Final Deliverable

PSAS PROGRAM EVALUATION
AT-RISK FOR AMPUTATION STUDY

Department of Veterans Affairs

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Booz | Allen | Hamilton

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INTRODUCTION

This study examines how well VA prevents or delays amputation among veterans identified as being at-risk for limb loss

Each year approximately 56,000 diabetes-related amputations are performed nationwide (Fotieo, Reiber, Carter, Smith 1999; www.ada.org).[i] Of that number, about 22,000 amputations are performed within the Veterans Health Administration (VHA) (Fotieo, Reiber, Carter, Smith 1999). Amputations affect the quality of life as well as functional status of individuals, with 81% of persons with lower limb amputation experiencing activity limitations (Fotieo, Reiber, Carter, Smith 1999).[ii]

The VA's Preservation-Amputation Care and Treatment (PACT) Initiative was announced in 1993 to apply a model of early detection and preventive care to patients at-risk for limb loss. Subsequently, important prevention guidelines were identified, and recommendations were made for the care of veterans with several major diseases including diabetes mellitus. The External Peer Review Program (EPRP), a systematic chart review by external reviewers, was developed to collect relevant information to reinforce the practice of early detection, prevention and intervention using these recommended prevention processes. The EPRP database was designed for the storage of selected information from the chart review. Our study linked EPRP database with other VA databases (i.e., inpatient database (PTF-Surgery Module) and outpatient database (OPC-Visit Module)) to examine the extent to which risk identification, preventive foot care and patient education are provided to patients at-risk for limb loss.

The Department of Veterans Affairs contracted with Booz Allen Hamilton (teamed with Northwestern University, Focus on Therapeutic Outcomes (FOTO, Inc). and Convergent Healthcare) to evaluate program outcomes associated with patients at-risk for amputation. VA staff developed specific study questions for the evaluation of program outcomes. The Booz Allen team collaborated with VA staff to develop an analysis plan for the evaluation of how well VA prevents or delays amputation among veterans identified as being at-risk for limb loss and the extent to which recommended prevention procedures affect program and patient outcomes.

AT-RISK STUDY QUESTIONS

1. Are patients with diabetes and vascular disease and those at-risk for lower limb loss screened and referred to the appropriate foot-care specialist?
2. Do patients with diabetes and vascular disease and those at-risk for lower limb loss receive information and education on risk factors for amputation?
3. Do VA patients, both PACT and non-PACT, when risk- and age-adjusted, have amputation and re-amputation rates the same as or less than those found in comparable non-VA patients?

Three study samples were defined to adequately address the study question

In order to answer all the questions presented by VA within this study, different approaches were used to select 3 study population samples: an Index File Study Sample, a Targeted At-Risk Sample, and an Amputation Sample. This was necessary because the sample sizes were greatly reduced after the process of file matching and merging. Therefore, in order to make the most efficient use of the existing data, we created different study samples.

1) **"Index File" study sample (n=451,824).** "Globally at-risk" patients are defined in an epidemiological sense as patients identified in the 1997 outpatient database (OPC) who had the first indication of diabetes mellitus (DM) or peripheral vascular diseases (PVD). The OPC database had multiple visits for each patient and there were 10 fields for ICD-9 diagnostic codes. The patient was selected for the study if DM or PVD appeared in any of the 10 fields during any visit. We then kept only the "first" visit record when DM or PVD was documented in the (1997 OPC) database. The ICD-9 codes used for this study are listed below.

ICD-9 Diagnostic Codes used for DM and/or PVD

250.00, 250.01, 250.02, 250.03, 250.10, 250.11, 250.12, 250.13, 250.20, 250.21, 250.22, 250.23, 250.30, 250.31, 250.32, 250.33, 250.40, 250.41, 250.42, 250.43, 250.50, 250.51, 250.52, 250.53, 250.60, 250.61, 250.62, 250.63, 250.70, 250.71, 250.72, 250.73, 250.80, 250.81, 250.82, 250.83, 250.90, 250.91, 250.92, 250.93, 362.01, 362.02, 440.00, 440.10, 440.80, 440.90, 441.10, 441.20, 441.30, 441.40, 441.50, 441.60, 441.70, 441.90, 442.00, 442.10, 442.20, 442.30, 442.90, 443.00, 443.100, 443.8, 443.90, 444.00, 444.10, 444.90, 446.00, 446.10, 446.30, 446.40, 446.50, 446.60, 446.70, 447.00, 447.10, 447.20, 747.60, 747.64

We followed these patients throughout the 4-year period and examined the "survival time" (time from their outpatient visit to the time they had the first major amputation); we also used Cox Regression model to identify factors that increased relative risks for first major amputation.

2) **"Targeted At-Risk" study sample (n=44,012).** According to the Healthcare Analysis and Information Group (HAIG) Report, about 60% of patients with amputations have a co-morbidity of DM or PVD. However, as our data demonstrated, only a small fraction (2.3%) of patients with DM or PVD ended up having amputations. Therefore, we used an alternative approach to define "at-risk". Using the EPRP database responses, we identified patients whose feet had been examined by a foot care specialist or physician to be at-risk. The rationale was that EPRP represented a more focused chart review for patients with DM. The charts reviewed were pre-selected for patients who were identified as having diabetes and at-risk for amputation. Therefore, these patients represented a targeted at-risk population served by the VAMCs. 44,012 patients (93% out of 47,247 valid responses for this question in the EPRP database) were identified as having a documented visual inspection of their feet. We identified them as our targeted at-risk patient sample to answer questions regarding the level of risk (i.e., "risky foot") and the rate for patient education and counseling (i.e., Questions 1 and 2). Although 44,012 represents the number of targeted at-risk patients, many variables used to answer subsequent questions had missing

data. Consequently, other denominators were used to determine the rates at which preventive measures were taken. Our understanding after several discussions with the EPRP database manager was that the missing data represented an intentional skip pattern; that is, not all preventive measures were performed in all "at-risk" patients since the level of risk varied. In the following report, we provide both "percent" (based on the total at-risk sample of 44,012) and "valid percent" (based on the number of non-missing responses to each question about preventive measures). Only 892 out of 44,012 at-risk patients identified in EPRP database had a documented amputation surgery in the PTF database.

3) "**Amputation" sample (n=10,258).** To compare the rates of amputation (at all levels, including minor and major amputations) in facilities with highly implemented PACT programs vs. those with only partially implemented PACT Program, we examined the documentation in the surgery modules from the PTF database. In this sample, if a patient has multiple surgery records, we kept only the highest level of amputation for each patient during the four-year period. In the original Statement of Work, all questions were asked using the distinction of facilities with a PACT Program and facilities that were "non-PACT." However, since PACT is implemented differently at every VAMC and the VA could not identify facilities that were PACT or non-PACT, the Booz Allen team conducted an internet survey to VAMCs. This survey was designed to obtain information on how each facility implemented the VHA PACT Directive. Based on the responses of the survey, facilities were then rated as "high-ranked", "moderate-ranked", or "low-ranked" on formally implementing the PACT guidelines.

The VAMCs were coded at the level of PACT implementation using 4 categories: "high", "moderate", "low" and "did not respond". We compared the frequency of total amputations as well as amputations at different levels in patients from all four categories. We also performed additional analyses to compare patient and facility characteristics among VAMCs with different PACT rankings. No differences were found between VAMCs with "moderate", "low" or "did not respond". However, more VAMCs with "high" PACT ranking were urban, and were affiliated with universities and medical schools. We noted that greater percentages in total number as well as in higher level of amputations (e.g., above-knee) were from VAMCs with "high" PACT ranking, and therefore, we decided to keep only VAMCs with "high" PACT ranking in the "high" category, and regrouped "moderate" and "low" into the "partial" PACT category. Thus, not only sample size in high and partial PACT categories were more balanced (45.3% of all amputations in high-PACT, and 54.7% in partial-PACT category), the analyses of level are reasonable.

Summary of Findings

1. Screening and referral
    a. Using EPRP survey responses, 93% (i.e., 44,012) of surveyed VA diabetic patients (n=47,247) were screened for foot disorders related to their diagnoses.
    b. 33% or 3,448 patients were referred to a foot-care specialist (7.8% of 44,012, or 33% of 10,586 non-missing data, or valid responses).
2. Risk education and information: 93.5% (n=41,146) of VA patients at-risk for lower limb loss received some information and/or education on risk factors for amputation.
3. Amputation and re-amputation rates compared to non-VA patients
    a. In the "at-risk" sample, 892 out of 44,012 (2.0%) at-risk patients had at least one amputation during the 1997-2000 period, representing a 0.5% annual amputation rate

among patients identified as “at-risk”. No comparable non-VA amputation rates are available.

b. From the 451,824 globally at-risk patient sample, 10,258 patients had amputation surgeries (toe, ankle, foot, below-knee, above-knee, hip), representing a total amputation rate of 2.3%. Among the 10,258 patients, 3,152 (0.7%) had a toe amputation, 1,006 (0.2%) had foot or ankle amputation, 3,117 (0.7%) had a below-knee amputation, 2,926 (0.6%) had an above-knee amputation, 57 (0.01%) had a hip amputation.

c. 12.9 % or 1,329 of the 10,258 patients had re-amputations over the four-year period.

d. In “amputation” sample (n=10,258):

- High ranked PACT Program amputation rate is 2.8%
- Partially ranked PACT Program amputation rate is 2.1%
- Unranked PACT Program amputation rate is 1.9%
- 3,768 (36.7%) patients were referred from VAMCs with a highly implemented PACT Program
- 2,937 (28.6%) were referred from VAMCs with a moderately implemented PACT Program
- 1,618 (15.8%) were referred from VAMCs with a poorly implemented PACT program
- 1,935 (18.9%) were referred from VAMCs who did not respond to the Booz Allen PACT internet survey

e. VAMCs with highly implemented PACT Programs tend to be large, urban, and academically affiliated

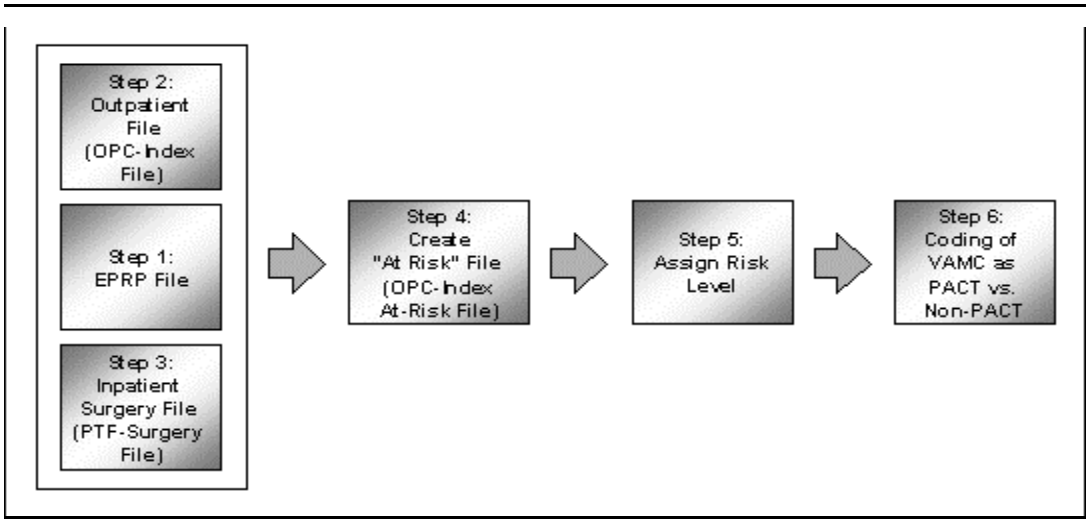
f. Using the Index File Survival Analysis study sample, Cox Regression showed that being 60 years old or older, being African-American, having gangrene, an ulcer, or a prior amputation increased the relative risk of undergoing a major amputation. VAMCs with highly implemented PACT Programs were predictive of first major amputation after controlling for all the above-mentioned variables.

g. When age- and risk-adjusted, the amputations rate is also higher in facilities that were ranked as highly implemented PACT Programs.

METHODOLOGY

The methodology used to extract VA data was completed in 6 non-linear steps

The Booz Allen team merged three different VA databases to create an electronic file containing the study populations needed to answer the questions posed by VA. Following the VHA PACT Directive (2001-030), risk levels were then assigned to the study population. A process flow diagram and the methodological details are summarized below.



Step 1. EPRP File and selection of a Targeted At-Risk Sample (n=44,012)

The Booz Allen team utilized the External Peer Review Program (EPRP) chart review results to identify a Targeted At-Risk Sample and to answer questions related to patient education and counseling. The EPRP surveyors used standardized questionnaires to guide the chart review process. Different questionnaires, or modules (e.g., COPD Module, Diabetes Module) were designed for different patient populations. We received 13 files from the EPRP database manager (from fourth-quarter 1997 through 2000), and merged these files to create an electronic master file. The merged master file contained 222,787 records (one patient one record). After matching this file with the OPC-Index Patient File (see Step 2), 68,239 patients remained with diverse diagnoses. However, the majority of patients responded to the Diabetes Module, as evidenced by the response to the question about foot inspection (i.e., 47,247 patients). Out of the 47,247 responses, 44,012 (93%) indicated that a foot inspection was performed. These 44,012 patients represent the Targeted At-Risk Sample (patient population) used for questions regarding prevention measures and patient education.

