environment would jeopardize developing key patient-provider membership relationships (Lovelock, 1983). Also, legislation prevents implementing such strategies at a federally funded hospital.

Tangible incentives such as coupons, prizes and the like have also been shown to reduce appointment no-shows. Such

incentives can result in excess costs and should only be considered with unusually high appointment non-compliance rates. Also, once the incentive is discontinued, non-compliant patterns tend to return (Bean and Talaga, 1992).

Location. The probability of a patient breaking an appointment increases as the distance from the health care facility increases (Bean and Talaga, 1992, 1995). This information can be helpful for planning and developing outlying clinics. Try to locate clinics in patient populated areas.

Time Interval. The greater the time interval between scheduling and appointment, the more likely a patient will break the appointment (Deyo and Inui, 1980; Bean and Talaga, 1995; Grunebaum et al., 1996). The patient either forgets about the appointment, spontaneously improves, or even worsens, thus requiring emergency medical services. In many instances - i.e. specialty referrals - complications ensue when attempting to reduce the time to appointment. Prospective reminders (such as computer-generated telephone reminder systems) may help to alleviate the affects caused by the interval between scheduling and the actual appointment.

Patient profile.

To influence the appointment keeping behavior of a patient, one must first identify or "target" that patient (Barron, 1980). A predictive model can guide health care administrators toward

interventions that target high risk individuals or groups, thereby maximizing resources while reducing appointment no-shows (Goldman, 1982). Possible predictors of appointment non-compliance shape patient profiles. For example, a 19 to 30 year old high school dropout in a low socioeconomic category is considered a high appointment no-show risk.

Marketing

Two similar problems arise with the available appointment non-compliance literature. First, there is a poor correlation between various study results. As previously mentioned, many researchers describe various points of heterogeneity within not only the available study results, but also differences between medical institutions and patient population demographics. Simply defining the term (appointment no-show) poses a challenge. This leads to the second problem: The inability to generalize the results of this large base of information collected during the past twenty years. The inability to generalize makes it impossible to generate a broad-based solution toward reducing the number of appointment no-shows (Garuda et al - 98).

Most of the available no-show literature addresses population demographics and not underlying causes - i.e. transportation, financial difficulties, work related difficulties, etc.... The population demographics at the Naval Hospital, for example, will always remain approximately the same

(see Appendix A). Focusing on a demographic characteristic such as age does not explain why individuals who fit a certain demographic profile miss appointments. Rather than concentrating on population demographics, one should use demographics to profile the true underlying causes (Garuda et al., 1998).

Previous studies provide information and techniques that administrators can adapt to fit their respective organizations. An organization's marketing department should be responsible for adapting and implementing this information (Garuda et al., 1998).

Marketing enables an organization to target specific needs while preserving scarce resources (Olsen et al., 1998). This applies to the military health system. An effective marketing strategy will identify the underlying causes of appointment non-compliance at the organizational level and lead to developing effective cause-specific solutions (Garuda et al., 1998).

Garuda et al. (1998) also presents a six step marketing process for appointment non-compliance that targets the no-show population. The first step involves segmenting high-risk populations into categories. These categories reflect the underlying causes of the no-show behavior, which makes segmentation the most important of the three steps. Finding the underlying causes will take both time and patience. Much of the data for discovering the underlying causes can be collected

through a patient survey. Although tedious, developing effective cause-specific solution requires identifying the specific causes.

The next step involves targeting the most important segment from those identified. Size, growth, and financial considerations all factor into targeting. Accurate targeting enables an organization to effectively allocate scarce resources.

Positioning, the third step, requires decision-makers to understand the needs and characteristics of each identified segment and implement effective measures. Much of this information will be available from the surveys. The final three steps; developing, testing, and launching show similarities to other quality models such as Plan Do Check Act (PDCA), and will not be addressed here.

In summary, the literature on appointment non-compliance reveals a nebulous collection of inconsistencies. A multitude of predictors and interventions makes it virtually impossible to develop a broad-based solution to reduce and control appointment no-shows. Although several studies focus on population statistics, these statistics do not address the underlying causes. A health care organization that sees patients between the ages of 17 and 35 will likely always serve that demographic. The organization doesn't have much control over the distribution

of the local population.

Rather than basing interventions on demographics, one should identify the underlying causes (transportation, work, etc.) of appointment non-compliance. Identifying specific causes will enable an organization to develop a marketing plan utilizing cause-specific solutions. All health care organizations whether hospital, clinic, civilian or military, have unique and multiple differences that require each to develop an organization-specific strategy for reducing appointment non-compliance (Garuda et al., 1998).

Purpose

The purpose of this study is to identify various predictors of appointment non-compliance at Naval Hospital, Camp Lejeune and suggest effective interventions in lieu of developing an organizational specific marketing strategy.

