

Lowering VA Medical Equipment Maintenance Costs:  
Looking at Self-Insured Risk Pools

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## Abstract

Exploring innovative ways to provide high quality maintenance at a lower cost is a top priority of many biomedical engineers at the Department of Veterans Affairs (VA). As pressure to decrease costs become more intense, VA medical centers have begun looking outside the organization for new best practices and better ways to operate their departments. One of the ideas being explored by biomedical engineers is a risk management pool where expensive service contracts are cancelled and a portion of the money that would have been spent on a service contract is put into a fund control point to finance needed maintenance. This project, "Lowering VA Medical Equipment Maintenance Costs: Looking at Self-Insured Risk Pools" examines the results of several risk pools that have been recently established as an alternative to maintenance contracts in five Veterans Integrated Service Networks (VISNs).

Actual expenditures are tracked for FY'98 (1 October 1997 to 30 September 1998) and compared to the original contract cost estimate. In all VISNs, the costs were lower with the establishment of the risk pool.

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## INTRODUCTION

One area that contributes to the rising cost of medical care is the increase in the use of technology along with the rising cost of maintenance and support for medical equipment technology. This paper addresses one initiative undertaken by biomedical engineers in several Department of Veterans Affairs (VA) networks in order to reduce the maintenance cost of medical equipment. In the past, biomedical engineering departments were faced with two options: a) to maintain equipment in-house or b) to purchase a maintenance contract from a vendor. Today, biomedical engineering departments are exploring a third option - a self-insured maintenance risk pool.

Self-insured maintenance involves setting aside a fixed amount of money to fund needed maintenance from outside vendors. In this paper, the self-insured maintenance will also be referred to as a "risk pool." Self-insured maintenance differs from purchasing maintenance insurance in two ways: a) the organization does not pay a broker a set premium and b) the organization retains all savings. As with traditional insurance, the ability to predict costs increases with the larger number of items in the risk pool. Therefore, the opportunity for risk pools to be established with enough items to work effectively has been enhanced by the creation of Veteran Integrated Service Networks (VISNs) which enables multiple VA facilities to work together as one business unit. This paper will look at self-insured medical

equipment risk pools in five selected areas including VISN 3 (New York), VISN 8 (Florida), VISN 11 (Indiana & Michigan), VISN 12 (Wisconsin, Chicago, and Michigan Upper Peninsula), and VISN 20 (Northwestern U.S.). The project will include a comparison of projected service contract costs to actual maintenance expenditures from 1 October 1997 through 30 September 1998. The project also discusses the mechanics of starting a risk pool, the lessons learned from this initiative, and the recommended funding levels for future risk pools.

#### Statement of Research Question

The fundamental research question is: "Are maintenance costs lower using medical equipment management risk pools in the Department of Veterans Affairs?" The independent variable is level of risk ( 0 = service contract, 1 = self-insured risk pool). The dependent variable is cost of medical equipment maintenance.

The objective of this study is to show the results of using self-insured risk pools in five VISNs. Additionally, the study can help managers determine an appropriate funding level for risk pools. Finally, this study provides additional information on setting up a risk pool, including steps for setting up a risk pool (Appendix A) and a list of sites and contacts where VA risk pools have been initiated (Appendix B).

### Conditions which prompted the study

One important condition that prompted this study was pressure to reduce costs for VA medical centers in all areas of operation. One of the goals put forth by Dr. Kizer in 1995 was to decrease the cost of medical care per patient by 30% by the year 2000. This includes pressure to reduce maintenance costs for medical equipment. Traditionally, service contracts have been much more expensive than in-house maintenance, but, for a variety of reasons, in-house maintenance is not always feasible.

The second condition was the need to examine the experience from the Great Lakes Organization of Biomedical Engineers (GLOBE) in VISN 12 which established a medical equipment management risk pool in May 1997. In a five month period, the GLOBE risk pool saved the medical centers nearly \$400,000. Limitations of this study included a small sample size and a relatively short timeframe. The engineers in the GLOBE were not sure exactly how much funding they should request in next year's budget and were also unsure if the savings that they had achieved was due to good luck or was a reliable predictor of future savings.

The third condition was pressure from other medical centers and VISNs who are looking at starting risk pools and need data on this subject.