We recoded some variables in order to use the information from the EPRP database. Recoding was required because modifications were made over time for certain variables in the EPRP Diabetes Module. Certain questions were added, and definitions of response categories were modified in later versions. These issues were responsible for much of the variation in numbers of responses (and missing data). Therefore, we standardized the responses (through recoding) and used valid percent (based on the non-missing data) to indicate the true percentages of findings (see Appendix A). For example, the field “at-

risk foot" initially had 7 response categories (1-7) and in subsequent versions had 9 categories (1-9). The definitions of the 7 response categories branched out to 9. These response categories were recoded into separate variables called "risky foot" (risky foot 1, risky foot 2, etc.). Thus, some patients had responses to 7 risky-foot variables while others had responses to all 9 risky-foot variables.

Step 2. Extract demographic information from Outpatient File and prepare the Index Patient File. (n=451,824)

Another electronic file was developed from the Outpatient (OPC) Diagnosis, Visit and Procedure files so that patients' diagnoses, visits and demographic data could be identified. Patients were selected if, in their 1997 outpatient visit records, they had ICD-9 diagnostic codes for diabetes mellitus (DM) or peripheral vascular disease (PVD) affecting the circulation to their lower extremities. We kept only one record for each patient (i.e., the first record that had a DM or PVD code(s) in 1 of the 10 diagnosis fields). Patients younger than 19 years of age were excluded. We matched this file with the BIRLS file (containing death records from VA) and deleted patients who died before the study period started (i.e., September 30, 1996). The "Index Patient File" represents the globally at-risk patient sample (n=451,824).

Step 3. Extract amputation study sample from Inpatient Surgery File (n=10,258)

A third electronic file was created from the inpatient surgery Patient Treatment Files (PTF) from 1997 through 2000. Patients were selected if they had lower extremity amputations or cardiovascular surgery codes (a total of 42,640 records). Among these patients, 17,196 were records of revascularization (or, vascular bypass) surgeries and 25,444 were records of amputation (for 16,612 patients). These records represented multiple data points for each patient who underwent amputations, vascular bypass surgeries, or both. From this file, we selected only those who matched the "index patient file" (See Step 2) and who had amputations on or after October 1, 1996. We then unduplicated the records to retain the highest level of amputation for each patient. The unduplication procedure is necessary so that a file can be matched with another file. We performed the unduplication procedure by year to get the highest level of amputation for the patient in a particular year (i.e., 97, 98, 99, 00). We also performed unduplication procedure for four years combined so that we know the highest level of amputation for the patient over the entire four-year period. In summary, over the four-year period, 10,258 patients had a matched visit date from the 1997 Outpatient Index File. These patients were used as the Amputation Sample.

Step 4. Integrating amputation information with the Index Patient File for globally at-risk patient sample and for survival analysis (n=451,824)

The selected fields from the three files described in the previous steps (EPRP, OPC-Index, and PTF-Surgery files) were merged to create the first "study sample" data file, i.e., the "globally at-risk" patient sample in which the highest level of amputation for each patient was retained (N=451,824).

Survival analyses were also conducted to evaluate the relative risk for **first major amputation** because patients with minor amputations rarely lose mobility — an important function to fully participate in society. In order to perform the survival analysis we created a separate file for the same 451,824 patients in the Index Patient File, which contained only records of the first major amputation.

Step 5. Assign risk level to patients

Risk levels were assigned to the 451,824 patients in the Index Patient File, according to the VHA PACT Directive. The VHA PACT Directive defines "at-risk" as those "with diabetes, peripheral vascular

disease and end stage renal disease, who are considered susceptible to ulcer development." However, the latter group (end stage renal disease) was not specifically used to identify at-risk patient for this study.

Accordingly, the following risk levels were assigned.

- Level 0: Patients who had DM or PVD but not both, who did not have evidence of sensory loss, diminished circulation, foot deformity, ulceration, or history of ulceration or amputation
- Level 1: Patients who demonstrated evidence of sensory loss and/or diminished circulation, but had no evidence of foot deformity or history of plantar ulceration
- Level 2: Patients who had findings for Level 1 and also demonstrated foot deformity, but had no history of plantar ulceration
- Level 3: Patients who had findings for Levels 1 and 2 and also have a history of ulceration, and/or prior amputation, Charcot foot deformity, or history of rest pain, reflecting the highest risk of lower extremity events

Some indicators used to assign risk levels came from the EPRP database; others (e.g., ulcer symptoms, gangrene or neuropathy codes) came from the PTF Surgery and Outpatient Diagnosis and Visit Modules. For example, the EPRP "risky foot" variables indicate the presence or absence of 9 different clinical signs of potential risk for amputation. In the Survival Analysis File, only a small proportion of patients (i.e., n=53,721) had pertinent "risky foot" variables. However, with the diagnostic and procedural codes, we were able to assign a risk level to all 451,824 patients. The following is a summary of "risk assignment".

First, we assigned Level 3 risk based on ICD-9 and surgery codes, surgery dates, and "risky foot" indicators. Patients were identified as being in Level 3 if they had:

- one or more prior amputation in 1995 or 1996,
- one or more diagnostic codes for ulcer or gangrene,
- one or more procedural codes indicating vascular bypass surgeries, or
- a "risky foot" rating that indicated presence of skin breakdown or healing ulcer or an ulceration or other sores.

We next defined Level 0 using risk indicators from the VHA PACT Directive (2001-030) as outlined above. Patients were identified as being in Level 0 if they had:

- only DM or PVD diagnosis but not both,
- no diagnostic codes indicating neuropathy,
- no diagnostic codes indicating ulcer or gangrene and no procedural codes indicating vascular bypass surgeries,
- no prior amputations, and
- absence of any of the risky foot conditions except minor abnormalities.

We decided to collapse the middle two risk level categories because it was extremely difficult and imprecise to define “sensory loss”, “diminished circulation”, or “foot deformity” by using the ICD-9 codes. The following new defined risk levels are presented below:

VA Risk Assignment Level	**New Risk Level Assignment**
Level R0	**Risk Level 1**
Level R1 + R2	**Risk Level 2**
Level R3	**Risk Level 3**

See Table 3, page 15, for operation definitions and proportions of the sample falling into each Risk Assignment Level.

Step 6. Coding of VAMC as PACT vs. Non-PACT

In this step, we coded each VAMC as either having a highly implemented PACT Program or a partially implemented PACT Program. The Booz Allen team conducted an internet survey based on the VHA PACT Directive 2001-030. *See “Review and analysis of the VA’s PACT Program”, October 14, 2002 for detailed survey information on the methodology and PACT Program ranking.* Data were analyzed to establish a rating of PACT Program implementation. Stations were identified as having an active (highly implemented) PACT Program if their PACT implementation ratings were ranked “high” based on survey results. Stations were also identified as having “moderately” or “poorly” implemented PACT Program if their associated PACT implementation ratings were “moderate” or “low.” VAMCs that did not respond to the internet survey were coded as “did not respond”.

LIMITATIONS

There are several limitations to this study that should be considered when reviewing the findings

In order to answer each study question for the At-Risk Amputation Study, different data extraction techniques were used, which are described in each section. There are limitations in both the data as well as the methods for each of the study populations, which are outlined in detail in the findings. The limitations are summarized at a high level below.

- Data fields changed over time within and across data sets
- Data were frequently incomplete
- Patients could not be identified as being treated in a VAMC with a PACT Program
- Comparison non-VA samples were difficult to identify
- Multiple patient records with limited common variables existed for surgery files
- Inconsistent demographic variables existed in VA comparison data sets
- There was concern for general integrity of data analyzed
- Potential for sampling bias exists

There were specific data issues related to the External Peer Review Program (EPRP) database. EPRP is a systematic chart review by external reviewers, which was developed to collect relevant information to reinforce the practice of early detection, prevention and intervention using recommended prevention measures. The EPRP database was designed for the storage of selected information from the chart review. This study linked EPRP database with other VA databases (i.e., inpatient database (PTF-Surgery Module) and outpatient database (OPC-Visit Module) to examine the extent to which risk identification, preventive foot care and patient education are provided to patients at-risk for limb loss.

When EPRP data was matched other databases we identified data issues that should be taken into consideration when interpreting the results of the analyses. The following is a list of the issues:

- inconsistent variable names, coding schemes, definitions and wording of the questions
- missing data
- lack of module labeling
- inconsistent findings

There have been changes in EPRP variable names and variable definitions. However, there was no explanatory documentation regarding the evolution of variables. There are two booklets that had the original questions regarding diabetes prevention measures. One booklet, titled “DMmodule2000Q1” (or in abbreviation “DM”), contains only questions of the Diabetes Module. The other one, titled “EPRP Chronic Disease Care and Prevention Indicators Data Base Questions” (or in abbreviation “CDCIPI982”), contains

questions on several targeted chronic diseases (i.e., questionnaires for cardiac infarction, diabetes mellitus, chronic obstructive pulmonary disease, etc.). Although the majority of the questions had the same name or wording, some did not. For example, “footsnse” (i.e., foot sense) had different wording in the two booklets.

The variable names may also have been changed. Example: risky foot was called “atriskft” (in CDCIPI982”) and “riskyft” in “DM”. The definitions (or coding scheme) of the response categories were different in the code books. The “atriskft” has 7 categories of response choices whereas “riskyft” has 9 categories of response choices.

Since EPRP database manager had recoded the risky foot variable into separate variables with dichotomous responses (i.e., riskyft1, yes/no; riskyft2, yes/no, riskyft3, yes/no, etc.), many patients had missing data on at least 2 “riskyft” variables.

Not all symptoms documented in patients’ charts were checked or entered in the EPRP database. For example, some patients had foot deformities (“riskyft8” was checked for “Yes”), but did not have sensory or color abnormality (“riskyft5-presence of color change on elevation” or “riskyft6-absence of pedal pulse” or “riskyft7-decreased protective sensation” was checked for “No”), which was counter-intuitive. The results are not absolute because the data only reflected what the chart reviewer noted or documented.

The EPRP data did not have a clear indication of the module used for the patients identified in the study sample. It is possible that a diabetic patient (identified by the researchers from any of the VA databases) was surveyed (by the EPRP reviewers) for another diagnosis, such as acute myocardiac infarction, thus resulting in missing data in variables relevant to diabetes mellitus. To prevent this from happening a variable should be created to indicate the module used so that researchers can better target patient selection.

Another limitation regarding the study question related to PACT vs. non-PACT VA facilities was that researchers did not have a clear indication of those facilities that had a PACT Program and those that did not. In response to this limitation, the Booz Allen team created a VAMC Internet survey to determine how each facility implemented the criteria outlined in the PACT Directive. The survey was designed to identify whether formal policies, procedures, and activities as outlined in the PACT Directive were implemented at each facility. A limitation to this methodology of PACT identification is that physicians and/or other medical center staff may be performing PACT activities, however if the VAMC did not have formal policies and guidelines the VAMC may have received a lower score related to PACT implementation. Also, because a small percent of VAMCs did not respond to the survey those VAMCs (accounting for nineteen percent of the amputations performed at VA) were eliminated from the study and therefore not used to calculate results.

FINDINGS

Specific analysis metrics collaboratively developed by VA and Booz Allen address the three At-Risk for Amputation Study questions

The Booz Allen team collaborated with VA to further refine analysis metrics to evaluate program outcomes. The Booz Allen team extracted specific patient samples from VA databases to provide analysis based on these metrics.

We have organized our findings to correspond with each analysis metric. The metrics are presented below and correspond to the November 9, 2001, *Refined Project Plan* of the Program Evaluation of Prosthetics and Sensory Aids Services. These multiple metrics, outlined in Findings, are divided into the following three categories: Referral and Screening Processes, Patient Information and Education and Amputation and Re-amputation Rates. In addition, we report our findings of the survival analysis on relative risk for a major amputation.

- **Question 1**: What percent of patients at-risk for lower limb loss were referred to a foot-care specialist by VAMC?
  - **1a.** What percent of patients had their feet inspected and were identified as having a risk for future complications? (Referral and Evaluation)
  - **1b.** What percent of patients had their feet inspected and were identified as having a risk for future complications? (Screening)
  - **1c.** Describe distribution of patients at different risk levels on first visit
  - **1d.** Apply risk level determined by formula using VA Guidelines as well as multiple sources such as specific diagnostic codes, surgery records and focused patient record reviews
  - **1e.** Assign a Prevention Index by using EPRP Prevention Index formula from the diabetes prevention care score
- **Question 2**: What percent of patients at-risk for lower limb loss received information and education on risk factors for amputation?
  - **2.1.** What percent of patients received nutrition consult?
  - **2.2.** What percent of patients received information on smoking cessation?
  - **2.3.** What percent of patients received regular preventive foot care?
  - **2.4.** What percent of patients received a footwear prescription?
- **Question 3**: Do VA patients, both PACT and non-PACT, when risk and age-adjusted, have amputation and re-amputation rates the same as or less than those found in comparable non-VA patients?

- **3a.** What are the amputation rates for VA patients who are in PACT Programs and for VA patients not in a PACT Program?
- **3b.** What are the re-amputation rates for VA patients who are in PACT Programs and for VA patients not in a PACT Program?
- **3c.** What are the amputation rates for VA (PACT and non-PACT) and non-VA patients when age and risk adjusted?

- **Additional Analyses**—Cox Regression (Survival) analysis compared variables posing greater (relative) risks to patients for major amputation.