Essentially a repeat of Bean and Talaga's 1995 study methodology, the following independent variables may affect appointment non-compliance at the Naval Hospital; interval between schedule and appointment, age, and gender.

I present the following characteristics of appointment non-compliance as the null hypotheses:

H_o1: The interval between schedule and appointment does not affect the rate of broken appointments.

H_o2: The appointment breaking rates between younger adults

and older adults is the same.

H_O3: Gender does not pose as a significant predictor of appointment breaking between adults.

The alternative hypotheses are as follows:

H_A1: Appointment non-compliance becomes greater as the interval between schedule and appointment increases.

H_A2: The appointment breaking rates are greater for younger adults than for older adults.

H_A3: A significant difference in the appointment compliance rate exists based on gender.

Method

This study evaluated appointment no-show data from 20 hospital clinics. Schedule-appointment interval, age, and gender comprise the primary independent variables. These are the variables that either prove or disprove each hypothesis. The dependent variable is the appointment outcome, defined as the number of kept vs. the number of broken appointments during fiscal year 1999. Other independent predictors that do not influence the hypotheses, but are included in the analysis for descriptive purposes include branch of service, clinic type, and number of appointments per quarter. A CHCS ad-hoc report was created to accumulate the raw data for this study. The data was then imported into SPSS (version 10.0) and categorized to

generate the chi-square contingency tables for this study. This SPSS data was then used for the Chi-squared Automatic Interaction Detector (CHAID) analysis. Bean and Talaga (1995) described the potential benefit of using CHAID in the following statement:

> Inconsistencies observed in the outcomes of previous predictive studies of appointment breaking can be partially explained by interactions between situational factors and patient characteristics. For example, demographic variables such as age and sex could interact with appointment lead time or the particular medical specialty being sought. Although previous research does not provide a basis for making specific hypotheses about interactions, we thought it would be desirable to employ a data analytic technique that allowed for an examination of both main effects and interactions among the predictors employed in the study (p. 3).

Bean and Talaga (1995) did discover significant interacting independent variables in their study using CHAID analysis. Answer Tree™ software by SPSS™, a version of CHAID, will be employed in this study to identify possible primary and underlying relationships of each variable of interest. In addition to detecting interacting sub-groups, Answer Tree™ results in the form of tree diagrams are easily understood.

CHAID methodology uses if-then statements to create data decisions based upon the variables of interest, and then the categories that develop convert to tree diagrams. The independent variables are categorical, and therefore allow for chi-square and CHAID analysis. Degrees of freedom and sample size will be reported with the chi-square results. All statistical analyses will employ an alpha level of .05.

Validity and Reliability

The study hypotheses were formed based on the findings of past research. Although impossible to achieve absolute validity or reliability in any study or experiment, prior research does support the variables and methods that were chosen to predict appointment non-compliance. The heterogeneity of past research made it difficult to confirm the reliability and validity of the results. The effectiveness of an implementation plan addressing appointment non-compliance based on current findings will help determine the degree of validity and reliability of this study (Cooper and Schindler, 1998).

The population demographics will only help describe possible underlying causes of appointment non-compliance at the Naval Hospital and support previous research. If a significant gap arises between the scheduling date and the actual appointment date, it will support the implementation of a computer-generated telephone reminder system at the Naval

Hospital. Since a CHAID analysis was only performed in one study, it's difficult to predict whether any significant subgroups will emerge.

Results

Using chi-square methodology, all 5 predictors were statistically significant when measured against the dependent variable - Outcome. Since all predictors were significant, identifying interacting sub-groups through a CHAID analysis is no longer warranted. Although no potentially interacting predictors exist, a CHAID analysis will identify patterns and rank predictors.

Appointment Non-Compliance Data by Interval (Table 1)

Predictor	Compliant	Non-compliant	% Non-compliant
Appointment interval			
Same day	57089	2382	4.0%
1 day	49781	5962	10.7%
2-3 days	26398	3307	11.1%
4-6 days	25568	3539	12.2%
7-13 days	35680	6200	14.8%
14-20 days	24778	4654	15.8%
21-27 days	14121	2839	16.7%
28 or more days	11108	2385	17.7%
Total cases	244523	31268	11.3%

Note. Pearson chi-square = 5342.929, df = 7, $p < .000$
N of valid cases = 275791

Since a significant difference between each appointment interval does exist when compared to the dependent variable - Outcome, reject the null hypothesis. Accept H_A1: Appointment non-compliance becomes greater as the schedule-appointment interval increases.

Appointment Non-Compliance Data by Age (Table 2)

Predictor	Compliant	Non-compliant	% Non-compliant
Age			
Under age 11	64680	6040	8.5%
11-20	28227	3889	12.1%
21-25	53448	10972	17.0%
26-30	26018	4183	13.9%
31-40	31161	3736	10.7%
over age 40	40989	2448	5.6%
Total	244523	31268	11.3%

Note. Pearson chi-square = 4255.838, df = 5, $p < .000$
N of valid cases = 275791

Significant differences were also noted between age groups. The null hypothesis is rejected. Accept H_A2: The appointment breaking rates are greater for younger adults than for older adults.

