



DEPARTMENT OF VETERANS AFFAIRS
OFFICE OF INSPECTOR GENERAL

Office of Audits and Evaluations

DEPARTMENT OF VETERANS AFFAIRS

Deficiencies in Infrastructure
Readiness for Deploying
VA's New Electronic Health
Record System

AUDIT

REPORT #19-08980-95

APRIL 27, 2020



The mission of the Office of Inspector General is to serve veterans and the public by conducting effective oversight of the programs and operations of the Department of Veterans Affairs through independent audits, inspections, reviews, and investigations.

In addition to general privacy laws that govern release of medical information, disclosure of certain veteran health or other private information may be prohibited by various federal statutes including, but not limited to, 38 U.S.C. §§ 5701, 5705, and 7332, absent an exemption or other specified circumstances. As mandated by law, the OIG adheres to privacy and confidentiality laws and regulations protecting veteran health or other private information in this report.

**Report suspected wrongdoing in VA programs and operations
to the VA OIG Hotline:**

www.va.gov/oig/hotline

1-800-488-8244



Executive Summary

VA has long recognized the need to modernize its electronic health record information system to ensure greater interoperability with the Department of Defense (DoD) to improve and inform the delivery of quality care to veterans. In May 2018, VA awarded Cerner Government Services Inc. a contract without competition to replace the VA's electronic health record system. Under the contract, the VA's legacy information system, Veterans Information Systems and Technology Architecture (VistA), will be replaced. VA will use Cerner's commercial-off-the-shelf solution titled Millennium. The contract was awarded at a cost of almost \$10 billion over a 10-year period of performance. If successfully implemented, it will create a common electronic health record system across the DoD and VA.

DoD's electronic health record system, Military Health System (MHS) GENESIS, at its core consists of Cerner's Millennium. The connection of VA and DoD's electronic health record systems will result in a comprehensive, lifetime health record for service members. From the veteran perspective, the new electronic health record system will drive better clinical outcomes by giving healthcare providers a more comprehensive picture of veterans' medical history and ultimately improve their access to higher-quality care.

There are tremendous costs and challenges associated with this effort. In addition to the almost \$10 billion contract, VA estimates another \$6.1 billion will be needed for program management and infrastructure-related costs. Of this amount, approximately \$4.3 billion is for program infrastructure and the remaining \$1.8 billion is estimated for program management. The infrastructure cost estimates do not cover, however, some of the physical upgrades to the individual healthcare facilities, which are to be funded by the Veterans Health Administration (VHA). VHA and Office of Electronic Health Record Modernization (OEHRM) officials indicated to the audit team that these costs are generally anticipated to be funded from VHA's nonrecurring maintenance budget.¹

Although transitioning from VistA to a new electronic health record system has transformational importance, it is a massive and complex undertaking. Challenges to implementing a new electronic health record system VA-wide are intensified by VA's need to coordinate and collaborate with DoD, as well as to modernize VA's aging infrastructure to accommodate the new system. The OIG recognizes the significant level of effort and commitment required by VA to manage and facilitate this large-scale implementation, including the tremendous work from staff thus far.

¹ Nationwide costs are somewhat uncertain at the writing of this report. However, physical infrastructure upgrade costs for the initial operating capability site—the Mann-Grandstaff VA Medical Center in Spokane, Washington—are estimated by the associated Veterans Integrated Service Network (VISN) to be about \$23.2 million.

In preparation for the new system's deployment at VA healthcare facilities, significant upgrades are needed to VA's physical and information technology (IT) infrastructure. Physical infrastructure, or building infrastructure, refers to the underlying foundation that supports the system, such as electrical, cabling, as well as heating, ventilation, and air-conditioning. IT infrastructure includes network components such as wide and local area networks, end-user devices (e.g., desktop and laptop computers, and monitors), and medical devices.

The objective of this audit was to determine whether VA's infrastructure-readiness activities were on schedule to facilitate the electronic health record modernization initiative, starting with the previously scheduled deployment of the new system on March 28, 2020, at the initial operating capability site—the Mann-Grandstaff VA Medical Center (VAMC) in Spokane, Washington. Specifically, the audit team examined the state of physical and IT infrastructure to determine VA's readiness to proceed with system implementation and to identify infrastructure challenges that could impact the overall system deployment schedule. According to data provided by OEHRM, the new system will be implemented to VA's 174 medical centers and 1,577 standalone sites. The OIG's oversight of the electronic health record modernization effort is warranted given the tremendous cost and scale of this initiative. The audit's focus on the Mann-Grandstaff VAMC is essential because any issues at VA's initial operating site, if unresolved, have the potential to be replicated at future deployment sites. Early identification of deficiencies allows VA time to implement recommendations and prevent these issues at other sites.

When the DoD implemented MHS GENESIS at its initial deployment sites, the department experienced significant setbacks such as an overwhelming number of help desk tickets, loss of initial system connectivity, and a low user adoption rate. This caused the DoD to halt its implementation for two years while they corrected deficiencies and evaluated deployment actions. As a result of this evaluation, among other lessons learned, DoD concluded that infrastructure upgrades should be completed at sites six months before deploying the system to help ensure an efficient and successful system rollout.

VA recognized the need to apply these lessons learned from the DoD experience to help avoid similar setbacks. VA officials have testified before Congress as recently as June 2019 that having infrastructure in place six months before deployment to sites was a program goal. This means that infrastructure readiness should have been completed by September 28, 2019. However, this audit found many deficiencies that increase the risk that VA could repeat DoD's setbacks and potentially hinder performance when the system goes live. It could also delay the new electronic health record system implementation in VA sites nationwide.

On February 11, 2020, during the audit team's exit conference held to discuss the results of this audit with VA officials and staff, the OEHRM's executive director stated the March 28, 2020, system deployment date at Mann-Grandstaff VAMC and its associated facilities would be delayed. The executive director also stated the future system deployment date at this site was

unknown. Soon after, VA released a new targeted deployment date of July 2020. However, in early April 2020, VA announced this deployment date would also be delayed until an unknown time due to the COVID-19 pandemic. Since notice to postpone system deployment occurred after the audit team conducted its work and an updated deployment date has not yet been announced, throughout this report the team refers to the previously anticipated system deployment date of March 28, 2020.

What the Audit Found

The OIG found critical physical and IT infrastructure upgrades have not been completed, even as recently as January 8, 2020, at the Mann-Grandstaff VAMC and its associated facilities. The lack of important upgrades jeopardizes VA's ability to properly deploy the new electronic health record system and increases risks of delays to the overall schedule. In fact, some infrastructure upgrades needed to help ensure end users do not experience diminished system performance on the deployment date are not projected to be completed until months later. For example, modifications to telecommunications rooms will not be completed until up to four months after VA's previously scheduled deployment date of March 2020. Until modifications are complete, many aspects of the physical infrastructure existing in the telecommunications rooms (such as cabling) and data center do not meet national industry standards or VA's internal requirements. Additionally, 31 percent of end-user devices needed for the go-live date remained to be upgraded as of October 7, 2019.² Moreover, VA medical devices require authorization from DoD to connect to the new electronic health record system and this authorization had not yet been received by VA as of January 2020.

Infrastructure upgrades were not completed at the Mann-Grandstaff VAMC in a timely manner to properly prepare for deployment of the new health record system primarily because VA lacked

- Initial comprehensive site assessments that included physical infrastructure to determine a realistic go-live date,
- Requisite specifications for infrastructure,
- Appropriate monitoring mechanisms, and
- Adequate staffing.

VA committed to an aggressive, but likely unrealistic, deployment date of March 2020 without having the necessary information on the state of the medical center's infrastructure.

² The day a site turns on the new electronic health record system for personnel to use is referred to as the "go-live" date. Going live does not mean that the full system with all functionality will be up and running. This go-live definition was refined by the OEHRM to specify the system capabilities that will be available at Mann-Grandstaff VAMC when the system is turned on. As of November 2019, the OEHRM anticipated about 81 percent of the total 278 system capabilities expected to deploy at the VAMC to go live in March 2020.

Specifically, on June 26, 2018, VA publicly announced the medical center's go-live date of March 2020 before facility infrastructure assessments had been performed. However, it was not until nearly a year later in May 2019 that an assessment was performed identifying physical infrastructure needs. About a month later, the chief technology integration officer of the OEHRM told lawmakers that all infrastructure upgrades would not be complete before the go-live date and indicated those infrastructure upgrades were not necessary to support going live in March 2020. In addition, as of November 1, 2019, the requirements specifications document for infrastructure was still not signed and approved by VHA. Three parties share the responsibility for infrastructure-readiness upgrades—the OEHRM, VHA, and the Office of Information and Technology (OIT).³ However, disagreements between OEHRM and VHA leaders, such as those regarding the standard to be used for network cabling requirements, contributed to delays. This requirements specifications document was later signed on November 20, 2019.

VA lacked some management controls needed to effectively monitor infrastructure readiness at the Mann-Grandstaff VAMC. For example, the OEHRM infrastructure-readiness division's internal tracking tools used to report on the status of physical infrastructure at initial deployment sites was not put into use until June 2019, only three months before VA's goal to have infrastructure upgrades complete. As of November 2019, no comprehensive tool existed at the national program level to monitor and track upgrades to critical medical devices that are used to provide patient care or capture data. Although the OEHRM was conducting internal briefings that included infrastructure readiness, the lack of a comprehensive, effective tracking mechanism increases the risk that management cannot ensure milestones are being met.

VA lacked staffing to oversee the program's infrastructure readiness. As of November 2019, four of six staff positions on the infrastructure-readiness team were still unfilled, and the infrastructure-readiness director position was vacant until filled in August 2019, or approximately two months before VA's goal of having infrastructure upgrades complete six months before the go-live date. The infrastructure-readiness director position is primarily responsible for coordinating physical infrastructure upgrades for system deployment. Without this dedicated position being filled early in the infrastructure planning process, VA would be less likely to spot potential issues stemming from deficient infrastructure.

The audit team also found that, while not directly affecting system deployment, there were security vulnerabilities with some of the physical infrastructure at the Mann-Grandstaff VAMC. These vulnerabilities were not identified in the Current State Review performed by Cerner or the engineering assessment conducted by the OIT because these assessments do not call for identification of physical security concerns. However, an individual responsible for physical

³ Examples of specific infrastructure elements outlined in the requirements document include end-user devices and heating, ventilation, and air-conditioning (HVAC).

infrastructure at the VAMC recognized that damage to some of this physical infrastructure due to unauthorized access could result in campus-wide loss of connectivity for an extended time. A loss of connectivity to the system could inhibit clinicians' ability to provide adequate patient care.

Deployment of the new system was originally planned for three initial operating capability sites beginning in March 2020 followed by deployment in 47 "waves" for the remaining sites across VA from fiscal years 2020 through 2028. The deployment, however, has already experienced delays. In December 2019, the OEHRM provided the team a revised schedule that indicated VA postponed the deployment date for two of the three initial sites by approximately seven months until November 2020 because, according to OEHRM leaders, these sites had more distinct areas of clinical care. Accordingly, VA needed additional time to define system capabilities to support these clinical areas. After the audit team conducted its work, VA also postponed the deployment date for the Mann-Grandstaff VAMC.

Because the initial operating sites will not deploy the new system by the previously scheduled dates, the first three waves of site deployment originally scheduled to go live in August, October, and November 2020, have also been postponed until 2021. By not having infrastructure ready for the deployment of the new system, VA could experience some issues similar to those encountered by DoD and have less time to respond to and correct infrastructure-related deficiencies before deploying the system at future sites. In turn, this could lead to a delay in VA's goal of improving patient care through the modernization initiative.

What the OIG Recommended

The audit team made eight recommendations to address the identified deficiencies. Seven recommendations are directed to the executive director of the OEHRM to conduct the following:

1. Establish an infrastructure-readiness schedule for future deployment sites that incorporates lessons learned from DoD.
2. Reassess the enterprise-wide deployment schedule to ensure projected milestones are realistic and achievable, considering the time needed for facilities to complete infrastructure upgrades.
3. Implement tools to comprehensively monitor the status and progress of medical devices at the enterprise level.
4. Standardize infrastructure requirements in conjunction with VHA and the OIT and ensure those requirements are disseminated to all necessary staff.
5. Evaluate physical infrastructure for consistency with OEHRM requirements and monitor completion of those evaluations.
6. Fill infrastructure-readiness team vacancies until optimal staffing levels are attained.

7. Ensure physical security assessments are completed and addressed at future electronic health record deployment sites.

The final recommendation calls on the Mann-Grandstaff VAMC director to

8. Ensure all access points to physical infrastructure are secured and inaccessible to unauthorized individuals.

Management Comments

The executive in charge, Office of the Under Secretary for Health, and the executive director of the OEHRM concurred with Recommendations 1 through 7.⁴ The Mann-Grandstaff VAMC director concurred with Recommendation 8. Responsive action plans were provided for each of the eight recommendations. While the executive director of the OEHRM requested closure of Recommendations 1 through 4 and 7, the OIG considers these recommendations open. The OIG will monitor implementation of the planned actions and will close the recommendations when sufficient evidence has been provided to demonstrate corrective actions have been implemented. The executive director and the executive in charge also provided technical and general comments. Appendixes C and D contain the full text of responses provided by the executive in charge, Office of the Under Secretary for Health, and the OEHRM executive director, respectively.



LARRY M. REINKEMEYER
Assistant Inspector General
for Audits and Evaluations

⁴ The executive in charge, Office of the Under Secretary for Health, has the authority to perform the functions and duties of the under secretary for health.

Contents

Executive Summary	i
Abbreviations	viii
Introduction.....	1
Results and Recommendations	11
Finding 1: The New Electronic Health Record System Is Likely to Go Live at the Mann-Grandstaff VAMC with Deficient Supporting Infrastructure	11
Recommendations 1–6.....	27
Finding 2: Inadequate Safeguarding of Critical Physical Infrastructure at the Mann-Grandstaff VAMC Increases Risks to System Security	31
Recommendations 7–8.....	35
Overall Report Conclusion.....	36
Appendix A: Background	38
Appendix B: Scope and Methodology.....	43
Appendix C: Management Comments Executive in Charge of the Office of the Under Secretary for Health	48
Appendix D: Management Comments Executive Director of the Office of Electronic Health Record Modernization.....	49
OIG Contact and Staff Acknowledgments	57
Report Distribution	58

Abbreviations

CBOC	community-based outpatient clinic
DoD	Department of Defense
FY	fiscal year
GAO	Government Accountability Office
IOC	initial operating capability
IT	information technology
MHS	Military Health System
OEHRM	Office of Electronic Health Record Modernization
OIG	Office of Inspector General
OIT	Office of Information and Technology
VAMC	VA medical center
VHA	Veterans Health Administration
VISN	Veterans Integrated Service Network
VistA	Veterans Information Systems and Technology Architecture



Introduction

After more than four decades of working with its current electronic health record information system, known as the Veterans Information Systems and Technology Architecture (VistA), the VA decided to replace VistA with a system that could offer the interoperability and functionality needed for VA to deliver better quality care based on patients' comprehensive medical history.⁵ The long-standing record system lacked the seamless interoperability needed with the Department of Defense (DoD) to achieve those care goals and became too costly to maintain.

This report provides the findings of an audit by the VA Office of Inspector General (OIG) with the objective of determining whether VA's infrastructure-readiness activities were on schedule to facilitate the electronic health record modernization initiative at its initial operating capability (IOC) site.⁶ The Mann-Grandstaff VA Medical Center (VAMC), located in Spokane, Washington, and its associated facilities (including community-based outpatient clinics and veteran centers), have been selected to collectively serve as the first IOC site to use the new electronic health record system. The audit team examined the state of physical and information technology (IT) infrastructure to determine readiness to proceed with implementation of the system at the Mann-Grandstaff VAMC and associated facilities. The audit team also identified physical and IT infrastructure-readiness challenges that have the potential to impact the overall VA-wide system deployment schedule.

