DEPARTMENT OF VETERANS AFFAIRS

OFFICE OF INSPECTOR GENERAL

Office of Audits and Evaluations

DEPARTMENT OF VETERANS AFFAIRS

Deficiencies in Reporting Reliable Physical Infrastructure Cost Estimates for the Electronic Health Record Modernization Program

AUDIT | **REPORT #20-03178-116** | **MAY 25, 2021**

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Executive Summary

At the time of this audit, VA was about two-and-a-half years into an estimated 10-year modernization effort to replace its aging electronic health record system.[1] The new system is being designed to be interoperable with the one used by the Department of Defense. As a result, healthcare providers will be able to access more comprehensive medical histories for the over nine million veterans enrolled in the VA healthcare program. The Electronic Health Record Modernization (EHRM) program manages VA's transition to the new system. VA has reported that the program will cost about $16 billion over the 10 years needed to implement the new system across Veterans Health Administration (VHA) facilities nationwide. Because of the extensive costs to taxpayers and the importance of the EHRM program to providing veterans with quality care, the VA Office of Inspector General (OIG) conducted this audit as part of its oversight of the complex modernization program.

Specifically, the OIG initiated this audit to determine whether VA developed and reported reliable cost estimates for physical infrastructure upgrades necessary to support the new electronic health record system. The OIG team examined whether estimates developed by VHA met VA standards and were comprehensive, well documented, accurate, and credible. The team also considered whether the Office of Electronic Health Record Modernization (OEHRM) reported estimates to Congress in accordance with statutory mandates.

In preparation for the system's deployment, VA medical facilities need significant upgrades to their physical infrastructure, such as electrical work, cabling, heating, ventilation, and cooling. These upgrades are critical to successful deployment of the new system and are likely to cost billions of dollars.

Reliable cost estimates for these upgrades are imperative to ensuring that Congress has the information needed to make informed budgetary and investment decisions. Within VA, senior leaders depend on estimates to plan program budgets, conduct acquisition activity, and monitor program execution. For these reasons, reporting all program-related costs and ensuring cost estimates are reliably developed is critical to the program's success.[2]

[1] The audit review period extended from the award of the EHRM contract on May 17, 2018, through congressional reporting in January 2021.

[2] Veterans Benefits and Transition Act of 2018, Pub. L. No. 115-407, § 503 (2018), codified at 38 U.S.C. § 5701 note prec. For the purposes of this report, the term "program-related" refers to the Veterans Benefits and Transition Act of 2018's definition of the EHRM program as "any activities … *to procure or implement* an electronic health or medical record system to replace" the existing electronic health record system and "any contracts or agreements entered into by [VA] to carry out, support, or analyze" these activities (emphasis added).

What the Audit Found

VHA had developed two formal cost estimates as of July 2020 for physical infrastructure upgrades necessary for implementation of the new electronic health record system. However, the OIG team found that these two cost estimates were not reliable. The team evaluated the estimates using VA and Government Accountability Office (GAO) cost-estimating guidance, which states that to be reliable, the estimates should be comprehensive, well documented, accurate, and credible. Neither estimate reviewed fully met these four characteristics. Evidence further indicates the reported estimates may be understated:

- Formal cost estimates differed significantly from a subsequent higher draft estimate that relied on more detailed information.
- Estimates were partially based on physical infrastructure upgrade cost estimates for VA's first facilities to implement the new system, which were found to be significantly lower than actual needs dictated.
- Statistical projections made by the audit team suggest that VHA's two formal estimates for physical infrastructure costs, dated June 2019 and November 2019, may be underestimated by as much as $1 billion and $2.6 billion, respectively.

The OIG team found that several factors contributed to the lack of reliable estimates, including that an independent cost estimate was not completed as required by VA financial policy.[3] An independent cost estimate is a complete and fully documented estimate that external or third parties develop and use to test the reasonableness of the program cost estimate. Thus, it likely would have revealed many of the issues found during this audit and would have allowed VHA to take earlier action to improve the reliability of its estimates.

