An Evaluation of Patient Waiting Times in the Adult Cardiology Clinic of the Nork Marash Medical Center

Daren Djirikian
Rollins School of Public Health, Emory University, Atlanta, GA, USA
Haykanush Minasyan, MD
Anahit Demirchyan, MD, MPH

Yerevan
December 2003

Table of Contents

Executive Summary

Purpose. The Nork 2-Patient Waiting Time Project (N2-PWT) was conducted to evaluate patient waiting times within the Adult Cardiology Clinic (ACC) of the Nork Marash Medical Center (NMMC). The purpose of the project was to assess reasons for lengthy client waiting times so that quality improvement suggestions could be made which could subsequently improve patient flow within the clinic and therefore reduce patient waiting time.

Methods. The study was descriptive and employed a patient waiting time monitoring instrument to track each patient as he or she moved throughout the clinic. The project consisted of three phases: (1) instrument development, pre-testing, modification, and data collection in the pre-intervention phase; (2) data analysis and intervention implementation and; (3) post-intervention data collection and analysis to assess the intervention impact. Random sampling was performed for each phase of the project**.** Patients were observed from the time they entered the clinic until the physician examination was concluded. In the initial phase of the project, 152 observations were collected over a period of 18 days. Data provided by the monitoring instrument were keyed and analyzed with SPSS version 11.0. A number system assigned to unscheduled patients was the chosen intervention designed to decrease waiting times for all patients. For the post-intervention phase of the project, 63 patients were observed over a period of ten days. As in the initial phase, observations in the post-intervention phase were performed in the morning and afternoon. Tests of significance between pre- and post-intervention phases of the project were performed using Excel Spreadsheet 2000 to determine whether the selected intervention significantly decreased patient waiting time.

Ethical Considerations. The research proposal was reviewed by the Institutional Review Board (IRB) committee of Emory University, Atlanta, Ga, USA.

Results: The data from the initial assessment indicated that 113 (74%) patients with scheduled appointments had mean waiting times of 31:06 ± 26:44 minutes. 35 (23%) patients who were emergent and did not have a scheduled appointment had mean waiting times of 49:24 ± 72:07 minutes. These differences in waiting time were not statistically significant when compared using an independent samples t-test. After implementing a number system assigned to patients who come to the clinic on an unscheduled basis, 63 patients were followed over a period of ten days to assess the intervention impact. While three patients were lost to tracking within this category, 41 (65.1%) patients in the post-intervention phase were scheduled patients, while 19 (30.2%) were unscheduled patients. Scheduled patients waited 27:17 ± 27:27 minutes, while emergent patients waited 29:00 ± 31:49 minutes. Comparison of scheduled patient waiting times in the pre- and post-intervention phase (31:06 ± 26:44 vs 27:17 ± 27:27 minutes) revealed no statistically significant differences. Comparison of waiting times for emergent patients in the pre- and post-intervention phase (49:24 ± 72:07 versus 29:00 ± 31:49 minutes) revealed no statistically significant difference.

Conclusions. Quantitative data provided by the patient waiting time monitoring instrument as well as qualitative observations indicated the need for several quality improvement measures, namely:

1. More examination rooms and fully functional echocardiographs and EKGs
2. A computerized scheduling system for ease of patient scheduling and processing
3. To examine patients without an appointment so they do not conflict with scheduled appointments
4. To examine scheduled patients as close to their appointment as possible
5. To conduct post-examination consultations in the physicians office or in private as much as possible
6. A system to order patients upon their arrival at the clinic

After discussing these and other options with clinical staff, the chosen intervention was a number system to order patients upon their arrival at the clinic. Although the number system did not significantly decrease patient waiting times, an important step was stimulating critical thinking among clinical staff during brief conferences to discuss approaches to decrease waiting times.

1. INTRODUCTION

1.1 Rationale

Patient waiting times can serve as indications of problems within an existing system of how a clinic or hospital functions. The Nork Marash Medical Center (NMMC) is attempting to gain international accreditation from the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) via achieving the Joint Commission International Accreditation Standards for Hospitals. Based on Joint Commission International Accreditation (JCIA) standards, a hospital should have a system in which data collection supports further study of areas targeted for study and improvement (standard QMI. 3.19, JCIA). At NMMC, this standard has been met satisfactorily. However, patient assessments were not completed in the time frame prescribed by the organization (standard AOP. 1.3, JCIA). For instance, in the Adult Cardiology Clinic (ACC), which sees patients 18 and older with heart problems, the target total examination time, which includes nurse and physician exam times, is set at fifteen minutes. Reasons for why this target is not met may point to problems with process and structure within the clinic. Problems in process could include complicated or multiple diagnoses for a particular patient, while structural problems may point to a lack of well-functioning equipment to make a timely diagnosis.

Lengthy examination times, in turn, produce longer waiting times for patients who have yet to be examined. These factors can lead to an overcrowded waiting room, increased frustration among medical staff in dealing with patient complaints, patient dissatisfaction with lengthy waits, and dissatisfaction among staff and patients with a system that may not have enough physical resources to examine every patient every day.

The project was designed using the Donabedian model of quality assurance, which "…mean[s] all actions taken to establish, protect, promote, and improve the quality of health care" (Donabedian, xxiii, 2003). A patient waiting time monitoring instrument was developed that would lend insight into ways to improve quality of care delivered within the ACC. Using this instrument, we sought to determine patient waiting times for scheduled and unscheduled appointments and reasons thereof, and to use these baseline data to make quality improvement suggestions/interventions to potentially decrease waiting times within the ACC.

While several studies of patient waiting times and patient flow analysis have been conducted in western countries (Backer, Family Practice Management, June 2002; Miro et al., Emergency Medical Journal, 2003; 20:143-148; Kapustiak et al., J Med Pract Manage, 2000 Mar-Apr;15(5) 228-33; Lambe et al., Ann Emerg Med, 2003 Jan; 41(1):35-44; Racine et al., Arch Pediatr Adolesc Med. 2002 Dec; 156(12):1203-9; Fam Plan Manag., 1992 Mar-Apr;1(1): 1-8; Pomar et al., Rev Esp Salud Publica., 2000 May-Jun;74(3):263-74), to our knowledge, no such study has been conducted in Armenia. Therefore, determining reasons for waiting and possibly making improvements within the system to decrease waiting time is a study worthy of performance.

1.2 Background Information

A collaborative project between the Center for Health Services Research and Development (CHSR) at the American University of Armenia (AUA) and the Nork Marash Medical Center (NMMC) was jointly proposed in March 2000 (Oksuzyan, Demirchyan, and Thompson, <u>The Evaluation of Medical Records Documentation and Surgical Summary Database at Nork Marash Medical Center, 2001)</u>. The AUA/NMMC project (ANP) was designed to improve managerial systems and quality of care in the hospital (Ibid). In the scope of this project, NMMC was the first health care institution in Armenia that has undergone internal evaluation to assess the extent of its compliance with Joint Commission International Accreditation (JCIA) standards (Ibid from Koroukian S. and Vardanian A. <u>Report on data collection and analysis at Nork Marash Medical Center</u>. AUA/NMMC; 2001). The evaluation revealed that NMMC has the ability to generate all the clinical, financial, and utilization data needed to meet its managerial and other needs (Oksuzyan et al., 2001). The current study of patient waiting time (N2-PWT) within the framework of quality improvement evaluates how the current system of patient flow is conducted within the Adult Cardiology Clinic (ACC) and what interventions can be used to promote positive change within the existing system to reduce patient waiting times. Therefore, should interventions improve patient waiting times, other factors that were assessed initially, such as daily patient volumes, would need to be reassessed to verify that improvement in patient waiting time was not simply due to fewer patients coming to the clinic on a daily basis.

The ACC is an outpatient division of the NMMC that examines patients ages 18 and older. These patients come to the clinic as initial or primary patients, are assessed, and if necessary are designated to receive treatment. Patients may also be designated as secondary or follow-up patients who have received some form of cardiac intervention and return to the clinic to be reevaluated.

N2-PWT was an internal quality improvement project proposed and undertaken by CHSR and NMMC. The aim of this project was to record the length of waiting times for scheduled and unscheduled visits, track reasons for waiting for each patient, develop and implement recommendations that may improve patient waiting times, and finally to collect post-intervention data to assess whether waiting times had decreased from the pre-intervention phase. Therefore, a full turn of the Donabedian Quality Monitoring Cycle would be completed, which includes obtaining data on performance, analyzing patterns, interpreting patterns using hypotheses that might explain patterns, taking corrective or promotive action based on causal hypotheses, and finally obtaining post-intervention data to determine consequences of action taken (Donabedian, p. xxvii, 2003).