Physical infrastructure, or building infrastructure, refers to the underlying foundation that supports the electronic health record system, such as electrical; cabling; and heating, ventilation, and air-conditioning.

IT infrastructure includes network components such as wide and local area networks, end-user devices (e.g., desktop or laptop computers and monitors), and medical devices (e.g., vital signs monitors).

Why the OIG Did This Audit

Successful deployment of the new electronic health record system will allow VA and DoD users to see a veteran's complete and accurate health record and facilitate sharing of records with community care providers. This is a critical step toward providing seamless, high-quality health care to current veterans and those transitioning from military service. However, failure to implement VA's electronic health record modernization initiative correctly could undermine VA's efforts to provide quality health care and place billions of taxpayer dollars at risk for waste.

⁵ In 1977, the VA Massachusetts General Hospital Utility Multi-Programming System (MUMPS) was developed. In June 1981, MUMPS became VistA, at the time named the Decentralized Hospital Computer Program. It was renamed VistA in 1996.

⁶ Initial operating capability sites are the first sites to deploy and test the new electronic health record system.

The OIG's mission is to conduct effective oversight of VA programs and operations to advance its goals to ensure veterans receive access to quality health care and receive benefits in a timely manner, while ensuring VA funds are appropriately spent. Scrutiny by the OIG is warranted in this case because of the tremendous cost and scale of the electronic health record initiative and because prior modernization efforts by VA have been unable to achieve seamless interoperability with DoD. Since 2000, the OIG has identified information management as a major management challenge for VA because the department has a history of not properly planning and managing its critical IT investments.⁷ This audit identified physical and IT infrastructure-readiness challenges that have the potential to affect system performance at the go-live date.

The VA's legacy electronic health information system, VistA, has served the department for more than 40 years but lacks needed interoperability and is too costly to maintain. Over the years, VA has taken steps to modernize VistA. However, these attempts have not resulted in a single, interoperable electronic health record system with DoD. The Government Accountability Office (GAO) has previously reported that these attempts have cost VA over a billion dollars. VA determined that using a common electronic health record system will drive better clinical outcomes by giving healthcare providers a more comprehensive picture of veterans' medical history and enhance collaboration with VA's community healthcare partners. From the veteran perspective, this will ultimately improve access to higher-quality care. The need to oversee implementation of a new system is even more pressing because the recent VA Maintaining Internal Systems and Strengthening Integrated Outside Networks Act of 2018 (the MISSION Act) provides veterans with increased access to community care providers and increases the need for a modernized electronic health record system that can facilitate record sharing with community healthcare providers.⁸

On June 1, 2017, then VA Secretary David Shulkin signed a "determination and findings" document declaring VA would acquire the new electronic health record system from Cerner Corporation using an exception to the Federal Acquisition Regulation requirement for full and open competition. Cerner developed the core platform of DoD's new electronic health record system, Military Health System (MHS) GENESIS.

The determination and findings provided several rationales for why the acquisition of the new electronic health record system was in the public's interest. The reasons included the ability for VA to gain efficiencies from DoD lessons learned, accelerated delivery of a modern electronic health record to support improved health care, and the facilitation of a more consistent patient experience between VA and DoD. In May 2018, VA awarded Cerner an almost \$10 billion contract to replace VistA. The department purchased the commercial-off-the-shelf electronic

⁷ Department of Veterans Affairs, "*Inspector General's VA Management and Performance Challenges*," FY 2019 Agency Financial Report, sec. III, (2019).

⁸ VA Mission Act of 2018, Pub. L. No. 115-182, 132 Stat. 1393 (2018).

health record system platform Millennium. The contract has a 10-year period of performance, consisting of a five-year base period and five-year option period, and aligns with DoD's procurement in 2015 of the MHS GENESIS system, which at its core, consists of Cerner's Millennium. To deploy the new electronic health record information system successfully, VA must have necessary physical and IT infrastructure in place.

In addition to the almost \$10 billion contract to Cerner, the department estimated also needing \$6.1 billion for program management and infrastructure-related costs during the 10-year expected lifespan of electronic health record modernization. Of the \$6.1 billion, about \$4.3 billion is for infrastructure-related costs, such as IT infrastructure and interfaces. The infrastructure cost estimates do not cover, however, some of the *physical* infrastructure upgrades, such as cabling, ventilation, air-conditioning, and physical security, which will be funded by VHA's nonrecurring maintenance budget. The remaining \$1.8 billion is estimated for program management.

In fiscal year (FY) 2020 alone, the Office of Electronic Health Record Modernization (OEHRM) has received \$1.5 billion in program funding. Of this amount, approximately \$328 million is estimated for infrastructure costs, such as IT infrastructure end-user device upgrades. VHA and OEHRM officials told the audit team during interviews that funding for some of the physical infrastructure upgrades to facilities will come from VHA's nonrecurring maintenance budget, which is in addition to the \$328 million. The audit team noted that these infrastructure upgrades have the potential to represent a significant cost to VA, as these upgrades at the Mann-Grandstaff VAMC alone are estimated to cost about \$23.2 million.

When DoD implemented MHS GENESIS at its initial deployment sites, DoD experienced significant setbacks, such as an overwhelming number of help desk tickets, loss of system connectivity during initial deployment, and a low user adoption rate. This caused DoD to halt its implementation for two years while it corrected deficiencies and evaluated deployment actions.

DoD identified many issues unrelated to infrastructure associated with implementation setbacks. Yet because the sites were finalizing infrastructure at the same time the system was being deployed, DoD personnel were unable to determine whether problems experienced during deployment were caused by software issues or infrastructure problems. From its evaluation of deployment actions, DoD ultimately determined that infrastructure upgrades needed to be completed at sites six months before deploying the system to permit an efficient and successful system rollout.

VA recognized the need to apply these lessons learned from DoD to help avoid similar setbacks. The executive director of the OEHRM testified before Congress as recently as June 2019 that having the infrastructure in place six months before system deployment to sites was a program goal and stated that the office was "sticking to our plan" for infrastructure to be ready six months

before “go live.”⁹ This means that infrastructure upgrades should have been completed by the end of September 2019.

The audit team recognizes the inherent complexities of transitioning from VistA to a new electronic health record system and the transformational importance of this initiative. Challenges to implementing a new electronic health record system VA-wide are exacerbated by VA's need to carefully coordinate and collaborate with DoD, as well as to modernize VA's aging infrastructure. The audit team also recognizes the significant level of effort required by VA to manage and facilitate this large-scale implementation, and the tremendous work by its personnel to have brought the implementation this far.

Electronic Health Record Modernization Program Governance

There are two entities responsible for achieving successful electronic health record modernization. The first is VA's OEHRM, which was established in June 2018. On March 1, 2019, DoD and VA jointly established the Federal Electronic Health Record Modernization Program Office.

Office of Electronic Health Record Modernization

The OEHRM is responsible for ensuring VA successfully prepares for, deploys, and maintains the new electronic health record system. This office is also responsible for coordinating with DoD on numerous issues, including ensuring that VA benefits from DoD's lessons learned during its system implementation. While executive leaders from the OEHRM report directly to the VA deputy secretary, the office also works in collaboration with the Veterans Health Administration (VHA) and the Office of Information and Technology (OIT). Figure 1 provides an organization chart of the OEHRM and the offices with which it collaborates.

⁹ House Committee on Veterans' Affairs, Subcommittee on Technology Modernization, Hearing, Implementation of Electronic Health Record System at the Department of Veterans Affairs (VA) and the Department of Defense (DoD), June 12, 2019.

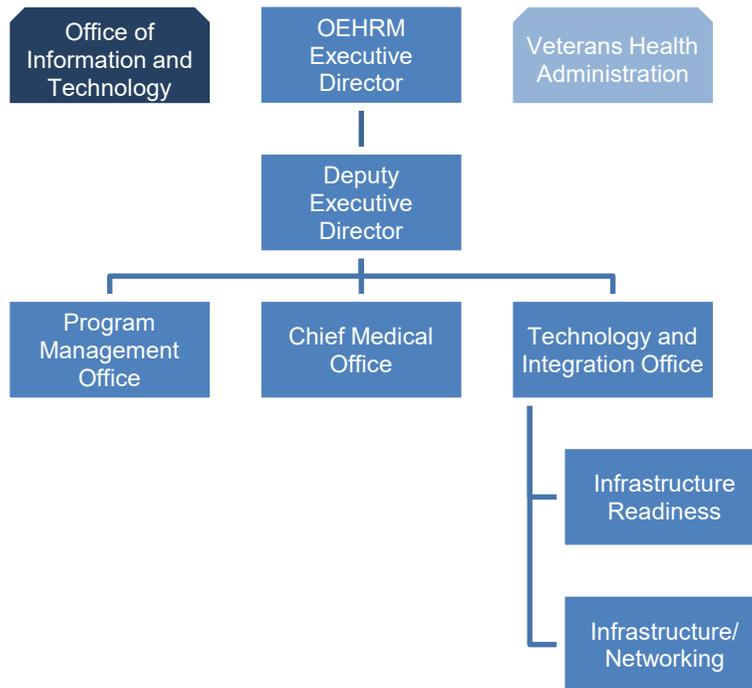


Figure 1. Organization chart of the Office of Electronic Health Record Modernization as of November 2019 and collaborating entities.

Source: Excerpt from organization chart provided by the OEHRM on November 15, 2019

All three VA offices on the top tier of this table are supposed to work collaboratively to upgrade the infrastructure needed for the implementation of the new electronic health record system. For example, the OEHRM developed the technical requirements for the new system, while the OIT and VHA shared the responsibility to define the requirements used to ensure it is properly supported by IT and physical infrastructure.¹⁰ The OIT is also responsible for aligning projects and plans to support IT infrastructure upgrades and using local staff for surge support during the transition from VistA to the Millennium-based system. VHA is responsible for decisions related to medical devices and facility upgrades, and maintenance of the physical infrastructure. For example, VHA is responsible for ensuring physical upgrades and modifications to facility spaces are completed. The OEHRM is ultimately accountable for the modernization initiative's success. The OEHRM has appointed a director of infrastructure readiness who provides oversight of the infrastructure upgrades related to electronic health record modernization; however, this position was vacant until August 2019.

¹⁰ Specific areas of requirements outlined by the OEHRM, in coordination with the OIT and VHA, include cable specifications; the specifications laptops need to properly access the system; the size of monitors; and heating, ventilation, and air-conditioning (HVAC) requirements for equipment.

Federal Electronic Health Record Modernization Program Office

This office replaced the Interagency Program Office, which was established to act as the single decision-making authority for all future electronic health record modernization efforts for VA and DoD. As of December 2019, many details of this office were still being determined, but recent legislation states that the offices' director and deputy director will serve four-year terms with DoD and VA alternating as the selecting agencies for both positions. The director of this office reports to the deputy secretaries at both DoD and VA, and both departments must approve of the selection prior to appointment.

Deployment Schedule for New System

VA's planned deployment of the Millennium-based system includes three IOC sites followed by 47 additional deployment cycles (referred to by the OEHRM as "waves") for the remaining sites to install the system VA-wide from FY 2020 through FY 2028. The executive director of the OEHRM testified in June 2019 that the purpose of deploying to the IOC sites is to identify challenges and address identified weaknesses before deploying the system at additional sites.¹¹ The three IOC sites are Mann-Grandstaff VAMC and two sites in the Puget Sound Health Care System in Washington—the Seattle VAMC and American Lake VAMC in Tacoma. The 11 community-based outpatient clinics (CBOCs) associated with the VAMCs and one consolidated patient accounting center are also part of the IOC system deployment.

For the IOC sites to be effective learning grounds, infrastructure upgrades should be in place six months before going live at those sites so that the root causes of weaknesses and problems can be identified and addressed. This is a clear takeaway from the DoD experience. Accordingly, OEHRM leaders have publicly and repeatedly expressed to lawmakers their commitment to the timely infrastructure upgrades, confirmed the importance of having upgrades completed to the audit team, and specified this goal as a standard in its integrated infrastructure plan:

- On November 2018, the OEHRM's chief technology integration officer told the House Subcommittee on Technology Modernization that the office planned to have technology readiness done six months before implementation at the IOC sites.
- On June 2019, the OEHRM's executive director reiterated in another hearing VA's plan for infrastructure to be ready six months before the go-live date.¹²
- On November 2019, in an interview with the audit team, the OEHRM's executive director confirmed that VA's objective to have infrastructure completed six months

¹¹ House Committee on Veterans' Affairs, Subcommittee on Technology Modernization Hearing, June 12, 2019.

¹² Later in this hearing, the OEHRM's chief technology integration officer admitted that not all infrastructure would be completed by the go-live date.

before the system is deployed at the IOC sites is “critical” to mitigating setbacks that occurred at DoD’s sites.

- Additionally, the OEHRM’s integrated infrastructure plan, dated November 2018, stated that infrastructure upgrades are “expected to be complete no later than six months before the go-live event.”

Go-Live Date

The day that a site turns on the new electronic health record system at the IOC site for personnel to use is being referred to as the go-live date. Going live does not mean that the full system with all functionality will be up and running, and the definition of “go live” was refined by the OEHRM to specify the system capabilities that will be available at Mann-Grandstaff VAMC on the go-live date. Capabilities are essentially the features of the electronic health record system that are available to end users and support the different facility areas such as the pharmacy and oncology. As of November 2019, the OEHRM expected the new electronic health record system to go live at the Mann-Grandstaff VAMC in March 2020 with about 225 of the total 278 capabilities expected to deploy there eventually, or about 81 percent. For example, order management is one of the new system’s capabilities that was projected to go live in March 2020. So, staff working in a dental clinical area should be able to use the system’s order management function to place, modify, and cancel orders.

According to the OEHRM, some capabilities, such as cardiology and certain aspects of telehealth, would not go live in March 2020. Rather, these capabilities were expected to be available about six months later in September 2020. OEHRM officials stated that, in the interim, clinicians would have to access the VistA legacy system for those capabilities not yet available in the new system.

On February 11, 2020, the audit team held an exit conference with VA officials from the OEHRM, VHA, and the OIT to discuss the findings and recommendations of this audit. During this meeting, OEHRM’s executive director informed the audit team the go-live date at Mann-Grandstaff VAMC and its associated facilities, scheduled for March 28, 2020, would be delayed. The executive director also stated the future system deployment date at this site was unknown. Soon after, VA released a new targeted deployment date of July 2020. However, in early April 2020, VA announced this deployment date would also be delayed until an unknown time due to the COVID-19 pandemic. Because notice to postpone system deployment occurred after the audit team conducted its work and an updated deployment date has yet to be announced, throughout this report the team refers to the previously anticipated system deployment date of March 28, 2020.

Testing Before Going Live

Before the system is initially deployed, it must be tested to help ensure a successful go-live event. Cerner provided VHA with a deployment handbook that outlines when major events should take place before deployment, including two system testing events called “integration validation.” The second testing event acts as a retest of system scenarios that failed during the first testing event and also as a new test event for additional scenarios and occurred approximately seven weeks before the projected IOC site go-live date.