Appointment Non-Compliance Data by Gender (Table 3)

Predictor	Compliant	Non-compliant	% Non-compliant
Gender			
Female	141771	16950	10.7%
Male	102752	14318	12.2%
Total	244523	31268	11.3%

Note. Pearson chi-square = 161.273, df = 1, p < .000
N of valid cases = 275791

Reject the null hypothesis. Accept H_A3: A significant difference in the appointment compliance rate exists based on gender.

Hypothesis statements were not drawn for the predictors Branch of service and clinic type because the distribution of the sample does not support such an effort. They are included in this analysis as descriptive data.

Appointment Non-Compliance Data by Branch of Service (Table 4)

Predictor	Compliant	Non-compliant	% Non-compliant
Branch of Service			
USMC	210663	27897	11.7%
USN	25799	2781	9.7%
Other	8061	590	6.8%
Total	244523	31268	11.3%

Note. Pearson chi-square = 279.193, df = 2, p < .000
N of valid cases = 275791. Distribution: USMC members & their families made 88.3% of all appointments.

Appointment Non-Compliance Data by Clinic (Table 5)

Predictor	Compliant	Non-compliant	% Non-compliant
Clinic			
Chiropractic	8432	1876	18.2%
Dermatology	4149	615	12.9%
Gastroenterology	729	110	13.1%
General Surgery	7438	887	10.7%
Gynecology	2368	432	15.4%
Internal Medicine	4409	593	11.9%
Hospital FPC	54583	6936	11.3%
Mental Health	2885	807	21.9%
Neurology	1145	152	11.7%
Obstetrics	22725	2605	10.3%
Occupational Therapy	2326	601	20.5%
Ophthalmology	4173	527	11.2%
Optometry	3147	1073	25.4%
Orthopedics	8171	1013	11.0%
Pediatrics	25022	1780	6.6%
Physical Therapy	13717	2910	17.5%
Podiatry	2863	473	14.2%
Sports Medicine	1863	491	20.9%
Urology	2193	241	9.9%
Navy FPC	72185	7146	9.0%
Total	244523	31268	11.3%

Note. Pearson chi-square = 3953.276, df = 19, $p < .000$
N of valid cases = 275791. Distribution: The Hospital FPC and the Navy FPC combined, accounted for 51% of all appointments.

The intent of the following table was to check for cyclic patterns in appointment non-compliance at the Naval Hospital by quarter and to quantify the consistency of the predictors. Although statistically significant, no fluctuations emerge that would suggest a trend. The level of appointment non-compliance remains consistent across all 4 quarters.

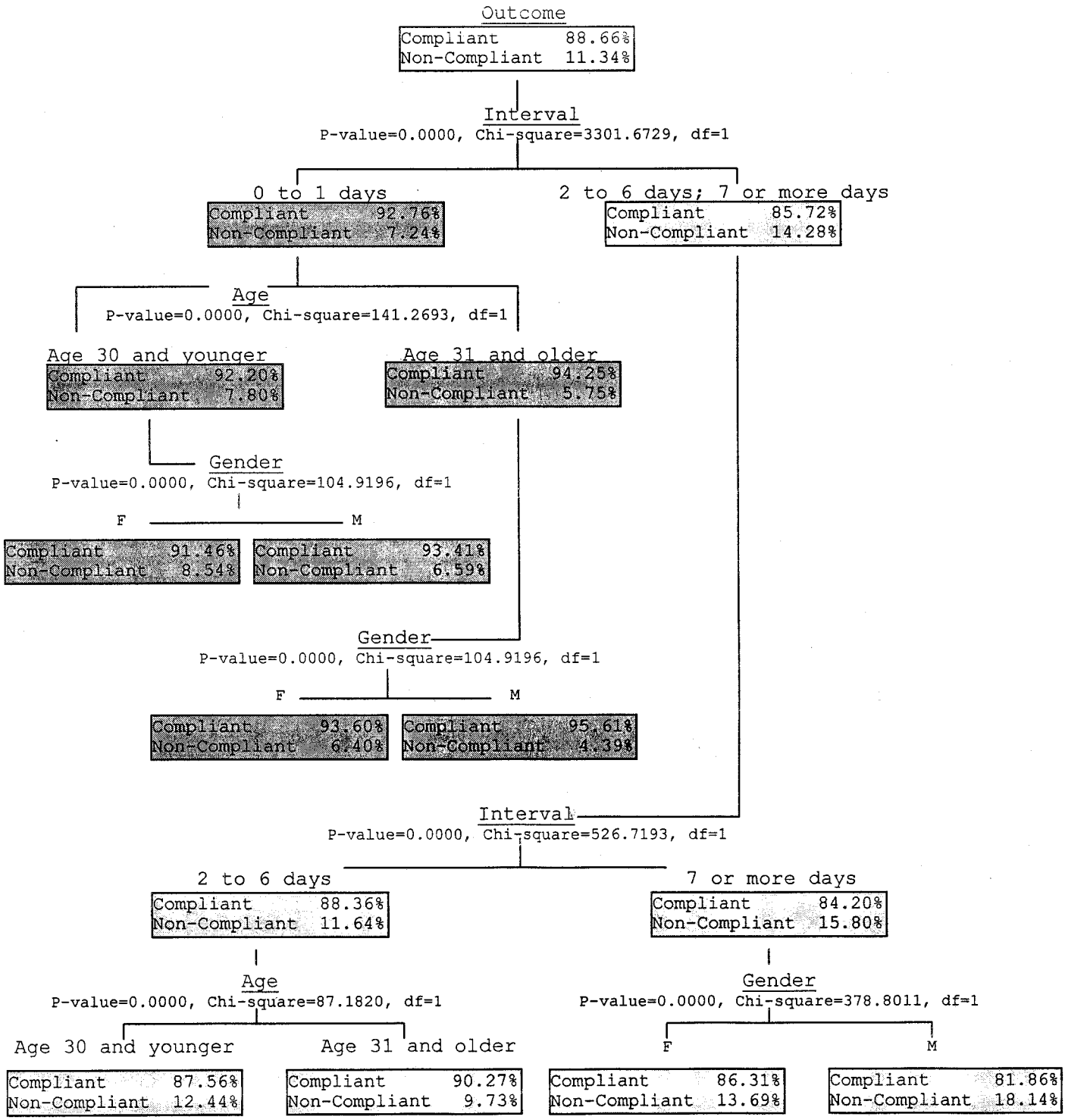
Appointment Non-Compliance Data by Quarter (Table 6)