The initial hypotheses formulated for lengthy patient waiting times within the ACC were:
1. Too few examination rooms;
2. Too few fully functional echocardiographs; and
3. The practice of making out-of-schedule appointments for patients who may have friends or relatives who work in any part of NMMC

The objectives of the project were the following:

1. Develop and pretest a patient waiting time monitoring instrument and make necessary modifications to accurately assess patient waiting times and reasons thereof;
2. Collect observational data ("gold standard") using the revised patient waiting time monitoring instrument;
3. Analyze data to determine reasons for lengthy patient waiting times;
4. Prepare and present an initial report to the hospital medical board detailing the results of the initial study and to make quality improvement recommendations for patient waiting time;
5. Implement selected and approved interventions; and
6. Collect post-interventional data to assess improvement in the system.

The project should be ongoing to assess long-term changes. It also serves to inform clinical and administrative leaders of quality assurance activities intended to facilitate hospital functioning.

2. METHODS

2.1 Study design

The study was descriptive using direct observations. Waiting time was defined as the time from which the patient entered the clinic until he or she entered an examination room. While the study was intended to quantify reasons for patient waiting times, it was also designed to assess whether physical resources were in adequate supply to match daily patient demand.

Initial observations were completed over a period of 18 days with a mean observation period of 3 hours and 42 minutes that included observations conducted in the morning and afternoon. Patients included in the study were those who could be followed from the time of entry into the clinic until the end of the physician examination. Therefore, not only was it possible to track waiting time defined as the time from which the patient entered the clinic until he or she entered an examination room, but it was also possible to determine the period of total examination time.

2.2 Study instrument

An observational instrument was developed that would facilitate the process of data collection based on how a particular patient circulated within the clinic from the time of his or her arrival. The instrument initially consisted of 16 descriptors. This instrument was pre-tested on twenty-nine patients, before an additional descriptor was amended to the instrument to track the reason a patient came without an appointment according to the examining physician. This additional descriptor was added because many patients came

to the clinic without an appointment. Therefore, once the instrument was finalized, the 17 descriptors consisted of (Appendix 1):

1. Observation number
2. Patient name (for tracking purposes only during clinic visit)
3. Whether the visit was primary (initial) or follow-up (secondary)
4. Whether the visit was post-surgical
5. Whether the visit was emergency (urgent)
6. Whether the patient had a scheduled appointment
7. Reason patient came without appointment according to physician
8. Time of scheduled appointment if applicable
9. Time patient arrived at the clinic
10. Exam room number
11. Time patient entered exam room
12. Start/end time of nurse exam
13. Start/end time of physician exam
14. Nurse's name
15. Physician's name
16. Primary diagnosis of patient
17. Reason for waiting

Other daily variables of interest included on the data collection instrument were date of observations, observers name, time observations began, time observations ended, the physicians name examining primary cases on a daily basis, the total number of primary and follow-up patients, the total number of primary and follow-up patients admitted without an appointment, staffing levels for nurses, resident cardiologists, and cardiologists, the number of functional exam rooms, the number of functional echocardiographs, and the number of missed primary and follow-up appointments.

Observations, for the most part, were conducted behind the admitting desk where the observer had a clear view of exam rooms one and two. Exam room three was in another part of the clinic and therefore not visible from the observer's vantage point. Because of this, only a limited number of observations were conducted for patients who were examined in room three. Also, nurses were asked to provide information for descriptors 2-6 and 8 from the monitoring instrument, while information for items 7 and 16 were obtained from the examining physician. Even if the patient came for a follow-up visit, the primary diagnosis of that particular patient was noted on the monitoring instrument.

2.3 Study population

Those eligible for the study were any and all types of patients ages 18 and older who came to the clinic for an examination or consult.

The sample size was calculated to be 96. This size was increased to 152 in order to track an adequate number of afternoon observations.

2.4 Ethical considerations

The research protocol was reviewed by the Institutional Review Board (IRB) committee of Emory University, Atlanta, GA, USA. The study was a technical assistance project and did not involve disclosure of any patient identity or descriptors outside the clinic. Furthermore, patient privacy was not an issue during each observation period since the observer remained outside of the examination rooms.

2.5 Data analysis

The data were keyed into and analyzed with SPSS 11.0 software.

3. RESULTS

The Adult Cardiology Clinic (ACC) consists of a patient waiting room, 3 examination rooms with examination beds, electrocardiograph (ECG) and echocardiograph (ECHO) machines, a small nurses station for admitting procedures, and physician offices. Hours of clinic operation are from 9 AM to 5 PM daily, after which time the clinic remains open with residents on duty and cardiologists who work by contract. Staffing levels include four nurses, four cardiology residents, five cardiologists, varying levels of cardiology fellows, two financial clerks who are trained as nurses, and one computer technician who manages a patient database. Nurses perform admitting procedures that include background information such as type of visit (scheduled or emergency), whether the patient was referred from another healthcare facility or physician, life-style habits (Nork Marash Medical Center Adult Cardiology Clinic Department/First Visit Form), blood pressure measurements, auscultation, and ECG. Cardiology residents conduct their own assessments under the supervision of cardiologists. One cardiologist is responsible for admitting primary visits each weekday, while this procedure is mixed on Saturday. All physicians perform a physical examination, an ECHO if required, and other procedures and record clinical information (history of disease, patient complaints, diagnostic test results, etc) (Oksuzyan et al., p 5, 2001). On a daily basis, scheduled and unscheduled patients arrive at the ACC for examination. Scheduled visits are either primary (initial) or follow-up (secondary). Unscheduled visits consist of emergency patients, patients who may come for a discharge examination from within the hospital, or patients who may come from great distances within or outside of Armenia. Therefore, daily patient volumes may fluctuate significantly.

3.1 Pre-intervention phase

The mean daily observation time in the initial phase was 3 hours and 42 minutes ranging from 1 hour and 55 minutes to 6 hours and 49 minutes (sd = 73 minutes). 152 patients were observed throughout the initial phase. 149 physician examinations were completed. Attending cardiologists completed 59.1% of patient examinations, while resident-cardiologists completed 40.9%. While some examinations required an additional resident

or attending cardiologist, only the cardiologist who began the examination was noted on the patient waiting time monitoring instrument.

Out of 152 patient visits observed, 113 (74.3%) patients had a scheduled appointment, while 39 (25.7%) patients came to the clinic without an appointment. Of the 39 patients without an appointment, 35 (23.0%) patients were emergent while the remaining 4 unscheduled patients consisted of three patients coming for discharge and one patient who came based on a physician referral from within clinic. The clinic also schedules emergency patients in advance.

Sub-classifications of all patients consisted of either primary or follow-up examinations, and whether the visit was post-surgical (post-interventional). 64 (42.1%) patients were primary or new patients to the clinic, while 88 (57.9%) were follow-up or return patients. 61 (40.1%) patients were post-surgical or post-interventional while 91 (59.9%) patients were neither post-surgical nor post-interventional. The discrepancies between these numbers and those shown in the tables below are due to six patients who came without an appointment but were also non-emergency patients, and one patient who had a scheduled emergency visit. Of those six patients, five were follow-up and post-surgical patients, while one was follow-up and non-post-surgical. The scheduled emergency visit was for a patient who came for a primary and non-post-surgical visit.

The 113 scheduled visits consisted of 41 primary and 72 follow-up visits (Table 1).

Table 1. Scheduled Primary or Follow-up Patients

	Frequency	Percent
Primary	41	36.3
Follow-up	72	63.7
Total	113	100.0

The 113 scheduled visits consisted of 50 post-surgical and 63 non-post-surgical visits (Table 2).

Table 2. Scheduled post-surgical (post-intervention) visits

	Frequency	Percent
Post-surgical	50	44.2
Non-post –surgical	63	55.8
Total	113	100.0

The 35 emergency patients consisted of 24 primary and 11 follow-up patients (Table 3).

Table 3. Emergency primary and follow-up visits

	Frequency	Percent
Primary	24	68.6
Follow-up	11	31.4
Total	35	100.0

The 35 emergency patients consisted of 6 post-surgical and 29 non-post-surgical patients (Table 4).