Therefore, this study was initiated to examine the experience of a variety of risk pools from several areas of the country over an entire year. Although there were several VISNs

trying out the idea of a risk pool, biomedical engineers at the VA had little experience with this concept. Therefore a retroactive study of the results could be very beneficial in helping biomedical engineers start new risk pools and determine appropriate funding levels.

### Literature Review

The literature review encompassed a variety of sources including traditional library reference material, information available from VA biomedical engineers, and unpublished manuscripts. Many articles addressed the necessity to plan for service support along with the decision to buy medical equipment. "Decisions on selecting appropriate mechanisms of service support have become quite complex and carry significant financial consequences" (Dickerson & Jackson). Many alternatives to reduce the cost of maintaining medical equipment were explored by biomedical engineers.

New concepts regarding maintenance and other operational decisions are encouraged throughout the organization. The VA has reorganized into 22 Veteran Integrated Service Networks (VISNs), which allows greater incentives for medical centers to work together in smaller business units (Kizer). Biomedical engineers and technicians in many VISNs organized formal and informal groups to work together solving problems and increasing cost effectiveness of biomedical programs. These groups were approached at the VISN level by several companies offering

maintenance insurance plans. Although this concept was explored, self-insured plans offered greater potential savings and less overhead.

Articles regarding maintenance insurance are pertinent to the decision to implement self-insured risk pools. As stated in one article regarding maintenance insurance, "instead of paying the service contract costs to the manufacturer, the hospital now pays the insurance company a premium, which is much less expensive than the service contract" (Tran). The literature also stated that even though maintenance insurance has some advantages over a service contract (such as lower costs, choice of vendors, simple budgeting, elimination of hidden cost), there are several disadvantages as well. Besides the normal coordination required with clinical services and vendors, maintenance insurance policies require additional paperwork to process claims and monitor reimbursement (Tran). Therefore, forming a resource pool for a self-insured maintenance program was more attractive to some biomedical engineering departments.

Maintenance insurance is another option to control medical equipment maintenance costs. Companies offering maintenance insurance offer a variety of programs. Some work similarly to an extended warranty contract in that the medical center would be responsible for having equipment repaired by a vendor and would then submit the bills for reimbursement. Most companies allow options for in-house repair as well. These policies eliminate uncertainty of expenses and usually offer a lower price than

individual service contracts (Koneig). Koenig states that under such plans response time by an outside vendor should not be longer for time and materials than response time under a service contract because the vendors cannot afford to hurt their overall reputation by providing low-quality service. Also, since thousands of hospitals already perform maintenance on a time and materials basis, slow response time should not be a major concern (Koenig). This article also discusses potential disadvantages of purchasing maintenance insurance including the additional paperwork involved, and the possibility that reimbursement will be delayed or disallowed.

Gentles of Sunnybrook Health Science Centre in Toronto Canada published an article in 1995 describing their experience with maintenance insurance companies and their own self-managed insurance program. "Equipment maintenance insurance is a recent development that has achieved some cost savings for hospitals. However greater cost savings can be achieved by a centrally managed self-insurance program that crosses across departmental lines." In the study, Sunnybrook Health Science Centre put 29 laboratory and radiology devices under a maintenance insurance program with an outside vendor for one year, and implemented a self-insurance program for the second year. Significantly higher savings were achieved with the self-insurance. Under the insurance premium plan with the vendor, Sunnybrook paid \$155,000 for maintenance insurance on 29 items instead of the \$205,000 that they would have paid for the service contracts. Although

they saved \$50,000, the vendor also made \$64,638 because the total claims for maintenance were only \$90,613. They noticed within the first six months that the actual expenditures were approximately 42% of the original contract costs. This experience led the engineering department to launch a self-insured program for these items and encouraged them to add several more items to the program. Under the self-insured program, the medical center saved \$135,000, over twice the amount saved with the maintenance insurance vendor. Gentles states:

The main reason for the increased savings was that the program was managed by a person with a technical background rather than a financial one. Someone who is comfortable dealing with equipment maintenance issues can negotiate many of the service charges with the vendor. In addition, some call screening was done by this person to reduce the expense of service calls for minor problems.”