Predictor	Compliant	Non-compliant	% Non-compliant
Quarter			
1st Quarter	61844	7846	11.3%
2nd Quarter	64767	8085	11.1%
3rd Quarter	61203	7709	11.2%
4th Quarter	56709	7628	11.9%
Total	244523	31268	11.3%

Note. Pearson chi-square = 23.382, df = 3, $p < .000$
N of valid cases = 275791.

The CHAID tree diagram (table 6) identified Interval as the most significant predictor of appointment non-compliance of the three in this study. Age and Gender were also significant, but within the Interval predictor.

CHAID analysis (Figure 1)



Note: n=275791. See Appendix B for complete data.

Discussion

Table 1 shows a continuing upward trend in the number of appointment no-shows as the interval between scheduling and appointment increases. This supports previous studies that examined interval as a predictor of appointment non-compliance. For this study, interval is clearly the most important predictor; the only one of the three associated with hypothesis statements that is not a demographic variable.

The results of age (Table 2) also support the literature findings. Younger people tend to miss a significantly higher number of scheduled appointments than do older people (typically those over 40). Sixty three percent of those who held appointments at the Naval Hospital during 1999 were 30 years or younger in age. This presents a large demographic at risk for appointment non-compliance, yet does not offer any information towards lowering the incidence. Those over the age of 40 had a markedly lower incidence of appointment no-shows at 5.6 percent.

Contrary to most research results, gender was found to be a significant predictor of appointment non-compliance at the Naval Hospital. With Marines making up a majority of the patient population at 87% (Table 4), and many of those being both young and male, this is an understandable development. Their (Marines) daily routines are similar, resulting in a large homogenous

group with similar reasons for not keeping appointments, whether work related or other.

The CHAID analysis (Table 6) shows that Interval is the most significant predictor in the study. Clearly, patients keep same day and next day appointments much more regularly (7.24%) than they do other appointments (14.28%). Age and gender, although significant, serve only a descriptive purpose. For example, the CHAID analysis reveals that a significant number of males missed appointments scheduled 7 or more days ahead. The number of males in the population will always remain somewhat stable. Decreasing the number of male beneficiaries or a particular beneficiary age group is obviously not an option. This analysis supports implementing measures to lower the effects of interval on appointment non-compliance.

The Naval Hospital's appointment non-compliance rate of 11.3% is below the previously stated national average of 15 to 30%. The national average though, is just an average, and not a standard. Just because a facility has a non-compliance rate below 15% does not mean it should not take steps to lower appointment no-shows. Each facility is unique. Fifteen percent may be acceptable for some, and unacceptable for others, it all depends on the variables involved. Monitoring appointment non-compliance should be a continuous process.

Some may question the need to lower appointment no-shows in a managed care environment since the capitated reimbursement will remain the same whether the patient shows up or not - theoretically resulting in a cost savings. In fact, this couldn't be further from the truth. The eventual decline in the health status of the population as a result of an inability to implement consistent preventive measures would lead to substantial long-term costs (Weingarten, Meyer, and Schneid, 1997; Garuda, et al., 1998).