Table 4. Emergency post-surgical (post-intervention) visits

	Frequency	Percent	Valid Percent	Cumulative Percent
Post-surgical	6	17.1	17.1	17.1
Non-post-surgical	29	82.9	82.9	100.0
Total	35	100.0	100.0	

When analyzing the data based only on scheduled and emergency patients, the mean waiting time, which was defined as the time from which the patient entered the clinic until s/he entered an examination room, was 31:06 ! 26:44 minutes (n = 113) for scheduled patients and 49:24 ! 72:07 minutes (n = 35) for emergency patients. This difference in mean waiting time was not statistically significant. Non-statistically significant differences in patient waiting times were also observed between primary and follow-up patients, but marginally significant differences were observed for whether the visit was post-surgical (Tables 5 & 6).

Table 5. Patient waiting times for scheduled, emergency, and primary or follow-up visits

	Scheduled Appointment	Emergency Appointment	Primary	Follow-up
	(n = 113)	(n = 35)	(n = 64)	(n = 88)
Mean ! SD	31:06 ! 26:44	49:24 ! 72:07	41:11 ! 55:01	30:39 ! 29:32
Mode	4:00	0:00	0:00	0:00
Median	25:00	24:00	25:00	25:00

No statistically significant differences in waiting times.

Table 6. Patient waiting times based on whether the visit was post-surgical

	Postsurgical Visit	
	Yes (n = 61)	No (n = 91)
Mean ! SD	27:50 ! 28:23*	39:57 ! 49:06*
Mode	0:00	4:00
Median	20:00	26

*Marginally significant difference (p = 0.084)

152 reasons for waiting were recorded based on all patients who were followed in the observation time period. The most prevalent reason for waiting was that an "examination room was previously in use" (n = 55). Those who experienced no wait (n = 57) were: seen at their appointment time (n =2); were a relative of an employee at the hospital (n = 3); were seen within 15 minutes after arrival in the clinic (n = 18); and were seen before their appointment (n = 34) (Figure 1). One mistake in the "no wait" category was initially including those patients who waited a maximum of 15 minutes.

Figure 1: Reason for Waiting
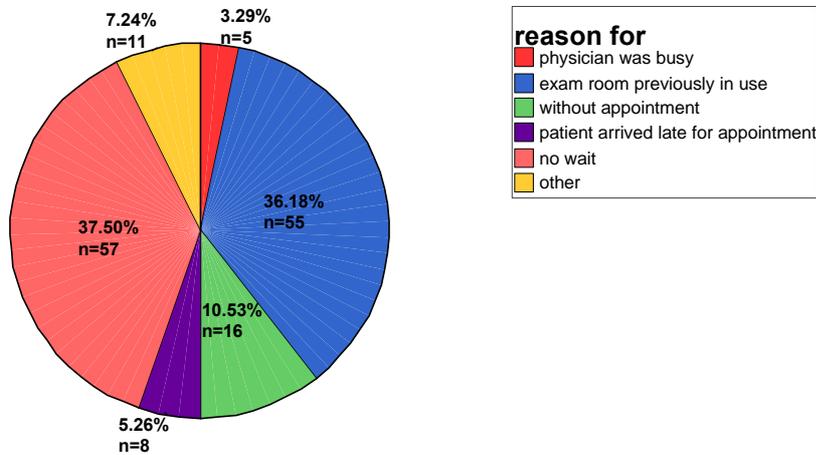
Categorizing the number of patients who experienced a wait indicated that nearly 66% of all patients experienced a waiting time of greater than 15 minutes (Figure 2). This reinforces the fact that most examinations were longer than the fifteen minutes target.

Figure 2: Waiting Time Categories
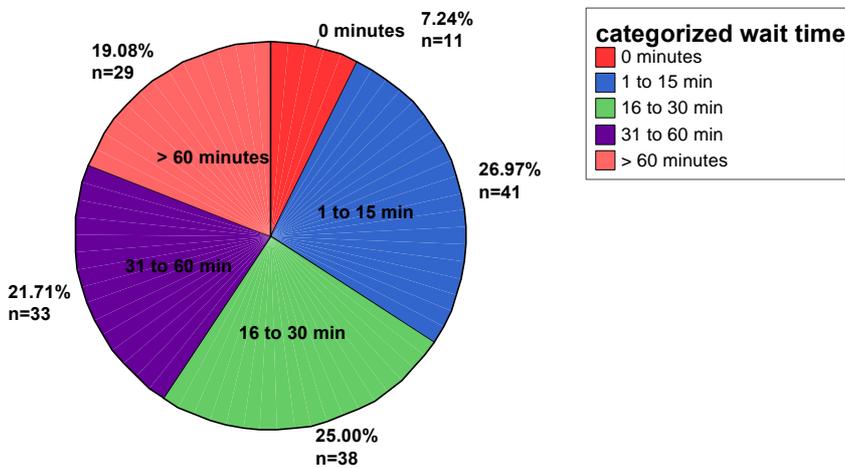
To gain a better understanding of peak waiting times, we graphed waiting time versus scheduled time for those patients with an appointment. Approximately 11% of patients experienced an approximate waiting time of 46 minutes with appointments for 11:30 AM, while approximately 11% experienced an approximate waiting time of 22 minutes with scheduled appointments for 12:30 PM (Figure 3).

Figure 3: Relationship Between Waiting Time and Schedule Appointment Time
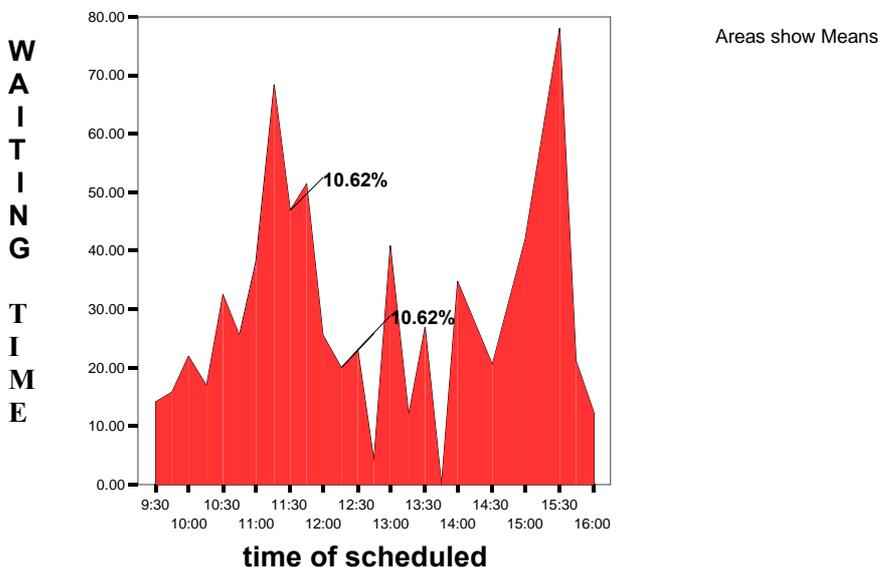
Factors which may impact patient waiting time are the duration of nurse and physician examinations. Since the clinic only has three examination rooms, only one of which is fully-functional in terms of equipment, we tracked nurse and physician exams based on whether the visit was scheduled or emergent, and visit sub-classifications that included primary or follow-up examinations and whether the visit was post-surgical, as well as examination times based on the primary diagnosis (Tables 7 & 8).

Table 7: Mean examination times based on scheduled, emergency, and primary or follow-up visits

		Scheduled Appt	Emergency Appt	Primary or Follow-up	
		Yes (n=113)	Yes (n=35)	P (n = 64)	F (n = 88)
Nurse Exam	Mean !SD	5:05!2:21 (n = 109)	5:10!2:29 (n = 32)	5:50!3:03* (n = 60)	4:35!1:31* (n = 86)
Physician Exam	Mean !SD	16:53!10:48 (n = 104)	16:22!9:10 (n = 35)	20:30!9:53** (n = 64)	13:19!9:28** (n = 78)
Total Exam	Mean !SD	22:04!11:05 (n = 113)	21:43!9:34 (n = 35)	25:58!10:09*** (n = 64)	16:16!10:07*** (n = 88)

*Statistically significant (p < 0.05) difference between primary and follow-up nurse exam
** Statistically significant (p < 0.05) difference between primary and follow-up physician exam
*** Statistically significant (p < 0.001) difference between primary and follow-up physician exam

**Table 8: Mean examination time based on whether the visit was post-surgical**

		Postsurgical	
		yes	no
duration of nurse exam	Mean	4.82	5.29
	Std Deviation	1.66	2.72
duration of physician's exam	Mean	13.00*	18.93*
	Std Deviation	10.00	9.81
total exam time	Mean	16.89**	22.68**
	Std Deviation	10.28	11.21

* Statistically significant (p = 0.001) difference
** Statistically significant (p < 0.05) difference

For all types of examinations, nurse exam durations were 5:06 ! 2:21 (n = 146), physician exam durations were 16:33 ! 10:16 (n = 142), and total examination times were 20:21 ! 11:11 (n = 136) minutes, respectively. Total examination time differed significantly (p < 0.001) from the target time of 15 minutes.