Sunnybrook is now working with other hospitals in the Toronto area to explore the possibility of creating a joint risk pool that would allow them to add larger items, including radiology equipment, to the self-insured program (Gentles). By working with several medical centers, the VA biomedical engineers could also address high-ticket areas such as radiology.

Maintenance costs in highly technical areas such as radiology often exceed the original purchase price of the equipment over the lifetime of the equipment. “Next to personnel services, equipment maintenance is the second largest budgetary expense in large radiology departments” (Gregory & David). Many options for service should be explored including alternatives to

traditional methods of maintenance. "Wise customers will explore many options before choosing a service agreement" (Gregory & David).

In an earlier study of VA maintenance costs, savings achieved by the VISN 12 Great Lakes Organization of Biomedical Engineers (GLOBE) were evaluated using five months of maintenance data. This paper showed that VISN 12 saved 70% of maintenance costs by implementing a VISN-wide self-insured risk pool (Fiscus, Johnson, & Olaiya). Limitations of this study included the short time frame (1 May 1997 - 30 September 1997) and the small sample size.

Although there have been several articles published regarding maintenance options with medical equipment, none of the articles described experience with self-insured risk pools from multiple sites over an extended period of time. Therefore this study should assist in providing insight into the ability of self-insured risk pools to lower the cost of medical equipment maintenance.

### Purpose

The purpose of this project is to analyze the results of several self-insured risk pools and help medical center administrators learn from the recent efforts in other VISNs in establishing self-insured risk pools. The dependent variable is cost (of medical equipment maintenance). The independent variable is level of risk (0 = service contract, 1 = self-insured risk

pool). The hypothesis for this study is that implementing a self-insured risk pool lowers the cost of medical equipment maintenance.

#### METHOD AND PROCEDURES

Data were collected from VA biomedical engineers that had formed medical equipment risk pools. Two types of risk pools are used in this study: a) a centralized risk pool, and b) a “virtual” risk pool, where equipment identified for the risk pool was tracked centrally but remained in separate fund control points. The VAs using a centralized risk pool, used one fund control point, or account, to fund needed maintenance for medical equipment. The VAs using a “virtual” risk pool used separate fund control points at different locations, but monitored the costs centrally. A fund control point is a financial tool used by VA medical centers to track transactions much like a checking account used for personal expenditures. Both preventive maintenance and emergency maintenance were funded from the risk pools.

This data consisted of: a) contract costs that were based on quotes for vendor contracts for covering the medical equipment maintenance for one fiscal year, and 2) actual maintenance costs that were incurred for emergency and preventive maintenance for one fiscal year (1 October 1997 – 30 September 1998).

Biomedical engineers were contacted at each VISN implementing a medical equipment risk pool and were asked to

submit costs of contracts that were cancelled as well as actual maintenance expenditures. The data were submitted via MS-Exchange or facsimile.

Data were entered into an Excel spreadsheet and results were obtained for total dollars saved and for the percentage of savings over the original contract costs. These data were compiled in a format that could be compared to data found in an Gentles' earlier study in the Leadership in Health Services journal. Therefore, the percentage of savings from the Sunnybrook Health Science Center could be compared to the results from the VA Risk Pools. Statistical analysis was performed using Excel software.

Validity of the data was addressed by each of the biomedical engineers. Data were retrieved from the VA Decentralized Hospital System (DHCP) financial package and forwarded to Milwaukee for this study. DHCP financial data has been reviewed by internal and external auditors for reliability.

Data used in this study are not sensitive. Ethical and privacy concerns did not need to be addressed in this study. No human subjects were used in this study.

## RESULTS

Maintenance costs were significantly lower at the .05 confidence level for four of the five VISNs in this study after the implementation of the risk pools. The total costs were also significantly lower. See Table 1. A one-tailed z-test was used

to determine if the risk pool costs were lower than the original contract costs at a statistically significant level. Since the calculated z-value exceeds the z critical value, the results are statistically significant for this one-tailed test for VISN 3, 8, 11, 12, and for the total means.