The primary weakness of this study is the lack of a patient survey. Without a well designed survey, it is virtually impossible to identify underlying reasons for appointment non-compliance such as work related difficulties. This leads to a second weakness, which is an inability to identify those predictors of appointment non-compliance that would have the most benefit for the patients at the Naval Hospital. These can also only be identified through a patient survey.

A third weakness is data integrity. A standby patient (the chiropractic clinic for example, has implemented a quasi-standby program) may fill an appointment that has already been coded as a no-show and is then never correctly re-coded. Additionally, the level of access by multiple personnel to various information systems potentially jeopardizes the integrity of the data.

Conclusions and Recommendations

Appointment non-compliance at the Naval Hospital is likely either due to forgetfulness, spontaneous improvement, or a patient's condition worsening and requiring emergency services. Supported by the effect of interval on the dependent variable - outcome.

A computer generated telephone reminder system would offer an effective and cost efficient solution to the problem. The system would allow patients to cancel unwanted scheduled appointments at the touch of a button and serve as a reminder for patients who may have forgotten about an appointment that was scheduled several days or even weeks in advance. Plus, the manpower requirements would be minimal, unlike implementing a prospective or retrospective mail reminder system.

The software for this system may seem expensive at $34,000, but the potential savings far exceeds the cost of the software. In 1996 the average cost of an appointment at the Naval Hospital, Cherry Point (NHCP), was determined to be $145 (Naval Hospital, Cherry Point, 1997). NHCP serves a population very similar to that of the Naval Hospital, Camp Lejeune. There were 31,268 appointment no-shows at the Naval Hospital, Camp Lejeune last year. Using the NHCP data, it would take only 235 recovered appointments to break-even from the computer software

investment. That would require less than a 1% (0.75%) improvement over the current level of no-shows.

Since up to 64% of appointment non-compliance may be attributed to both poor communication (50%) and forgetfulness (14%), the Naval Hospital could recover as many as 20,012 appointments with the use of such an automated computer reminder system. The appointment non-compliance rate could drop from 11.3% to 4.08 percent. This translates into $2,901,240 in potential annual savings. Although this cost data is anecdotal, and the example outcome improbable, it is clear that even a nominal benefit would outweigh the short-term cost.

The intangibles, which include increasing access and improving quality, should be the primary objectives of implementing such a software package at the Naval Hospital.

Other suggested alternatives include a standby program and over-booking; the latter of which is not recommended. In today's politically charged health care environment overbooking carries too many risks. The variables composing appointment issues are too numerous and diverse to implement such a measure.

Once the chosen alternative is implemented, it must be continuously monitored. Clinics with unusually high no-show rates, such as Optometry, may require clinic-specific interventions to help recover appointments, such as a stand-by program (Wilford Hall, 1997).

When choosing which clinics may need specific assistance, do not look merely at the percentage of no-shows. Look at the total number of appointments. A clinic with a no-show rate of 22% out of 1,300 patients may not be as critical as a clinic with a 14% no-show rate out of 35,000 patients.

The cost of the appointment also plays a key factor when examining the rate of no-shows. Certain specialties such as orthopedics and otolaryngology can involve highly invasive procedures. These procedures elevate the cost of such appointments much higher than the $145 average. A 5% appointment non-compliance rate in orthopedics may be deemed unacceptable, whereas a 5% non-compliance rate in the primary-care clinic may be ideal. The difference in appointment costs weighs heavily in deciding the acceptable and unacceptable levels of appointment non-compliance for each clinic.

Those patients who repeatedly miss appointments (defined as >5 per year) may have some underlying issues that the hospital or clinic staff is unaware of, such as transportation problems or work related conflicts. One good strategy targets habitual appointment no-show patients by increasing the number of appointment reminders they receive. Of course, an automated appointment reminder system would negate the need for such a measure.

At the Naval Hospital, the two family practice clinics had a combined total of 188 patients who repeatedly missed 5 or more appointments during 1999 for a total of 1,347 missed appointments. This means 188 patients accounted for 10% of all the missed appointments in the family practice clinics. It is important to contact these patients and offer the assistance they need to make their appointments. It will improve both the operating efficiency of the respective clinic and the health status of the beneficiary population.

Following the implementation of a computer-generated telephone reminder system, the Naval Hospital should begin to manage appointment non-compliance by establishing incremental measures (such as those described earlier) to target specific high-risk areas and consistently monitor the results. The hospital's marketing department should coordinate such a task.

Future research should focus on the development of a well-designed patient survey to identify true underlying causes of appointment non-compliance rather than just identifying demographics. Further empirical research based on the results of such a survey will present a more robust picture of the barriers to appointment compliance at the Naval Hospital.