The 34 patients who entered prior to their scheduled appointments (Figure 4) tended to cluster between 1 and 30 minutes representing 71% (n = 24), while 24% (n = 8) entered more than 60 minutes prior to their appointment.

Figure 4: Entry into Exam Room Before Scheduled Appointment
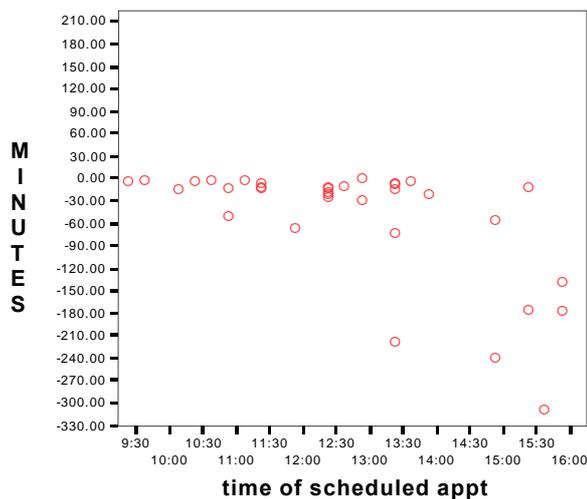
While the staff of the ACC cannot examine all patients at their scheduled appointment times because of conflicts with patients who may be emergent, there is a problem with patients arriving late for their appointment (Figure 5). Approximately 78% of 79 patients who arrived late for an appointment had to wait more than 15 minutes. Not only could

this mean that those patients lose their initial appointment, but it could also create longer waits for existing patients since it is impossible to judge when a patient may arrive for his or her appointment. Therefore, a particular appointment slot may be unused, or the next scheduled patient may be moved up in the schedule, or an emergency patient could be examined instead.

Figure 5: Wait Categories For Patients who entered clinic after Scheduled Appointment
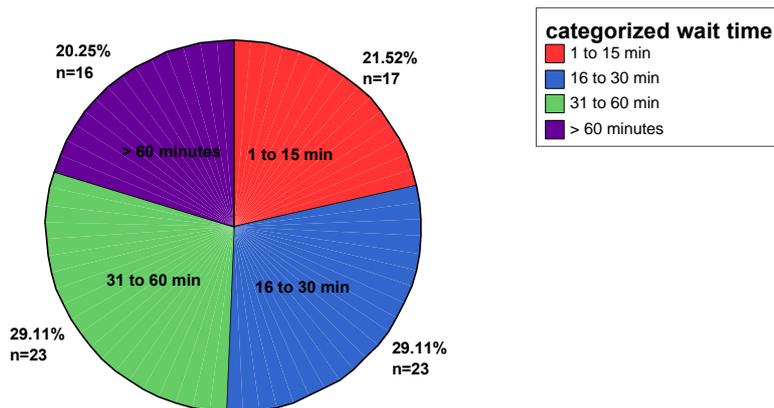
Since the total examination target time for all examinations was 15 minutes, we categorized examination times based on primary diagnoses, even if a particular patient came to the clinic for a follow-up visit. Not surprisingly, therefore, examination durations for follow-up appointments were shorter than primary appointments. The most prevalent diagnosis was for ischemic heart disease, while arrhythmia was the least prevalent (Figure 6).

Figure 6: Primary Diagnosis
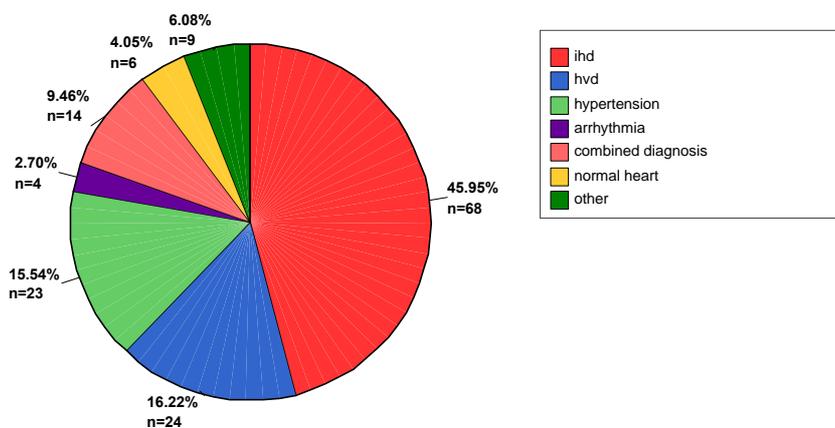
The examination times for primary diagnoses were calculated to determine if the fifteen minute total examination target was being met. All examination durations based on primary diagnosis exceeded 15 minutes (Table 9).

Table 9: Relationship between Primary Diagnosis and Examination Duration

Primary Diagnosis (n = 150)	Duration Nurse Exam (Mean ! SD)	Duration Physician Exam (Mean ! SD)	Total Exam Time (Mean ! SD)
Ischemic HD (68)	4:53 ! 1:41	13:51 ! 10:04	17:55 ! 10:35
Heart Valve Disease (24)	5:00 ! 2:34	19:27 ! 10:29	22:38 ! 12:40
Hypertension (23)	5:13 ! 1:51	18:41 ! 8:13	23:05 ! 8:53
Arrhythmia (4)	9:15 ! 16:24	17:00 ! 9:58	26:15 ! 11:30
Normal Heart (8)	6:20 ! 4:48	18:00 ! 3:57	22:28 ! 12:23
Combined (13)	4:41 ! 2:08	19:15 ! 11:31	24:20 ! 5:03
Other (10)	4:38 ! 1:25	19:06 ! 14:26	22:48 ! 13:49

Other: cardiomyopathy (1), atypical chest pain (1), thyroiditis (1), ischemic cardiomyopathy (1), exuditive pericarditis (1), hypertrophic cardiomyopathy (1), pericarditis post surgery (1), ischemic cardiomyopathy (2), pericardial effusion (1)

Combined: hypertension + atrial fibrillation (1), ischemic heart disease + hypertenstion (4), hypertension + cardiomyopathy (2), ischemic heart disease + heart valve disease (2), hypertension + heart valve disease (1), ischemic heart disease + ischemic cardiomyopathy (1), myocardial insufficiency + arrhythmia (1), myocardial infarction + hypertension (1).

Due to limited examination rooms and fully functional echocardiographs and EKGs (Table 10), one interesting finding was in which rooms examinations were conducted. For instance, if a patient was follow-up, wherein the primary diagnosis was known in advance of the appointment, the examination could be conducted in a room that did not necessarily require the use of an echocardiograph or EKG. In this regard, an examination room with better equipment could remain free for another patient. It was possible to track each patient based on the examination rooms into which s/he entered, although few observations were conducted for examination room 3. Therefore, primary and follow-up patients were tracked according to examination room (Tables 11 & 12).

Table 10: Equipment Characteristics based on examination room

Exam Room	1	2	3
Echo	Problems with HV Exams	Fully Functional	For IHD Only
EKG	Fully Functional	Old, artifacts, pens don't work well	Can't read heart

Table 11: Examination room of primary patients

Primary Patient Diagnoses (n = 63)	Room of First Exam			Room of Second Exam
	1	**2**	**3**	**2**
Ischemic heart disease (n = 19)	8	7	4	1
Heart valve disease (n= 10)	2	7	1	2
Hypertension (n = 15)	10	5	0	0
Arrhythmia (n = 4)	2	2	0	1
Normal Heart (n = 6)	5	0	1	0
Combined Diagnosis (n = 4)	3	1	0	1
Other (n = 5)	2	1	2	1

64 Patients Examined as Primary Patients

Table 12: Examination room of follow-up patients

Follow-up Patients (n = 85) Primary Diag.	Room of First Exam			Room of Second Exam	
	1	**2**	**3**	**1**	**2**
Ischemic Heart Disease (n = 49)	33	13	3	1	5
Heart valve disease (n = 14)	5	9	0	0	0
Hypertension (n = 8)	7	1	0	0	1
Arrhythmia (n = 0)	0	0	0	0	0
Normal Heart (n = 0)	0	0	0	0	0
Combined Diagnosis (n = 9)	4	4	1		
Other (n = 5)	3	1	1	0	0

88 Patients Examined as Follow-up Patients

These tables indicate that examination rooms are being used efficiently for diagnoses, in particular ischemic heart disease (IHD) and heart valve disease (HVD). Most diagnoses for IHD take place in exam room one, which has the only fully functional EKG. According to physicians, it is possible to diagnose IHD based only on an EKG. Also, most diagnoses for HVD take place in exam room two, which has the only fully functional echocardiograph that can be used to diagnose this type of disease. This is an important finding since the limited resources available to the clinic are being used efficiently in terms of examination rooms and equipment. However, as Tables 11 & 12

further indicate, equipment is not in adequate supply because some patients were moved from their initial examination room to another. The consequences are twofold: a patient already being examined may have to return to the waiting room (data not shown) or longer waits may be created for patients who have yet to be examined. Overall, tables 10, 11, and 12 point to the need for more fully functional equipment for the clinic to function more efficiently.