State of Infrastructure at the Mann-Grandstaff VAMC

In preparation for deployment, significant physical and IT upgrades are needed to ensure compatibility with the new system, and to bring much of the physical infrastructure up to current industry and VA standards. As discussed earlier, in addition to the 10-year contract costs and OEHRM-funded infrastructure upgrades that fall outside that contract, VHA is expected to fund some of the physical infrastructure upgrades. According to data provided by OEHRM, the new electronic health record system will be implemented to 174 medical centers and 1,577 standalone sites. The total expected cost for these upgrades is still somewhat uncertain. However, planned physical infrastructure upgrades for the Mann-Grandstaff VAMC alone that are to be funded by VHA are estimated to cost about \$23.2 million. These infrastructure upgrades, funded by VHA's nonrecurring maintenance budget include upgraded cabling, ventilation and air-conditioning, and physical security.

VA uses predeployment site assessments called Current State Reviews to assess the facility and detail gaps between the current conditions and what is needed for deployment of the new electronic health record system. Cerner is responsible for conducting a Current State Review at each facility and providing VA leaders with findings and recommendations. While assessments of both physical and IT infrastructure are critical, the Current State Reviews for the IOC sites did not comment on the sites' *physical* infrastructure. The Current State Reviews did identify the need for significant IT infrastructure upgrades, such as new computers, monitors, printers, scanners, and bar code readers. Specifically, for the Mann-Grandstaff VAMC, the assessment from July 2018 recommended 2,127 computer and monitor upgrades needed to support deployment of the new system because

- 1,025 desktop computers did not meet the minimum OEHRM end-user device requirements;
- 206 laptop computers did not meet the minimum OEHRM end-user device requirements, and
- 896 monitors, at least, did not meet the minimum OEHRM end-user device requirements, which requires monitors to be 22 inches or larger.

However, by the time the May 2019 OEHRM *Initial Operating Capability (IOC) End User Device (EUD) Deployment Plan* was released, the number of desktop computers, laptop computers, and monitors identified as needing replacement increased from 2,127 to 6,205.

Also, after completing Current State Reviews in April and May 2019, OIT staff performed separate engineering assessments specifically to evaluate the IOC sites and their preparation for going live. The results of the assessment at the Mann-Grandstaff VAMC identified significant limitations in the physical infrastructure, including inadequate space and power, outdated network cabling, and a lack of equipment grounding. In October 2019, VHA officials directed staff at facilities nationwide to begin completing self-assessments similar to the engineering assessment conducted at the Mann-Grandstaff VAMC. As part of these, each facility is required to conduct an assessment of its physical infrastructure using a provided template, with results returned to VHA by March 31, 2020.

Current Schedule Delays

Although VA leaders maintain that the new electronic health record system will be implemented VA-wide by calendar year 2028, the initial deployment schedule has already seen slippages, as projected go-live dates for initial sites have been delayed.

After this audit began, in December 2019, VA postponed system deployment at the Seattle and American Lake VAMCs until at least November 2020. An OEHRM leader stated that infrastructure was not a significant reason for this postponement, but rather was mostly attributable to these IOC locations having more distinct areas of clinical care. Additional time was needed to define system capabilities to support these clinical areas. An OEHRM leader acknowledged to the audit team in November 2019 that the postponement will have a cascading effect on the deployment schedule. The OEHRM December 2019 revised schedule, however, indicates that despite the shift of some dates from the prior deployment schedule, VA-wide system deployment is still anticipated to be complete within the projected 10-year time frame. Notably, in February 2020, VA also postponed the deployment date for the Mann-Grandstaff VAMC, and in March 2020, OEHRM released a new target deployment date of July 2020. As of April 3, 2020, the Secretary of VA announced the delay of Mann-Grandstaff and stated the deployment schedule is extremely fluid due to the COVID-19 pandemic and that future updates will be provided. Table 1 depicts the initial and revised deployment schedules for the IOC sites and the sites involved in the first three waves as reported in August and December 2019, as well as the postponement of deployment at Mann-Grandstaff VAMC.

Table 1. The OEHRM's Initial and Revised System Deployment Schedule for IOC Sites and the Sites in Waves 1 through 3

Wave	Site name	Initial projected go-live date	Revised projected go-live date
IOC	Mann-Grandstaff VA Medical Center	March 23, 2020	July 2020*
	American Lake VA Medical Center	April 27, 2020	November 30, 2020
	Seattle VA Medical Center	April 27, 2020	November 30, 2020
1	Jonathan M. Wainwright Memorial VA Medical Center	August 7, 2020	May 27, 2021
	White City VA Medical Center	August 7, 2020	May 27, 2021
2	Portland VA Medical Center	October 9, 2020	July 8, 2021
	Portland VA Medical Center - Vancouver	October 9, 2020	July 8, 2021
	Roseburg VA Medical Center	October 9, 2020	July 8, 2021
3	Anchorage VA Medical Center	November 9, 2020	September 3, 2021
	Boise VA Medical Center	November 9, 2020	September 3, 2021

Source: VA OIG, based on OEHRM-provided deployment schedules from August and December 2019, and VA updates provided in March 2020 on Mann-Grandstaff VAMC.

*As of April 2020, will be delayed due to the COVID-19 pandemic.

Results and Recommendations

Finding 1: The New Electronic Health Record System Is Likely to Go Live at the Mann-Grandstaff VAMC with Deficient Supporting Infrastructure

As of the audit team's site visit in October 2019, less than six months before the expected go-live date of March 2020 for the Mann-Grandstaff VAMC, many critical physical and IT infrastructure upgrades had not been completed. Furthermore, many of the physical upgrades are not scheduled to be complete until months after that date. For example, modifications to telecommunications rooms that house equipment critical to deployment of the new electronic health record system will not be complete until up to four months after the go-live date. Also, 31 percent of end-user devices needed for the go-live date remain to be upgraded as of October 7, 2019. The audit team followed up with the OEHRM and the VAMC's engineering architect after the site visit. As of December 20, 2019, contracts had yet to be awarded for some critical physical infrastructure upgrades. Additionally, as of January 8, 2020, some critical IT infrastructure upgrades had yet to be completed.

Medical devices, used to provide patient care or capture data, also require an "authority to connect" from DoD that allows the devices to connect to the system.¹³ However, as of January 8, 2020, VHA officials stated the authority to connect had not been granted.

By not having the proper infrastructure ready for the deployment of the new system, VA has reduced its ability to identify the root causes for any system performance issues, as DoD experienced during its electronic health record system implementation. DoD's experience also portends that going live with deficient infrastructure can lead to diminished user experience and low adoption rates, in particular if there is system latency or other unresolved performance issues.¹⁴ A significant effect of diminished user experience is a low user adoption of the system that, in turn, could lead to a longer learning curve once the system is implemented. On a broader scale, these delays put the overall program schedule at risk. The OEHRM's aggressive but seemingly unrealistic deployment schedule increases the risk of unnecessary program costs if future deployment sites are forced to make deadline-driven temporary fixes, only to have to pay for permanent solutions later.

Finally, if the new electronic health record system did go live at Mann-Grandstaff VAMC as initially planned in March 2020, many aspects of the physical infrastructure in its

¹³ Medical devices at Mann-Grandstaff VAMC will only require one authority to connect.

¹⁴ Latency can be defined as the time it takes a signal to pass through a device or network (such as the time it takes a user to log in to a system, or the time it takes for a computer to send or receive information to the data center in Kansas City).

telecommunications rooms and data center would not have met national industry or VA internal standards. That is exemplified by a lack of equipment clearance and power supply found by the audit team, which pose risks of diminished performance at the system go-live date. Although the VAMC is planning to address these deficiencies, the audit team noted that some of these upgrades will be completed after the go-live date. Furthermore, the audit team identified a delay in standardized and approved critical infrastructure requirements as well as other management control deficiencies that inhibited the OEHRM's ability to monitor infrastructure readiness.

What the OIG Did

The scope of this audit included physical and IT infrastructure-readiness efforts at the Mann-Grandstaff VAMC since the award of the electronic health record modernization contract to Cerner Government Services Inc. on May 17, 2018. The audit team inspected a total of 24 telecommunications rooms, including all 22 priority 1 and 2 rooms at the Mann-Grandstaff VAMC, one priority 2 room at the Spokane Vet Center, and one priority 2 room at the North Idaho CBOC in Coeur d'Alene, Idaho. The audit team also inspected the data center located in the basement of the Mann-Grandstaff VAMC. Priority 1 rooms are categorized as critical by VA and related work *must* be completed before going live. Priority 2 rooms are categorized as rooms with upgrades that VA *prefers* to have completed before going live.

The audit team inspected the 24 telecommunications rooms and the data center from October 7 through October 11, 2019. The audit team also relied on information from VA's inventory management system to identify end-user and medical devices procured and received by the facility from June 13, 2019 (the date the VAMC began to receive these items in support of the new electronic health record system), through October 7, 2019 (the day the team arrived on site). The audit team tested the accuracy of the inventory system data by conducting on-site inspections of end-user devices (e.g., desktop or laptop computers and monitors) and medical devices (e.g., vital signs monitors and medication dispensing cabinets). The audit team also verified these items were compatible with the new electronic health record system.

The audit team reviewed applicable policies, procedures, and guidelines, as well as industry standards, including those from the American National Standards Institute. The audit team gathered evidence from VA officials, including records held by the OEHRM. The team also interviewed staff from the OEHRM, VHA, the OIT, and Veterans Integrated Service Network (VISN) 20, including executive leaders and local facility staff involved with infrastructure readiness.

The first OIG finding discusses the following concerns:

- Physical infrastructure was not upgraded timely, with many upgrades pending completion after going live.

- IT infrastructure was not upgraded six months before going live and some medical devices may not be able to connect to the new system.
- The infrastructure upgrade schedule was likely unrealistic for the March 2020 go-live date and could contribute to further system deployment delays.
- Infrastructure upgrade requirements were not standardized.
- Management controls were lacking and key staffing positions were vacant.

Physical Infrastructure Was Not Upgraded Timely, with Many Upgrades Pending Completion After Going Live

The audit team found that all 24 telecommunications rooms and the data center at the Mann-Grandstaff VAMC and associated facilities still needed work completed to meet industry and VA standards. This was identified during the week of October 7, 2019, less than six months before the go-live date. Examples of needed upgrades and corrective work not yet completed include the following:

- Network cabling upgrades
- Patch panel upgrades
- Equipment rack substandard clearance
- Poor cable management
- Lack of IT equipment grounding
- Proper power supplies
- Data center deficiencies
- Heating, ventilation, and air-conditioning installation¹⁵

VA staff told the audit team that the VAMC has experienced deferred maintenance. The OEHRM's chief technology integration officer stated this has led to a backlog of projects. Additionally, the Mann-Grandstaff VAMC was built in 1950 and was therefore not designed for today's technological needs. The audit team was told by the VAMC's engineering architect that the existing telecommunications rooms were originally just closets. The following sections detail key deficiencies the audit team identified.

¹⁵ Needed upgrades were not identified by the audit team during on-site inspections but were identified by the VAMC.

Network Cabling Upgrades Needed

VA's standards specify the use of Category 6a network cabling, but allow for Category 6 cabling.¹⁶ The specification for Category 6a cabling is consistent with industry standards and provides better performance because of lower signal loss and the ability to support more bandwidth.¹⁷ However, during the week of October 7, 2019, the audit team found that 22 telecommunications rooms inspected at the Mann-Grandstaff VAMC and two of its associated facilities had cabling that did not meet the standard, primarily Categories 5 and 5e. In one room, the audit team found Category 3 cabling but a staff member on site was unsure whether the cabling was actually connected to IT equipment. Cabling found below Category 5e is particularly concerning because it does not provide the one gigabit of connectivity to the computers and other end-user devices as required by the OEHRM for the new electronic health record system. For example, Category 5 cabling only provides 100 megabits connectivity, which is only 10 percent of the speed required.¹⁸ After the audit team's site visit, the VAMC awarded a contract to upgrade its cabling with work scheduled to be completed on January 13, 2020. The audit team notes this date is about three months after VA's stated goal of having infrastructure ready six months before the go-live date. Figures 2 and 3 are photos of substandard network cabling in two of the telecommunications rooms at the Mann-Grandstaff VAMC.

¹⁶ Office of Information Technology, *Infrastructure Standards for Telecommunications Spaces*, Version 2.2, April 10, 2019.

¹⁷ Telecommunication Industry Association Standard 1179-A, *Healthcare Facility Telecommunications Infrastructure Standard*, September 2017.

¹⁸ A gigabit is equal to one billion bits whereas a megabit is only equal to one million bits.



Figure 2. (Left) A photo of multiple strands of Category 3 cabling in room A105A of the main hospital building at Mann-Grandstaff VAMC, taken during the audit team's inspection
Source: VA OIG, Spokane, Washington, site visit photo; 8:29 a.m.; October 9, 2019.

Figure 3. (Right) A photo of Category 5 cabling in room A302 of the main hospital building at the Mann-Grandstaff VAMC.

Source: VA OIG, Spokane, Washington, site visit photo; 2:35 p.m.; October 8, 2019.

Patch Panel Upgrades Also Needed

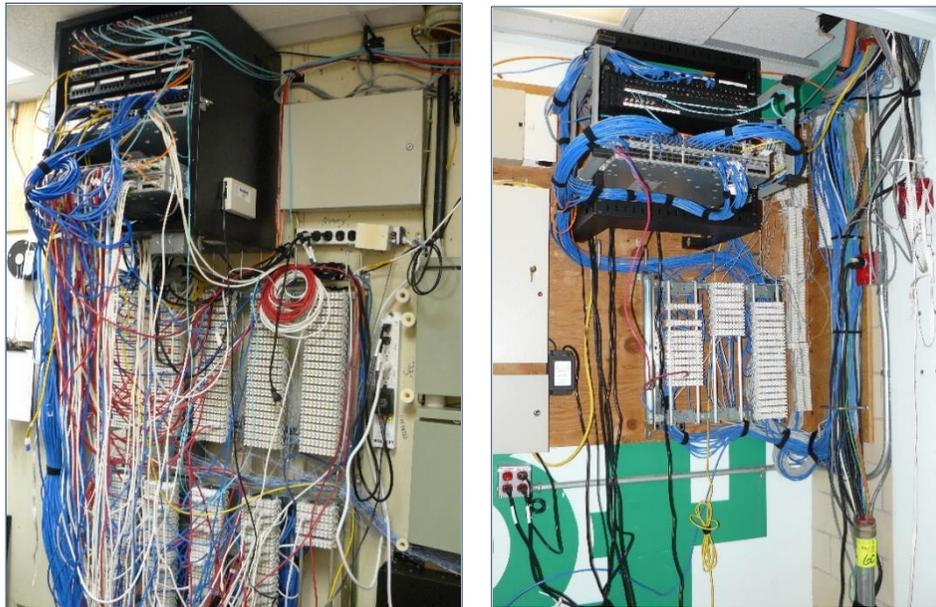
A patch panel is a connecting hardware system that facilitates cable termination and administration. VA standards require that the performance categories of the patch panel and connecting networking cables match. However, the audit team identified four telecommunications rooms that used Category 5e patch panels with Category 6 cabling. Category 5e patch panels are not designed to handle the higher frequency of Category 6 cabling. The higher frequency of the cabling can lead to interference between the cables called “crosstalk” that can negatively affect network performance. After the audit team’s site visit, the VAMC awarded a contract to upgrade its patch panels with the work scheduled to be completed by March 9, 2020. This date was about three weeks before the go-live date of March 28, 2020.