Table 1

Mean costs used for statistical tests

Risk Pool Location	N	Contract costs (Mean)	Actual costs (Mean)	Savings	Z value
VISN 3	77	14206.76	3412.91	10793.86	5.44*
VISN 8	42	12043.51	5206.85	6836.66	2.50*
VISN 11	14	45758.14	15226.64	30531.50	1.90*
VISN 12	67	17559.79	5520.75	12039.04	4.49*
VISN 20	22	15719.55	7211.32	8508.23	1.22
Total	222	19227.60	6329.67	12897.92	6.70*

\* denotes significant values at the .05 level

All of the risk pool costs were lower than the original contract costs. The only risk pool that was not identified as having a statistically significant result, VISN 20, was the smallest risk pool in the study. Even though there was overall savings of 54.13% over the service contract costs, there were

only 22 items in this pool. The size may have contributed to the inability to demonstrate a statistically significant result.

The total savings achieved by implementing these risk pools was \$2,873,327 in twelve months. At a VISN level, the savings ranged from \$345,830 to \$1,176,506. Percentages of savings ranged from 54.13% to 75.88% of original contract costs. Overall, the average percentage saved was 67.31% of original contract costs. See Table 2.

Table 2  
Actual costs and savings

<b>Risk Pool</b>	<b>Contract</b>	<b>Actual</b>	<b>%</b>	
<b>Location</b>	<b>Costs</b>	<b>expenditures</b>	<b>Savings</b>	<b>Savings</b>
VISN 3	\$1,093,921	\$262,794	\$831,127	75.98
VISN 8	1,011,655	390,693	620,962	61.38
VISN 11	640,614	213,173	427,441	66.72
VISN 12	1,176,506	369,891	806,615	68.56
VISN 20	345,830	158,649	187,181	54.13
Total	4,268,526	1,395,199	2,873,327	67.31

There were no up-front costs or increases in staff needed to implement these risk pools. Although there are additional demands required of the biomedical staff to process requests for service and to verify the cost of each service call, there is a

lower demand on the contracting officers who formerly awarded and administered the maintenance contracts.

Table 3

95% Confidence Intervals for FY '98 savings

	Average	Confidence Interval	
	% Savings	Lower level	Upper level
VISN 3	68.71	50.53	86.89
VISN 8	65.33	49.35	81.31
VISN 11	52.83	32.03	73.63
VISN 12	62.61	41.57	83.65
VISN 20	68.45	43.45	94.06
Total	62.57	52.85	72.29

Biomedical technicians are usually responsible for calling for service on medical equipment that is no longer on a service contract. These calls are typically paid for by either credit card or purchase order. By having the biomedical staff responsible for equipment repairs, calls can be screened for necessity, thus reducing unnecessary expenditures. Simple problems may be solved without outside service representatives, and other problems may be solved with telephone assistance from the vendor. Additionally, the biomedical staff can monitor the timeliness and quality of the repairs made.

Confidence intervals for savings were developed for each VISN and for the overall data. See Table 3.

#### DISCUSSION

The results of this data set show that a significant savings has been achieved by implementing medical equipment risk pools. The hypothesis that medical equipment maintenance costs are lower using a self-insured risk pool is supported by this study.

This is consistent with the findings of Gentles' study, which found that medical equipment maintenance costs were lower with the implementation of a self-insured risk pool.

Another finding was that data were more readily available from the VISNs that had centralized their risk pool into one fund control point. Two VISNs that used "virtual" fund control points were not able to provide data to be used in this study because the data were not available from each medical center in their virtual pool. This time delay makes analysis and decision-making more difficult for administrators in their own VISN.

A third finding was that each VISN was able to reinvest some of the savings into strengthening its biomedical engineering program. Most groups used this saving to fund training for technicians. Some VISNs reinvested some of the savings in equipment or training for biomedical engineering technicians and managers.

## CONCLUSION AND RECOMMENDATIONS

The main conclusion of this project is that self-insured risk pools allow VA medical centers and clinics to save approximately 68% of the money previously allocated to service contracts. Using the aggregate confidence interval, managers may wish to fund risk pools at 73% of the original cost of the service contracts. This gives managers (both technical and financial) a 95% degree of confidence that enough money will be available to fund needed maintenance.