The demographic and clinical characteristics were analyzed for patients who are at-risk for amputation

Table 1 shows the characteristics of Index File and the targeted at-risk study populations related to gender, ethnicity, diagnoses, amputation and vascular surgery information. The two study samples are similar in age, each with an average age of 64 years. Patients are predominately Caucasian males. Diabetes mellitus accounted for the largest proportion of cases (82% in the Index File and 95% in the targeted at-risk group). Few patients (3.4% of the globally at-risk, 2.7% of the targeted at-risk sample) had amputations or vascular surgery. The ethnicity of approximately 25% of patients in each group was unknown.

Table 1. Demographic and Clinical Characteristics of the At-Risk Patients

	GLOBALLY AT-RISK (INDEX FILE) N=451,824			TARGETED AT-RISK* N=44,012		
Age (Mean ± Standard Deviation)	64.19 ± 11.50			63.67± 10.84		
	N	Summary	No response (missing data)	N	Summary	No response (missing data)
Gender			0			0
Male	439,601	97.3%		40,356	91.7%	
Female	12,223	2.7%		3,656	8.3%	
Ethnicity			125,920 (28%)			11,219 (25%)
Caucasian	239,041	52.9%		25,512	58.0%	
African-American	61,761	13.7%		5,280	12.0%	
Hispanic	21,795	4.8%		1,648	3.7%	
American Indian or Asian	3,307	0.7%		353	0.8%	
Diagnosis			0			0
DM only	369,899	81.9%		41,996	95.4%	
PVD only	72,463	16.0%		1,040	2.4%	
DM and PVD	9,462	2.1%		976	2.2%	
Had an Amputation during 97 - 00	10,258	2.3%	0	892	2.0%	0
Included a Major Amputation**	6,100	1.4%	0	390	0.9%	0
Had a Vascular Surgery	5,490	1.2%	0	364	0.8%	0
Had no Amputation nor Vascular Surgery	436,663	96.6%	0	42,816	97.3%	0

**The At-Risk patients identified from the EPRP database (i.e., those who had a positive response to the question "Within the past year, does the record document a visual inspection of the patient's feet?" These patients represented a more focused or " targeted at-risk" population identified by the VA clinicians.*

*** ICD-9-CM codes for the surgical procedures: Hip (8418-8419), AK-Above Knee (8416-8417), BK-Below Knee (8415).*

REFERRAL AND SCREENING PROCESSES

Q. 1a/1b: What percent of patients had their feet inspected and were identified as having a risk for future complications? What percent of patients had documented visual inspections of their feet?

Questions 1a and 1b assess whether at-risk patients were screened, referred to or evaluated by a foot-care specialist and uses the data from the matched at-risk study sample. According to the documentation reviewed in patient medical records (i.e., EPRP), the majority of patients had their feet inspected, and over 50% are under the care of a foot-care specialist.

Because the questions posed by VA can be answered by several EPRP variables (with varying degree of missing data), we report sample sizes for each question and the "valid percent" based on non-missing responses (for each variable).

Screening: 44,012 patients (93.2% out of 47,247 responses) had documented visual inspection of their feet.

Referral and evaluation: 10,586 patients had responded to the question "was the patient referred to a foot care specialist?"

- 32.6% or 3,447 were referred to a foot-care specialist for further evaluation of abnormal findings (n = 10,586)
- 50.6% or 5,355 were already under care for foot problems (n = 10,586)
- 3.4% or 359 had previously been evaluated by a foot specialist (n = 10,586)

These three categories account for 9,161 patients; i.e., 86.5% of the total 10,586 records reviewed.

Among patients already under care for foot problems (n=5,355) the following is a summary of their signs or symptoms of their feet (based on the "Risky-Foot" variables). These percentages add up to more than 100% because more than one response was possible.

- 2,280 (42.6% of 5,355) had a minor abnormality
- 2,003 (37.4% of 5,355) had indication of either pre-ulcer or ulcer
- 1,346 (25.1% of 5,355) had abnormal coloring, temperature or pulse
- 1,781 (33.3% of 5,355) had decreased protective sensation
- 363 (9.2% of 3931 non-missing responses) had documented deformity
- 564 (14.2% of 3981 non-missing responses) had other abnormal findings

Q. 1c/1d: What percent of patients are assigned a risk level? What percent of patients are at each risk level?

In the previous section, we provided the findings (of Risky-Foot symptoms) of those who were currently under the care of a foot care specialist (n=5,355).

In this section, we answer Questions 1c and 1d using the entire targeted at-risk study sample (i.e., the 44,012 patient) as our denominator.

The different numbers of responses (as shown in Table 2, Column 3 "N of total responses") deserve some clarification. The original question regarding "Risky Foot" (i.e., signs and symptoms of abnormal findings) in EPRP Diabetes Module states: "Designate the abnormal findings from the examination of the feet". Earlier version of the Module had 7 responses that medical record reviewer could check. However, the same question had 9 response categories in later versions. After the data were entered into the EPRP database, the data manager then set up a variable for each symptom (i.e., "Risky-Foot 1" to

"Risky-Foot 9"). As a result, out of 44,012 patients, a total of 35,423 patients had responses for variables "Risky-Foot 1" to "Risky-Foot 7", 16,880 patients had responses for variable "Risky-Foot 8", and 17,071 patients had responses for variable "Risky-Foot 9". Moreover, if the chart reviewer/record retriever did not see a particular symptom documented in the medical record, or neglected to put it in the recording form, the symptomatic "Risky Foot" would not have been entered in the database. This might explain partially why so many patients had missing data on these variables, in addition to intentional skip patterns.

"Risky Foot" variables represented clinicians' documentation of the patients' foot/feet signs and symptoms, it was possible patients had more than one symptom; therefore, the record reviewer would have several Risky-Foot variables checked. This explains why the total percentage exceeded 100.

The opposite scenario was also noted: not all symptoms documented in patients' charts were checked or entered in the EPRP database. For example, we noted that some patients had foot deformities, but did not have sensory or color abnormality, which was counter-intuitive. Therefore, the EPRP data provided some good indications for risky conditions; however, they should be not treated as "absolute" symptoms the patients had. The risk assignment using EPRP data, ICD-9, and CPT procedural codes (as described below) was not ideal.

A full description of these indicators, and the number and percentage of cases in which they occurred are presented in Table 3.

Table 2. Risky Foot Rated by Staff in EPRP File

RISKY FOOT INDICATOR	PRESENT ("YES")	N OF TOTAL RESPONSES	VALID %*	% OF "TARGETED AT-RISK" PATIENTS (N=44,012)
Minor abnormality (Riskyft1)	17,177	35,423	48.5	39.0
Pre-ulcer or hemorrhage under a callus (Riskyft2)	257	35,423	0.7	0.6
Skin breakdown or healing ulcer (Riskyft3)	1,225	35,423	3.5	2.8
Ulceration or other sores (Riskyft4)	3,287	35,423	9.3	7.5
Color abnormality on elevation (Riskyft5)	1,118	35,423	3.2	2.5
Decreased temperature or absence of pulses (Riskyft6)	1,976	35,423	5.6	4.5
Decreased protective sensation (Riskyft7)	4,270	35,423	12.1	9.7
Foot deformities (Riskyft8)	625	16,880	3.7	1.4
Other abnormal findings (Riskyft9)	1,015	17,071	5.9	2.3

** Percent is based on responses to each characteristic.*

Since only a proportion of the 44,012 patients had responses for Risky-Foot variables, we could not solely rely on them to establish risk level. As explained in Step 5 of the Methodology section of this document, we utilized the risk indicators from the VHA PACT Directive (2001-030) to assign risk levels. We examined ICD-9 codes from the Outpatient file, procedural codes from the PTF Surgery file, and incorporated the EPRP "Risky-Foot" variables to develop new levels of risk. The new Risk Level R1 replaces the VA Risk Level R0, new R2 replaces VA Risk Levels R1 and R2, and Risk Level R3 remains the same.

Table 3 displays the number of patients classified into each of the new risk categories and provides an operational definition of the new risk categories. The majority of patients were rated at R1 risk level using the new criteria (77%).

Table 3. Risk Level Assignment (N=44,012)

NUMBER (%) OF PATIENTS IN NEW RISK LEVEL	OLD VA RISK LEVEL	OPERATIONAL DEFINITION
R1 33,899 (77.0%)	R0	Patients with DM or PVD but no sensation loss, neuropathic complications, or history of ulceration or amputation.
R2 4,510 (10.2%)	R1 & R2	Patients with DM or PVD with "foot deformity" or sensory loss, color change or foot pulse abnormality.
R3 5,603 (12.7%)	R3	Patients with DM or PVD with an ulcer, gangrene or prior amputation.

Note: We collapsed the middle two risk levels (VA R1 and R2 risk levels) into one category, R2, because diabetes related "foot deformity" or sensory loss, color change, foot pulse abnormality were difficult to determine from ICD-9 codes. The percentages add to 99.99 due to "rounding".

Q. 1e: What percent of patients was assigned a Prevention Index?

Question 1e focuses on patients who were assigned a Prevention Index. The EPRP database received from VA did not have a variable for Prevention Index. However, we identified prevention measures included in the database. We report the frequency and percentage of patients who had each of the following prevention measures, based on the targeted at-risk sample (n=44,012). Between 67% and 93% of patients received one or more prevention measures.

- All patients had documented visual inspection of their feet
- 35,897 (81.6% of 44,012) had assessment of lower extremity sensation, 7,735 (17.6%) did not, and 378 (0.9%) had a paraplegic limb due to stroke (2 patients did not have a response)
- 38,539 (87.6%) were checked for lower extremity pulses
- 40,699 (92.5%) were tested for their hemoglobin A1c
- 31,643 (71.9%) had a funduscopic examination of their retina-- 50.9% of them were examined by an ophthalmologist, 38.2% by an optometrist, and 7% by a primary care physician

PATIENT INFORMATION AND EDUCATION

Q.2: What percent of patients at-risk for lower limb loss received educational services on diabetes mellitus, weight, diet, tobacco, symptom change and footwear change?

Question 2 addresses whether patients received education, nutrition consults, and smoking cessation counseling. In summary, 93.5% of patients received information and/or education about risk factors for amputation, and substantially more than half received nutritional, tobacco risk, and smoking-cessation information and/or counseling.

The majority of patients (41,146 or 93.5% of 44,012) received education on risk factors for amputation. Patients who received counseling on diabetes mellitus, weight, diet, tobacco, symptom change or footwear change were identified. Since each variable has different response rate, we report each percent (based on the entire at-risk sample) and valid percent (based on non-missing responses only).

2.1) 93.0% or 29,239 patients received a nutrition consult (n=31,448)

2.2) 83.3% or 3,864 patients received counseling at least once regarding smoking cessation (n=4640), and 60%, 3,584 were counseled regarding tobacco risk to health (n=5,969)

2.3) No variables in the EPRP indicated “regular preventive foot care”. We attempted to answer this question by examining the appropriate clinical stop code (i.e., 411--Podiatry) on those patients who were currently under the care of foot specialists (i.e., n=5,355). However, when we matched the IDs of these patients with Outpatient (OPC) database, only 140 patients were coded as being seen in Podiatry

2.4) 11.9% or 782 patients had a prescription to change footwear, according to EPRP (n= 6,561). 398 of the 782 (50.9%) patients indicated that they went to a clinic for footwear check. However, only 11 were coded in OPC as having been to a clinic for a therapeutic footwear check (Clinic stop code 417-- Prosthetic and Orthotic Clinic).

The differences in results derived from EPRP and OPC databases prevent a definitive conclusion about the percentage of patients receiving these educational services. There are a number of potential explanations for these disparities including patients’ non-compliance with plan of care, missing data and patients’ use of other settings (e.g., non-VA providers) to receive these services.

AMPUTATION AND RE-AMPUTATION RATES

Q.3a: What are the amputation rates for VA patients who are in PACT Programs and for VA patients not in a PACT Program?

Question 3a addresses amputation rates for VAMCs with fully versus partially implemented PACT Programs. In general, when patients from non-participating facilities (facilities that did not respond to the PACT Internet Survey) were excluded, the results show that amputation rates are higher in VAMCs with a fully implemented PACT Program than VAMCs with a partially implemented PACT Program. The “amputation” sample was used to answer the questions in this section (Q.3a, Q.3b, and Q.3c). This study

sample reflects numbers of amputation surgeries; at times, there are multiple amputation surgeries for one patient.

We first identified all amputation surgery records from fiscal year 97-00 Inpatient (PTF) Surgery file (Step 3 of Methodology), matched the patients with the globally at-risk "Index File" patient sample (Step 2), and then examined patients' highest level of amputation within the four-year study period. Among the 10,258 patients who had at least one amputation, 3,152 had a toe amputation (representing 30.7% of the 10,258 amputation patient sample; 0.7% of the globally at-risk/Index File patient sample), 1,006 had foot or ankle amputation (9.8% of the amputation patient sample; 0.2% of the Index File patient sample), 3,117 had a below-knee amputation (representing 30.4% of the amputation patient sample; 0.7% of the Index patient sample), 2,926 had an above-knee amputation (representing 28.5% of the amputation patient sample; 0.6% of the Index File patient sample), 57 had a hip amputation (representing 0.6% of the amputation patient sample; 0.01% of the Index patient sample).

The number of amputations at each PACT facility was examined. PACT ranking (i.e., implementation level) was based on the patients' referring or home station.