Appendix A

Description of the Naval Hospital

The Naval Hospital, Camp Lejeune, North Carolina, located in the southeast part of the state, serves a large population of Marines, as well as Sailors and other military and civilian personnel. The hospital resides in TRICARE Region Two; one of twelve regions located in the continental United States. Anthem-Alliance currently holds the TRICARE contract for the region.

Camp Lejeune is located in Onslow County North Carolina. The population of the city lists approximately 75,100, while the population of Onslow County lists approximately 154,000. Jacksonville is home to nearly half of all Onslow County's residents. The 42,000 local military personnel account for more than half of the city's population; not including those dependents of military personnel and local retirees.

The 117 bed Naval Hospital (expandable to 198 in the event of a mobilization) and adjunct clinics play a very important role in meeting the health care needs of the local community. Onslow Memorial Hospital, the only other hospital in the county, maintains a 133-bed capacity. Although both the Naval Hospital and Onslow Memorial Hospital constantly look at ways of improving access to care, the moderate rural setting of both the town and county limit access to many of the tertiary and

specialty services available in larger urban areas. As a result, access to services outside the Naval Hospital cost more than in higher populated areas. Recent growth has led to the development of services previously not available in the local community.

APPENDIX B

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
INTERVAL * OUTCOME	275791	100.0%	0	.0%	275791	100.0%
AGE * OUTCOME	275791	100.0%	0	.0%	275791	100.0%
SEX * OUTCOME	275791	100.0%	0	.0%	275791	100.0%
GROUP * OUTCOME	275791	100.0%	0	.0%	275791	100.0%
QUARTER * OUTCOME	275791	100.0%	0	.0%	275791	100.0%

INTERVAL * OUTCOME

Crosstab

			OUTCOME		
			COMPLIANT	NON-COMPLIANT	Total
INTERVAL	Same day	Count	57089	2382	59471
		% within INTERVAL	96.0%	4.0%	100.0%
		% of Total	20.7%	.9%	21.6%
	1 day	Count	49781	5962	55743
		% within INTERVAL	89.3%	10.7%	100.0%
		% of Total	18.1%	2.2%	20.2%
	2-3 days	Count	26398	3307	29705
		% within INTERVAL	88.9%	11.1%	100.0%
		% of Total	9.6%	1.2%	10.8%
	4-6 days	Count	25568	3539	29107
		% within INTERVAL	87.8%	12.2%	100.0%
		% of Total	9.3%	1.3%	10.6%
	7-13 days	Count	35680	6200	41880
		% within INTERVAL	85.2%	14.8%	100.0%
		% of Total	12.9%	2.2%	15.2%
	14-20 days	Count	24778	4654	29432
		% within INTERVAL	84.2%	15.8%	100.0%
		% of Total	9.0%	1.7%	10.7%
	21-27 days	Count	14121	2839	16960
		% within INTERVAL	83.3%	16.7%	100.0%
		% of Total	5.1%	1.0%	6.1%
	28 or more days	Count	11108	2385	13493
		% within INTERVAL	82.3%	17.7%	100.0%
		% of Total	4.0%	.9%	4.9%
Total		Count	244523	31268	275791
		% within INTERVAL	88.7%	11.3%	100.0%
		% of Total	88.7%	11.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5342.929[a]	7	.000
Continuity Correction			
Likelihood Ratio	6058.531	7	.000
Linear-by-Linear Association	4558.612	1	.000
N of Valid Cases	275791		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 1529.78.

AGE * OUTCOME

Crosstab

			OUTCOME		
			COMPLIANT	NON-COMPLIANT	Total
AGE	Under age 11	Count	64680	6040	70720
		% within AGE	91.5%	8.5%	100.0%
		% of Total	23.5%	2.2%	25.6%
	11-20	Count	28227	3889	32116
		% within AGE	87.9%	12.1%	100.0%
		% of Total	10.2%	1.4%	11.6%
	21-25	Count	53448	10972	64420
		% within AGE	83.0%	17.0%	100.0%
		% of Total	19.4%	4.0%	23.4%
	26-30	Count	26018	4183	30201
		% within AGE	86.1%	13.9%	100.0%
		% of Total	9.4%	1.5%	11.0%
	31-40	Count	31161	3736	34897
		% within AGE	89.3%	10.7%	100.0%
		% of Total	11.3%	1.4%	12.7%
	over age 40	Count	40989	2448	43437
		% within AGE	94.4%	5.6%	100.0%
		% of Total	14.9%	.9%	15.7%
Total		Count	244523	31268	275791
		% within AGE	88.7%	11.3%	100.0%
		% of Total	88.7%	11.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4255.838[a]	5	.000
Continuity Correction			
Likelihood Ratio	4328.907	5	.000
Linear-by-Linear Association	133.414	1	.000
N of Valid Cases	275791		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 3424.06.