The lack of reliable cost estimates was caused in part by insufficient planning at the outset of the program. OEHRM leaders stated that at the beginning of the program the focus was on the EHRM contract and the system itself, rather than infrastructure. VHA staff further clarified that it was not until November 2018, nearly six months after the EHRM contract award to Cerner to procure the new electronic health record system, that key VHA staff were first made aware of a need for physical infrastructure upgrades. Subsequently, OEHRM and VHA needed to collaborate to develop infrastructure requirements and assess current facility conditions. Thus, VHA did not know enough about the infrastructure requirements to make accurate cost predictions at the time the two formal estimates were developed. Only in November 2019 did OEHRM and VHA agree on an initial set of infrastructure requirements, and as of January 2021, requirements continued to be defined. Additions to requirements mean VHA staff responsible for

[3] VA Financial Policy, vol. III, chap. 12, "Life Cycle Cost Estimating," May 4, 2017.

developing physical infrastructure cost estimates must react and adjust them to respond to new information.

The team identified that VHA has taken proactive measures to request facilities nationwide conduct assessments to identify the current physical infrastructure conditions. Completing these assessments and developing site-specific plans based on individual site conditions will be imperative to developing a reliable cost estimate. These efforts also ensure that VA leaders have the information needed to successfully plan, prepare, and execute these necessary upgrades to support OEHRM's system deployment schedule.

Ultimately, when unreliable cost estimates are used for budget planning and funding requests, there is increased risk that underfunding could occur. Physical infrastructure upgrades are typically paid from VHA's medical facilities appropriation, the source of nonrecurring maintenance funds. The medical facilities appropriation is used for the maintenance and operations of hospitals, nursing homes, and other facility needs, so reallocating funds to cover unanticipated EHRM program-related infrastructure costs would place other critical facility services and upgrades at risk. VHA will need to improve the reliability of cost estimates to ensure future physical infrastructure upgrades can be planned, budgeted, and timely completed.

The OIG team also found that OEHRM, the entity responsible for reporting all program costs to Congress, did not include critical physical infrastructure upgrade costs in the program's life cycle cost estimate reported to Congress. Although VHA provided OEHRM with an approximately $2.7 billion estimate for physical infrastructure upgrade costs in June 2019, OEHRM did not include them in its life cycle cost estimate. The Veterans Benefits and Transition Act of 2018 requires the VA Secretary to submit quarterly mandated reports that include life cycle cost estimates to Congress.[4] VA and GAO guidance state that a life cycle cost estimate includes all costs, regardless of funding source.[5]

However, none of the eight quarterly reports submitted by OEHRM as of January 2021 included physical infrastructure costs in the program's life cycle cost estimate, despite all but one of them containing language indicating that *physical* infrastructure costs were included. In fact, the only infrastructure costs the life cycle cost estimate included were related to *information technology* infrastructure. OEHRM officials stated physical infrastructure upgrades were the responsibility of VHA. Accordingly, OEHRM stated it did not disclose these to Congress as part of the program's reported cost estimates because funding and completion of these upgrades were

[4] Veterans Benefits and Transition Act of 2018. Although physical infrastructure is not one of the life cycle cost estimate categories specified in the Act, as previously stated, the statute defines the EHRM program as "any activities … to procure or implement an electronic health or medical record system to replace" the existing electronic health record system and "any contracts or agreements entered into by [VA] to carry out, support, or analyze" these activities.

[5] *VA Cost Estimating Guide*, ver. 2.2, August 17, 2016; GAO, *Cost Estimating and Assessment Guide*, GAO-20-195G, March 2020.

outside OEHRM's responsibility, and because these upgrades within VHA facilities had been long-standing.

While long-standing deferred maintenance likely contributed to the need for physical infrastructure upgrades, the OIG found that these upgrades are necessary for the successful implementation of the new system. The costs associated with these upgrades should have been transparently disclosed to Congress as part of the program's life cycle cost estimate to help alleviate members' cost uncertainty concerns and advance meaningful oversight and budgeting of the program. Reporting these costs will also help inform taxpayers of how much the new system is projected to cost.