Equipment Rack Clearance Not to Standard

Equipment racks are the support structure for IT equipment and cabling terminations. Although the audit team has not identified VA standards for rack clearance, VA generally follows American National Standards Institute requirements. National industry standards require three feet of clearance in front of the racks so IT personnel have adequate room for installation of equipment and two feet of clearance at the rear of the rack for service access.¹⁹ Twenty-one of

¹⁹ American National Standards Institute/Telecommunications Industry Association, *Telecommunications Pathways and Spaces*, 569-E, May 2019.

the rooms inspected had equipment racks. Of those, 20 lacked the required front or rear clearance, or both, and the majority of the racks had no rear clearance at all. Insufficient clearance prevents access to IT equipment for servicing or troubleshooting, increasing the risk of downtime if equipment fails and potentially leaving clinicians without access to the electronic health record system for extended periods. The audit team found that the size of six of the 20 telecommunications rooms simply will not allow for the required clearances, and the facility does not have plans to either relocate or expand the rooms to correct the issue. Figures 4 and 5 are photos of equipment racks in telecommunications rooms without rear clearance.



Figures 4 and 5. Photos of equipment racks mounted directly to the wall with no rear clearance taken during the audit team's inspection.

Figure 4 (left) was taken in room 108 of building 12.

Figure 5 (right) was taken in room A800D in the main hospital building.

Source: VA OIG, Spokane, Washington; 10:18 a.m. and 2:07 p.m.; October 8, 2019

Poor Cable Management

VA requires proper cable management to minimize the risk of damage to cables and connectors.²⁰ The audit team found 19 of the 24 rooms inspected had cables that were hanging from patch panels or network switches instead of being properly concealed within the equipment racks. This can cause strain on the cables and equipment connectors and over time cause the cables and equipment connectors to fail. This presents a risk of end-user devices losing access to

²⁰ Office of Information Technology, *Infrastructure Standards for Telecommunications Spaces*, Version 2.2, April 10, 2019.

the electronic health record system, ultimately putting patient care at risk. Figures 6 and 7 show improper cable management in telecommunications rooms.

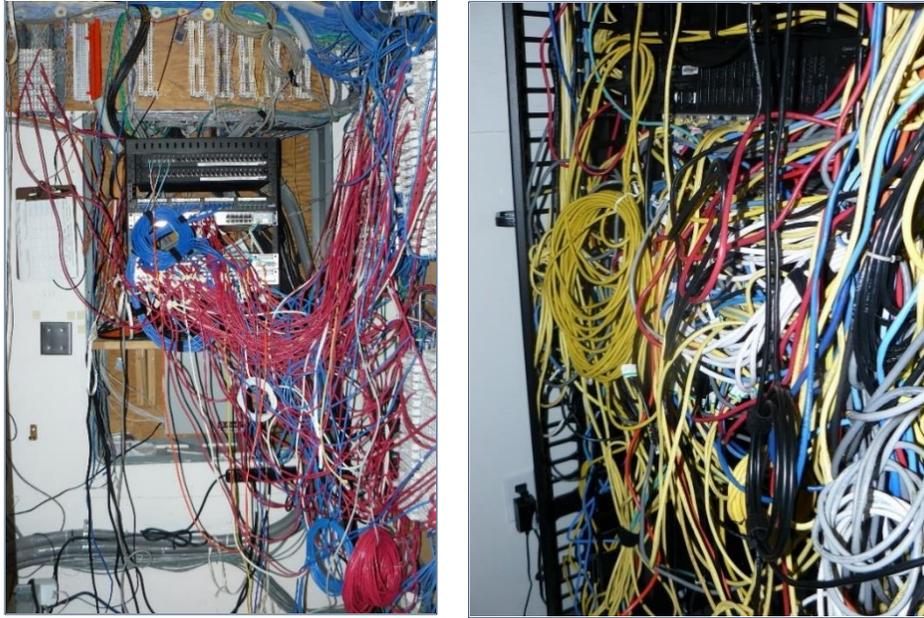


Figure 6. (Left) A photo of improper cable management in room A105A of the main hospital at the Mann-Grandstaff VAMC, taken during the audit team's inspection.

Figure 7. (Right) A photo of improper cable management in the Coeur d'Alene CBOC telecommunications room.

Source: VA OIG, Spokane, Washington; 8:30 a.m. and 1:51p.m.; October 9, 2019

Lack of IT Equipment Grounding

The primary purpose of grounding IT equipment is to enhance personnel safety and reduce the likelihood of a fire hazard. The OEHRM requires grounding per national telecommunications grounding standards.²¹ In addition, Occupational Safety and Health Administration standards require that employers ensure proper grounding of equipment for the purpose of protecting employees.²² The audit team identified 16 telecommunications rooms that lacked grounding, which increases the risk of death or injury due to electrical shock or the destruction of equipment from an electrical fire.

²¹ Office of Electronic Health Record Modernization (OEHRM) Requirements Specification, Version 1.0, June 5, 2019.

²² Occupational Safety and Health Administration Standard 1926.962, Grounding for the Protection of Employees, July 10, 2014.

Proper Power Supplies Lacking

The OEHRM requires that all uninterruptible power supply units be functional and adequate.²³ The audit team identified four telecommunications rooms that lacked uninterruptible power supply units. These units are important because they provide continuous power to IT equipment in telecommunications rooms when the main power source fails.

Table 2 provides a breakdown of the deficiencies most commonly found in the VAMC's telecommunications rooms and two associated facilities inspected by the audit team from October 7–11, 2019.

Table 2. Summary of Telecommunications Room Deficiencies Identified at Mann-Grandstaff VA Medical Center and Two Associated Facilities (October 7–11, 2019)

	Cabling upgrades needed	Patch panel upgrades needed	Equipment rack clearance not to standard	Poor cable management	Improper grounding of IT equipment	Proper power supply lacking
Rooms with deficiencies	22	4	20	19	16	4
Number of rooms inspected	24	19	21	24	24	24
Percentage not in compliance	91.7%	21.1%	95.2%	79.2%	66.7%	16.7%

Source: OIG inspections of telecommunications rooms identified as Priority 1 and 2.

Note: Only 19 telecommunications rooms had patch panels and 21 rooms had equipment racks.

²³ OEHRM Requirements Specification, Version 1.0, June 5, 2019.

Data Center Deficiencies Noted

Mann-Grandstaff VAMC's data center will house the Cerner servers and act as the main computer room. The audit team identified issues with data center infrastructure, including substandard cabling and its improper management. Also, the data center lacked the 18-inch clearance from the top of server racks to fire sprinkler systems required by national standards.²⁴ The required clearance is important to ensure water distribution is not disrupted in the event of a fire. However, the data center is located directly under the facility's cafeteria so increasing the ceiling height to allow for the required clearance was not an option. Pipes above the server racks have leaked periodically, which could eventually lead to damaged servers and loss of connectivity to the electronic health record system. Although local staff stated there have been leaks, they insisted equipment in the data center has not been damaged when this occurred. To help prevent future damage, the VAMC installed special ceiling tiles above the server racks to catch and divert liquid. The audit team did not observe an active leak during its inspection to determine if the VAMC's fix was sufficient. Figures 8 and 9 show the proximity of a sprinkler head to the server racks and the special ceiling tiles installed above the server racks.

²⁴ American National Standards Institute / Building Industry Consulting Services International 002-2019, Data Center Design and Implementation Best Practices, May 1, 2019.



Figure 8. (Left) Picture of the proximity of the sprinkler heads to the server racks in the data center room, taken during the audit team's inspection.

Source: VA OIG, Spokane, Washington; 9:23 a.m.; October 7, 2019.



Figure 9. (Right) Picture shows the ceiling tiles installed directly above server racks, which will eventually hold Cerner's servers. The tiles are used to prevent equipment damage that could be caused by leaking pipes above.

Source: VA OIG, Spokane, Washington; 10:05 a.m.; October 7, 2019.

Heating, Ventilation, and Air-Conditioning Installation Needed

Properly controlling operating temperature in telecommunications rooms helps ensure equipment longevity. The OEHRM's chief technology integration officer stated that the temperature in the telecommunications rooms when going live was his biggest concern. National standards recommend telecommunications rooms maintain an internal temperature of 64 to 81 degrees Fahrenheit, but allow for temperatures up to 90 degrees Fahrenheit.²⁵ Although the audit team's physical inspections did not identify any rooms exceeding 90 degrees, the VAMC was still installing additional equipment in each room that will require more cooling. The VAMC had plans to procure and place temporary exhaust fans and new doors in most rooms by the go-live date to provide ventilation and maintain the recommended temperature range within rooms. As of December 20, 2019, the contract(s) for the temporary fixes had not been awarded, with work likely to be completed after the go-live date. There were also plans to replace the temporary exhaust fans with a permanent cooling system up to seven months after the anticipated go-live

²⁵ American National Standards Institute/Telecommunications Industry Association, *Telecommunications Pathways and Spaces*, 569-E, May 2019.

date. The audit team noted that the temporary exhaust fan solution would bear an additional cost to VA, only to be replaced by a permanent solution months later.

Although there were plans to address the deficiencies, according to a Mann-Grandstaff VAMC staff member, not all contracts to complete the projected work had been awarded as of December 20, 2019. The audit team obtained schedules provided by a VHA staff member involved in the management and oversight of physical infrastructure projects that indicate some of the work would not be finished until December 2020, about nine months after the go-live date.

Additionally, local staff at the VAMC told the audit team that there are plans to eventually move the data center, but these plans had not been approved.

IT Infrastructure Was Not Upgraded Six Months Before Going Live and Medical Devices May Not Be Able to Connect to the New System

The Mann-Grandstaff VAMC and its associated facilities that the OIG reviewed did not have critical IT infrastructure upgrades completed six months before the March 2020 go-live date. Specifically, the audit team found that according to the VA's inventory management system, as of October 7, 2019, the Mann-Grandstaff VAMC had not received 1,924 (or 31 percent) of the 6,205 IT end-user devices (e.g., desktop computers, laptop computers, and monitors) needed. However, the deployment schedule planned for 100 percent of computers to be received by October 1, 2019.

Although the audit team confirmed some newly procured medical devices such as medication dispensing cabinets had been received by the VAMC, the audit team could not determine at the time of the site visit in October 2019 if the VAMC had received the total number of devices necessary for system deployment. This is because the audit team did not have a list of the total number of medical devices needed for the VAMC and associated facilities or a comprehensive deployment plan listing these devices at the time of the site visit. The audit team asked the OEHRM on December 19, 2019, for the total number of devices needed for going live, and the office's acting lead healthcare technology manager stated that identifying the total number of medical devices needing to be upgraded had to be done by manually reviewing multiple purchase orders for devices. On January 10, 2020, OEHRM staff provided the audit team a list of devices needed for going live and received at the VAMC. According to this list provided by the OEHRM, only about 49 percent of the medical devices needed for going live had been received. Furthermore, this list indicated the OEHRM did not expect to receive the last medical devices needed for going live to be delivered to the VAMC until early March 2020.

Significantly, medical devices also require an "authority to connect" from DoD to allow them to connect to the system for information sharing purposes. Without an authority to connect, clinicians will be unable to connect those devices to the new system, leaving some healthcare delivery functions inaccessible through the new system for care providers, which could impact clinical procedures. Likewise, this would significantly affect the success of the go-live event, if

not halt it altogether, unless VA excludes those system capabilities that require device connections from system deployment. As of January 8, 2020, the OEHRM acting lead healthcare technology manager indicated to the audit team that there was an interim authority to connect for the new system only to allow for system testing of the equipment. However, the authority to connect that would allow the devices to connect at the go-live date had yet to be granted. The audit team inquired why this had yet to be granted, and the OEHRM's acting lead healthcare technology manager stated it was because a related memorandum of understanding was still needed.²⁶ OEHRM officials stated they were confident the authority to connect would be granted by the go-live date.

Finally, the VAMC did not have circuit upgrades necessary to support the VAMC's wide area network completed six months before the go-live date.²⁷ Specifically, the OEHRM required that the Mann-Grandstaff VAMC have circuits with a committed information rate of at least 500 megabits per second.²⁸ However, the committed information rate at Mann-Grandstaff VAMC, as of October 2019, was only 200 megabits per second, or less than half of what is required. According to staff from the OIT, as of December 2019, this upgrade was estimated to be completed by mid-January 2020 and the infrastructure engineering director stated there was a plan to upgrade the circuits to the 500 megabits per second before the go-live date. However, should this not be completed by the go-live date, IT and medical equipment's usability at the facility may be affected, as the increased bandwidth associated with a circuit upgrade allows for better, more efficient transmission of data for the IT infrastructure connected to the system.

The Infrastructure Upgrade Schedule Was Likely Unrealistic for the March 2020 Go-Live Date and Could Contribute to Further System Deployment Delays

Critical physical and IT infrastructure was not upgraded six months before the March 2020 go-live date, in part because the OEHRM's schedule to complete critical infrastructure upgrades within that window of time was likely unrealistic. This was because VA did not have a clear picture of the true state of physical infrastructure at Mann-Grandstaff VAMC when leaders committed to the March 2020 date. The age of the Mann-Grandstaff VAMC along with its deferred maintenance highlights the importance of identifying infrastructure needs as early as possible so upgrades may realistically be completed before system deployment. VA must also account for the time inherent in the procurement process.

²⁶ This memorandum of understanding was associated with receiving an authority to operate, which must be completed prior to VA receiving an authority to connect.

²⁷ A circuit is a path between two or more points along which an electrical current can be carried.

²⁸ A committed information rate is the minimum bandwidth (i.e., amount of data that can be sent through a network) guaranteed by the VAMC's internet service provider for the wide area network.

OEHRM officials acknowledged during interviews with the audit team that they did not anticipate the breadth of infrastructure upgrades needed for facilities VA-wide. VA committed to Mann-Grandstaff VAMC's go-live date before facility infrastructure assessments were performed. Specifically, the then Acting VA Secretary publicly announced the March 2020 go-live date on June 26, 2018. However, almost a year had passed from the time the go-live date was announced before OEHRM leaders had a clear picture of the true state of physical infrastructure at the VAMC, in part, because the initial site assessment report, referred to as the Current State Review, did not comment on physical infrastructure. This left only about four months to address the physical infrastructure upgrade needs—a process that realistically takes 12 to 24 months, according to VHA staff acknowledgments during OIG interviews in October and November 2019. An OEHRM leader stated in a November 2019 interview with the audit team that site facility assessments should be performed two to three years before a go-live date to allow for sufficient lead time to address any deficiencies. Also concerning is that the OEHRM first made infrastructure requirements for physical infrastructure available to VHA at a technical design session in April 2019, just five months before the necessary infrastructure was supposed to be ready for the go-live event.

For IT infrastructure, the Current State Reviews, which first identified the need for end-user device upgrades to support the new system, were completed in July 2018. This gave VA about 14 months (until September 2019) to achieve the department's goal for the completion of infrastructure upgrades. This was about eight fewer months than the about 22 months the OEHRM Infrastructure Readiness Planner estimated that it takes from the time the need for a device is identified to delivery to an end user. Also, VA did not begin procuring end-user devices until the end of April 2019, leaving only about five months for delivery to the VAMC, as well as for additional actions that need to be taken to prepare the devices for the end user, such as configuring. Finally, VA evidently needed more time than allotted to complete actions necessary to receive approval from DoD to receive medical device connection authority. For example, the OEHRM's integrated master schedule for the project, dated September 2019, planned for the connection authority to be completed by December 10, 2019, or less than four months before going live. However, the OEHRM acting lead healthcare technology manager indicated to the audit team that this had not been completed as of January 8, 2020.