- 3,768 patients were referred from VAMCs with "high" PACT ranking
- 2,937 were from VAMCs with "moderate" PACT ranking
- 1,618 from VAMCs with "low" PACT ranking
- 1,935 from VAMCs that did not respond to the PACT survey

In general, highly ranked PACT facilities had the highest number of overall amputations of all other groups (36.7% of all amputations in high PACT facilities vs. 28.6% in moderate PACT vs. 15.8% in low PACT vs. 18.9% in non-participating facilities). When excluded patients from non-participating facilities (VAMCs that did not respond to the BAH PACT internet survey), 45.3% of all amputations (n=8,323) came from high PACT facilities, and 54.7% from moderate and low PACT facilities (35.3% from moderate, and 19.4% from low, respectively).

However, when examining amputations by level, Chi-square analysis showed that there was an overall statistical difference in frequency distribution of amputation levels among patients who were referred from the two types of facilities (χ^2=32.43, df=4, p< .0001). Closer examination revealed that facilities with partially implemented PACT programs (i.e., combining "moderate" and "low" PACT categories) referred more patients for toe and foot/ankle amputation whereas facilities with fully implemented PACT programs referred more patients for above-knee amputations.

To illustrate, out of 2,517 patients who had toe amputation from ranked facilities, 1,450 (57.6%) were from partially implemented PACT facilities (again, "low PACT" and "moderate PACT" combined), 1,067 (42.4%) were from facilities that implemented PACT fully (the "high PACT" facilities). However, statistically speaking, the observed count for toe amputation was much more than expected (i.e., only 1,377 were expected) in facilities that implemented PACT partially. Out of 2,463 patients who had above-knee amputations, 1,206 (49.0%) were from the "high PACT" facilities. However, statistically speaking, the observed number of A/K amputations was much more than expected in high ranked PACT facilities (i.e., only 1,115 were expected, standardized residual = 2.7).

In terms of the amputation rate, the rate for high-PACT facilities was 2.8% (3,768 out of 134,028 patients had amputation from a high ranked PACT facility), whereas the amputation rate for partially implemented

PACT facilities was 2.1% (4,555 out of 216,188 patients had an amputation from a partially implemented PACT facility). Chi-square analysis showed that high ranked PACT facilities had more than expected amputation rate than low-PACT facilities (χ^2=176.94, df=1, p< .0001).

To summarize, overall amputation rates for the entire Index File patient population (i.e., 451,824 patients who had DM or PVD or both, the "globally at-risk" patients identified from the VA outpatient database in 1997) was 2.3% (n=10,258 out of 451,824); overall amputation rate was 2.4% (n=8,323 out of 350,216) when excluding patients referred from facilities that did not participate in the BAH PACT survey. Among VAMCs that participated in the survey (n=350,216), the overall amputation rate for high-PACT facilities was 2.8%, significantly greater than the amputation rate of 2.1% from partial-PACT facilities.

Table 4. Comparison of Number of Amputation Among Facilities with Different PACT Ranking

PACT Ranking			
Type of Amputation	**High**	**Partial (Moderate + Low)**	**Total**
Toe	1,067	1,450	2,517
Foot	317	471	788
BK	1,159	1,345	2,504
AK	1,206	1,257	2,463
Hip	19	32	51
Total	3,768	4,555	8,323

Table 5. Comparison of Number of Amputation Among Facilities with Different PACT Ranking and Non-Ranking

	PACT RANKING				
Type of Amputation	**High**	**Moderate**	**Low**	**Non-Ranked**	**Total**
Toe	1,067	932	518	635	3,152
Foot	317	289	182	218	1,006
BK	1,159	878	467	613	3,117
AK	1,206	817	440	463	2,926
Hip	19	21	11	6	57
Total	3,768	2,937	1,618	1,935	10,258

The high number of amputation surgeries performed in VAMCs with a well implemented (i.e., "high") PACT Program may suggest sampling bias as VAMCs with established programs may see patients with further (advanced) disease progression. Another explanation may reflect the differences in practice patterns of physicians, that is, physicians in VAMCs with well-implemented PACT Programs may be those with more experience and perform more amputations than physicians in VAMCs without fully implemented PACT Programs. The difference in frequency may also reflect patients' selection bias in that patients with advanced diseases might choose to have surgeries done in facilities where they received preventive measures and/or patient education in order to have continuity of care.

Table 6. Comparison Of Amputation Rates In VAMCs With Fully And Partially Implemented PACT Programs From 1997 To 2000 (N=10,258, 1,935 From Non-Ranked Facilities)

	High PACT	Amputation Rate Based on the High PACT Sub-Sample (N=134,028)	Partial PACT (Mod + Low)	Amputation Rate Based on the Partial PACT Sub-Sample (N=216,188)	Did Not Respond	Amputation Rate Based on the Non-Ranked Sub-Sample (N=101,608)
Type of Amputation	N	%	N	%	N	%
Hip	19	.01	32	.01	6	.006
AK	1,206	.90	1,257	.58	436	.43
BK	1,159	.86	1,345	.62	613	.60
Foot	317	.24	471	.22	218	.21
Toe	1,067	.80	1,450	.67	635	.62
Total Amputations	3,768	2.8%	4,555	2.1%	1935	1.9%

Booz Allen performed additional analysis on the characteristics of facilities that were both ranked and not ranked for PACT implementation

VA provided Booz Allen with data to determine the characteristics related to each facility including: average occupancy rate, average daily census, university affiliation, urban vs. non-urban, outpatient visits, authorized beds, discharges and bed days of care. The VA data did not include average authorized beds and occupancy rates for total inpatient services (only surgical units).

VAMCs with a highly implemented PACT Program are more likely to be large, urban, and academically affiliated than facilities with partially implemented PACT programs

There were 114 VAMCs that responded to the PACT Program internet survey and were therefore ranked for their level of implementation of the PACT Directive. VAMCs with different levels of ranking were compared using ANOVAs with Scheffe post hoc analyses when the ANOVAs were significant. Detailed results of the analysis are presented in Appendix F.

VAMCs that had a high level of PACT Program implementation had higher average outpatient visits compared to VAMCs who had partially (included moderate and low) PACT Program implementation, according to outpatient data.

According to the inpatient service data, VAMCs that had a high level of PACT guidelines implementation had higher average admissions, discharges, daily census, bed days of care, and patients treated compared to VAMCs with moderate or low levels of PACT Program implementation. According the surgery service data, VAMCs that had a high level of PACT Program implementation had higher average daily census and bed days of care in the surgical units. No differences were found across PACT ranking regarding average surgery admissions, surgery discharges, patients treated in surgical units, and authorized surgical beds or occupancy rates.

Non-Ranked Facilities were less likely to be located in an urban setting and less likely to affiliated with an university

There were 25 facilities that did not respond to the PACT Program Internet Survey. These facilities were requested to fill out a survey for all facilities that are organizationally aligned in the same health system (e.g. VA North Texas Health Care System), which accounted for 38 VAMCs. These 38 VAMCs were not ranked for their level of implementation of the PACT guidelines. VAMCs that were not ranked were compared to the VAMCs that were previously ranked from the responses to the PACT Internet Survey (n=114) to determine if there were any differences. Non-ranked facilities were similar to VAMCs that were ranked in average admissions, discharges, daily census, bed days of care and number of patients treated according to total inpatient data. According to the surgery service data, non-ranked facilities had higher average daily surgical census and more average authorized beds. Non-ranked facilities were less likely affiliated with a university, and were less likely to be located in an urban setting compared to the VAMCs that were ranked. Details of the analysis results are presented in Appendix G.

3b. What are the re-amputation rates for VA patients who are in PACT Programs and for VA patients not in a PACT Program?

Question 3b addresses re-amputation rates for VAMCs with highly versus partially implemented PACT Programs. Over the four-year period, 12.9 % (or 1,329) of the 10,258 patients had re-amputations; 709 (6.9%) had additional toe amputation; 200 (1.9%) had foot or ankle amputation; 265 (2.6%) had below-knee, and 154 (1.5%) had above-knee amputation.

276 patients (20.8% of 1,329) were referred from facilities that did not participate in the PACT Internet Survey. Among the 1,053 patients whose referring facility had a PACT ranking, 479 were referred from facilities with a high ranked PACT Program, 574 were referred from facilities with a partially implemented PACT Program. When examining re-amputation rates by amputation level, there was a significant difference between the two types of facilities: facilities with a high PACT ranking had fewer toe or foot/ankle amputations than facilities with a moderate or low PACT ranking in toe amputation and foot/ankle amputations. However, there was no significant difference in below-knee or above-knee amputations between VAMCs with a well-implemented PACT Program and VAMCs with a partially implemented PACT Program.

Booz Allen performed additional analysis related to the re-amputation rates among patients who had prior amputations

The analyses were based on PTF surgery files without being matched to the "globally at-risk" patient sample. The Booz Allen team identified 811 patients (1,703 records) who had prior amputations in 1995 or 1996, and examined their re-amputations from 1997-2000.

In 1995 or 1996, 474 patients had a toe amputation and of those:

- In 1997, 179 had another toe amputation(s), 92 had a foot or ankle amputation, 145 had a BK amputation (BK alone, or BK and foot, or BK and foot and toe)[2], 57 had an AK amputation (AK alone, or combination of AK and another lower level amputation), and 1 had a hip amputation.
- In 1998, 105 had another toe amputation(s), 43 had a foot or ankle amputation, 83 had a BK amputation, and 43 had an AK amputation.
- In 1999, 76 had another toe amputation(s), 29 had a foot or ankle amputation, 64 had a BK amputation, and 41 had an AK amputation.
- In 2000, 52 had another toe amputation(s), 37 had a foot or ankle amputation, 56 had a BK amputation, and 22 had an AK amputation.

Table 7. Subsequent Amputations For Those Who Had A Toe Amputation In 1995 Or 1996

	1997	1998	1999	2000	Total
Toe	179	105	76	52	412
Foot	92	43	29	37	201
BK	145	83	64	56	348
AK	57	43	41	22	163
Hip	1	0	0	0	1
Total	474	274	210	167	1125

In 1995 or 1996, 108 patients had a foot amputation and of those:

- In 1997, 28 had another toe amputation(s), 23 had a foot or ankle amputation, 36 had a BK amputation, and 21 had an AK amputation.
- In 1998, 11 had another toe amputation(s), 10 had a foot or ankle amputation, 21 had a BK amputation, and 12 had an AK amputation.

[1] We used tabulation to examine the patterns, and then count the number of the highest level of amputations. For example, patients who had BK amputations in a particular year might have more than one amputations, the pattern included having a BK amputation alone, or a combination of BK and foot amputations, or BK and foot and toe amputations. In each of the tables, we report the number of highest level of "re-amputations" in subsequent years.

- In 1999, 5 had another toe amputation(s), 7 had a foot or ankle amputation, 15 had a BK amputation, and 11 had an AK amputation.
- In 2000, 6 had another toe amputation(s), 2 had a foot or ankle amputation, 14 had a BK amputation, and 12 had an AK amputation.

Table 8. Subsequent Amputations For Those Who Had A Foot Or Ankle Amputation In 1995 Or 1996

	1997	1998	1999	2000	Total
Toe	28	11	5	6	50
Foot	23	10	7	2	42
BK	36	21	15	14	86
AK	21	12	11	12	56
Total	108	54	38	34	234

In 1995 or 1996, 149 patients had a BK amputation and of those:

- In 1997, 12 had another toe amputation(s), 5 had a foot or ankle amputation, 74 had a BK amputation, and 58 had an AK amputation.
- In 1998, 6 had another toe amputation(s), 1 had a foot or ankle amputation, 16 had a BK amputation, 32 had an AK amputation, and 4 had a hip amputation.
- In 1999, 5 had another toe amputation(s), 2 had a foot or ankle amputation, 13 had a BK amputation, 18 had an AK amputation, and 1 had a hip amputation.
- In 2000, 4 had another toe amputation(s), 4 had a foot or ankle amputation, 11 had a BK amputation, and 12 had an AK amputation.

Table 9. Subsequent Amputations For Those Who Had A Below-The-Knee Amputation In 1995 Or 1996

	1997	1998	1999	2000	Total
Toe	12	6	5	4	27
Foot	5	1	2	4	12
BK	74	16	13	11	114
AK	58	32	18	12	120
Hip	0	4	1	0	5
Total	149	59	39	31	278

A. In 1995 or 1996, 80 patients had a AK amputation and of those:

- In 1997, 3 had another toe amputation(s), 10 had a BK amputation, 64 had an AK amputation, and 3 had a hip amputation.
- In 1998, 3 had another toe amputation(s), 1 had a foot or ankle amputation, 2 had a BK amputation, 16 had an AK amputation, and 1 had a hip amputation.

- In 1999, 1 had a toe amputation, another had a foot or ankle amputation, 4 had a BK amputation, and 14 had an AK amputation.
- In 2000, 1 had a BK amputation, and 5 had an AK amputation.

Table 10. Subsequent Amputations For Those Who Had An Above-The-Knee Amputation In 1995 Or 1996

	1997	1998	1999	2000	Total
Toe	3	3	1	0	7
Foot	0	1	1	0	2
BK	10	2	4	1	17
AK	64	16	14	5	99
Hip	3	1	0	0	4
Total	80	23	20	6	129

The four previous tables have been summarized in Table 9. Among patients who already had amputations in 1995 and 1996, in 1997, there are additional 222 toe, 120 foot or ankle, 265 BK, 200 AK, and 4 hip amputations.