Based on weekday, we were able to determine the average number of patients who come to the clinic with scheduled and unscheduled appointments. Nurses kept records (Appendix 2) for one month of patients who came with or without an appointment, and whether the visit was primary or follow-up (Figures 7 & 8). These patients represent those examined on a particular day. An average of 39 total patients are examined per day excluding Saturdays, and an average of 16 patients are admitted to the clinic without an appointment per day excluding Saturdays. These data were tabulated by nurses as patients entered the clinic, but may not be an accurate representation due to underreporting. Saturday is atypical with fewer staff members and patients. The counts in each figure represent the number of times data was collected for a particular day. These data indicate that on average almost half of the patients seen on a typical day within the clinic come without a scheduled appointment. Once again, this may create longer waits for those with scheduled appointments, especially if an unscheduled visit is an emergency.

Figure 7: Total Number of Patients based on Weekday
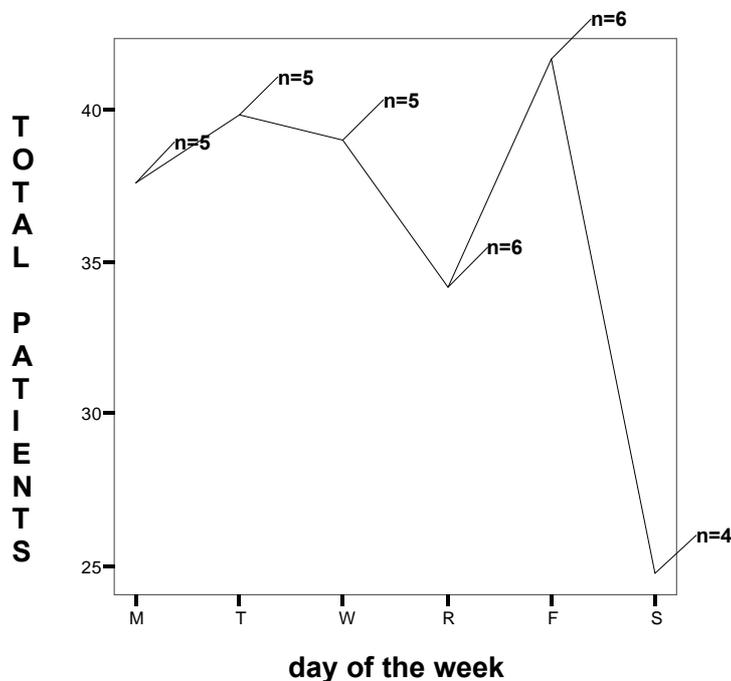
Figure 8: Total Number of Patients Without Appointment Based on Weekday
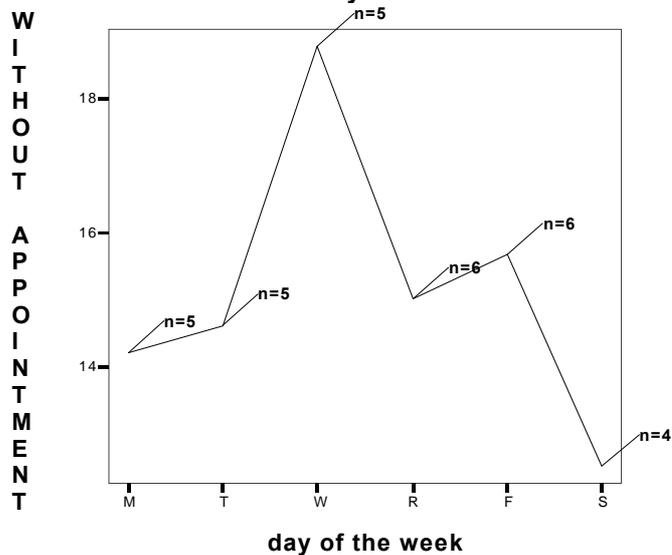
Nurses also kept records (APPENDIX 3) for one month on patients who called or walked into the clinic desiring an appointment in the future. The mean waiting time of all patients (n = 373) to receive an appointment was 33 ! 29 days. For non-emergent patients (n = 311), the mean waiting time to receive an appointment was 39 ! 29 days, while emergency patients (n = 60) waited an average of 6 ! 4 days. This difference in waiting for an appointment is statistically significant (p < 0.001). An interesting finding was that peak times assigned to scheduled (n = 311) and unscheduled (emergent, n = 35) patients were similar, at 12:49 PM ! 1:53 for scheduled appointments and 1:08 PM ! 2:10 for emergency patients. That is, most emergent patients arrived closely to those with scheduled appointments (Figures 9 & 10).

Figure 9: Time Assigned To Scheduled Patients
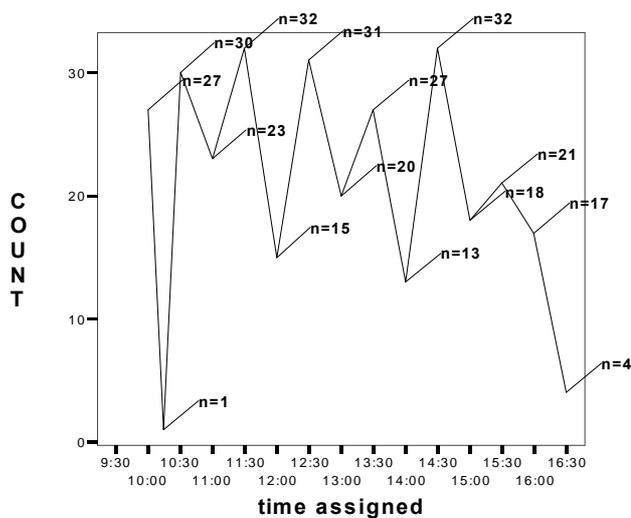
Figure 10: Time Assigned to Emergent Patients
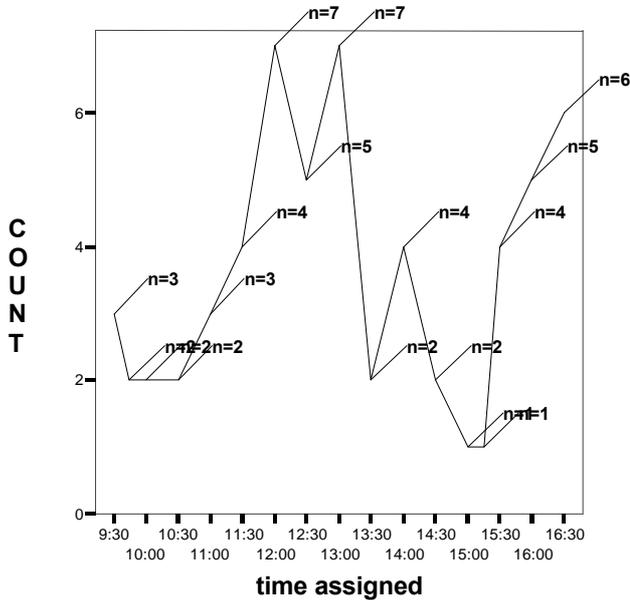
3.2 Post-intervention phase:

Sixty-three patient observations were conducted in the post-intervention phase to assess the impact of intervention: patient ordering. All visits were scheduled or unscheduled/ emergent. Three observations were lost during the tracking period as to whether patients were scheduled or unscheduled. Those patients with unscheduled visits received numbers to order them once they arrived in the clinic. The only observed drawback to the new number system was lack of daily consistency in assigning numbers to unscheduled patients. However, nurses did state it helped them better manage patients who came without an appointment.

With respect to patient visits, 41 or 65.1% were scheduled patients, while 19 or 30.2% were unscheduled patients. Three observations within this category were lost during the observation period, accounting for the discrepancy between percent and valid percent (table 13).