Despite OEHRM's executive director confirming to the audit team in November 2019 the criticality of infrastructure upgrades being completed six months before the go-live date, OEHRM and VHA personnel evidently knew that physical and IT infrastructure upgrades could not be completed in that time. Therefore, the infrastructure schedule that was developed was unrealistic. For example, none of the physical infrastructure upgrade projects were scheduled to be completed six months before the go-live date. In fact, four of the major acquisitions to complete necessary physical infrastructure upgrades, such as correcting space issues and power deficiencies, upgrading cabling and fiber, managing cable, and providing temporary cooling and ventilation in telecommunications rooms and the data center, were not even awarded six months

before the go-live date. The end-user device deployment plan was similarly unrealistic because it scheduled devices to be delivered to end users only about four-and-a-half months before the go-live date at the Mann-Grandstaff VAMC.

As a result of not completing infrastructure upgrades six months before the go-live date, VA has increased the potential for cascading delays, particularly if unanticipated events occur at the go-live time that need to be resolved before further deployment. The infrastructure upgrade schedule has reduced the amount of time VA has to respond to any system performance issues before the system go-live dates at the next IOC deployment sites, which were scheduled to take place approximately eight months later. Interviews with VA staff suggest that more time is needed between conducting site assessments and going live at each VA facility to allow sufficient time for infrastructure upgrades. Figure 10 below depicts a timeline of completed events and estimated future events at the Mann-Grandstaff VAMC related to physical infrastructure upgrades.

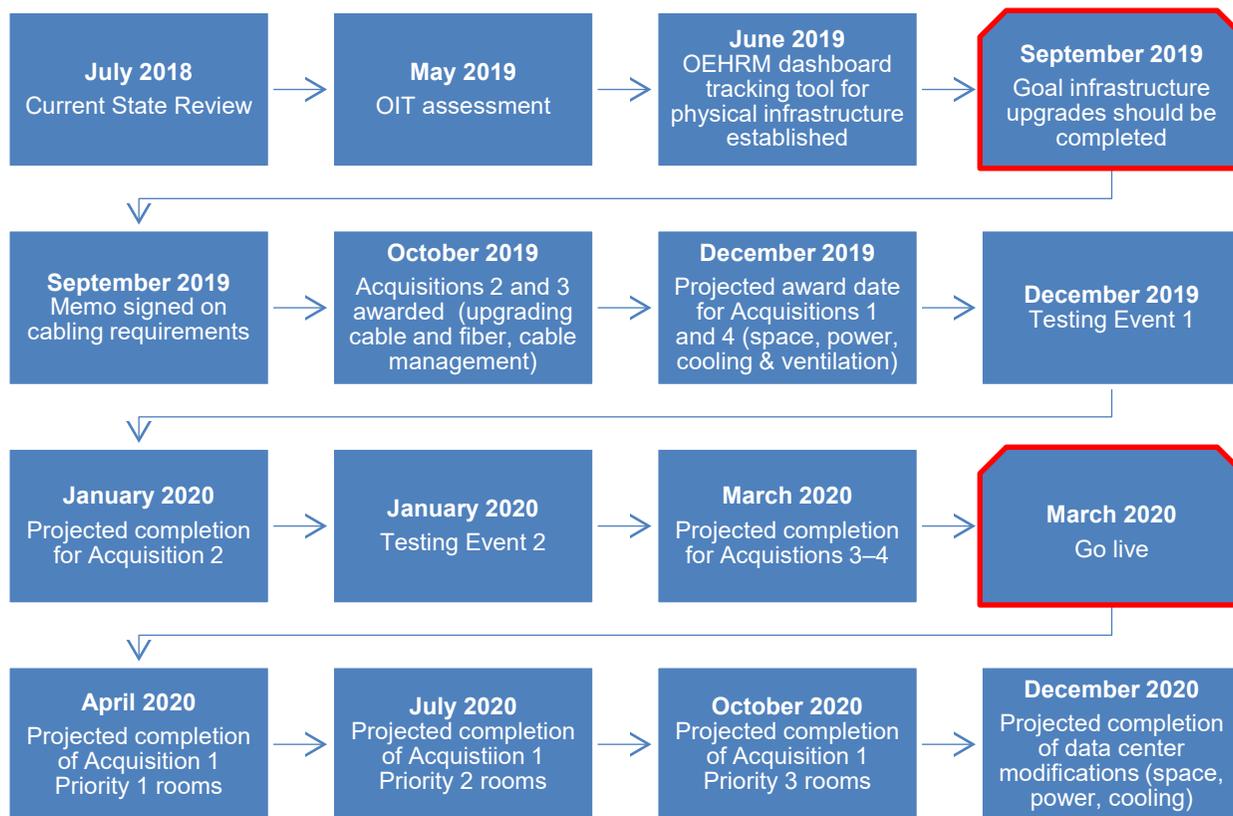


Figure 10. Timeline of completed and estimated future events and acquisitions (using examples) at the Mann-Grandstaff VAMC related to physical infrastructure upgrades. The red outlined boxes above denote the date OEHRM should have had infrastructure upgrades completed (to meet VA's stated goal of six months prior to the go live date) at the Mann-Grandstaff VAMC and the previously scheduled go-live date for the Mann-Grandstaff VAMC, respectively.

Source: VA OIG developed from documents and interviews.

As the Figure 10 timeline depicts, some physical infrastructure upgrades were not projected to be completed until after the initial March 2020 go-live date. Physical infrastructure projects are to be completed to meet industry standards, such as Building Industry Consulting Services International and American National Standards Institute. Acquisition 1 focuses on correcting deficiencies in 32 telecommunications rooms, as well as building or relocating seven telecommunications rooms. Deficiencies corrected under this acquisition include space, environment (cooling), power, physical security, and equipment requirements, such as installing new equipment racks. This acquisition also addresses grounding requirements for the rooms. Acquisition 2 upgrades cabling. Acquisition 3 targets cable management in the telecommunications rooms as well as fiber upgrades. Lastly, Acquisition 4 provides interim fixes to the telecommunications rooms in preparation for the new electronic health record system. These fixes include the addition of exhaust fans and new doors for 30 telecommunications rooms, as well as adding temporary cooling to the data center.

Infrastructure Upgrade Requirements Were Not Standardized

As of November 1, 2019, about 18 months after the contract award to Cerner, requirements for infrastructure were still not approved by all three entities involved with and responsible for infrastructure-readiness upgrades—the OEHRM, VHA, and the OIT. For example, an OEHRM leader told the audit team there were disagreements between the OEHRM and VHA over certain infrastructure requirements such as whether to require Category 6a cabling and said the disagreement over cabling has caused delays. Also of concern was that two of the Mann-Grandstaff VAMC's planned upgrade projects—totaling about \$9.3 million—were awarded in October 2019 before requirements were standardized on November 20, 2019. The award for cable management and upgrading cabling and fiber relied on unsigned requirements to direct the scope of work needed. In addition, the OEHRM did not make infrastructure requirements for physical infrastructure available to VHA until April 2019, just five months before the necessary infrastructure was supposed to be ready for the go-live event.

The lack of agreement between the OEHRM and VHA meant that the standardized, approved requirements specifications document was not available until November 20, 2019—two months after infrastructure was supposed to be in place—creating ambiguity for Mann-Grandstaff VAMC personnel responsible for adhering to requirements. Employees at Mann-Grandstaff VAMC expressed concerns that they were unsure of the exact requirements for supporting the new electronic health record system. OIT employees on site at Mann-Grandstaff VAMC also stated they were unable to provide specific information regarding how much system latency will exist on the go-live date because bandwidth usage of the new electronic health record system could not be fully predicted at that time. Without this information, it is unknown whether the infrastructure in place on the go-live date can support the required bandwidth of the system.

Management Controls Were Lacking and Key Staffing Positions Were Vacant

The OEHRM lacked some management controls needed to effectively monitor infrastructure readiness at the Mann-Grandstaff VAMC. For example, an OEHRM leader told the audit team that the internal tracking tools (referred to by the OEHRM as dashboard tools) used to monitor and report on physical infrastructure readiness at the IOC sites were not put into use until June 2019, only three months before VA's date to have infrastructure upgrades complete. Although the OEHRM was conducting internal briefings that included infrastructure readiness, the lack of a comprehensive, effective tracking mechanism limited leaders' ability to ensure milestones were being met. As of November 2019, the OEHRM's acting lead healthcare technology manager informed the audit team that no tools existed at the OEHRM level to comprehensively monitor and track the deployment of medical device infrastructure needed for going live. The manager stated the OEHRM relied on information from the facility or VISN personnel to monitor and assess progress on medical devices. Without a comprehensive tool to monitor the status and progress of medical devices, the OEHRM reduced its ability to identify and respond to associated delays.

The OEHRM also lacked some staff to oversee the program's infrastructure readiness. As mentioned earlier, the position of the infrastructure-readiness director was vacant until August 2019, which was about two months before VA's goal of having infrastructure in place six months before going live. This position is primarily responsible for coordinating physical infrastructure upgrades for system deployment. Without this position being filled early in the infrastructure planning process, VA would be less likely to spot potential issues stemming from deficient infrastructure. An OEHRM leader informed the audit team that while this position was vacant, no one else was assuming these duties. Additionally, according to the OEHRM's staffing chart, as of December 5, 2019, four of six positions on the infrastructure-readiness team were still unfilled.

Finding 1 Conclusion

Despite the significant effort VA has already put into this massive system overhaul, deficient infrastructure for the deployment of the new electronic health record system has increased the likelihood VA will experience similar setbacks as DoD when it initially deployed its electronic health record system. If VA moves forward without the infrastructure in place to support the new electronic health record system, it may experience system performance issues on the go-live date. Without infrastructure sufficiently upgraded, clinicians' ability to access timely information could be limited, ultimately affecting the quality of patient care. In addition, failing to have infrastructure ready for the go-live event reduces VA's ability to adequately identify and resolve any issues before deploying the system at future sites, which can lead to VA experiencing additional delays. Those delays, if realized, may result in additional costs to continue supporting

VistA, as well as increased costs for temporary solutions. Proper management controls to monitor infrastructure readiness are needed to ensure physical infrastructure is in place six months before going live at future deployment sites. Furthermore, the audit team identified a delay in standardized and approved critical infrastructure requirements as well as other management control deficiencies that inhibited OEHRM's ability to monitor infrastructure readiness.

Recommendations 1–6

The OIG made six recommendations for the executive director of the Office of Electronic Health Record Modernization:

1. Establish an infrastructure-readiness schedule for future deployment sites that incorporates lessons learned from the Department of Defense.
2. Reassess the enterprise-wide deployment schedule to ensure projected milestones are realistic and achievable, considering the time needed for facilities to complete infrastructure upgrades.
3. Implement tools to comprehensively monitor the status and progress of medical devices at the enterprise level.
4. Standardize infrastructure requirements in conjunction with the Veterans Health Administration and the Office of Information and Technology and ensure those requirements are disseminated to all necessary staff.
5. Evaluate physical infrastructure for consistency with Office of Electronic Health Record Modernization requirements and monitor completion of those evaluations.
6. Fill infrastructure-readiness team vacancies until optimal staffing levels are attained.

Management Comments

The executive in charge for the Office of the Under Secretary for Health concurred with the recommendations.²⁹ The executive director of OEHRM also concurred with the recommendations and provided an action plan for each. The executive director requested closure of Recommendations 1 through 4 and estimated corrective actions will be completed to address Recommendations 5 and 6 by March 2021.

For Recommendation 1, the executive director responded that the OEHRM has an infrastructure-readiness schedule that incorporates lessons learned from DoD. He reported the schedule will be updated to incorporate IOC sites' experiences. The executive director also stated

²⁹ The executive in charge for the Office of the Under Secretary for Health has the authority to perform the functions and duties of the under secretary for health.

that the OEHRM will continue to coordinate with VHA and the OIT to provide a unified schedule for future deployments based on enterprise- and site-level assessments.

In response to Recommendation 2, the executive director reported that the OEHRM will update its deployment schedule to incorporate VA lessons learned during deployment. The executive director also commented that the OEHRM will continue to coordinate with VHA and the OIT on the unified schedule that incorporates a VHA-approved infrastructure upgrade schedule.

To address Recommendation 3, the executive director responded that the OEHRM is implementing tools to comprehensively monitor the status and progress of medical devices at the enterprise level, with plans to expand medical device monitoring to VHA sites and to the VISNs.

For Recommendation 4, the executive director responded that the OEHRM, VHA, and the OIT collectively created site infrastructure requirements and installation monitoring tools, and VHA and the OIT have incorporated these requirements into their respective infrastructure standards.

To address Recommendation 5, the executive director reported that the OEHRM is working with VHA, the OIT, and local facilities to create a framework for validating physical infrastructure that includes a facility's confirmation memo that requirements are met.

In response to Recommendation 6, the executive director responded that the technology integration officer currently has two of six positions on this team filled and one detailee, with one position in active recruitment. The executive director stated the OEHRM has requested six additional staff for this team. VHA has also established and staffed a team for multi-office coordination focusing on technical requirements, management, and oversight of VHA facility infrastructure capital project and improvement execution.

In addition, the executive director provided technical comments in response to this finding that stated (1) Current State Reviews are comprehensive, (2) the OEHRM Site Infrastructure Requirements document was signed by the OEHRM, VHA, and the OIT on November 20, 2019, and (3) that infrastructure upgrades comply with minimum go-live requirements and will not diminish the end-user experience. The executive director also stated that infrastructure at each VA site is to comply with full operational capabilities within 12 months of going live. Finally, the executive director commented that, while the office agrees that required quantities of end-user devices changed from July 2018 through February 2020, the office is unable to document the 6,205 number cited in the OIG's draft audit report.

Along with the above comments, the executive director provided VHA's general comments in response to the finding and stated the Mann-Grandstaff infrastructure has been validated to meet the critical requirements for electronic health record system deployment and that all telecommunications room improvements critical to going live will be modified before the go-live date. VHA stated those items not critical to going live will continue to be worked and completed later. VHA also stated that they have already begun providing additional program office resources to meet schedules and are prioritizing staffing resources. Finally, VHA stated that

since the OIG site visit was conducted, VA has worked to address infrastructure issues discussed with the audit team and developed standardization across the program.

OIG Response

Responsive action plans were provided for each of this finding's six recommendations. Although the executive director requested closure of Recommendations 1 through 4, the OIG will consider them open until the OEHRM has provided sufficient evidence to demonstrate the cited corrective actions have been implemented. Likewise, the OIG will monitor implementation of the planned actions to address recommendations 5 and 6 and close them when evidence supports corrective actions have been completed.

In response to the OEHRM executive director's technical comments, the OIG added language in the executive summary of this report to clarify that this report states the program lacked comprehensive assessments because the initial reviews conducted at Mann-Grandstaff and its associated facilities lacked physical infrastructure assessments to determine a realistic go-live date. The OIG also included a sentence in the executive summary of this report stating when the requirements document was signed.

In response to the executive director's comment that infrastructure upgrades comply with minimum go-live requirements and will not diminish the end-user experience, the OIG maintains that each of the infrastructure deficiencies cited in this report increases the risk of connectivity issues or diminished system performance if unaddressed. Moreover, the OIG maintains that the completion of upgrades was not on track to ensure all critical physical infrastructure at the Mann-Grandstaff VAMC and its associated facilities would meet industry and VA standards when the new electronic health record system was initially scheduled to go live in March 2020.