This study can be used by biomedical engineers and managers who wish to lower their costs of medical equipment maintenance. Engineers who have not established a risk pool will be able to learn from the success of those who already have implemented this initiative. The study will assist biomedical engineers in setting up a risk pool by providing the background data, specific steps and a list of additional lessons learned. Additionally, engineers who have implemented a risk pool can use this study to determine appropriate funding levels for future budgets.

Risk pools can be implemented without significant up-front costs or staff increases. There will be a slight additional workload on the biomedical staff to implement the procedures necessary to bring in vendors for maintenance, but this is offset by a decrease in workload for contract administration staff.

Biomedical engineers who have not set up self-insured risk pools may wish to do this in order to lower maintenance costs.

New risk pools should be funded at levels between 53% and 73% of the amount that was being paid for service contracts.

Proper selection of the appropriate equipment for this risk pool is needed to achieve maximum savings. Equipment histories should be used along with user requirements to evaluate appropriate equipment for a self-insured risk pool.

Quality of maintenance should be monitored to ensure that medical equipment assets are preserved and are available to meet medical center objectives. Biomedical engineers and technicians must ensure that equipment is evaluated for inclusion in the medical center equipment management program and that needed preventive maintenance is performed on time.

User satisfaction should also be monitored in order to ensure that clinical staff members who depend on the medical equipment are satisfied with the maintenance as well as with the process for obtaining repairs and assistance with medical devices.

Further studies should include the acquisition value of equipment in order to describe the amount of equipment at risk and to standardize budgetary decisions. Since acquisition values are a fixed number, this would allow appropriate adjustments to be made and allow appropriate comparisons among risk pools from different VISNs.

Appendix A : Steps to Implement a VA Equipment Risk Pool

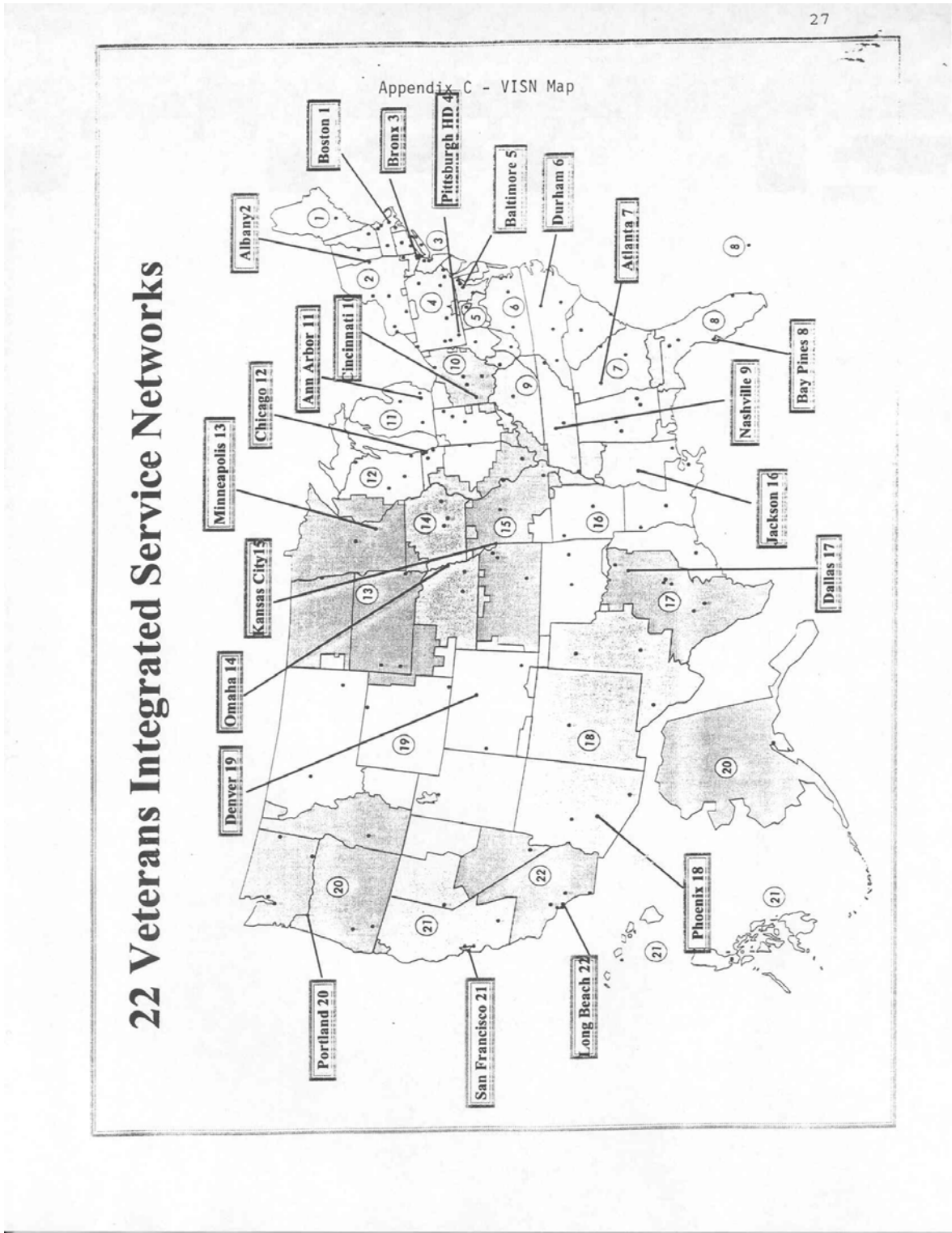
1. Identify a working group to represent each medical center.
2. Identify contracts to be cancelled.
3. Compile information identifying equipment (Many VAs are using manufacturer, model, type, and barcoded EE#)
4. Decide on mechanism of authorizing and tracking expenses (Many have formed a centralized fund control point.)
5. Ensure appropriate funding is available (Usually a percentage of the contracts that are to be cancelled is made available to the appropriate fund control point).
6. Issue credit cards.
7. Clarify process for dealing with expenses over the credit card limits.
8. Issue appropriate computer access codes if needed. (Some VAs may need access to remote sites).
9. Cancel contracts. (May require 30 days notice or more depending on existing contract specs.)
10. Review risk pool expenditures.
11. Monitor quality and user satisfaction.