Table 13. Type of Appointment

	Scheduled visit?	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	41	65.1	68.3	68.3
	No	19	30.2	31.7	100.0
	Total	60	95.2	100.0	
Missing	System	3	4.8		
Total		63	100.0		

Sub-classifications of all patients consisted of either primary (initial) or follow-up (return) examinations, and whether the visit was post-surgical. There were 63 total primary or follow-up patient visits, but two of these patients were lost during the tracking period, signifying 61 total valid patients within this category. Twenty-seven or 42.9% were primary patients, while thirty-four or 54.0% were follow-up patients (table 14). Two patients could not be followed in this group, and therefore the cumulative percent of primary or follow up visits was 96.8%.

There were 63 total observations conducted for whether a particular patient was post-surgical, but three of these patients were lost during the observation period. Post-surgical patients accounted for 26 or 41.3% of patient visits, while non-post-surgical patients accounted for 34 or 54.0% (table 15).

Table 14. Primary (P) or Follow-up (F) patients

	Primary or Follow-up	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	P	27	42.9	44.3	44.3
	F	34	54.0	55.7	100.0
	Total	61	96.8	100.0	
Missing	System	2	3.2		
Total		63	100.0		

Table 15. Post-surgical Patients

	Post-surgical?	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	26	41.3	43.3	43.3
	No	34	54.0	56.7	100.0
	Total	60	95.2	100.0	
Missing	System	3	4.8		
Total		63	100.0		

19 or 30.2% patients were classified as emergency patients, while 41 or 65.1% were non-emergency patients. Again, three observations within this category were lost during the observation time period, and resulted in differences between observed and valid percent (table 16).

Table 16. Emergency Visits

	Emergency visit?	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	30.2	31.7	31.7
	No	41	65.1	68.3	100.0
	Total	60	95.2	100.0	
Missing	System	3	4.8		
Total		63	100.0		

The 19 patients who were categorized as emergency cases all came to the clinic without a scheduled appointment. This also means that all unscheduled patients were emergency cases. The reason the patient came without an appointment according to the physician who examined the emergency patient was noted in the *Patient Waiting Time Monitoring Instrument*. These results are presented in table 17.

Table 17. Reasons patients came to the clinic without an appointment

Reason for unscheduled/emergency Visit according to the physician	Frequency
Physician told patient to come to the clinic	3
Unknown: observer was not able to ask physician	4
Patient did not feel well	1
Chest pain and positive treadmill test	1
Examination for patient discharge from within NMMC	1
From within NMMC for a follow-up appointment	1
A post-surgical checkup after 10 days	1
Physician does not know	2
High blood pressure	1
Patient thought she had a heart attack	1
Pain	1
Referral from surgeon within the hospital	1
Brought to the clinic by a surgeon	1
Total	**19**

Table 18. Pre-intervention vs. post-intervention patient waiting time (min) and test of significance. The intervention was a number system assigned to emergency patients.

	Scheduled Appointment	Emergency Visit
Pre-intervention data	(n = 113)	(n = 35)
Mean + / - Std. Dev	31:06 ! 26:44	49:24 ! 72:07
Mode	4:00	0:00
Median	25:00:00	24:00:00
Post-intervention data	(n = 41)	(n = 19)
Mean + / - Std. Dev	27:17 +/- 27:27	29:00 +/- 31:49
Mode	3:00	0:00
Median	21:00	24:00:00
2-tailed T-test	0.45	0.29

Because instituting the number system was designed to decrease patient waiting time between the pre- and post-intervention data collection phases, a 2-tailed T-test of significance was conducted. This test of significance revealed there were no statistically significant differences between waiting times of scheduled patients in the pre-and post

intervention phase, and also revealed there were no statistically significant differences between patients who came to the clinic as emergent patients in the pre- and post-intervention phases ($p > 0.05$) (table 18).

Since our only hypothesis in the post-intervention phase of the project was that numbers given to unscheduled patients could potentially decrease waiting times for scheduled and unscheduled patients, it is not necessary to perform additional tests of statistical significance between patient waiting times with respect to primary and follow-up patients, or post-surgical and non-post-surgical patients, as these are subcategories within scheduled and unscheduled/emergency patients between the pre- and post-intervention phase of the project. However, for descriptive purposes, post-intervention waiting times are displayed here for primary or follow-up patients, and whether the visit was post-surgical (tables 19 and 20).

Table 19. Patient Waiting Time (Min) For Primary, and Follow-up Visits

	Primary Visit (n = 27)	Follow-up Visit (n = 34)
Mean + / - Std. Dev	32:00 +/- 23:52	24:05 +/- 31:34
Mode	22:00	1:00
Median	25:00:00	14:00

No statistically significant differences between waiting times for primary and follow-up patients.

Table 20. Patient Waiting Time Post-surgical, and non-post-surgical patients

	Post-surgical (n = 26)	Non-post-surgical (n = 34)
Mean + / - Std. Dev	20:51 +/- 30:15	33:10 +/- 26:35
Mode	1:00	22:00
Median	14:00	26:00:00

No statistically significant differences between waiting times for primary and follow-up patients.

Also for descriptive purposes, nurse, physician, and total examination times are shown based on scheduled or unscheduled visits, primary or follow-up visits, and post-surgical or non post-surgical patients (Tables 21, 22, 23). Duration of physician exam times was significantly different ($p < 0.05$) between primary and follow-up visits, and post-surgical or non-post-surgical visits (Tables 22, 23). Total examination time was also statistically significantly different ($p < 0.05$) for total examination time between primary and follow-up patients (Table 22). However, these differences did not affect waiting time in the post-intervention phase as compared to the waiting time in the post-intervention phase as shown by the 2-tailed T-test of significance in table 6 because these visits are sub-classifications of scheduled and unscheduled/emergency visits.

Table 21. Average examination time (min) for scheduled and emergency visits.

		Scheduled (n = 41)	Emergency (n = 19)
Duration of nurse exam	Mean +/- Std Dev	4:31 +/- 1:22	4:57 +/- 2:25
Duration of physicians' exam	Mean +/- Std Dev	14:57 +/- 6:59	18:25 +/- 12:45
Total exam time	Mean +/- Std Dev	18:53 +/- 7:59	21:25 +/- 14:16

No statistically significant differences between scheduled and emergency exam times

Table 22. Average examination times based on primary or follow-up patients

		Primary (n = 27)	Follow-up (n = 34)
Duration of nurse exam	Mean +/- Std Dev	4:22 +/- 1:34	4:53 +/- 1:54
Duration of physicians' exam	Mean +/- Std Dev	20:09 +/- 10:43*	12:34 +/- 5:31*
Total exam time	Mean +/- Std Dev	23:47 +/- 12:01**	16:25 +/- 7:13**

*Statistically significant difference ($p < 0.05$) when equal variances are not assumed
**Statistically significant difference ($p < 0.05$) when assuming equal variances

Table 23. Average examination and time (min) based on post-surgical visits.

		Post-surgical	
		Yes	No
Duration of nurse exam	Mean +/- Std Dev	5:07 +/- 2:03	4:18 +/- 1:28
Duration of physicians' exam	Mean +/- Std Dev	12:46 +/- 5:52*	18:30 +/- 10:25*
Total exam time	Mean +/- Std Dev	17:11 +/- 7:28	21:35 +/- 11:50

*Statistically significant difference ($p < 0.05$) when equal variances are not assumed

As a possible explanation of why patient-waiting time may have not decreased during the intervention, significance testing for the number of nurses, attending physicians, and residents per day was performed to compare pre- and post-intervention data. The test revealed statistically significant differences between each of these categories of clinical professionals (table 24).

Table 24. Comparison of numbers of clinical staff

	Nurses	Attending Physicians	Residents
Pre-intervention (Mean)	3.8	4.9	3.8
Post-intervention (Mean)	2.9	3.6	2.6
2-tailed T-test*	p = 0.001	p << 0.001	p << 0.001

*unequal variances assumed

4. STUDY LIMITATIONS

While approximately 23% of all visits within the initial phase of the project were classified as emergency according to nurses, it was not fully known whether these patients were truly emergency patients. During the initial study phase, nurses performed an initial examination on all patients who classify themselves as emergency cases. Those who are truly emergency patients are examined as soon as possible by a physician, while those who are not truly emergent wait to be examined at a later period within the day if possible.

Although there is a wide variation between the waiting time of scheduled and emergency patients, the non-statistically significant differences in waiting time between these two classes of patients may be due to the small sample size of emergency patients.