SEX * OUTCOME

Crosstab

			OUTCOME		
			COMPLIANT	NON-COMPLIANT	Total
SEX	F	Count	141771	16950	158721
		% within SEX	89.3%	10.7%	100.0%
		% of Total	51.4%	6.1%	57.6%
	M	Count	102752	14318	117070
		% within SEX	87.8%	12.2%	100.0%
		% of Total	37.3%	5.2%	42.4%
Total		Count	244523	31268	275791
		% within SEX	88.7%	11.3%	100.0%
		% of Total	88.7%	11.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	161.273[b]	1	.000		
Continuity Correction[a]	161.118	1	.000		
Likelihood Ratio	160.421	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	161.272	1	.000		
N of Valid Cases	275791				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13272.89.

GROUP * OUTCOME

Crosstab

			OUTCOME		
			COMPLIANT	NON-COMPLIANT	Total
GROUP	CHIROP	Count	8432	1876	10308
		% within GROUP	81.8%	18.2%	100.0%
		% of Total	3.1%	.7%	3.7%
	DERMAT	Count	4149	615	4764
		% within GROUP	87.1%	12.9%	100.0%
		% of Total	1.5%	.2%	1.7%
	GASTRO	Count	729	110	839
		% within GROUP	86.9%	13.1%	100.0%
		% of Total	.3%	.0%	.3%
	GENERA	Count	7438	887	8325
		% within GROUP	89.3%	10.7%	100.0%
		% of Total	2.7%	.3%	3.0%
	GYNECO	Count	2368	432	2800
		% within GROUP	84.6%	15.4%	100.0%
		% of Total	.9%	.2%	1.0%
	INTERN	Count	4409	593	5002
		% within GROUP	88.1%	11.9%	100.0%
		% of Total	1.6%	.2%	1.8%
	LEJEUN	Count	54583	6936	61519
		% within GROUP	88.7%	11.3%	100.0%
		% of Total	19.8%	2.5%	22.3%
	MENTAL	Count	2885	807	3692
		% within GROUP	78.1%	21.9%	100.0%
		% of Total	1.0%	.3%	1.3%
	NEUROL	Count	1145	152	1297
		% within GROUP	88.3%	11.7%	100.0%
		% of Total	.4%	.1%	.5%
	OBSTET	Count	22725	2605	25330
		% within GROUP	89.7%	10.3%	100.0%
		% of Total	8.2%	.9%	9.2%
	OCCUPA	Count	2326	601	2927
		% within GROUP	79.5%	20.5%	100.0%
		% of Total	.8%	.2%	1.1%
	OPHTHA	Count	4173	527	4700
		% within GROUP	88.8%	11.2%	100.0%
		% of Total	1.5%	.2%	1.7%
	OPTOME	Count	3147	1073	4220
		% within GROUP	74.6%	25.4%	100.0%
		% of Total	1.1%	.4%	1.5%

Crosstab

			OUTCOME		
			COMPLIANT	NON-COMPLIANT	Total
GROUP	ORTHOP	Count	8171	1013	9184
		% within GROUP	89.0%	11.0%	100.0%
		% of Total	3.0%	.4%	3.3%
	PEDIAT	Count	25022	1780	26802
		% within GROUP	93.4%	6.6%	100.0%
		% of Total	9.1%	.6%	9.7%
	PHYSIC	Count	13717	2910	16627
		% within GROUP	82.5%	17.5%	100.0%
		% of Total	5.0%	1.1%	6.0%
	PODIAT	Count	2863	473	3336
		% within GROUP	85.8%	14.2%	100.0%
		% of Total	1.0%	.2%	1.2%
	SPMED-	Count	1863	491	2354
		% within GROUP	79.1%	20.9%	100.0%
		% of Total	.7%	.2%	.9%
	UROLOG	Count	2193	241	2434
		% within GROUP	90.1%	9.9%	100.0%
		% of Total	.8%	.1%	.9%
	US NAV	Count	72185	7146	79331
		% within GROUP	91.0%	9.0%	100.0%
		% of Total	26.2%	2.6%	28.8%
Total		Count	244523	31268	275791
		% within GROUP	88.7%	11.3%	100.0%
		% of Total	88.7%	11.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3953.276[a]	19	.000
Continuity Correction			
Likelihood Ratio	3579.853	19	.000
Linear-by-Linear Association	502.240	1	.000
N of Valid Cases	275791		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 95.12.