What the OIG Recommended

The OIG made five recommendations. OEHRM's executive director should ensure an independent cost estimate is performed for program life cycle cost estimates, including physical infrastructure costs. VA's assistant secretary for management and chief financial officer should make certain that this independent cost estimate of EHRM program life cycle cost estimates is performed. The OIG also recommended that VHA's director of special engineering projects for the Office of Healthcare Environment and Facilities Programs develop a reliable cost estimate for physical infrastructure upgrades in accordance with VA cost-estimating standards, incorporate costs for upgrade needs identified in facility self-assessments and scoping sessions, and then continuously update this estimate based on emerging requirements and identified project needs. Finally, OEHRM's executive director is called on to disclose the costs for physical infrastructure upgrades funded by VHA or other sources in its life cycle cost estimates presented to Congress.

Management Comments

OEHRM's executive director, VA's assistant secretary for management and chief financial officer, and VHA's acting under secretary for health concurred with the recommendations. Responsive action plans with target completion dates within 12 months were provided for each of the five recommendations. VA also provided technical comments that were fully considered and addressed as appropriate (see OIG responses on pages 18 and 25). Appendix D contains the full text of VA responses.

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Contents

Abbreviations

EHRM	Electronic Health Record Modernization
FY	fiscal year
GAO	Government Accountability Office
IT	information technology
LCCE	life cycle cost estimate
OCAMES	Office of Capital Asset Management Engineering and Support
OEHRM	Office of Electronic Health Record Modernization
OIG	Office of Inspector General
PAE	Office of Programming, Analysis and Evaluation
VHA	Veterans Health Administration

Introduction

In this report, the VA Office of Inspector General (OIG) examines VA's reporting of cost estimates for physical infrastructure upgrades related to the 10-year Electronic Health Record Modernization (EHRM) effort. This effort will replace VA's aging electronic health record system (the Veterans Health Information Systems and Technology Architecture) with a system based on the one used by the Department of Defense. By doing so, VA expects to establish a single common system that will provide a comprehensive, lifetime health record for military service members. Significant physical infrastructure upgrades must occur at facilities nationwide to support successful system deployment, such as electrical work, cabling, and heating, ventilation, and cooling. (For additional information about the EHRM program and key dates, see appendix A.)

The OIG initiated this audit to determine whether VA developed and reported reliable life cycle cost estimates (LCCE) for physical infrastructure upgrades needed to support the new electronic health record system.[6] Specifically, the OIG team examined whether the Veterans Health Administration (VHA) developed estimates that were comprehensive, well documented, accurate, and credible, in accordance with VA standards, and whether the Office of Electronic Health Record Modernization (OEHRM) reported reliable estimates to Congress.

Why the OIG Did This Audit

In June 2017, the then VA Secretary signed a "determination and findings" document declaring that VA would acquire a new electronic health record system from Cerner Government Services. VA subsequently awarded the EHRM contract to Cerner in May 2018 and reported in the EHRM program's LCCE that the modernization effort would cost $16 billion. Given the tremendous investments of taxpayer dollars and the potential impact on veterans' health records used to provide quality care, the OIG is overseeing various aspects of this critical and complex program. VA's financial policy states that an LCCE includes all costs incurred during the total life of a system, from program initiation through termination.[7] However, the OIG team found that the EHRM program's LCCE omitted the costs for physical infrastructure upgrades needed to support deployment of the new electronic health record system. As of January 2021 (almost three years into the contract), the overall $16 billion figure reported to Congress had not changed. This is significant, as anticipated physical infrastructure upgrades have the potential to add billions of dollars to this figure.

[6] *VA Cost Estimating Guide*, ver. 2.2, August 17, 2016, explains that life cycle cost estimates are used to determine funding needs, including those related to developing, deploying, maintaining, operating, and disposing of a system over its full lifespan.