The minimum requirements referenced in the executive director's response refers to a December 2019 memo from the OEHRM's chief technology integration officer to Mann-Grandstaff's Medical Director establishing minimum requirements for heating, ventilation, and air-conditioning as well as network cabling. The memo was signed by the OEHRM about two months after the audit team's site visit to the Mann-Grandstaff VAMC. That was about three months after VA's goal to have infrastructure in place six months prior to the then-scheduled go-live date. Furthermore, although the OIT and VHA share the responsibility to define requirements for infrastructure upgrades, signature lines do not exist on this memo for officials or representatives from these offices to document their concurrence with these minimum requirements. Finally, if telecommunications rooms only met the memo's minimum requirements prior to the system going live, they would not meet industry standards. Specifically, the memo requires the temperature in telecommunications rooms to be below 110 degrees Fahrenheit while industry standards only allow for temperatures up to 90 degrees Fahrenheit. Furthermore, even though the executive director commented that VHA plans to remediate infrastructure deficiencies identified at the VAMC within 12 months of going live, the OIG

maintains that deficient infrastructure increases the likelihood VA will experience similar setbacks as DoD when going live.

In response to the executive director's comment that the office is unable to document the 6,205 end-user devices cited in this report, the OIG notes that this report cites the total number of desktop computers, laptop computers, and monitors that the OEHRM stated was necessary for the go-live event at the VAMC and its associated facilities. Specifically, the total 6,205 end-user devices cited in this report was obtained by the audit team from the OEHRM's *Initial Operating Capability End User Device Deployment Plan*, dated May 28, 2019, and was not developed by the team.

In response to VHA's comments on the finding, the OIG identified telecommunication rooms as critical to going live based on VA's own categorization. VA categorized priority 1 rooms as critical, stating the work *must* be completed before going live. The findings on telecommunication rooms presented in this report and summarized in Table 2 include priority 1 rooms considered by VA's categorization to be critical. This finding also addresses critical IT infrastructure, including end-user and medical devices. These devices are necessary for electronic health record system deployment and are cited by VA in internal documents as "critical."

The OIG recognizes that work is ongoing and additional efforts have likely taken place after the October 2019 site visit to make necessary infrastructure upgrades, whether or not they were made in response to the discussions and presentation of OIG draft findings. However, the team found some infrastructure upgrades would not be completed until months after the then projected March 2020 go-live date, as noted in this report. VHA's plan to have its facilities conduct self-assessments of physical infrastructure do align with Recommendation 5 and will facilitate the OEHRM's implementation of this recommendation.

Ultimately, gaining efficiencies from DoD's experience was one of the reasons stated by the then VA Secretary as to why VA's award to Cerner without competition was in the public's interest. DoD's experience demonstrates that going live with deficient infrastructure can lead to diminished user experience and low adoption rates. Thus, the OIG maintains that the OEHRM should establish an infrastructure-readiness schedule for future deployment sites that incorporates DoD lessons learned, which includes ensuring critical infrastructure is in place six months before going live.

Finding 2: Inadequate Safeguarding of Critical Physical Infrastructure at the Mann-Grandstaff VAMC Increases Risks to System Security

While not directly affecting system deployment, the audit team identified three security lapses during inspections of telecommunications rooms at the Mann-Grandstaff VAMC as critical physical infrastructure that was not properly safeguarded. National industry standards recommend limiting access to physical infrastructure to those on a “need-to-access” basis and providing a means to prevent unauthorized access.³⁰ However, three locations at Mann-Grandstaff VAMC containing critical physical infrastructure were found unsecured and vulnerable to unauthorized access. These vulnerabilities were not identified in the Current State Review performed by Cerner or the engineering assessment conducted by the OIT because these assessments do not call for identification of physical security access concerns. An individual responsible for physical infrastructure at the VAMC, however, recognized that damage to some of this physical infrastructure due to unauthorized access could result in campus-wide loss of connectivity for an extended period. A loss of connectivity to the system could inhibit clinicians’ ability to provide adequate patient care.

What the OIG Did

The audit team inspected all 22 priority 1 and 2 telecommunications rooms at the Mann-Grandstaff VAMC as well as the campus data center, one priority 2 telecommunications room at the Spokane Vet Center, and one priority 2 telecommunications room at the North Idaho CBOC in Coeur d’Alene, Idaho. The team used a standardized checklist that included identifying whether unauthorized access to critical equipment could easily occur. The audit team also reviewed applicable policies and procedures, as well as industry standards, including the American National Standards Institute. The audit team also performed interviews with local facility staff involved with infrastructure readiness.

Physical Infrastructure Security Vulnerabilities Identified

During on-site inspections, the audit team noted three security concerns, which left the system and equipment vulnerable to unauthorized access:

1. The maintenance manhole in front of the physical and occupational therapy and prosthetics building on the campus was unsecured.
2. The equipment rack in the pharmacy area was left unlocked.

³⁰ American National Standards Institute/ Building Industry Consulting Services International 002-2019, Data Center Design and Implementation Best Practices, May 1, 2019.

3. An unsecured dumbwaiter in a telecommunications room could provide individuals unauthorized access.

The audit team noted that the methods to remove these vulnerabilities are not overly burdensome, as they generally require the purchase and installment of a suitable lock. Unauthorized access can lead to potential equipment damage and loss of connectivity.

National industry standards recommend physical access to cabling infrastructure be limited strictly to data center cabling engineers and individuals under data center management supervision, on a strictly “need-to-access” basis. Further, any maintenance manholes on the data center property should have a lock or other means to prevent unauthorized access.³¹

However, while on site, the audit team noted that the maintenance manhole in front of the physical and occupational therapy and prosthetics building on the campus was unsecured. It opens to a pipe that runs all the fiber cabling from the commercial provider to the main hospital building. An individual responsible for physical infrastructure at the VAMC expressed concern that if tampered with, connectivity for the entire campus would be lost for an extended period. When questioned by the audit team, the chief of engineering service at the VAMC stated he considered correcting the physical security access concern a lower priority than the other assignments he needed to complete to support the new health record system deployment, such as ensuring proper cabling is in place. Figure 11 shows the unsecured maintenance manhole.

³¹ American National Standards Institute/ Building Industry Consulting Services International 002-2019, Data Center Design and Implementation Best Practices, May 1, 2019.



Figure 11. A photo of the unsecured maintenance manhole located on the Mann-Grandstaff VAMC campus taken by the team during the OIG site visit. All fiber cabling for the campus runs through this maintenance manhole.
Source: VA OIG, Spokane, Washington; 2:09 p.m.; October 7, 2019.

As to the remaining two concerns, national industry standards recommend telecommunications rooms providing support for life and safety networks incorporate additional security measures to restrict unauthorized access to the space.³² However, while on site, the audit team found two such vulnerabilities:

- The pharmacy department in the main hospital building had an office space that functioned as a telecommunications room. The rack housing IT equipment was unlocked on both sides, providing access to network switches and cables that should only be accessible to authorized personnel. Figure 12 shows an unlocked equipment rack mounted directly above the workspace of pharmacy personnel.

³² American National Standards Institute/ Telecommunications Industry Association Standard 1179-A, Healthcare Facility Telecommunications Infrastructure Standard, September 2017.



Figure 12. A photo of IT equipment directly above the workspace of pharmacy personnel.

Source: VA OIG, Spokane, Washington; 8:50a.m.; October 9, 2019.

- The telecommunications room on the second floor of the Mann-Grandstaff VAMC main hospital building houses equipment that serves the campus radiology department. This room has a dumbwaiter that, the audit team was informed, was used to move food and dishes between floors.³³ The dumbwaiter is not secured; therefore, unauthorized individuals with knowledge of the campus may be able to access and/or release prohibited items into the dumbwaiter from floors above with the intent to cause damage to IT equipment in the telecommunications room. Again, this vulnerability provides access to network switches and cables that should only be accessible to authorized personnel. See Figure 13 for a photo of the unlocked dumbwaiter in a telecommunications room at Mann-Grandstaff VAMC.

³³ A dumbwaiter is a small elevator for carrying items, especially food and dishes, between the floors of a building.



Figure 13. A photo of an unlocked dumbwaiter in a telecommunications room.

Source: VA OIG, Spokane, Washington; 2:54 p.m.; October 8, 2019.

Finding 2 Conclusion

The audit team identified critical physical infrastructure at the Mann-Grandstaff VAMC that was susceptible to unauthorized access. The unsecured maintenance hole in front of the physical and occupational therapy and prosthetics building presents a risk of damage to the fiber that supplies connectivity to the entire medical facility campus. An individual responsible for physical infrastructure at the VAMC acknowledged that connectivity for the entire campus could be lost for an extended time if the fiber is damaged. Additionally, unsecured telecommunications rooms allow for unauthorized access to network cables and switches.

Unauthorized access leaves systems vulnerable to damage that can result in extended loss of connectivity. Physical security was not a part of either Cerner or the OIT's assessments of the Mann-Grandstaff VAMC's infrastructure. As the methods to secure these vulnerabilities are not overly burdensome, the VAMC director should ensure they are addressed. Additionally, the OEHRM should ensure physical security assessments are completed and addressed at future deployment sites to avoid the same vulnerabilities.

Recommendations 7–8

7. The executive director of the Office of Electronic Health Record Modernization should ensure physical security assessments are completed and addressed at future electronic health record deployment sites.

8. The Mann-Grandstaff VA Medical Center director should ensure all access points to physical infrastructure are secured and inaccessible to unauthorized individuals.

Management Comments

The executive in charge for the Office of the Under Secretary for Health concurred with Recommendation 7. The executive director of OEHRM also concurred with Recommendation 7 and provided a responsive action plan that stated OEHRM and VHA have incorporated elements of physical security into planning and assessment documents for future facilities. The executive director reported he considers this action plan complete and requested closure.

The Mann-Grandstaff VAMC director concurred with Recommendation 8 and provided a responsive action plan that stated leadership is working diligently to address the security issues identified and anticipates completion of proposed actions before the go-live event at the Mann-Grandstaff VAMC.

OIG Response

The corrective action plans submitted are responsive to the intent of the recommendations. The OIG will consider Recommendation 7 open until the OEHRM has provided sufficient evidence that the planning and assessment documents include a review of physical security vulnerabilities. The OIG will monitor implementation of the planned actions for Recommendation 8 and will close both recommendations when sufficient evidence has been provided to demonstrate corrective actions have been implemented.

Overall Report Conclusion

Successful deployment of the new electronic health record system, which will allow providers to see a veteran's complete and accurate health record, is critical to providing high-quality health care. The OIG recognizes the inherent complexities VA has as it transitions from VistA to the Millennium-based system, and these challenges are only exacerbated by VA's aging infrastructure and the need for significant physical infrastructure upgrades. Further complicating the process is VA's need for coordination and collaboration with DoD, specifically with respect to medical devices and the necessity to obtain an "authority to connect" for these devices to connect to the new electronic health record system. The audit team recognizes that VA and the OEHRM have already placed a significant amount of effort into helping ensure the success of this electronic health record modernization initiative to date.

The OEHRM's chief technology integration officer testified before Congress on June 12, 2019, that VA would not have all infrastructure in place six months before going live at the IOC sites,

but assured committee members that this would not impact the go-live event.³⁴ However, about five months before the system was to go live at the Mann-Grandstaff VAMC and its associated facilities, the audit team identified many physical and IT infrastructure deficiencies. Of those, some existed even as of January 8, 2020, with just a little over two months before the go-live date. Ultimately, these deficiencies place deployment efforts at risk. If unresolved before the go-live date, there is increased risk of system performance issues caused by critical infrastructure not being timely upgraded or loss of system connectivity as a result of physical security vulnerabilities. Some of the deficiencies identified even have the potential to halt the deployment altogether, such as if VA is unable to connect medical devices to the system on the go-live date, unless VA excludes related capabilities from system deployment.

The findings in this report detail significant concerns for VA to consider before the deployment of its new electronic health record system in these areas:

1. Assessing and scheduling related to infrastructure needs and upgrades
2. Securing physical infrastructure
3. Implementing oversight tools and filling staff vacancies
4. Anticipating how addressing these concerns might affect timelines and wider deployment

The recommendations in this report are meant to help VA tackle some of these concerns. They will make certain that VA evaluates its schedule to ensure future sites adhere to the OEHRM's goal to complete infrastructure upgrades six months before going live. In addition, they will increase controls to enhance oversight of infrastructure improvements through monitoring tools and evaluations of physical security vulnerabilities at facilities. These actions are necessary for subsequent facilities to have time to focus on the deployment of the electronic health record system. They will help VA avoid experiencing some of the infrastructure-related setbacks experienced by DoD as well. Actions related to these recommendations should be taken immediately, as management and oversight deficiencies found at the Mann-Grandstaff VAMC can have a cascading effect and, if unresolved, have the potential to be replicated at future sites. Early identification of these issues allows VA time to implement recommendations and prevent these issues going forward. Ultimately, the OIG's recommendations align with VA's goal of improving patient care through the electronic health record modernization program.

³⁴ House Committee on Veterans' Affairs Subcommittee on Technology Modernization hearing, June 12, 2019.

Appendix A: Background

History of Electronic Health Record Modernization

VA pioneered the development of VistA, its current electronic health information system, more than 40 years ago. The in-house system was developed by clinicians and IT personnel and has served an essential role in delivering care to veterans by storing their health record information.³⁵ VistA is highly configurable and customizable. As a result, there are over 130 “instances” of VistA that together act as VA’s current electronic health information system.³⁶

VA has long recognized the need to modernize VistA, and over the years, VA has made several attempts to modernize and enhance its electronic health record system. For example, during fiscal years 2011 through 2016 alone, the GAO reported VA obligated approximately \$1.1 billion for contractors’ activities in pursuit of electronic health record system modernization. However, previous attempts to modernize VistA did not result in a single interoperable electronic health record system with DoD in ways that would give providers a more comprehensive picture of veterans’ medical history and ultimately improve and inform the delivery of quality care to veterans. The connection of VA and DoD’s electronic health record systems will result in a lifetime health record for military service members.

VA’s Office of Electronic Health Record Modernization

In June 2018, VA established the OEHRM, a dedicated executive office responsible for making certain that VA successfully prepares for, deploys, and maintains the new electronic health record system and supporting health information technology tools. The OEHRM is to coordinate with the DoD to help VA benefit from lessons learned at DoD’s IOC sites. The OEHRM and its sub-offices are led by VA personnel and augmented by contractor staff. VA awarded a task order to Booz Allen Hamilton to provide the OEHRM’s program management, administrative, and technical support.

The VA electronic health record system implementation is expected to include an IOC site deployment followed by 47 additional deployment “waves.” By 2028, VA plans to have launched the system across all healthcare sites. To align with DoD’s IOC sites, VA selected IOC sites from VISN 20 that are located in the Pacific Northwest. The three IOC sites are all in Washington State. They are the Mann-Grandstaff VAMC and two sites in the Puget Sound

³⁵ In 1977, the VA Massachusetts General Hospital Utility Multi-Programming System (MUMPS) was developed. In June 1981, MUMPS became VistA, at the time named the Decentralized Hospital Computer Program. It was renamed VistA in 1996.

³⁶ Customization of VistA has led to “versions” of the system that are referred to as “instances.” This definition was provided by GAO’s Information Technology Management Issues Director, Testimony before the Subcommittee on Technology Modernization, Committee on Veterans’ Affairs, House of Representatives, September 13, 2018.

Health Care System in Washington—the Seattle VAMC and American Lake VAMC in Tacoma. In addition, part of VA's patient accounting center will also be included as part of IOC go-live events. These IOC sites will be the first to deploy the Millennium-based system. Initial schedules projected the three IOC sites would go live with the new system beginning in March 2020. However, in December 2019, the OEHRM provided the audit team with a revised deployment schedule showing that two of the three IOC sites, American Lake VAMC and Seattle VAMC, will be delayed until November 2020. The remaining IOC site, Mann-Grandstaff VAMC, was still projected to go live in March 2020. In February 2020, VA also postponed the deployment date for the Mann-Grandstaff VAMC. Refer to Table 1 of this report for more detail on projected go-live dates.