Additionally, it was not always possible to fully track every patient after an observation begun because a particular patient may leave the clinic for an analysis such as a urine or blood test, or the patient remained in the waiting room after the observation period ended. Further limitations included: more observations were conducted in the morning which may influence the true length of waiting time; exam room 3 was out of sight from where observations were conducted and not all patients could be tracked who were examined in that room; and more than one physician may examine a particular patient which could increase the waiting time for other patients.

Pertaining to the intervention of instituting a number system for patients without a scheduled appointment, it is unknown what impact such a system has on patient waiting time. At the very least, it provides more order to the clinic and positively impacts these patients because they know they have registered and will be seen and are less likely to perpetually inquire when they will be examined.

5. DISCUSSION

5.1 Initial Phase

The initial phase of the Nork 2 Patient Waiting Time project (N2-PWT) serves as baseline data for patient waiting times within the Adult Cardiology Clinic (ACC) of the Nork Marash Medical Center (NMMC). Previous to this study, ACC staff stated that client waiting time was a problem. The project was conducted to assess ways in which the clinic could improve patient waiting times and therefore was within the scope of existing quality assurance/improvement activities conducted at NMMC. Based on the Donabedian model of quality assurance, the initial data served as the basis for recommendations made to clinical staff to facilitate the patient flow process. Patient waiting time was defined as the time from which the patient entered the clinic until s/he entered an examination room. The study was observation-based ("gold standard"). The data collection instrument was designed to track each patient as s/he flowed throughout the clinic, and to track the reason why a patient had to wait to be examined.

Our initial hypotheses for long patient waiting times were: too few examination rooms; too few fully functional echocardiographs, and the practice of making out of schedule appointments for patients with friends or relatives employed at NMMC. Based on the data, we confirmed the first two hypotheses, but we did not find the practice of making out of schedule appointments to be frequent (data not shown). After the initial study was completed, we discovered that the clinic also lacks functional EKG. Since the clinic has only three examination rooms, one fully functional echocardiograph and EKG, a valid reason for lengthy patient waiting times is lack of adequate physical resources within the

clinic. Despite these limitations, clinical staff work efficiently to examine as many patients as possible each day.

While the study was limited based on the fact that we could not follow all patients after an observation began, and that exam room 3 was out of normal sight so not all patients could be followed that were examined there, we were able to collect a sufficient number of observations over an 18-day period to quantify patient waiting time based on scheduled and unscheduled appointments.

The initial study revealed patient waiting times to be 31:06 ! 26:44 minutes for scheduled visits (n = 113) and 49:24 ! 72:07 minutes for emergent visits (n = 35). Sub-groupings for primary and follow-up visits revealed waiting times of 41:11 ! 55:01 minutes and 30:39 ! 29:32 minutes, respectively. While these differences were not statistically significant, they do indicate that scheduled patients are seen more quickly than emergency patients. This may indicate that the term "emergency" is not well defined, meaning that patients who come without an appointment and state that they are emergent are, in fact, not. According to the clinical staff of the ACC, all "emergency" patients are initially assessed to obtain auscultation, blood pressure readings, and an ECG. Based on these findings, if the patient is truly emergent, s/he is seen as quickly as possible. Therefore, one limitation of the initial study was that we could not distinguish patients based on whether they were truly emergent. Another limitation was that most observation periods were conducted in the morning, which may not provide an accurate assessment of patient waiting time throughout the day. However, for those observation periods conducted in the afternoon, we found that many patients arrive at 1:00 PM and thus the waiting times begin to increase again (Figure 3).

While some patients did experience long waiting times, approximately 27% of all patients waited only a maximum of 15 minutes to be examined (Figure 2). This group consisted of 32 scheduled and 9 emergency patients. This is a good indication that the clinical staff can conduct examinations efficiently, and furthermore suggests that truly emergent patients can be examined in a timely fashion. Even for patients who waited more than 60 minutes to be examined, 15 of 19 scheduled patients came before their assigned appointment (mean $\not\subset$ -60 minutes), while the 9 "emergency" patients may not have been truly emergent. Therefore, these data indicate the clinic attempts to see patients close to their scheduled appointment as possible and refers non-emergent patients to the waiting room.

Above all other reasons for lengthy waiting times, the clinic lacks sufficient exam rooms and equipment to examine patients in a timely fashion after their arrival. This is in accordance with our initial hypothesis and is also what clinical staff regard as the main reason for long waits. Not only do these insufficient resources translate into lengthy waiting times, they may also lead to patient dissatisfaction and potential clinical staff frustration in dealing with this problem effectively. The current staff of the ACC work efficiently because on average nurses examine patients as soon as they enter the exam room, and physicians on average examine patients within seven minutes after the conclusion of the nurse exam (data not shown).

5.2 Intervention and Post-intervention Phase

The selected intervention was a number system assigned by nurses to patients who come to the clinic as unscheduled patients. Of the 61 total observations compiled within the post-intervention phase, 19 were emergency patients and received sequential numbers as they arrived at the clinic. The goals of the entire project were to (1) develop and pretest a patient waiting time monitoring instrument and make appropriate instrument corrections; (2) collect observational data ("gold standard") using the modified patient waiting time monitoring instrument; (3) analyze data to determine reasons for lengthy patient waiting times; (4) prepare and present an initial report to the hospital medical board detailing the results of the initial study and to make quality improvement recommendations for patient waiting time; (5) implement selected and approved interventions; (6) collect post-interventional data to assess improvement in the system and; (7) prepare a final report to assess post-intervention effects on patient waiting time.

This final report shows the selected intervention of assigning sequential numbers to unscheduled/emergency patients had no impact on decreasing patient waiting time. It's important to note that the average number of clinical staff members differed significantly between the pre- and post-intervention periods, with fewer members being present in the post intervention phase for nurses, attending and resident physicians. Waiting times did decrease for scheduled and emergency patients from the pre- to post-intervention phases, although not significantly. Furthermore, it was computed that only the total number of patients who came without a scheduled appointment to the ACC differed significantly between pre- and post-intervention phases.

It is not possible to comment on how different numbers of clinical staff members in the pre- and post-intervention phases impacted waiting time because the only intervention was instituting the number system for unscheduled patients. Within the framework of Quality Assurance, an intervention is supposed to be implemented within a system that is to be improved. Post-intervention data is then collected to assess the intervention's impact on a proposed improvement before another intervention is implemented. For our study, implementing the number system after the initial assessment phase corresponded with fewer nurses, attending physicians, and residents on average. Therefore, it would have been more advantageous to use the number system during a time when the same numbers of clinical staff members were present. A further limitation is that nurses were not consistent in implementing the numbering system on a daily basis. This is understandable within the framework of Quality Assurance because change is sometimes very difficult. However, nurses commented that the number system positively impacted patients who came without an appointment. Additionally, it was also observed that unscheduled patients who received a number were less likely to return to the nursing counter to inquire when he or she would be examined. An extended benefit of the number system is allowing nurses to work more efficiently because it provides them with a sense of more control over the flow of patients within the clinic. Therefore, while it could not be shown that a sequential number system assigned to patients decreased

waiting times, the immediate benefits were greater clinic organization and more satisfied unscheduled patients within the observation periods.

Overall, the negotiation to choose interventions to decrease patient waiting times stimulated physicians and nurses to think together critically. This benefit is potentially long lasting in terms of forming more solid relationships between nurses and physicians in solving future problems the ACC may encounter. While the intervention was not shown to statistically impact patient waiting time, the fact that clinical staff were willing to make changes to their system indicated a strong desire to provide better overall care to the patient population and to improve patient flow.

6. CONCLUSIONS AND RECOMMENDATIONS

The limiting factor for the clinic to function optimally is due to the lack of structure within the clinic since the material resources of examination rooms and fully functional equipment is in short supply. Since there is a shortage of material resources within the clinic, the process of providing health care to the patients is slowed, which may lead to the negative outcome of patient dissatisfaction.

While the ACC is limited in terms of physical resources, several recommendations were postulated to decrease client waiting time and improve patient flow. These suggestions were presented to and discussed with clinical staff. The "readjustments in the system", as defined by Donabedian, include short- and long-term readjustments. Short-term readjustments include "facilitation", "routinization", and "circumvention". Facilitation is defined as the "identification and removal of obstacles to good care". Routinization is intended to "smooth and regulate both administrative and clinical processes". Circumvention is the "creation of mechanisms and procedures" to avoid obstacles that cannot be removed (Donabedian, pp 125-6). Long-term readjustments include the "provision of resources in adequate quantity and high in quality", which are "…both material and human" (Donabedian, p 125). We used this framework to make suggestions to clinical staff in order to decrease patient waiting time.