[7] VA Financial Policy, vol. III, chap. 12, "Life Cycle Cost Estimating," May 4, 2017.

Several reports issued by the Government Accountability Office (GAO) and VA OIG have found that VA's previous cost estimates for construction and information technology (IT) projects were not reliable.[8] Given the already high dollar value and importance of this modernization effort, developing reliable program LCCEs and reporting all necessary program costs are imperative to ensuring all relevant stakeholders have the information needed to make informed budgetary, investment, and management decisions.

This is the first of two OIG reports on whether VA developed and reported reliable LCCEs for upgrades needed to implement its new electronic health record system. This report focuses on estimates for physical infrastructure upgrades such as electrical work, cabling, and heating, ventilation, and cooling. VHA develops estimates for and funds these types of upgrades. The second report, which is scheduled to be published in early summer of 2021, focuses on estimates for upgrading IT infrastructure such as computers and network equipment. OEHRM and VA's Office of Information and Technology develop estimates for and generally fund these types of IT upgrades.

Life Cycle Cost Estimates

As previously mentioned, VA policy states that an LCCE includes all costs incurred during the total life of a system, from program initiation through termination.[9] It provides an exhaustive accounting of all resources required to deploy a particular program, and as such, "encompasses all past (or sunk), present, and future costs for every aspect of a program, regardless of funding source."[10]

In addition to VA financial policy requiring the development of an LCCE for all VA Secretary priority programs, such as the EHRM program, the Veterans Benefits and Transition Act of 2018 (the Act) requires the VA Secretary to report the annual and life cycle cost estimates of the EHRM program to Congress on a quarterly basis, among other program updates.[11] The Act broadly defines the EHRM program as "any activities … to procure or implement an electronic health or medical record system to replace" the existing electronic health record system and "any

[8] GAO, *VA Is Working to Improve Initial Project Cost Estimates, but Should Analyze Costs and Schedule Risks*, GAO-10-189, December 2009; GAO, *Agencies Need to Address Significant Weaknesses in Policies and Practices*, GAO-12-629, July 2012; VA OIG, *Audit of the Non-Recurring Maintenance Program*, Report No. 13-00589-137, May 7, 2014; GAO, *Management of Minor Construction and Non-Recurring Maintenance Programs Could Be Improved*, GAO-18-479, July 2018.

[9] VA Financial Policy, "Life Cycle Cost Estimating."

[10] *VA Cost Estimating Guide*, ver. 2.2.

[11] Veterans Benefits and Transition Act of 2018, Pub. L. No. 115-407, § 503 (2018), codified at 38 U.S.C. § 5701 note prec. states, "Not later than 30 days after the end of each fiscal quarter…the Secretary shall submit to the appropriate congressional committees the most recent updated versions, if any exist, of…each document described in subsection (a)(4) [annual and life cycle cost estimates]."

contracts or agreements entered into by [VA] to carry out, support, or analyze" these activities. Hereafter, these reports are referred to as "congressionally mandated reports."

Physical Infrastructure Upgrades Needed to Support the New System

Significant physical infrastructure upgrades are needed at aging VHA facilities to support the demands of the new electronic health record system. Both OEHRM and VHA cite the importance of these upgrades to support the system in internal documents, as discussed more fully in finding 2.

Physical infrastructure refers to the underlying foundation that supports the new electronic health record system. Examples of physical infrastructure deficiencies identified at the Mann-Grandstaff VA Medical Center, VA's first deployment site, were highlighted by a VA OIG report published in April 2020.[12] The report identified deficiencies in several areas where the medical facility's infrastructure did not meet OEHRM's requirements to support the new system, including

- substandard network cabling that needed to be upgraded to provide one gigabit of connectivity to computers and other end-user devices;
- inadequate heating, ventilation, and cooling, which can negatively affect equipment longevity; and
- lack of IT equipment grounding, which increases the risk of death or injury due to electrical shock or the destruction of equipment from an electrical fire.[13]

Physical infrastructure upgrades are different from IT infrastructure upgrades, which include investments such as computers and network equipment. Physical infrastructure upgrades are also funded differently from IT infrastructure upgrades. Physical infrastructure upgrades are generally categorized as nonrecurring maintenance expenses, which are funded from VHA's medical facilities appropriation.[14] However, if physical infrastructure upgrades require significant modifications, such as expanding medical facility square footage, they are considered minor construction. IT infrastructure upgrades, on the other hand, are typically funded by OEHRM or VA's Office of Information and Technology.