QUARTER * OUTCOME

Crosstab

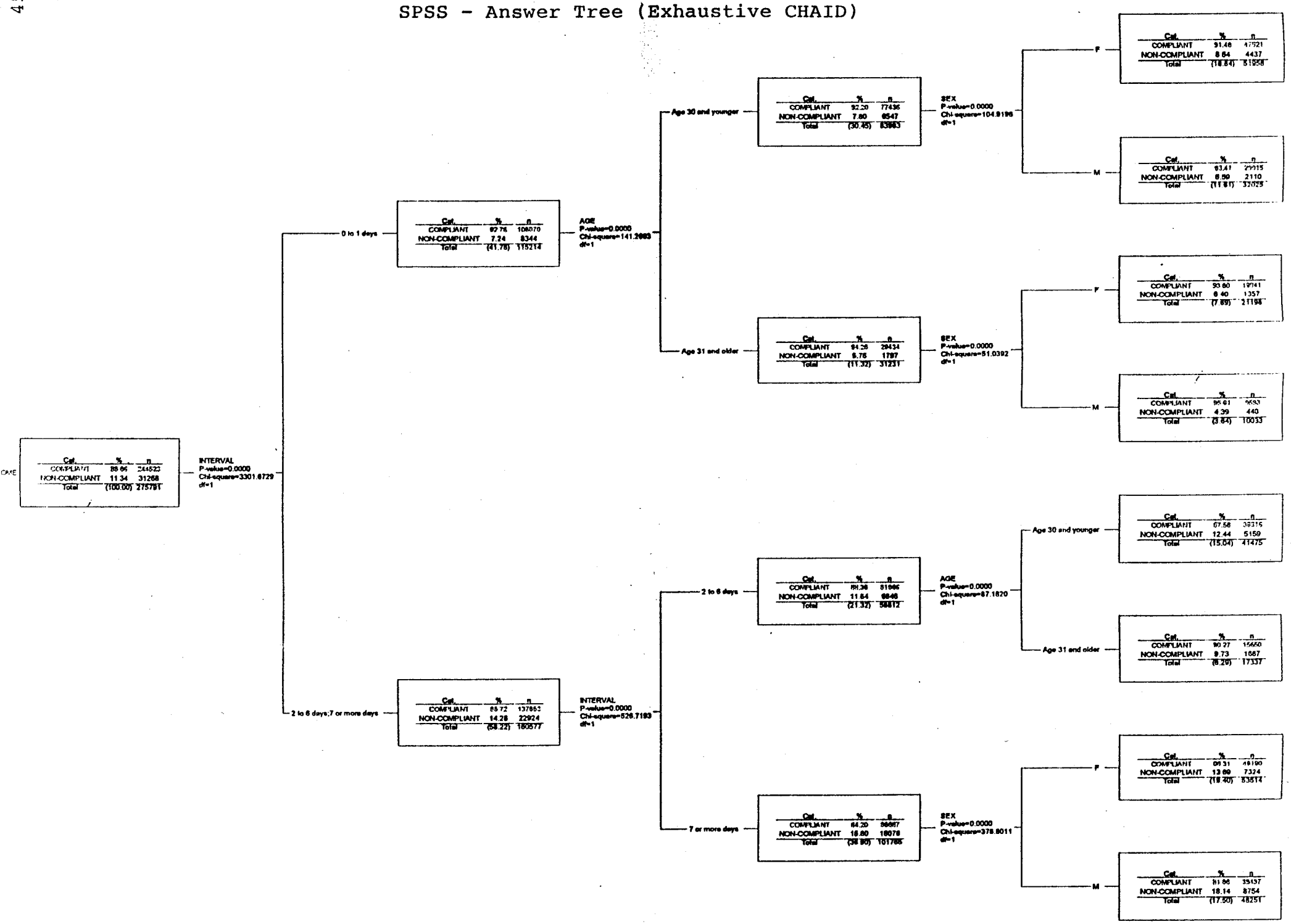
			OUTCOME		
			COMPLIANT	NON-COMPLIANT	Total
QUARTER	1st Quarter	Count	61844	7846	69690
		% within QUARTER	88.7%	11.3%	100.0%
		% of Total	22.4%	2.8%	25.3%
	2	Count	64767	8085	72852
		% within QUARTER	88.9%	11.1%	100.0%
		% of Total	23.5%	2.9%	26.4%
	3	Count	61203	7709	68912
		% within QUARTER	88.8%	11.2%	100.0%
		% of Total	22.2%	2.8%	25.0%
	4	Count	56709	7628	64337
		% within QUARTER	88.1%	11.9%	100.0%
		% of Total	20.6%	2.8%	23.3%
Total		Count	244523	31268	275791
		% within QUARTER	88.7%	11.3%	100.0%
		% of Total	88.7%	11.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.382[a]	3	.000
Continuity Correction			
Likelihood Ratio	23.191	3	.000
Linear-by-Linear Association	11.312	1	.001
N of Valid Cases	275791		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7294.25.

SPSS - Answer Tree (Exhaustive CHAID)



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13. ABSTRACT *(Maximum 200 words)*

Appointment non-compliance can disrupt the efficient operation of a medical facility. At Naval Hospital, Camp Lejeune, the appointment non-compliance rate for 1999 was 11.3%. Although not markedly high, Naval Hospital leaders believed more could be done to increase appointment compliance. The goal of this study was to identify potential predictors of appointment no-shows at the Naval Hospital and suggest methods to effectively address the issue.

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