Table 11. Frequency Table Of Re-Amputations In 1997 For Patients Who Had Prior Amputations In 1995, 1996

Re-amputation	I (Toe)*	II (Foot)**	III (BK)***	IV (AK)****	Total
Toe	179	28	12	3	222
Foot	92	23	5	0	120
BK	145	36	74	10	265
AK	57	21	58	64	200
Hip	1	0	0	3	4

*Patients had toe amputation in 1995 or 1996.
** Patients had a foot or ankle amputation in 1995 or 1996.
*** Patients had a BK amputation in 1995 or 1996.
**** Patients had an AK amputation in 1995 or 1996.

Re-amputation rates among patients who did not have amputations prior to 1997

In this section, summary tables are provided to show re-amputation rates among patients who did not have amputations prior to 1997.

Among those who had a toe amputation in 1997 (n=1,882):

- In 1998, 240 of them had a toe amputation(s), 86 had a foot or ankle amputation, 111 had a BK amputation, and 48 had an AK amputation.

- In 1999, 91 of them had a toe amputation, 39 had a foot or ankle amputation, 55 had a BK amputation, and 24 had an AK amputation.

- In 2000, 62 of them had a toe amputation, 25 had a foot or ankle amputation, 40 had a BK amputation, and 17 had an AK amputation.

Table 12. Subsequent Amputations for Those Who Had a Toe Amputation in 1997

	1998	1999	2000
Toe	240	91	62
Foot	86	39	25
BK	111	55	40
AK	48	24	17
Hip	0	0	0
Total	485	209	144

In 1997, 618 patients had a foot or ankle amputation and of those:

- In 1998, 22 had a toe amputation(s), 50 had a foot or ankle amputation, 37 had a BK amputation, 26 had an AK amputation, and 2 had a hip amputation.
- In 1999, 9 had a toe amputation, 6 had a foot or ankle amputation, 9 had a BK amputation, and 3 had an AK amputation.
- In 2000, 11 had a toe amputation, 6 had a foot or ankle amputation, 9 had a BK amputation, and 2 had an AK amputation.

Table 13. Subsequent Amputations For Those Who Had A Foot Amputation In 1997

	1998	1999	2000	Total
Toe	22	9	11	42
Foot	50	6	6	62
BK	37	9	9	55
AK	26	3	2	31
Hip	2	0	0	2
Total	137	27	28	192

In 1998, 1,899 patients had a toe amputation and of those:

- In 1999, 199 had a toe amputation, 88 had a foot or ankle amputation, 115 had a BK amputation, 51 had an AK amputation, and 1 had a hip amputation.
- In 2000, 64 had a toe amputation, 35 had a foot or ankle amputation, 52 had a BK amputation, 32 had an AK amputation, and 1 had a hip amputation.

Table 14. Subsequent Amputations For Those Who Had A Toe Amputation In 1998

	1999	2000	Total
Toe	199	64	263
Foot	88	35	123
BK	115	52	167
AK	51	32	83
Hip	1	1	2
Total	454	184	638

In 1998, 686 patients had a foot or ankle amputation and of those:

- In 1999, 99 had a toe amputation, 38 had a foot or ankle amputation, 57 had a BK amputation, 54 had an AK amputation, and 30 had a hip amputation.
- In 2000, 12 had a toe amputation, 11 had a foot or ankle amputation, 20 had a BK amputation, 8 had an AK amputation, and 1 had a hip amputation.

Table 15. Subsequent Amputations For Those Who Had A Foot Amputation In 1998 (N=686)

	1999	2000	Total
Toe	99	12	111
Foot	38	11	49
BK	57	20	77
AK	54	8	62
Hip	30	1	31
Total	278	52	330

Table 16. Subsequent Amputations For Those Who Had A Toe Amputation In 1999 (N=1,878)

	2000
Toe	239
Foot	99
BK	113
AK	66
Hip	2
Total	519

Table 17. Subsequent Amputations For Those Who Had A Foot Or Ankle Amputation In 1999 (N=649)

	2000
Toe	36
Foot	50
BK	43
AK	25
Hip	1
Total	155

3c. What are the amputation rates for VA patients (PACT and non-PACT) and non-VA patients when age and risk-adjusted?

Question 3c addresses the comparability of amputation rates in VA and non-VA facilities and uses data from the PTF-Surgery file. For a variety of reasons (including unavailability of comparable databases and published studies for the non-VA population), we are unable to compare VA amputation rates to those of the non-VA (public or private) sector.

A series of Chi-square analyses were conducted to examine if amputation rates at different levels differed once age and risk were adjusted. We divided patients into three age groups (60 and younger, 61 to 70, and 71 and older), and compare amputation rates among VAMCs with fully and partially implemented PACT programs. There were not significant differences in amputation rates between VAMCs categorized as highly implemented PACT Programs and partially implemented PACT facilities for patients in the lowest level of risk, Risk Level 1. However, for patients with greater risks (Risk Levels 2 and 3), facilities with a high implementation of PACT Program had significantly more amputations than facilities with a partially implemented PACT Program. This finding was observed in all three age groups (≤60, 61-70, ≥71).

Table 18. Amputation Rate (at highest amputation level) with Age and Risk-Adjustments

	Risk Level 1					
	60 and younger		61 to 70		71 and older	
	High PACT	Partial PACT	High PACT	Partial PACT	High PACT	Partial PACT
Rate	0.05	0.03	0.05	0.04	0.04	0.04
N	106,320		105,529		109,155	
p	ns		ns		ns	

	Risk Level 2					
	60 and younger		61 to 70		71 and older	
	High PACT	Partial PACT	High PACT	Partial PACT	High PACT	Partial PACT
Rate	38.5	32.0	44.5	35.9	46.0	34.3
N	3,350		3,651		3,799	
p	<.001		<.001		<.001	

	Risk Level 3					
	60 and younger		61 to 70		71 and older	
	High PACT	Partial PACT	High PACT	Partial PACT	High PACT	Partial PACT
Rate	23.5	20.6	24.8	20.7	25.6	20.7
N	4,453		6,540		7,419	
p	.025		<.001		<.001	

Table 19. Number of Amputations with Age and Risk-Adjustments

	Risk Level 2 (n=4,997)					
	60 and younger* (n=1,163)		61 to 70 (n=1,439)		71 and older (n=1,488)	
Highest Level of Amputation from 97 to 00	High PACT	Partial PACT	High PACT	Partial PACT	High PACT	Partial PACT
Toe	202	257	190	237	175	211
Foot	46	81	49	75	49	53
BK	171	183	224	246	212	224
AK	113	101	199	201	292	265
HIP	3	6	7	11	4	3
Total	535	628	669	770	732	756

	Risk Level 3 (n=5,098)					
	60 and younger (n=966)		61 to 70 (n=1,455)		71 and older* (n=1,681)	
Highest Level of Amputation from 97 to 00	High PACT	Partial PACT	High PACT	Partial PACT	High PACT	Partial PACT
Toe	115	188	187	264	177	259
Foot	55	80	58	98	52	73
BK	132	193	204	231	208	251
AK	85	109	178	229	320	339
HIP	4	5	1	5	0	2
Total	391	575	628	827	757	924

**Significant differences in overall rates (frequency distribution) between high-PACT and partial-PACT.*

ESTIMATED LIMB SURVIVAL TIME IN AT-RISK PATIENTS

We examined the survival time for patients at-risk for having an amputation event, and evaluated variables that increase the relative risk for such patients. In this study, we used Index study sample, and define amputation event as having a first major amputation, i.e., below knee, above knee or hip/pelvis amputations.

Study Sample

From the Index Survival Analysis Sample (n= 451,824, defined as having a documented diagnosis of DM or PVD at the first outpatient visit in 1997), 5,920 patients were identified as having a **first-time major amputation event** (i.e., below knee and above knee amputations). Table 21 summarizes the demographic and clinical information on patients who entered into the analysis.

Analysis Techniques

Survival analysis is concerned with studying the time between entry to a study and a subsequent event (such as first major amputation) (Walters, 2002, "What is…? series", www.evidence-based-medicine.co.uk). If an event (amputation) does not occur, the survival time is "censored" for a given patient. Cox's regression model is used to analyze survival data, providing an estimate of the treatment effect on amputation risk after adjustment for other variables. This analysis provides an estimate of how large an effect each predictor has on amputation risk. A positive regression coefficient means that the risk of amputation is higher.

Findings

Table 18 shows the variables used in the analyses and how they were coded.

Table 20. Variables Entered into Limb Survival Model

VARIABLE	RESPONSES
Gender (1, 0)	Male--compared to Female
Age group for survival analyses	<61 years, 61-70 years, >70 years
Ethnicity (1, 0)	African-American, Hispanic-- compared to Caucasians
PACT Implementation (1, 0)	Full-compared to Partial
Gangrene (1, 0)	Present--compared to Not Present
Ulcer (1, 0)	Present-- compared to Not Present
Diagnoses (1, 0)	DM alone, PVD alone, both DM and PVD
Neuropathy (1, 0)	Present--compared to Not Present
Prior Amputation (1, 0)	Already having an amputation compared to having no prior amputation

The results showed that 3,924 (1.1%) patients had undergone a first major amputation, compared to 345,146 who did not. The mean survival time for those who had an event was 21 months, and 41 months

for those who did not have an event. Table 19 summarizes the magnitude of "relative risk" for variables that increased risk of a major amputation.

Table 21. Results of Survival Analyses

VARIABLE	RISK OF HAVING AN AMPUTATION INCREASES WITH:
Gender	Males are **3.5 times** more likely to have an amputation than females.
Age group	Patients who are 61-70 years old are **1.18 times** more likely to have an amputation than those 60 or younger. Patients who are older than 70 years old are **1.21 times** more likely to have an amputation than those 60 or younger.
Ethnicity	African-Americans are **1.5 times** more likely to have an amputation than Caucasians. Hispanics are **1.3 times** more likely to have an amputation than Caucasians.
PACT Implementation	Patients referred from a VAMC with a well-implemented PACT Program ("high-PACT") are **1.4 times** more likely to have an amputation than those referred from a VAMC with a partially implemented VAMC PACT Program ("moderate" and "low" combined).
Gangrene	Patients who have gangrene are **13.9 times** more likely to have an amputation than those without gangrene.
Ulcer	Patients who have an ulcer are **5.9 times** more likely to have an amputation than those who do not have an ulcer.
Diagnoses	Patients who have PVD are **2.6 times** more likely to have an amputation than those having DM Patients who have both PVD and DM are **9.8 times** more likely to have an amputation than those having DM alone
Prior Amputation	People who had a prior amputation are **4.4 times** more likely to have an amputation than those who did not have a prior amputation.

Table 20 presents the demographic and clinical characteristics of the two populations (i.e., those with and without a first major amputation). Patients with a first major amputation are older, and the percentages of having both DM and PVD and prior amputation are higher. Patients without a major amputation were younger, had greater proportion of having only DM, vascular bypass surgeries, and had longer survival times compared to patients without a major amputation.

Table 22. Characteristics of Patients With and Without a Major Amputation

Characteristics	With Major Amputation (n=3,924) [3]	Summary	No response (missing data)	Without Major Amputation (n=345,146)	Summary	No response (missing data)
Age	Mean 67.8			Mean 64.0		
	Standard Deviation (SD) 10.0			SD 11.6		
Survival Time (in months)	Mean 21.1			Mean 40.9		
	SD 14.1			SD 10.5		
	N			**N**		
Gender						
Male	3,900	99.4%		335,660	97.3%	
Female	24	0.6%			2.7%	
Ethnicity						
Caucasian	2,319	59.1%	363	181,767	52.7%	93,441
African American	916	23.3%	9.3%	48,640	14.1%	27.1%
Hispanic	302	7.7%		18,841	5.5%	
Other	24	0.6		2,412	0.7%	
Diagnosis						
DM only	1,860	47.4%		283,330	82.1%	
PVD only	1,016	25.9%		55,926	16.2%	
DM and PVD	1048	26.7%		5,890	1.7%	
Had Vascular Bypass Surgery	19	0.5%		4,316	1.3%	
Amputation prior to 1997	533	13.6%		3,347	1.0%	
Ulcer	461	11.7%		4,252	1.2%	
Gangrene	602	15.3%		308	0.1%	

[3] For survival analysis, patients who had missing data for any variables used in the analysis were excluded (e.g., if missing PACT ranking, the patient would not be included). As a result, n=3,924, not 5,920 were included.

CONCLUSIONS

VA patients at-risk for lower limb loss are screened for at-risk conditions and are referred to appropriate foot care specialists

The study findings demonstrate that clinical strategies for risk reduction are, overall, widely applied by VA staff. Among the patient population deemed to be susceptible, a high percentage underwent:

- Inspection of visual foot (93%),
- Examination of lower extremity sensation (82%),
- Evaluation of foot pulses (88%),
- Test for hemoglobin A1c (93%), and
- Examination of retina (72%).

VA patients at-risk for lower limb loss receive information and education on risk factors for amputation at a very high rate

The study data demonstrates that, in general, these educational efforts are a high priority for VA. For example, 93% of at-risk patients received nutrition counseling (based on those surveyed) and 83% received some type of counseling for smoking cessation.

There is no definitive data source to determine patient compliance with educational and counseling efforts and recommendations. For example, few eligible patients were coded as having visited smoking cessation clinics. However, attendance at clinics neither guarantees smoking cessation, nor is it the only route available to patients for assistance with smoking cessation. Similarly, 12% of surveyed records indicated patients received prescriptions to change footwear, and 51% of those patients were coded as having visited a clinic for a therapeutic footwear check. However, only a few had a documented outpatient clinic visit. It is unclear whether this discrepancy is attributable to lack of cross walk between data sources, poor patient compliance, incomplete coding, or the availability of other non-clinic avenues for footwear assessment.