Both VHA and OEHRM have a role or some responsibility for estimating and reporting physical infrastructure costs that relate to the new electronic record system. The split reporting structure is

[12] VA OIG, *Deficiencies in Infrastructure Readiness for Deploying VA's New Electronic Health Record System*, Report No. 19-08980-95, April 27, 2020.

[13] A gigabit is a measure of bandwidth and is equal to one billion bits.

[14] The primary objective of nonrecurring maintenance projects is to maintain the safe, efficient, and effective function of VHA infrastructure.

summarized below, and this may have contributed to the lack of full reporting as detailed in finding 2 of the report.

VHA Responsibilities

VHA's Office of Healthcare Environment and Facilities Programs develops the cost estimates associated with physical infrastructure upgrades needed to support the electronic health record system. In September 2019, the Office of Healthcare Environment and Facilities Programs established a new team called the Special Engineering Projects team to identify EHRM program infrastructure needs and develop the related cost estimates.

To help facilitate the development of cost estimates, in October 2019, VHA's Office of Capital Asset Management Engineering and Support (OCAMES) directed engineering staff at VHA facilities nationwide to assess existing physical infrastructure and identify gaps between the current state of the facility and the EHRM program's physical infrastructure requirements. As these self-assessments are completed, the VHA Special Engineering Projects team reviews them, either visits or calls the facility to validate the information, and requests that the facility revise the assessment if needed for accuracy.

After the self-assessments are validated, the VHA Special Engineering Projects team performs scoping sessions with medical facility staff to develop facility-specific cost estimates and create a schedule for the upgrade work. These scoping sessions are vital for understanding the physical infrastructure needs at a facility and provide the basis for formulating a facility-specific cost estimate, which is ultimately used to adjust the cost estimate for EHRM program-related physical infrastructure upgrades if a change in estimated costs seems likely.[15] According to the director of the Special Engineering Projects team, scoping sessions should be completed in the first quarter of fiscal year (FY) 2022.[16]

[15] Veterans Benefits and Transition Act of 2018. For the purposes of this report, the term "program-related" refers to the Act's definition of the EHRM program as "any activities … *to procure or implement* an electronic health or medical record system to replace" the existing electronic health record system and "any contracts or agreements entered into by [VA] to carry out, support, or analyze" these activities (emphasis added).

[16] The government fiscal year runs from October 1 through September 30, so the first quarter of FY 2022 would be from October 1 through December 31, 2021.

Office of Electronic Health Record Modernization Responsibilities

Created in June 2018 by the then VA Secretary, OEHRM is responsible for ensuring VA successfully prepares for, deploys, and maintains the new electronic health record solution and supporting health IT tools. Importantly, OEHRM has been designated as the entity responsible for reporting the program's LCCEs to Congress, typically through the congressionally mandated and scheduled reports. OEHRM's executive director reports directly to the VA deputy secretary. The office is also accountable for developing the EHRM program's physical infrastructure requirements.

Results and Recommendations

Finding 1: VHA Cost Estimates for Physical Infrastructure Upgrades Needed in Support of the EHRM Program Were Not Reliable

The OIG found the cost estimates that VHA developed for physical infrastructure upgrades necessary to support the new electronic health record system were not reliable, according to cost-estimating standards. VA and GAO guidance state that cost estimates should be comprehensive, well documented, accurate, and credible, and VA financial policy defines these characteristics as standards for assessing cost estimates.[17] However, neither of VHA's formal cost estimates for physical infrastructure, dated June 2019 and November 2019, fully met these criteria.[18] As detailed in finding 2, neither of these estimates were included in the EHRM program's LCCE that OEHRM reported to Congress.