## Appendix B: Implementation Sites

VISN #	Medical Centers Involved	Contact Person	Fund Control Point
3	Brooklyn, NY Bronx, NY Castle Point, NY Montrose, NY East Orange, NY Lyons, NY New York, NY Northhport, NY	Stephanie Barbiero	Brooklyn
8	Miami, FL Bay Pines, FL Gainesville, FL Lake City, FL Miami, FL San Juan, PR Tampa, FL West Palm Beach, FL	Gil Waggoner	Miami

VISN #	Medical Centers Involved	Contact Person	Fund Control
11	Indianapolis, IN Ann Arbor, MI Battle Creek, MI Danville, IL Detroit, MI Northern Indiana Saginaw, MI	Joe Skochdopole	Indianapolis
12	North Chicago, IL Milwaukee, WI Madison, WI Iron Mountain, MI Hines, IL Chicago, IL Tomah, WI	Barbara Lavin	Milwaukee
20	White City, OR Boise ID Puget Sound, WA Portland, OR Roseburg, OR Spokane, WA Walla Walla, WA Anchorage, AK	Steve Broskey	virtual

Appendix C: VISN Map



## Appendix D: Glossary of Terms

**Biomedical Engineers** – individuals who have graduated from an accredited institution with an Engineering Degree and have overall responsibility for the equipment management program at a medical center.

**Fund Control Point** – a designation for cost accounting used in VA to monitor transactions and assign accountability for expenditures for a specific purpose.

**Maintenance Contract** – an agreement to pay a fixed amount of money for service on a specific item for a specified time period.

**Maintenance Insurance** – an agreement to pay a set premium in exchange for assurance that vendor costs will be reimbursed needed maintenance. Costs to the organization are capped to a prearranged amount by any savings from overpaid premium is kept by the insurance company.

**Self-Insured Maintenance (Risk Pools)** – the organization sets aside a fixed amount of money to fund needed maintenance. Any money not used for maintenance is kept by the organization, but cost to the organization is not capped to a fixed amount.

**Veteran Integrated Service Network (VISN)** – A formal organization of VA medical centers and healthcare delivery sites. The entire VA healthcare administration is divided into 22 VISNs, each with one network director.

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