VAMCs that have a high ranked PACT Program are more likely to be large, urban and academically affiliated facilities

The additional analysis conducted on VAMCs with high and partially implemented PACT Programs confirm that VAMCs with highly implemented PACT programs see more patients than VAMCs with moderate or low implementation, tend to be affiliated with universities, and tend to be in urban environments. VAMCs with highly implemented PACT Programs had higher outpatient visits, average admissions, discharges, daily census, bed days of care, and number of patients treated than facilities with a partially implemented PACT Program.

Initial amputation rates and re-amputation rates are higher in VAMCs with highly implemented PACT Programs than VAMCs with partially implemented PACT Programs

The VA data obtained for this study was analyzed using several different methodologies, all of which resulted in the same finding that amputation rates are higher in facilities that have a highly implemented PACT Program. The additional analysis conducted on the ranked facilities show that highly implemented PACT Program facilities are large, urban and academically affiliated, suggesting that these facilities care for patients with more severe illnesses.

It is likely that VAMCs with well-implemented PACT Programs are more established, with strong reputations for limb preservation efforts and surgical outcomes. Potentially drawing patients with further-advanced diabetes, peripheral vascular disease, and foot disease, these PACT Programs would experience a non-random distribution of patients, characterized by higher percentages of more advanced circulatory problems.

Alternatively, VAMCs with highly implemented PACT Programs may have different levels of experience and amputation thresholds than partially implemented PACT Program facilities. For example, highly implemented PACT Programs may be more likely to attempt early peripheral amputations (i.e., toe, foot, and low BK) to minimize higher-level amputations later. Consequently, these programs will have more frequent re-amputations.

Demographic and clinical characteristics have a significant impact on the risk of having an amputation

The study results show that patients with gangrene are 13.9 times more likely to have an amputation than those patients without signs of gangrene and patients with an ulcer are 5.9 times more likely to have an amputation than those without an ulcer. Patients who have PVD are 2.6 times more likely to have an amputation, and those with both PVD and DM are 9.8 times more likely to have an amputation than those with DM alone. The study results also show that males are 3.5 times more likely to have an amputation than females. Age is a factor for amputation, with patients older than 70 are 1.21 times more likely to have amputation than patients 60 years old or younger. Ethnicity also is a factor; African Americans are 1.5 times more likely to have an amputation than Caucasians.

RECOMMENDATIONS

**See Review and Analysis of VA's PACT Program (October 16, 2002) for management and operations related recommendations*

VA should develop an enhanced program of database education for its staff to increase the accuracy and comprehensiveness of its patient care data

During this study, the Booz Allen team encountered incomplete, conflicting, and sometimes inaccurate data that required creating statistical surrogates and modifying assumptions, to make the available data as meaningful and useful as possible.

The VA should enhance the accuracy, comprehensiveness, and reproducibility of data entry and collection processes by VA staff to further improve the quality of ongoing monitoring and subsequent studies on VA patients. Improved data would provide the VA the opportunity to better document patient care quality, performance improvement and its funding requests.

VA should consider more fully evaluating the observed discrepancy in amputation and re-amputation rates in VAMCs with highly implemented and partially implemented PACT Programs

While the Booz Allen team has confidence in the data suggesting differences among amputation and re-amputation rates, these differences were statistically significant but not large. A number of critical questions should be addressed.

- Are differences a result of patient preference?
- Do patients perceive specific VAMCs to be *de facto* limb preservation "Centers of Excellence" within VA, and is that perception accurate? What factors among partially implemented PACT Programs contribute to this perception, i.e., clinical outcomes, customer service, business processes? Does this perception, if present, have an impact on veterans' perceptions of partially - implemented PACT Programs' competencies for other healthcare and preventive services?
- Would VA wish to augment this perception, if it exists? Does VA need to address the use of customized program and service capabilities if specific centers are perceived as specialty centers?
- Are there practices and processes that should be disseminated to highly implemented and partially implemented PACT facilities alike, e.g., standardized limb-preservation care and amputation guidelines?
- Are there budgetary, staffing, and/or other financial implications to this phenomenon?

VA should consider testing predictive validity of the new risk assignment prospectively, which will clarify patient characteristics related to lower extremity amputations

Booz Allen identified several patient characteristics related to the probability of a lower extremity amputation and the results of these two analyses supported preliminary validity of the new risk assignment. VA should consider testing predictive validity of the new risk assignment prospectively, which will clarify patient characteristics related to lower extremity amputations. These results will strengthen the ability of VA to identify veterans at-risk of lower extremity amputation and provide data necessary to improve the ability to monitor the success of PACT and EPRP programs.

VA should contemplate implementing new management and outcomes data to strengthen implementation of PACT guidelines, develop standardized data and method of collection, and test the effect of PACT guidelines

Booz Allen determined that VAMCs have differing levels of PACT program implementation making comparisons of outcomes between VAMCs with and without fully implemented PACT programs challenging. A prospective three-part project should be undertaken to 1) identify unwarranted variation in PACT Program implementation, 2) correct unwarranted variation in PACT Program implementation, and 3) develop and prospectively collect standardized patient and program characteristics data that can be used to compare results of the PACT Program implementation. The results of this management and outcomes data project will strengthen implementation of PACT guidelines, develop standardized data and method of collection, and test the effect of PACT guidelines.

VA patients should be followed over time using the current VA data collection processes to examine other outstanding health issues, as well as additional re-vascularization and amputation surgery episodes

Patients should be followed over time using the current VA data collection processes to examine other outstanding health issues, as well as additional re-vascularization and amputation surgery episodes. VA should then be able to further assess at-risk variables. These results will strengthen VA's ability to identify veterans at-risk for lower extremity amputation and provide data necessary to improve the ability to monitor the success of PACT and EPRP programs using current VA data collection procedures.

VA should utilize specific performance measures to evaluate the care and treatment of patients at-risk for limb loss and those with amputations

The VA should utilize a set of performance measures to evaluate the care to patients at-risk for limb loss and those with amputations over time, see the table of measures on the following pages. Booz Allen recommends that VA convene a multidisciplinary team to determine desirable clinical goals and outcomes for the PACT Program and to refine the performance measures used to evaluate and monitor this program. It is important to note that VA should not utilize amputation rate alone to measure the success of the PACT Program. Many factors, as evidenced by this study, influence a facilities amputation rate such as severity of patient illness and individual clinician judgment. Also, the successful treatment of an at-risk patient may involve a less severe amputation to delay or prevent a high level amputation.

Table 23. Performance Measures Related to At-Risk for Amputation Patients

PERFORMANCE MEASURE CATEGORY	PERFORMANCE MEASURE/METRIC	DATA SOURCE
Quality of Life	**Quality of Life** Measure the eight functional scales from the SF-36 to assess patient self-report of quality of life over time. The eight scales include: ➢ **general health** ➢ **physical functioning** ➢ **role physical** ➢ **bodily pain** ➢ **mental health** ➢ **role emotional** ➢ **social functioning** ➢ **vitality** The SF-36 scores per construct would be transformed to measures ranging from 0 to 100 with higher scores suggesting better function or health.	SF-36v
Customer Service	**Education/ Training** ➢ Percent of patients that report knowledge of routine home care wound treatment	Patient Satisfaction Survey
	➢ Percent of patients that report they received diet counseling during the last twelve (12) months	
	➢ Percent of patients that report they have been seen by a diabetes educator during the last twelve (12) months	
	Satisfaction ➢ Percent of patients that report they are satisfied with the care provided to them at VA medical centers	
	Access ➢ Percent of at-risk patients within travel time and distance requirement (Zip Code File) ➢ Average wait time (in minutes) for at-risk patients to see a provider after check in ➢ Average wait time (in days) for at-risk patients to obtain an appointment ➢ Percent of at-risk patients satisfied with ease of making appointments	Patient Satisfaction Survey and/or VISTA scheduling package

PERFORMANCE MEASURE CATEGORY	PERFORMANCE MEASURE/METRIC	DATA SOURCE
Operations (Clinical Practices & Costs)	**Referred to a Foot Care Specialist** ➢ Percent of at-risk patients with an abnormal finding that were referred to a foot-care specialist (PACT Coordinator, Podiatrist, Orthopaedic or Vascular Surgeon, Diabetic Educator, etc).	EPRP or new tool
	Inspection of the Foot ➢ Percent of at-risk patients that had a vascular/foot examination during the last twelve (12) months. ➢ Percent of patients who have evidence of peripheral arterial disease (PAD) who have had a vascular/foot examination during the last four (4) months	
	Prescribed Therapeutic Shoes ➢ Percent of at-risk patients (with signs of foot deformities, Charcot's foot, previous foot ulcer) that were prescribed therapeutic shoes	
	Assignment of Risk Indicator ➢ Percent of diabetic or PVD patients that were assessed and assigned a risk indicator or score for a risky-foot. Risky-foot signs include signs of ulceration, loss of protective sensation, foot deformities, foot ulcerations, prior amputations, gangrene, etc.	
	Patient tracking mechanisms ➢ Percent of facilities tracking at risk patients	VISN/VAMC report
	Cost ➢ Average cost of care per case per year – At Risk (Diabetic/PVD) patients – Amputation patients Total dollars spent on service provision to patient population/Number of patients served in one year period	DSS or other cost tracking database

APPENDIX A—AT-RISK FOR AMPUTATION ANALYSIS METRICS

PERFORMANCE MEASURE	ANALYSIS METRIC/ DATABASE (S) UTILIZED	RESULTS
% of at-risk patients referred for evaluation	1. What percent of patients at-risk for lower limb loss were referred to a foot care specialist by VAMC? EPRP	**N=10,586** RESPONSES 3,447 (32.6% valid pct) had been referred to a foot care specialist for further evaluation of abnormal findings
	1a. What percent of patients had their feet inspected and were identified as having a risk for future complications? EPRP	N=10,608 RESPONSES 5,355 (50.6%) were currently under the specialists' care for foot problems 359 (3.4%) were previously evaluated by a foot specialist, and the problem was concluded stable 9,161 (86.5%) were either screened, referred or evaluated by a foot care specialist
Screened by foot care specialist	1b. What percent documented a visual inspection of patient's feet? EPRP	N=47,247 44,012 (93.2%) documented a visual inspection of the patient's feet
Assessment of risk level	1c. What percent of patients are assigned a risk level? Distribution of patients at different risk levels on first visit **OPC/PTF**	N=44,012 (AT-RISK SAMPLE) (Risk Level 1) 33,899 (77.0%) patients with DM or PVD but did not have sensation loss, neuropathic complications, or history of ulceration or amputation (Risk Level 2) 4,510 (10.2%) patients with DM or PVD and had "foot deformity" or sensory loss, color change or foot pulse abnormality (Risk Level 3) 5,603 (12.7%) patients with DM or PVD and had an ulcer, gangrene or prior amputation

PERFORMANCE MEASURE	ANALYSIS METRIC/ DATABASE (S) UTILIZED	RESULTS
	1d. What percentages of patients are at each risk level? Applied risk level determined by formula created by clinical staff OPC/PTF	**N=35,**423 RESPONSES 17,177 (42% of 44,012 / 51.5% valid pct) had a minor abnormality 257 (0.6% / 0.7% valid pct) had a pre-ulcer or hemorrhage under a callus 1,225 (2.8% / 3.5% valid pct) had a skin breakdown or healing ulcer 3,287 (7.5% / 9.3% valid pct) had an ulcer or other sores 1,118 (2.5% / 3.2% valid pct) had a color abnormality on elevation 1,976 (4.5% / 5.6% valid pct) had decreased temperature or absence of pulses 4,270 (9.7% / 12.1% valid pct) had decreased protective sensation N=16,880 RESPONSES 625 (1.4% / 3.7% valid pct) had foot deformities N= 17,071 RESPONSES 1,015 (2.3% / 5.9% valid pct) had other abnormal findings

PERFORMANCE MEASURE	ANALYSIS METRIC/ DATABASE (S) UTILIZED	RESULTS
Prevention index measures	1e/f. What percentage of patients are percentages of patients are assigned a Prevention Index? No formal Prevention Index was assigned as far as we knew. We answer this question by reporting the percentage of patients who received a variety of preventive measures. EPRP	**N=** 44,012 44,012 had a visual inspection of their feet 35,897 (81.6%) had examination of their lower extremity sensation 38,539 (87.6%) were checked for lower extremity pulses 40,699 (92.5%) were tested for their hemoglobin A1c 31,643 (71.9%) had a funduscopic examination of the retina
Patient education, including nutrition consult, smoking cessation	2. What percent of patients at-risk for lower limb loss received educational services on diabetes mellitus, weight, diet, tobacco, symptom change and footwear change? EPRP	N= 44,012 41,146 (93.5%) received education on risk factors for amputation Note: Select patients who received counseling on diabetes mellitus, weight, diet, tobacco, symptom change or footwear change. Since each variable has different number of responses, we used the entire at-risk population as our denominator
	2.1 Percent who received nutrition consult EPRP	N=31,448 RESPONSES 29,239 (66.4% of 44,012 or 93% valid pct) received a nutrition consult

PERFORMANCE MEASURE	ANALYSIS METRIC/ DATABASE (S) UTILIZED	RESULTS
	2.2 Percent of patients who were counseled regarding tobacco risks or were referred to a smoking cessation program Percent of patients have smoking cessation stop code EPRP OPC	**N=4,**640 responses 3,864 out of 4,640 (83.3% valid pct) patients were counseled at least once regarding tobacco use or were referred to a smoking cessation program 3 of 3,864 (0.00%) stopped by the smoking cessation clinic (Clinical Stop Code 707) N=5,969 RESPONSES 3,584 (60.0% valid pct) were counseled regarding tobacco risk to health
Regular preventive foot care	2.3 Percent of patients who have preventive foot-care clinic stop code EPRP OPC	N=44,012 140 (0.3%) were under the care of a foot care specialist (Podiatry: clinical stop code 411)
Therapeutic footwear and orthotics prescribed, Custom shoes and braces	2.4 Percent of patients prescribed a footwear change EPRP OPC	N=44,012 According to EPRP, 782 out of 6,561 (11.9% valid pct) patients had a prescription to change footwear. According to OPC, 398 (.9% of 44,012) of patients went to a clinic (clinical stop code 417) for therapeutic footwear check 11 out of 782 (1.4%) of patients who had a prescription to change footwear also went to a clinic for therapeutic footwear check. According to OPC, 398 (0.9% of 44,012, 50.9% of 782) of patients went to a clinic for therapeutic footwear check, and 11 of them had a documented outpatient visit to the Prosthetic and Orthotic Clinic (Clinical Stop code 417).