While recommendations were made during the presentation to the hospital and clinic staff, feedback was not possible shortly after this session. Therefore, we met twice with clinical staff to discuss the recommendations, obtain their feedback, and note their suggestions regarding ways to decrease patient waiting time.

Short-term Improvement Suggestions

Facilitation Suggestions	Response
Use better scheduling books. One book for all appointments scheduled by nurses and physicians and one book for patients who come without appointment	Desire a computer.
Use only one nurse per day to work at admitting desk for consistency of existing appointments and making new appointments.	Not possible because the nurses feel closed in by patients at the counter
Use educational videos to promote healthy lifestyles and to decrease perceived waits	Have tried to obtain such videos for years
Use gate to sort incoming patients	Mentality that family should be with patient at the nurses counter
Nurses should conduct an initial examination to determine if patients who claim to be emergency patients are truly emergent	Nurses already do this
Examine patients who come from long distances on the same day regardless of appointment status	Already done

Routinization Suggestions	
Use a number system for patients and record appointment time, time of entry into clinic, and assign number as each patient enters the clinic. Nurses should decide how to assign these numbers	This is a good suggestion.
Record in patient medical record the time of scheduled appointment, start and end times of nurses and physician exams to track waiting times over time	Possibly as a long term change
Assign one physician to not truly emergent patients each day and examine them when convenient (e.g. when exam rooms are free at the end of the day)	These patients are seen throughout the day when an exam room is free
Do not schedule patients during staff meetings	No comment
See patients as close to scheduled appointment as possible	Already being done

Circumvention Suggestions	
Conduct post-exam consultations in physician's office to free the exam room	Not always possible because of limited office space, but some physicians already do this
Consults should be done in private, not in within hearing distance of other patients to preserve patient confidentiality	No comment
Discuss analysis results immediately with a consult	No comment

Long-term Suggestions	Response
More examination rooms	Yes, we need them
Fix or replace EKGs an echocardiographs to provide equipment in adequate supply	Yes, we need them, but money is an issue

Additional suggestions by physicians and nurses during these meetings were as follow:
- Create a sign that states patients only are to come to the nurses counter one at a time
- Send patients to other clinics due to limited resources at the ACC. This could include patients who have been diagnosed with hypertension
- Write the patient's name on the appointment card that scheduled patients bring with them to the clinic and place them in order of scheduled appointment and admit patients in that order
- Patients examined by the ACC who need to be admitted to the hospital should be sent to the admitting department within NMMC instead of waiting at the ACC to be directed to a hospital ward
- One cardiologist should examine patients prior to surgery
- Nurses from operating rooms should take blood for pre-operative patients instead of ACC nurses
- One resident could be assigned on a weekly basis to the hospital wards to examine post-operative patients so other ACC physicians will not be detracted from clinic duty
- Create a patient database when the new clinic is finished to track patient waiting times based on when the patient entered the clinic, when s/he entered the exam room, and the duration of nurse and physician examinations
- Nurses should enter the waiting room and collect appointment cards and put them in order of appointment

Finally, in a third meeting with the head nurse, we decided on one immediate intervention designed to decrease patient waiting time. This was:
- use an ordered number system assigned to patients who come without appointment (emergency and non-emergency)

Choosing only one intervention at that time was due to staff taking vacations, wherein the clinic has used only 3 nurses since July first and will continue to do so until mid August. This translates into only two nurses working with patients throughout the day while a third nurse admits and schedules patients.

While it was not possible to convince clinical staff to institute many recommendations, the fact that we were able to meet with the staff and discuss such options indicates a willingness and desire to improve the structure and function of the clinic. This is a very important step in the right direction because not only are staff willing to listen to recommendations from an outside observer who may notice areas of improvement not

apparent to staff, but also because physicians and nurses come together and try to solve problems. Although the lack of sufficient exam rooms and equipment makes it difficult for the clinic to function optimally, the staff is creative in devising strategies to decrease real or perceived patient waiting time and hence improve satisfaction for staff and patients. One current strategy is to take blood pressure readings and/or auscultation while patients are in the waiting area.

There is good news on the horizon for the ACC because they will be moving to a new clinic within NMMC. This new clinic has seven examination rooms, which on average, are larger than current examination rooms. Also, the new clinic will employ one additional nurse for a total of five. This will allow four nurses everyday to work with patients while another nurse will maintain the nurses station. The nursing station is also an improvement over the existing one because it has two counters, one for nurses to register and admit patients, and another for physicians and nurses to exchange physician charts and other information. There are two large offices, and it is not known how these will be allocated to physicians. The waiting room is also larger than the existing one, but seating capacity is unknown at this time. Unfortunately, it is not known whether the clinic will have new or repaired equipment. Again, this could be a potential problem area because while the clinic will have more than twice the number of examination rooms it had in the old clinic, matching numbers of EKGs and echocardiographs could still be limited and could still be a point of contention as to why waiting times may not improve over the long term even when employing short-term recommendations.

While it is not possible to speculate how examinations may be conducted differently in the new clinic, it may be helpful if initial patient assessments were completed in one examination room by nurses even before the patient is to see a physician. The advantages would be twofold in that patient satisfaction would rise because patients would have already received some attention, and it would decrease total examination time in each room, which can translate into shorter waiting times. In order to accomplish the initial assessments in an orderly fashion, it would be useful for the clinic to employ signs which stress that only patients are to come to the nurses station to be registered. This looks to be a promising possibility as the head nurse has already spoken with someone who can complete this function. Yet, changing the mentality of patients and their family or friends in regard to not crowding the nurses' station will require more than just a sign. As mentioned previously, one way to ease crowding is to use an airport-style gate system to order patients only to the nurses' station. Employing such strategies will indicate to patients that they may be examined faster if they register without family or friends.

A revised patient flow form (Appendix 4) was instituted the day of the intervention, and includes whether the patient had a scheduled appointment, and the time s/he entered the clinic, the time of scheduled appointment, and entry time into the examination room. Nurses are already using this form that is designed to track waiting time for the clinic on a long-term basis once the quality improvement cycle has been completed.

Appendix 1: Patient Waiting Time Monitoring Instrument

NMMC
Adult
Clinic

Patient Waiting Time Monitoring Instrument

Date: **Number of patients: primary/day _____ secondary/day _____**

Observer's Name: **Number of patients admitted without scheduled appointment:**

Time Observations Begun:_____   **primary/day _____ secondary/day _____**

Time Observations Ended:_____   **Staffing levels/day: nurses _____ physicians _____ residents _____**

Physician's Name Examining   **Number of functional Exam. Rooms/day _____**

Primary Cases:_____   **Number of functional Echocardiographs/day _____**

Obser-vation #	Patient name	Primary or follow-up visit (P/F?)	Post-surgical (post-intervent.) visit or not (Y/N?)	Emergency visit (Y/N?)	With or without scheduled appointment(Y/N?)	Reason patient came without appointment*	If scheduled appointment, time it was scheduled for?	Time patient arrived
1	2	3	4	5	6	7	8	9
1								
2								
3								
4								
5								
6								
7								
8								

*physician reason

Number of Missed Appointments:

Primary Visit:_____

Secondary Visit:_____

Exam room #	Obser-vation #	Time patient entered exam room	Start/end time nurse exam		Start/end time physician exam		Nurse's Name	Physician's Name	Primary diagnosis of patient	Reason for waiting
10	1	11	12		13		14	15	16	17
	1									
	2									
	3									
	4									
	5									
	6									
	7									
	8									

Appendix 2: Patient Visit Tracking Instrument

NMMC Adult Clinic   Patient Visit Tracking Instrument

Today's Date:

	Patient Name	Appointment(Y/N)		Primary Visit?		Secondary Visit?	
		Y	N	Y	N	Y	N
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							

Appendix 3: Patient Referral Form

Registration Form for Patients Who Want an Appointment

Date _____

	Classification of Appointment		Primary	Follow-up	Date of Appointment	Appointment Time	Physician's Name
	emergency	normal					
	1	2	3	4	5	6	7
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Appendix 4: Intervention-Based Patient Visit Tracking Instrument

**NMMC Adult
Clinic**

Today's Date: Number of missed appointments:

                                                    Primary:

                                                    Follow-up:

	Assigned #	Appointment? Y	N	Primary Appt	Secondary Appt	Scheduled Time?	Arrival Time?	Entry Time?
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								