Responsibility for infrastructure readiness is a collaborative effort between the OEHRM, the OIT, and VHA. The OEHRM developed technical requirements of the new electronic health record solution based on Cerner recommendations. The OIT is responsible for ensuring IT infrastructure such as networks and end-user devices meet these requirements. VHA is primarily responsible for the physical infrastructure upgrades to the facilities, such as telecommunications rooms, and is also responsible for decisions related to medical devices.

Timeline of Events

Figure A.1 below shows the initial timeline of events related to the electronic health record modernization initiative beginning with signing of the determination and findings document by then VA Secretary Shulkin in June 2017.



Figure A.1. Electronic health record modernization initial timeline of events from signature of the determination and findings document to initial estimated go-live dates at IOC sites.

Source: VA OIG analysis of events related to the electronic health record modernization initiative.

In August 2019, OEHRM officials told the OIG audit team that VA had begun talks to postpone the system deployment date for the Seattle and American Lake VAMCs, and in December 2019 the office provided a formalized, adjusted deployment schedule that estimated these sites will not deploy the new system until November 2020.

Prior Reports

As of January 2020, the electronic health record modernization initiative is a little over 18 months into the 10-year expected implementation of the new electronic health record across the country at medical centers and CBOCs. Accordingly, VA's new electronic health record system and modernization initiative have not yet been audited. However, listed below are prior audits relevant to either VA's implementation of IT systems or previous efforts to modernize its electronic health record system.

OIG Report

- In August 2019, the VA OIG issued a report, *VA's Implementation of the Veterans Information Systems and Technology Architecture Scheduling Enhancement Project Near Completion*, which found the project management team did not effectively ensure

scheduling enhancements were adequately developed and met users' needs.³⁷ The report also found requirements were inadequate and requirement specification documents were insufficient to help make certain the scheduling enhancements would meet VHA's needs. The report also identified VA plans to deploy a Cerner scheduling solution as part of the electronic health record contract that will be implemented on an accelerated schedule.

Government Accountability Office Reports

- In July 2019, the GAO issued a report, *VA Needs to Identify and Report System Costs*, that found VA lacks a comprehensive definition of VistA because of decentralization of the system.³⁸ In addition, VA was unable to sufficiently demonstrate the reliability of VistA costs.
- In January 2018, GAO report *Historical Perspective on Prior Contracts and Update on Plans for New Initiative*, found VA has pursued four separate initiatives since 2011 to modernize VistA and obligated about \$1.1 billion during FYs 2011 through 2016 on modernization initiatives.³⁹
- In 2017, the GAO report *Improved Management Processes Are Necessary for IT Systems That Better Support Health Care*, concluded that VA's IT strategic plans do not include performance measures and targets for their defined objectives.⁴⁰ It also identified deficiencies with VA's IT investment management and enterprise architecture. The report found that until VA can improve these processes, it risks having IT systems that may not fully support VHA's mission.
- A 2015 GAO report, *Outcome-Oriented Metrics and Goals Needed to Gauge DOD's and VA's Progress in Achieving Interoperability*, found that as of October 1, 2014, DoD and VA had not taken action to comply with national data standards, certify that all healthcare data in their systems complied with national data standards, and were computable in real time, as required by the National Defense Authorization Act for FY 2014.⁴¹ The report further found the Interagency Program Office had not yet specified outcome-oriented metrics and established related goals to assess the impact of interoperability capabilities.

³⁷ VA OIG, *VA's Implementation of the Veterans Information Systems and Technology Architecture Scheduling Enhancement Project Near Completion*, 16-03597-171, August 20, 2019.

³⁸ Government Accountability Office, *VA Needs to Identify and Report System Costs*, GAO-19-125, July 2019.

³⁹ Government Accountability Office, *Historical Perspective on Prior Contracts and Update on Plans for New Initiative*, GAO-18-208, January 2018.

⁴⁰ Government Accountability Office, *Improved Management Processes Are Necessary for IT Systems That Better Support Health Care*, GAO-17-384, June 2017.

⁴¹ Government Accountability Office, *Outcome-Oriented Metrics and Goals Needed to Gauge DOD's and VA's Progress in Achieving Interoperability*, GAO-15-530, August 2015.

- In 2011, the GAO report *Critical Factors Underlying Successful Major Acquisitions* identified nine factors as critical to the success of IT investments.⁴² These included that program staff maintained regular communication with the prime contractor, were actively engaged with stakeholders, and included end users in the development of requirements.

⁴² Government Accountability Office, *Critical Factors Underlying Successful Major Acquisitions*, GAO-12-7, October 2011.

Appendix B: Scope and Methodology

Scope

The audit team conducted its work from August 7, 2019, through February 11, 2020. The audit scope included physical and IT infrastructure-readiness efforts since VA's award of the electronic health record modernization contract to Cerner on May 17, 2018. The scope includes upgrades completed and devices received related to the electronic health record modernization initiative at the VA's first IOC site, the Mann-Grandstaff VAMC.

For the purposes of this report, infrastructure associated with deploying the new electronic health record system is grouped into two broad categories—physical and IT:

- Physical infrastructure serves as the foundation for supporting the electronic health record system such as electrical; cabling; and heating, ventilation, and air-conditioning.
- IT infrastructure includes network components such as wide and local area networks, end-user devices (e.g., desktop computers, laptop computers, and monitors), and medical devices (e.g., vital signs monitors).

The scope for examining physical infrastructure included upgrades as of October 7, 2019, in all telecommunications rooms rated as priority 1 or 2 by the OEHRM at the Mann-Grandstaff VAMC and two facilities associated with the VAMC (within 40 miles of the medical center). The team also inspected the data center located in the basement of the Mann-Grandstaff VAMC. In addition, there were 13 other rooms categorized as priority 3 rooms, which had scheduled upgrades that neither the VAMC nor OEHRM leaders considered necessary or preferred for the system to go live. The audit team did not select any priority 3 telecommunications rooms.

The scope of the audit's focus on IT end-user devices included a list from VA's inventory management system of all desktop computers, laptop computers, and monitors received by the VAMC from June 13, 2019, through October 7, 2019.⁴³ This universe had a total of 4,281 devices. According to OIT staff at Mann-Grandstaff VAMC, the facility did not receive any electronic health record-related devices before June 2019. The chief of supply at Mann-Grandstaff VAMC informed the audit team that facility supply chain staff are the only individuals authorized to receive equipment for associated clinics.

The scope of the audit's inquiry for medical devices focused on a list from VA's inventory management system of all medical devices that were received by the VAMC from August 2, 2019, through October 7, 2019. This universe of devices totaled 136, consisting of Omnicell medication dispensing cabinets and Welch Allyn vital signs monitors. The audit team was

⁴³ VA's inventory system for non-expendable equipment is known as the Automated Engineering Management System / Medical Equipment Reporting System.

notified after the team's site visit that Welch Allyn vital signs monitors were no longer required for the March 2020 go-live event and would be part of a second set of system capabilities that is projected for deployment in September 2020. On January 10, 2020, an OEHRM staff member provided the audit team a list of medical devices needed for going live and received at the VAMC.

Methodology

The audit team reviewed applicable policies, procedures, and guidelines, as well as industry standards, including the American National Standards Institute. The audit team gathered evidence from VA officials, including records held by the OEHRM. The team also interviewed staff from the OEHRM, VHA, the OIT, and VISN 20, including executive leaders and local facility staff involved with infrastructure readiness.

In addition, the audit team coordinated with the Office of the Counselor to the Inspector General on laws, regulations, and VA policies, and with OIG statistics personnel to discuss approaches for on-site inspections and physical observations. The audit team visited the Mann-Grandstaff VAMC in October 2019 to conduct inspections and observations of physical and IT infrastructure-readiness efforts, as well as to conduct interviews with relevant on-site officials.

To verify the status of physical infrastructure upgrades performed for the electronic health record system, the audit team inspected a total of 24 telecommunications rooms, including all 22 priority 1 and 2 rooms at the Mann-Grandstaff VAMC, one priority 2 room at the Spokane Vet Center, and one priority 2 room at the North Idaho CBOC. The audit team also inspected the data center located at Mann-Grandstaff VAMC. Physical inspections of the telecommunications rooms and data center occurred during the week of October 7, 2019, and the team inspected all rooms using a standardized checklist.

To verify the status of IT infrastructure upgrades related to electronic health record modernization, the audit team used data from VA's inventory management system. The team tested the accuracy of the inventory system data by judgmentally selecting end-user and medical devices for visual inspection on site and tracing them to the inventory management system list.

For end-user devices, the audit team then compared the total number of each item listed as received in VA's inventory management system, as of October 7, 2019, to the total number of each item listed in the OEHRM's *Initial Operating Capability End User Device Deployment Plan*, dated May 28, 2019. The deployment plan lists quantities of desktop computers, laptop computers, and monitors the VAMC and its associated facilities needed for go live. This universe of devices totaled 6,205.

Internal Controls

The audit team assessed the internal controls of the OEHRM, the OIT, and VHA significant to the audit objective. This included an assessment of the five internal control components for each of the three entities to include control environment, risk assessment, control activities, information and communication, and monitoring. In addition, the audit team reviewed the principles of internal controls as associated with the audit objective. The audit team identified the following three components and four principles as significant to the audit objective. The audit team identified internal control weaknesses during this audit and proposed recommendations to address these control deficiencies.

- Component 1: Control Environment
 - Principle 4: Demonstrate Commitment to Competence
- Component 2: Risk Assessment
 - Principle 7: Identify, Analyze, and Respond to Risks
- Component 3: Control Activities
 - Principle 10: Select and develop control activities
 - Principle 12: Deploy through policies and procedures

Fraud Assessment

The audit team assessed the risk that fraud, violations of legal and regulatory requirements, and abuse could occur during this audit. The audit team exercised due diligence in staying alert to any fraud indicators, including taking the following measures:

- Soliciting assistance from the OIG's Office of Investigations personnel to identify potential fraud risk indicators
- Interviewing personnel and management from the OEHRM, the OIT, and VHA to determine whether they knew of fraudulent activity or weaknesses that could potentially lead to fraud or that would impact the scope of this audit

The OIG did not identify any instances of fraud or potential fraud during this audit.

Data Reliability

To determine the reliability of the VAMC's independently developed telecommunications rooms tracker, the audit team compared the classification of priority 1 and 2 telecommunications rooms to the OEHRM's own classifications and noted no significant discrepancies. Additionally, VAMC personnel responsible for physical infrastructure upgrades at Mann-Grandstaff confirmed the tracker was a complete list of telecommunications rooms and the priority of each room was accurate. The audit team further verified completeness of the listing through visual inspections.

The team's comparisons identified no material concerns with the data or deviations, and therefore, the OIG considers it reliable for the purposes of this report.

To assess the reliability of data obtained from VA's inventory management system, the audit team interviewed the system owner and compared the inventory system-generated universe provided by OIT staff at Mann-Grandstaff VAMC to a list generated independently by the VA OIG's data analysis group. The audit team tested the accuracy of the inventory system data by judgmentally selecting end-user (e.g., desktop computers, laptop computers, and monitors) and medical devices (e.g., vital signs monitors and medication dispensing cabinets) for visual inspection on site and traced them to the inventory management system list. The audit team also verified these devices were compatible with the new electronic health record system.

To assess the reliability of data contained in the OEHRM's end-user device deployment plan, the audit team compared the quantity and type of equipment listed in the plan to investment justification package documents and noted no material discrepancies.⁴⁴ The audit team also verified the end-user device deployment plan included, at minimum, the number of devices needing to be upgraded, which was identified by Cerner during their Current State Review. The team was only able to verify that the OEHRM's end-user device deployment plan included at least the minimum number of items identified by Cerner in 2018. Therefore, the team notes a data limitation in that the universe of desktop computers, laptop computers, and computer monitors may not reflect the total amount needed for system deployment as of the date of the site visit.

Although the audit team, at the time of the site visit, confirmed many newly purchased medical devices had been received, the team was unable to validate that the facility had received all needed devices because at the time neither the OEHRM nor the facility had provided the total number of devices needed for going live. On January 10, 2020, the OEHRM's acting lead healthcare technology manager provided the audit team with a list of total medical devices needed for the March 2020 go-live date. The audit team compared the quantities of medical devices identified by the OEHRM as needed for the March 2020 go-live event to vendor quotes and contract documents and noted no discrepancies. The team was unable to verify that the list of medical devices provided by the OEHRM as of January 10, 2020, reflected the total amount needed to support go-live actions. Therefore, the audit team notes a data limitation in that the universe of medical devices may not reflect the total amount needed for system deployment as of the date of the site visit. All data used was determined to be sufficient and reliable to support the conclusions in this report with the exception of the limitations identified.

⁴⁴ Investment Justification Packages are OEHRM documents used to request and obtain funding approval for purchases.

Government Standards

The OIG conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that the OIG plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for the findings and conclusions based on audit objectives. The OIG believes the evidence obtained provides a reasonable basis for the findings and conclusions based on the audit objectives.

Appendix C: Management Comments

Executive in Charge of the Office of the Under Secretary for Health

Department of Veterans Affairs Memorandum

Date: March 10, 2020

From: Executive in Charge, Office of the Under Secretary for Health (10)

Subj: OIG Draft Report: Deficiencies in Infrastructure Readiness for Deploying VA's New Electronic Health Record System (VIEWS 02490262)

To: Executive Director, Office of Electronic Health Record Management

1. Thank you for the opportunity to review the Office of Inspector General (OIG) draft report: Deficiencies in Infrastructure Readiness for Deploying VA's New Electronic Health Record System. I concur with recommendations 1-7 and provide the attached general comments for consideration in response to OIG. The Director, Mann-Grandstaff Veterans Affairs Medical Center, provides the attached action plan and concurrence for recommendation 8.

The OIG removed point of contact information prior to publication.

(Original signed by)

Richard A. Stone, M.D.

Attachments

For accessibility, the original format of this appendix has been modified to comply with Section 508 of the Rehabilitation Act of 1973, as amended.

Appendix D: Management Comments

Executive Director of the Office of Electronic Health Record Modernization

Department of Veterans Affairs Memorandum

Date: April 13, 2020

From: Executive Director, Office of Electronic Health Record Modernization (00EHRM)

Subj: Office of Inspector General Draft Report, "Audit of VA's Infrastructure Readiness Efforts for the Electronic Health Record Modernization Initiative," Project Number 2019-08980-R9-0001

To: Assistant Inspector General for Audits and Evaluations (52)

1. The Department of Veterans Affairs (VA) Office of Electronic Health Record Modernization (OEHRM) appreciates the opportunity to review the Office of Inspector General's (OIG) draft report regarding infrastructure readiness efforts to support implementation of VA's new electronic health record (EHR) solution at the Mann-Grandstaff VA Medical Center. OEHRM concurs with OIG's findings and recommendations, and provided input in the Action Plan to address these recommendations (Attachment).

2. Prior to the release of OIG's draft report, VA identified that the new EHR solution requires additional systems configuration to execute planned user training at the Mann-Grandstaff VA Medical Center. VA analyzed the schedule impact and revised its implementation timeline. This decision was made after gathering feedback from clinicians and end users. OEHRM is taking every precaution to deliver an effective system for our clinicians and users, and remains committed to getting this absolutely right for our Veterans.

3. I am pleased to report that OEHRM identified process improvements aligned to OIG's recommendations. Progress toward completion of the recommendations is underway.

The OIG removed point of contact information prior to publication.