PERFORMANCE MEASURE	ANALYSIS METRIC/ DATABASE (S) UTILIZED	RESULTS
Amputation and re-amputation rates	3a. Estimate amputation rates for VAMCs that have fully implemented PACT Programs vs. those who do not. PTF-Surgery	See Table 6
	3b. Estimate re- amputation rates for VAMCs that have PACT Program vs. those who do not have an active PACT Program PTF-Surgery	See Tables 7-17
	3c. What are the amputation rates for VA patients (PACT and non-PACT) and non-VA patients, when age and risk adjusted? PTF-Surgery	**See** Table **18**

APPENDIX B—DATABASE DEFINITIONS

Patient Treatment File (PTF) and Outpatient Care File (OPC)—Both files collect nationwide data and are housed in the Austin Automation Center (AAC). The PTF collects discharge data about each inpatient episode of care. It contains demographics, ICD-9 discharge diagnoses, up to 32 ICD-9 procedures for each episode of care including dates of the procedure, and up to five surgical procedures. The corresponding outpatient file collects data on each outpatient visit, but diagnoses have been collected only for a few years. Its validity has not been as widely studied as that of the PTF. The companion Beneficiary Identification and Records Locator Subsystem (BIRLS) is an administrative database frequently used to track patient mortality, as it does not require locating veterans through receipt of medical care.

External Peer Review Program (EPRP)—This program uses an outside contractor to measure quality of care processes and outcomes in VA patients through chart review in every VA medical facility. The mechanism compares VA care to an external set of criteria drawn from a clinical guideline written by non-VA physicians.

Functional Independence Measure (FIM)—A disability assessment tool considered the industry standard. It is a basic indicator of severity of disability, using an 18-item scale that addresses seven levels of function.

Functional Status and Outcomes Database for Rehabilitation (FSOD)—A database established in 1997 through a cooperative agreement between the Office of Physical Medicine and Rehabilitation, the Uniform Data System for Medical Rehabilitation (UDSmr), and the Austin Automation Center. It tracks outcomes through the full continuum of rehabilitative care.

National Prosthetic Patient Database—A nationwide database that tracks prosthetics-provided equipment and supplies and repairs and can provide summaries of volume and costs.

Veterans SF36 (Short Form Functional Status Assessment for Veterans)—Adapted from the Medical Outcomes Study (MOS) SF-36, this is a primary measure of health-related quality of life. It measures eight concepts of health: physical functioning, role limitations due to physical problems, bodily pain, general health perceptions, energy/vitality, social functioning, role limitations due to emotional problems, and mental health.

Uniform Data System for Medical Rehabilitation (UDSmr)—UDSmr is the largest national registry of standardized information on medical rehabilitation inpatients in the U.S.

APPENDIX C—EPRP DEFINITIONS

MNEMONIC	QUESTION TEXT	DEFINITION/DECISION RULES
acei	Was the patient on or prescribed an ACE inhibitor within the past two years?	ACE inhibitors may be effective in decreasing proteinuria in diabetic patients.
allvsts	For patients with less than three visits to an applicable clinic a year, was the patient counseled at every visit regarding risks of tobacco use and/or encouraged to stop using tobacco?	Referral to a tobacco cessation class or program (or if the patient was already attending such a program) is the same as counseling, even if the patient didn't attend.
	Does medical record documentation contain a copy of written discharge instruction to the patient regarding each of the following:	If a written discharge instruction sheet is present in the record, but a section addressing any specific instruction is left blank, do not consider the specific instruction to have been given.
dcdocact	Activity Level?	
dcdocdiet	Diet?	
dcdocsym	What to do if symptoms worsen?	
dcdocwt	Weight monitoring?	
dcdpcmeds	Discharge Medications?	
footinsp	Within the previous year, does the record document a visual impairment of the patient's feet?	If patient is unilateral amputee of lower extremity, question is pertinent to the remaining foot. Visual inspection of the feet should include inspection for breaks in skin, erythema, trauma, and pallor on elevation, dependent rubor, nail deformities, extensive callus and pitting edema.
Footplse	Within the past year, does the record document pulses were checked in patient's feet?	Foot should be examined to determine presence of dorsalis pedis (DP) and posterior tibial pulses. Signs and symptoms of vascular complication include no palpable pulses and signs of acute ischemia. There must be documentation in the record sufficient to indicate that pulses were or were not palpable.
footspec	Was the patient referred to a foot care specialist (PACT coordinator, Podiatrist, Orthopedic or Vascular Surgeon,	PACT coordinator. If pt was identified as having loss of protective sensation, prescription of protective footwear may also be counted as referral. If appt. not kept,

MNEMONIC	QUESTION TEXT	DEFINITION/DECISION RULES
	Diabetic Educator, etc.) for further evaluation of the abnormal finding?	referral still occurred.
ftwrchng	Designate the recommended footwear change.	Protective footwear may include walking or athletic shoes, soft insoles, and extra depth shoes with or without custom molded inlays. Some diabetic patients are eligible for special shoes paid for by VHA, while others are eligible only for shoes paid for by Medicare. A recommendation for preformed inserts may be to purchase such inserts commercially or to have such inserts custom-made. Protective footwear is designed to meet the diabetic patient's individual need.
ftwrpres	Designate the prescribed footwear change.	*Protective footwear may include walking or athletic shoes, soft insoles, and extra-depth shoes with custom-molded inlays, and custom-molded therapeutic shoes.* *The following fall under the compensation package for the Medicare Shoe Program: preformed inserts, orthotics, molded shoes, and extra-depth shoes.* *Orthotics = specially engineered foot devices worn inside the shoe: orthotics are designed to control abnormal foot function, absorb shock, enhance balance, and take pressure off problem areas.* *Cam Walker = a rigid rocker-bottom (RRB) sole, designed to protect the lower leg, ankle, and foot.* AFO = ankle foot orthosis
Onedt	Enter the date of the most recent visit in which the patient was counseled regarding tobacco use or referred to a tobacco cessation program	"Most recent visit" always refers to the visit prior to the pull list date (study interval date for the baseline data collection.) No data may be taken from visits following the pull list date.
onetime	Enter the date of the one encounter in which the patient was counseled regarding tobacco use or referred to a tobacco cessation program	
pecouns	Within the past two years, does the record document counsel to the patient regarding increased physical activity?	Examples of counseling to increase physical activity are as follows: incorporate regular physical activity into daily/weekly routine; benefits of increased physical activity; or methods for increasing physical activity such as "walk daily". Current level of activity appropriate for this patient's current age, physical state, and activity needs.

MNEMONIC	QUESTION TEXT	DEFINITION/DECISION RULES
		This can mean the patient is actively engaged in regular physical activity such as walking, jogging, bicycling or, conversely, performs only minimal physical exertion but is at the limit of his/her capability.
preschng	Was a change in the patient's footwear prescribed?	Some diabetic patients are eligible for special shoes paid for by VHA, while others are eligible only for shoes paid for by Medicare. In some instances, prescription and custom design, fitting, and/or molding are required.
shoechng	Was a change in the patient's footwear recommended?	Recommendation can come from primary care provider. Suggestion of new shoes, larger shoes, use of athletic shoes, or "no bare feet" is a recommended change in footwear.
stoptob	Within the past year, during at least three visits to applicable clinics, was the patient counseled regarding risks of tobacco use and/or encouraged to stop using tobacco?	Counseling should occur at a visit to one of the 8 applicable clinics. The visits do not have to be consecutive. Do not count counseling done in the emergency department, the inpatient setting, or any place other than the eight clinics (with the exception of the tobacco cessation clinics, classes or counseling sessions).
threedts	Enter the dates of the three visits in which the patient was counseled regarding risks/cessation of tobacco use.	The encounters do not have to be consecutive. Counseling provided three times within in year is sufficient
tobacold	Within the past year, was the patient counseled at least once regarding tobacco use or referred to a tobacco cessation program?	Referral to a tobacco cessation class or program (or if the patient was already attending such a program) is the same as counseling, even if the patient didn't attend
tobcess	Did the patient receive tobacco use cessation advice or counseling during the hospitalization?	Smoking Counseling: Documentation indicating the patient was advised to quit using tobacco, whether or not the patient is a current user. Shown a tobacco use cessation video. Given a brochure or handouts on tobacco use cessation. Referred to a smoking cessation class or clinic. Prescribed a smoking cessation aid such as Nicoderm or bupropion.
tobstatus	Enter the patient's most recent tobacco use status documented in the medical record	Documentation of patient's current status in regard to smoking or tobacco use indicates the patient was screened for tobacco use. If there is conflicting information regarding the patient's tobacco use, use the most recent information.
wtcoun	Within the past two years, was the patient counseled regarding	Sources: Optimal sources are nutrition assessment/notes by Dietary Service and

MNEMONIC	QUESTION TEXT	DEFINITION/DECISION RULES
	weight control?	clinic notes by the physician or nurse practitioner. 1.In most instances, nutrition counseling can also be regarded as weight control counseling. (See examples in the context of the question.) Discussion of a low calorie or ADA diet with limited calorie restriction is weight control counseling. 2. Also acceptable is discussion of the patient's weight, even is the weight is normal or less than normal. Example: "keep watching your weight," "your weight is fine," "you could gain a few pounds." 3. If the patient was referred for weight control counseling or a class, but refused to attend, answer '1' because the patient was counseled. 4. If the record shows the patient was asked about current progress with diet or weight loss, accept as weight control counseling. 5. Checklist formats must contain date and clinician initials or signature. 6. Notation of the patient's current dietary habits/food intake is not acceptable unless there is also weight control/nutrition advice.

APPENDIX D—VAMCS THAT REFERRED PATIENTS TO A FOOT CARE SPECIALIST

VAMC-CITY, STATE	NUMBER OF PATIENTS REFERRED TO FOOT CARE SPECIALIST
Togus, ME	12
White River Junction, VT	10
Ft. Harrison/ Miles City, MT	4
Fargo, ND	11
Sioux Falls, SD	2
Cheyenne, WY	58
Witchita, KS	27
Honolulu, HI	33
Wilmington, DE,	18
Anchorage, AK	3
Albany, NY	14
Albuquerque, NM	32
Alexandria, LA	22
Altoona, PA	43
Amarillo, TX	43
Ann Arbor, MI	18
Decatur, GA	25
Augusta, GA	33
Baltimore, MD	19
Bath, NY	6
Battle Creek, MI	4
Bay Pines, FL	17
Beckley, WV	21
Bedford, MA	11
West Texas HCS, TX	15

VAMC-CITY, STATE	NUMBER OF PATIENTS REFERRED TO FOOT CARE SPECIALIST
Gulf Coast HCS (Biloxi), MS	25
Birmingham, AL	59
Bonham, TX	4
VA Boston HCS- Boston Div., MA	13
Brockton, MA	16
Bronx, NY	29
Brooklyn, NY	25
Upstate New York HCS (Buffalo, Batavia), NY	18
Butler, PA	80
Boise, ID	16
Canandaigua, NY	17
Castle Point, NY	11
Charleston, SC	19
Westside, IL	2
Chillicothe, OH	22
Cincinnati, OH	22
Clarksburg, WV	48
Cleveland-Wade Park, OH	19
Coatesville, OH	9
Columbia, MO	25
Columbia, SC	16
Miami, FL	8
W Palm Beach, FL	25
Dallas VAMC, TX	37
Illiana/Danville, IL	9
Dayton, OH	25
Detroit, MI	10
Denver, CO	56
Des Moines, IA	18

VAMC-CITY, STATE	NUMBER OF PATIENTS REFERRED TO FOOT CARE SPECIALIST
North Chicago, IL	28
Dublin, GA	8
Durham, NC	69
East Orange, NJ	17
Erie, PA	55
Fayetteville, AR	21
Fayetteville, NC	11
Fort Lyons, CO	17
Fort Meade, SD	19
Fresno, CA	11
Gainesville, FL	8
Grand Island, NE	7
Grand Junction, CO	9
Hines, IL	4
Houston, TX	22
Huntington, WV	9
Indianapolis, IN	13
Iowa City, IA	37
Iron Mountain, MI	1
Jackson, MS	28
Kansas City, MO	35
Hampton, VA	17
Knoxville, IA	3
Las Vegas, NV	11
Lake City, FL	4
Lebanon, PA	15
Lexington-Leestown, KY	15
Lincoln, NE	1
Little Rock, AR	25