(Original signed by)

John H. Windom

Executive Director

Office of Electronic Health Record Modernization

Attachment

For accessibility, the original format of this appendix has been modified to comply with Section 508 of the Rehabilitation Act of 1973, as amended.

Attachment 1

**Office of Electronic Health Record Modernization (OEHRM)
Findings Comments**

OIG Draft Report: Audit of VA's Infrastructure Readiness Efforts for the Electronic Health Record Modernization Initiative, Project Number 2019-08980-R9-0001

Date of Draft Report: February 13, 2020

Finding 1: Finding 1: The New Electronic Health Record System Is Likely to Go Live at the Mann-Grandstaff VAMC with Deficient Supporting Infrastructure

OEHRM Comments: concur

After a review and assessment by Veterans Health Administration, Office of Information Technology, and Office of Electronic Health Record Modernization in early to mid December 2019, it was concluded by all the parties that the OEHRM Minimum required infrastructure is in place at Mann Grandstaff to provide a positive go live user experience. Additionally, VHA executed a plan to remediate some deficiencies which are due to be completed within 12 months after the Mann Grandstaff non-EHR related Go Live. These additional remediations will enhance the user experience and provide for a longer term healthy infrastructure state.

See December 2019 memo validating this to the site's leadership.

VHA Comments:

1. The infrastructure assessment conducted at Mann-Grandstaff Veterans Affairs Medical Center and that is on-going across VHA not only looks at what is necessary or critical for electronic health record (EHR) deployment but also looks at the current configuration, layout, and condition of all Office of Information Technology (OIT) related infrastructure. Mann-Grandstaff infrastructure has been validated to meet the critical requirements for EHR deployment but is also pursuing additional modernization efforts to correct other non-EHR related deficiencies.
2. Page IV, Lines 72-74 – Va would like it noted that improvements in telecommunication rooms and other building infrastructure work critical to the March 2020 Go-Live will be modified prior to that date, and that those items not critical to Go-Live will continue to be worked and completed later.
3. Beginning in the Summer 2019, VHA provided additional program office resources to coordinate building infrastructure readiness and construction site preparation work in order to meet established Go-Live schedules for the Initial Operating Capability (IOC) sites. The priority for these staffing resources were to provide coordination on technical requirements with OEHRM and OIT, provide oversight and assistance to facility staff at the IOC sites, and initiate plans and readiness activities for the remaining sites in Veterans Integrated Service Network 20 and future deployment Waves. Future site readiness includes the development of the self-assessment tool referenced in the draft report. The intended plan for building infrastructure readiness will advance well ahead of the current EHRM deployment schedule and require minor adjustments/corrections as the EHRM deployment advances to a facility.

The OIG sit visits were completed several months ago. Since that time VA has worked hard to ensure a successful deployment by addressing infrastructure issues that were discussed and developing standardization across the program. VHA is conducting assessments across all VHA facilities well ahead of the actual deployments. The original completion date was March 2020, however, this deadline will need to be extended. HEFP is assisting sites with completion to ensure that the assessment does not affect critical path milestones. Lessons learned from IOC sites are critical to ensuring the future deployment is successful.

Finding 2: Inadequate Safeguarding of Critical Physical Infrastructure at the Mann-Grandstaff VAMC Increases Risks to System Security

VA Comments: concur

Attachment 2

Office of Electronic Health Record Modernization (OEHRM) Action Plan

OIG Draft Report: Deficiencies in Infrastructure Readiness for Deploying VA's New Electronic Health Record System, Project Number 2019-08980-R9-0001

Date of Draft Report: February 13, 2020

<u>Recommendations/Actions</u>	<u>Status</u>	<u>Completion Date</u>
--------------------------------	---------------	------------------------

Recommendation 1: Establish an infrastructure readiness schedule for future deployment sites that incorporates lessons learned from the DOD.

OEHRM Comments: Concur

Office of Electronic Health Record Modernization (OEHRM) has a deployment schedule which includes the infrastructure readiness schedule. This schedule incorporates lessons learned from DOD (e.g. completing key infrastructure at least 6 months early and utilizing Cerner's backend printing functions). The deployment schedule was developed and will be updated to incorporate changes experienced during OEHRM's Initial Operating Capability (IOC). OEHRM has and will continue to coordinate with Veterans Health Administration (VHA) and Office of Information and Technology (OIT) to provide a unified schedule for future deployments based on the scheduled enterprise and site level assessments.

OEHRM considers Recommendation 1 completed and requests that OIG close the recommendation.

Recommendation 2: Reassess the enterprise-wide deployment schedule to ensure projected milestones are realistic and achievable, considering the time needed for facilities to complete infrastructure upgrades.

OEHRM Comments: Concur

Office of Electronic Health Record Modernization (OEHRM) has a deployment schedule, which will be updated to incorporate VA lessons learned during OEHRM's deployment. OEHRM has and will continue to coordinate with Veterans Health Administration (VHA) and Office of Information and Technology (OIT) to provide a unified schedule for future deployments, which incorporate VHA's agreed upon schedule for completing the required infrastructure upgrades.

OEHRM considers Recommendation 2 completed and requests that OIG close the recommendation.

Recommendation 3: Implement tools to comprehensively monitor the status and progress of medical devices at the enterprise level.

OEHRM Comments: Concur

Office of Electronic Health Record Modernization (OEHRM) developed and implemented tracking tools to effectively monitor infrastructure readiness at Mann-Grandstaff Veterans Affairs Medical Center. OEHRM uses these tools to provide weekly updates of Veterans Health Administration (VHA) Capital Improvement projects, room-by-room updates, and near real-time monitoring of deployment and imaging of computers through the VA Information Central Analytics Metrics Platform (ICAMP) system. OEHRM will continue expanding these dashboards and oversight mechanisms to more actively monitor areas like physical security and provide a better national view.

OEHRM is also implementing tools to comprehensively monitor the status and progress of medical devices at the enterprise level. OEHRM plans to expand monitoring to existing VHA sites and Veterans Integrated Service Network level monitoring mechanisms for medical devices which are being assessed for how they will be supporting national deployment.

OEHRM considers Recommendation 3 completed and requests that OIG close the recommendation.

Recommendation 4: Standardize infrastructure requirements in conjunction with VHA and the OIT and ensure those requirements are disseminated to all necessary staff.

OEHRM Comments: Concur

Office of Electronic Health Record Modernization (OEHRM) is collaborating with Veterans Health Administration (VHA) and Office of Information and Technology (OIT) to ensure a successful Go-Live. Collectively OEHRM, VHA, and OIT created the following:

- Site Infrastructure Requirements (to specify the required infrastructure);
- Site Self-Assessment (to identify infrastructure needs/deficiencies in advance of Go-Live);
- Site Infrastructure Playbook (to identify the steps a facility would need to take for a successful Go-Live); and
- Installation project monitoring tools (to create a standard and repeatable process for infrastructure upgrades).

OIT and VHA have also incorporated the above standards and requirements into their infrastructure standards. For example, VA is in the process of updating their Technical Information Library (TIL) for structured cabling to follow the latest ANSI-TIA standard. Similarly, OIT updated their computer specifications with the OEHRM specification for future technology refreshes in the enterprise.

OEHRM considers Recommendation 4 completed and requests that OIG close the recommendation.

Recommendation 5: Evaluate physical infrastructure for consistency with OEHRM requirements and monitor completion of those evaluations.

OEHRM Comments: Concur

Office of Electronic Health Record Management (OEHRM) is working with Veterans Health Administration (VHA), Office of Information and Technology (OIT), and Local Facilities to create a framework for validating physical infrastructure. This validation includes a facility confirmation memo that verifies site requirements are met; VHA certification that construction projects are complete; and validation from OIT that End User Devices (EUDs) are imaged and installed. ICAMP provides real time updates to End User Devices and VHA provides monthly updates to capital improvement projects.

Status: In process

Target Completion Date: March 2021

Recommendation 6: Fill infrastructure-readiness team vacancies until optimal staffing levels are attained.

OEHRM Comments: Concur

Office of Electronic Health Record Management (OEHRM) Technology Integration Officer currently has two of six positions filled in Infrastructure Readiness with another in active recruitment. Additionally, one staff has been detailed to support infrastructure, as well as a team of 19 contractors. In the newest proposed organizational chart, TIO has requested an additional six staff for Infrastructure Readiness, with an emphasis on construction and project management.

Additionally, Veterans Health Administration (VHA) has established and staffed a team of four staff focused on the technical requirements, management, and oversight of VHA facility infrastructure capital project and improvement execution. These VHA staff are aligned in the Office of Healthcare Environment and Facilities Programs and coordinates with Medical Center, VISN, and VHA leadership as well as OEHRM and OIT.

Status: In process

Target Completion Date: March 2021

Recommendation 7: Ensure physical security assessments are completed and addressed at future electronic health record deployment sites.

OEHRM Comments: Concur

The Office of Security & Preparedness (OSP) is responsible for all physical and logical security at VA. Office of Electronic Health Record Management (OEHRM) has worked with OSP on many aspects of logical security and some aspects of physical security. Additionally, OEHRM and Veterans Health Administration (VHA) have incorporated elements of physical security into the planning and assessment documents for future facilities. These assessment and planning documents are:

- (1) Site Infrastructure Requirements
- (2) Site Infrastructure Playbook, and
- (3) Installation project monitoring tools.

OEHRM will also reassess these planning and assessment documents with VHA to ensure and validate they incorporate the requisite physical security assessments and planning for future deployment sites.

OEHRM considers Recommendation 7 completed and requests that OIG close the recommendation.

Recommendation 8: Ensure all access points to physical infrastructure are secured and inaccessible to unauthorized individuals.

VAMC Director Comments: Concur

Mann-Grandstaff VA Medical Center leadership recognizes the importance of the physical security of the electronic health record infrastructure and will expeditiously resolve all physical security issues identified in the OIG audit.

We are working diligently to address the security issues identified in the draft report (manhole cover, equipment racks and the dumbwaiter door) and anticipate having these security issues resolved before Go-Live.

Status: In process

Target Completion Date: Go-Live

Attachment 3

Department of Veterans Affairs (VA) Technical Comments to
Office of the Inspector General (OIG) Draft Report

"Audit of VA's Infrastructure Readiness Efforts for the Electronic Health Record Modernization Initiative,"
Project Number 2019-08980-R9-0001

Office of Electronic Health Record Modernization Technical Comments

OIG Draft Report: Audit of VA's Infrastructure Readiness Efforts for the Electronic Health Record Modernization Initiative, Project Number 2019-08980-R9-0001

1. Suggested change (Statement of findings: Line 70-72, Draft Report: page iv): Infrastructure upgrades needed to help ensure that end users do not experience diminished system performance on deployment date comply with minimum Go Live requirements. Each VA site's facility infrastructure is to comply with full operational capabilities within one year of Go-Live.

Draft Report: In fact, some infrastructure upgrades needed to help ensure end users to not experience diminished system performance on the system deployment date are not projected to be completed until months later.

Justification: Minimum Go-Live requirements will not diminish the end user experience.

2. Suggested change (Statement of findings: Line 81-84, Draft Report: page iv)

Infrastructure upgrades at the Mann-Grandstaff VAMC are based on comprehensive Current State Reviews. Requirements specifications and contract monitoring provide the overall deployment view.

Draft Report: Infrastructure upgrades were not completed at the Mann-Grandstaff VAMC in a timely manner to properly prepare for deployment of the new health record system primarily because VA lacked the following: comprehensive site assessments to determine a realistic go live date, requisite specifications for infrastructure, appropriate monitoring mechanisms, and adequate staffing.

Justification: Site Assessments, Infrastructure Specifications, End User Device procurement with cost tracking and Staffing (Government and Contractor) were each addressed in the latter part of 2019.

3. Suggested change (Statement of findings: Line 99-100, Draft Report: page iv)

OEHRM Site Infrastructure Requirements specification was signed by OEHRM, VHA and OIT on November 20, 2019.

Draft Report: In addition, as of November 1, 2019, the requirements specifications document for infrastructure was still not signed and approved by VHA.

Justification: OEHRM Site Infrastructure Requirements specification was signed by OEHRM, VHA and OIT on November 20, 2019.

4. Suggested change (Statement of findings: Line 386-395, Draft Report: page 8)

The OEHRM Investment Justification Package (IJP) process does not document an increase of 4,000+ End User Devices (EUDs) for the Mann-Grandstaff VAMC.

Numerous factors influenced the changed requirements, including:

- Windows 10 upgrade. Some computers were decommissioned during upgrade.

- Warranty. Warranty periods expired during the 1.5 period.
- Training site requirements. Training was not fully considered in earlier assessments.
- Spares. Additional computers were purchased as spares and back-ups.
- Medical monitors were not originally included in all surveys.

Draft Report: Specifically, for the Mann-Grandstaff VAMC, the assessment from July 2018 recommended 2,127 computer and monitor upgrades needed to support deployment of the new system:

- 1,025 desktop computers did not meet the minimum OEHRM end-user device requirements to allow for efficient data processing;
- 206 laptop computers did not meet the minimum OEHRM end-user device requirements, and
- 896 monitors, at least, did not meet the minimum OEHRM end-user device requirements, which requires monitors to be 22 inches or larger.

However, by the time the May 2019 OEHRM Initial Operating Capability (IOC) End User Device (EUD) Deployment Plan was released, the number of desktop computers, laptop computers, and monitors identified as needing replacement increased from 2,127 to 6,205.

Justification: End User Device equipment required quantities changed between July 2018 and the current date (Feb 2020), yet not to the extent reported in the OIG Audit. OEHRM is not able to document the 6,205 quantity. Numerous factors influenced the changed requirements, including:

- Windows 10 upgrade. Some computers were decommissioned during upgrade.
- Warranty. Warranty periods expired during the 1.5 period.
- Training site requirements. Training was not fully considered in earlier assessments.
- Spares. Additional computers were purchased as spares and back-ups.
- Medical monitors were not originally included in all surveys.

OIG Contact and Staff Acknowledgments

Contact	For more information about this report, please contact the Office of Inspector General at (202) 461-4720.
----------------	---

Audit Team	Tim Crowe, Director Luis Alicea Jessica Blake Hilda Canes Garduño Kristi Corthell Francis Hoang Christopher Sizemore
-------------------	--

Report Distribution

VA Distribution

Office of the Secretary
Veterans Benefits Administration
Veterans Health Administration
National Cemetery Administration
Assistant Secretaries
Office of General Counsel
Office of Acquisition, Logistics, and Construction
Board of Veterans' Appeals
Network Director, VISN 20: Northwest Network
Director, Mann-Grandstaff VA Medical Center

Non-VA Distribution

House Committee on Veterans' Affairs
House Appropriations Subcommittee on Military Construction, Veterans Affairs,
and Related Agencies
House Committee on Oversight and Reform
Senate Committee on Veterans' Affairs
Senate Appropriations Subcommittee on Military Construction, Veterans Affairs,
and Related Agencies
Senate Committee on Homeland Security and Governmental Affairs
House Subcommittee on Technology Modernization
National Veterans Service Organizations
Government Accountability Office
Office of Management and Budget
U.S. Senate:
Idaho: Mike Crapo, James Risch
Montana: Steve Daines, Jon Tester
Washington: Maria Cantwell, Patty Murray
U.S. House of Representatives:
Idaho: Russ Fulcher, Mike Simpson
Montana: Greg Gianforte
Washington: Suzan Delbene, Denny Heck, Jaime Herrera Beutler, Pramila Jayapal,
Derek Kilmer, Rick Larsen, Cathy McMorris Rodgers, Dan Newhouse, Kim Schrier,
Adam Smith

OIG reports are available at www.va.gov/oig.