VAMC-CITY, STATE	NUMBER OF PATIENTS REFERRED TO FOOT CARE SPECIALIST
Long Beach HCS, CA	15
Louisville, KY	6
Loma Linda VAMC, CA	13
Madison, WI	12
Manchester, NH	15
Marion, IL	7
Marion, IN	11
Sacramento, CA	34
Martinsburg, WV	28
Memphis, TN	17
Miles City, NM	11
Minneapolis, MN	8
Montgomery, AL	21
Castle Point/Montrose, NY	16
Mountain Home, TN	24
Murfreesboro, TN	40
Muskogee, OK	23
Nashville, TN	54
New Orleans, LA	29
New York, NY	22
Northampton, MA	24
Northport, NY	24
Oklahoma City, OK	18
Omaha (incl Lincoln), NE	9
Asheville-Oteen, NC	27
Palo Alto-Palo Alto, CA	88
Philadelphia, PA	13
Phoenix, AZ	79
Pittsburgh, PA	129

VAMC-CITY, STATE	NUMBER OF PATIENTS REFERRED TO FOOT CARE SPECIALIST
Poplar Bluff, MO	11
Portland, OR	29
Tucson/Prescott, AZ	29
Providence, RI	15
Richmond, VA	31
Roseburg HCS, OR	23
Reno, NV	17
Saginaw, MI	17
St Cloud, MN	10
St Louis, MO	8
Salem, VA	18
Salisbury, NC	9
Salt Lake City, UT	18
San Francisco, CA	24
Seattle, WA	28
San Diego, CA	22
Station Not Identified	15
Sheridan, WY	26
Shreveport, LA	20
Spokane, WA	18
Syracuse, NY	30
San Antonio, TX	38
San Juan, PR	14
Tampa, FL	65
Temple, TX	88
Tomah, WI	9
Topeka, KS	7
Tucson, AR	30
Tuscaloosa, AL	38

VAMC-CITY, STATE	NUMBER OF PATIENTS REFERRED TO FOOT CARE SPECIALIST
Tuskegee, AL	6
Leavensworth, KS	2
Walla Walla, WA	12
Washington, DC	22
West Haven (incl Newington), CT	21
Los Angeles, CA	15
White City, OR	11
Wilkes Barre, PA	39
Milwaukee, WI	8
Station Not Identified	3
El Paso, TX	60
Columbus, OH	21
	3,448

APPENDIX E— THOSE FACILITIES THAT DID NOT RESPOND TO THE PACT INTERNET SURVEY

VAMC	VISN
VAMC Altoona, PA	4
VA ALASKA HEALTH CARE SYSTEM & REGIONAL OFFICE	20
VA Ann Arbor Health Care System	11
VAMC Bay Pines, FL	8
VA BLACK HILLS HEALTH CARE SYSTEM -VAMC Fort Meade, SD Division -VAMC Hot Springs, SD Division	23
VAMC Butler, PA	4
VA CENTRAL CALIFORNIA HEALTH CARE SYSTEM	21
VAH Columbia, MO	15
VA EASTERN KANSAS HEALTH CARE SYSTEM -VAMC Leavenworth, KS Division -VAMC Topeka, KS Division	15
VAMC Erie, PA	4
VA GREATER LOS ANGELES HEALTH CARE SYSTEM -VAMC Sepulveda, CA Division -VAMC West Los Angeles, CA Division	22
VAMC Kansas City, MO	15
VAMC Lebanon, PA	4
VA LONG BEACH HEALTH CARE SYSTEM	22
VAMC Marion, IL	15
VAMC Murfreesboro, TN (Division)	9
NORTHERN ARIZONA VA HEALTHCARE SYSTEM (Prescott)	18
VA NORTHERN INDIANA HEALTH CARE SYSTEM -VAMC Fort Wayne, IN Division -VAMC Marion, IN Division	11
VA PALO ALTO HEALTH CARE SYSTEM -VAMC Palo Alto, CA Division -VAMC Menlo Park, CA Division -VAMC Livermore, CA Division	21
VAMC Poplar Bluff, MO	15
VAMC Richmond, VA	6
VAMC Salisbury, NC	6
VAMC Syracuse, NY	2
VAMC Washington, DC	5
VA WESTERN NEW YORK HEALTH CARE SYSTEM -VAMC Batavia, NY Division -VAMC Buffalo, NY Division	2

APPENDIX F—RESULTS OF ANALYSIS RELATED TO PACT RANKED FACILITIES

Outpatient Service Data

Results of facilities ranked high, moderate, low
VAMCs ranked high (n=35) had higher (373448±29900) average visits compared to VAMCs ranked low (n=27; 258247±34043), but high was not different than moderate (n=45; 294300±26370) (F=3.6, p=.031).
VAMCs ranked high (n=80) had similar (328928±187789) average visits compared to VAMCs ranked low (n=27; 258247±150864) (two-sample t=1.97, df=55.3, p=.054).

Results of facilities ranked high vs. partial
VAMCs ranked high (n=35) had higher (373448±195809) average outpatient visits compared to VAMCs ranked low (n=72; 280780±166686) (two-sample t=2.41, df=58.7, p=.02).

Inpatient Service Data

Results of facilities ranked high, moderate, low
VAMCs ranked high (n=35) had higher (5,874±459) average admissions compared to VAMCs ranked moderate (n=44; 4,060±410) or VAMCs ranked low (n=27; 3,772±523) (F=5.97, p=.004).
VAMCs ranked high (n=35) had higher (5,855±455) average discharges compared to VAMCs ranked moderate (n=44; 4,068±406) or VAMCs ranked low (n=27; 3,759±518) (F=5.98, p=.003).
VAMCs ranked high (n=35) had higher (170.2±14.1) average daily census (cumulative) compared to VAMCs ranked moderate (n=44; 109.3±12.5) or VAMCs ranked low (n=27; 97.9±16) (F=7.36, p=.001).
VAMCs ranked high (n=35) had higher (62,113±5,134) average bed days of care compared to VAMCs ranked moderate (n=44; 39,890±4,579) or VAMCs ranked low (n=27; 35,739±5,845) (F=7.36, p=.001).
VAMCs ranked high (n=35) had higher (6,013±466) average patients treated compared to VAMCs ranked moderate (n=44; 4,171±415) or VAMCs ranked low (n=27; 3,858±415) (F=6.04, p=.003).

Results of facilities ranked high vs. partial
VAMCs ranked high (n=79) had similar (4,864±2,814) average admissions compared to VAMCs ranked low (n=27; 3,773±2,824) (two-sample t=1.74, df=44.9, p=.09).
VAMCs ranked high (n=79) had similar (4,860±2,779) average discharges compared to VAMCs ranked low (n=27; 3,759±2,814) (two-sample t=1.76, df=44.6, p=.09).
VAMCs ranked high (n=35) had similar (136.3±82.6) average daily census (cumulative) compared to VAMCs ranked low (n=27; 97.9±99) (two-sample t=1.81, df=39.2, p=.08).
VAMCs ranked high (n=79) had similar (49,736±30,142) average bed days of care compared to VAMCs ranked low (n=27; 35,739±36,042) (two-sample t=1.81, df=39.2, p=.001).
VAMCs ranked high (n=79) had similar (4,987±2,842) average patients treated compared to VAMCs ranked low (n=27; 3,858±2,898) (two-sample t=1.76, df=44.3, p=.09).

Surgery Service Data

Results of facilities ranked high, moderate, low
There was no difference across PACT ranking for average admissions; VAMCs ranked high (n=33; 1,208±113), VAMCs ranked moderate (n=35; 921±110), VAMCs ranked low (n=22; 843±138) (F=2.6, p=.08).
There was no difference across PACT ranking for average discharges; VAMCs ranked high (n=33; 1,204±111), VAMCs ranked moderate (n=35; 889±107), VAMCs ranked low (n=22; 838±135) (F=2.94, p=.058).
VAMCs ranked high (n=33) had higher (25.5±2.3) average daily census (cumulative) compared to VAMCs ranked low (n=22; 15.8±2.8), but high was not different than moderate (n=35; 17.8±2.2) (F=4.4, p=.015).
VAMCs ranked high (n=33) had higher (9,304±844) average bed days of care compared to VAMCs ranked low (n=22; 5,771±1,034), but high was not different than moderate (n=35; 6,485±820) (F=4.4, p=.015).
There was no difference across PACT ranking for average patients treated; VAMCs ranked high (n=33; 1,227±113), VAMCs ranked moderate (n=35; 906±109), VAMCs ranked low (n=22; 853±138) (F=2.96, p=.057).
There was no difference across PACT ranking for average authorized beds; VAMCs ranked high (n=33; 49.2±5.7), VAMCs ranked moderate (n=36; 38.4±5.4), VAMCs ranked low (n=22; 30.7±6.9) (F=2.26, p=.111).
There was no difference across PACT ranking for average occupancy; VAMCs ranked high (n=33; 0.70±0.03), VAMCs ranked moderate (n=35; 0.69±0.03), VAMCs ranked low (n=22; 0.70±0.04) (F=0.03, p=.98).

Results of facilities ranked high vs. partial
VAMCs ranked high (n=68) had similar (1,060±658) average admissions compared to VAMCs ranked low (n=22; 843±654) (two-sample t=1.35, df=35.8, p=.19).
VAMCs ranked high (n=68) had similar (1,042±648) average discharges compared to VAMCs ranked low (n=22; 838±643) (two-sample t=1.29, df=35.8, p=.21).
VAMCs ranked high (n=68) had similar (21.5±14) average daily census (cumulative) compared to VAMCs ranked low (n=22; 15.8±12) (two-sample t=1.81, df=39.6, p=.08).
VAMCs ranked high (n=68) had similar (7,853±5,107) average bed days of care compared to VAMCs ranked low (n=22; 5,770±4,541) (two-sample t=1.81, df=39.6, p=.08).
VAMCs ranked high (n=68) had similar (1,062±660) average patients treated compared to VAMCs ranked low (n=22; 854±654) (two-sample t=1.29, df=35.9, p=.20).
VAMCs ranked high (n=69) had similar (43.6±34.7) average authorized beds compared to VAMCs ranked low (n=22; 30.7±24.9) (two-sample t=1.91, df=49.2, p=.06).
VAMCs ranked high (n=68) had similar (0.69±0.2) average occupancy rates compared to VAMCs ranked low (n=22; 0.70±0.2) (two-sample t=0.21, df=39.4, p=.84).

APPENDIX G—NON-RANKED FACILITIES VS. RANKED FACILITIES

Surgery Service Data

- Non-ranked (n=21) VAMCs had a higher (29.4±19) average daily surgical census compared to ranked (n=89) VAMCs (20.1±14) (two-sample t-test, t=2.07, df=25.1, p<.05).
- Non-ranked (n=21) VAMCs had similar (10,332±7044) average bed days of care compared to ranked (n=89) VAMCs (7334±5059) (two-sample t-test, t=1.84, df=25.1, p=.08).
- Non-ranked (n=21) VAMCs had similar (0.70±0.2) average occupancy rates compared to ranked (n=89) VAMCs (0.696±0.2) (two-sample t-test, t=.14, df=28.8, p=.89).
- Non-ranked (n=21) VAMCs tended to have more (78.2±93) average authorized beds compared to ranked (n=89) VAMCs (40.0±33), but the difference was not significant (two-sample t-test, t=1.85, df=21.2, p=.08).
- 45% (16 of 38) of non-ranked VAMCs were affiliated with a university compared to 85% (97 of 114) of ranked VAMCs.
- 30% (8 of 27) of non-ranked VAMCs were geographically located in an urban setting compared to 56% (59 of 106) of ranked VAMCs (chi square=5.8, df=1, p<.05).

Inpatient Service Data

- Non ranked (n=24) VAMCs had similar (3,942±3,266) average admissions compared to ranked (n=105) VAMCs (4,558±2,842) (two sample t test, t=.85, df=31.4, p=.40).
- Non ranked (n=24) VAMCs had similar (3,898±3,263) average discharges compared to ranked (n=105) VAMCs (4,553±2,816) (two sample t test, t=.91, df=31.3, p=.37).
- Non ranked (n=24) VAMCs had similar (113.0±105) average daily census (cumulative) compared to ranked (n=105) VAMCs (125.7±88) (two sample t test, t=.55, df=30.8, p=.59).
- Non ranked (n=24) VAMCs had similar (41,228±38,502) average bed days of care compared to ranked (n=105) VAMCs (45,897±32,188) (two sample t test, t=.55, df=30.8, p=.59).
- Non ranked (n=24) VAMCs had similar (4,002±3,359) average patients treated compared to ranked (n=105) VAMCs (4,671±2,884) (two sample t test, t=.90, df=31.2, p=.37).

APPENDIX H—REFERENCES

[i] Fotieo GG, Reiber GE, Carter JS, Smith DG. Diabetic amputations in the VA: are there opportunities for interventions? J Rehabil Res Dev. 36(1):55-9, 1999 Jan, (American Diabetes Association website 4/02/02 and VA-Scope of Work for PSAS)

[ii] Fotieo GG, Reiber GE, Carter JS, Smith DG. Diabetic amputations in the VA: are there opportunities for interventions? J Rehabil Res Dev. 36(1): 55-9, 1999 Jan.