VHA's OCAMES director told the OIG team that fine-tuned cost predictions could not be made at the time the estimates were developed because not all infrastructure requirements needed to support the system were known. Additionally, VHA and OEHRM leaders did not know the true state of physical infrastructure at VHA facilities and did not have a team responsible for identifying physical infrastructure deficiencies and estimating related costs until after VHA's first cost estimate was developed. Prior to this team being in place, the OCAMES director developed VHA's first estimate, as an ancillary responsibility, and the director acknowledged it was an estimate primarily intended to inform senior leaders of the significant investment needs for physical infrastructure.

Because of these limitations, unreliable estimates were used to support the department's funding requests. Dependency on these estimates increases the risk that available funding will be insufficient to cover EHRM program-related physical infrastructure upgrades. Underestimates could require VHA to shift funds intended for other medical facility projects to cover the cost of these upgrades. The OIG team acknowledges it is reasonable for cost estimates to be refined over time as information becomes known, and that VHA has begun taking actions to improve its estimates, such as performing scoping sessions to help identify facility-specific costs. VHA should continue these actions and work towards ensuring cost estimates adhere to VA's standards in order to effectively manage implementation of the new electronic health record system and make certain that sufficient funding is also available for other potentially critical medical facility upgrades.

[17] Specifically, the *VA Cost Estimating Guide*, version 2.2, outlines the four characteristics of a reliable cost estimate. VA Financial Policy, "Life Cycle Cost Estimating," defines these characteristics as "standards" by which cost estimates are assessed.

[18] VHA provided a draft estimate dated June 2020 that the OIG team did not review for reliability because it was not finalized.

What the OIG Did

The OIG team evaluated VHA's two formal physical infrastructure cost estimates. The June 2019 estimate was the first formal estimate provided to VHA leaders and OEHRM. The November 2019 estimate was used as the basis for the FY 2021 budget request submitted in February 2020. The team evaluated these estimates in accordance with VA standards. The team also reviewed a draft June 2020 VHA cost estimate for informational purposes only, as VHA had not finalized calculations. The team gathered evidence from VA staff, including VHA and OEHRM. Additionally, the team conducted interviews with staff from OEHRM, VHA, and VA's Office of Management. For more on the scope and methodologies, see appendixes B and C.

Characteristics of a Reliable Estimate

To provide context for the OIG team's analysis, this section examines more closely the VA and GAO cost-estimating guidance on the four characteristics of a reliable estimate.[19] VA financial policy states these characteristics are the standards by which cost estimates should be assessed.[20] Accordingly, the OIG team refers to these characteristics as VA standards for reliable cost estimates in the discussions that follow. Notably, VA's cost-estimating guide and financial policy were updated in response to a GAO report that found, in part, that VA lacked cost-estimating policies that incorporated best practices and that VA's cost estimates evaluated by GAO did not meet or only partially met each of the four characteristics.[21] Table 1 provides more detail on the characteristics of a reliable cost estimate as defined by VA and GAO.

Table 1. Four Characteristics of a Reliable Cost Estimate

Characteristic	Description
Comprehensive	• Accounts for all possible costs • Is structured in sufficient detail to ensure that costs are not omitted or double counted • Documents all cost-influencing ground rules and assumptions

[19] *VA Cost Estimating Guide*, ver. 2.2; GAO, *Cost Estimating and Assessment Guide*, GAO-20-195G, March 2020.
[20] VA Financial Policy, "Life Cycle Cost Estimating."
[21] GAO, *Agencies Need to Address Significant Weaknesses in Policies and Practices*, GAO-12-629, July 2012.

Characteristic	Description
Well-Documented	• Includes supporting documentation that explains the process, sources, and methods used to create the estimate • Contains the underlying data used to develop the estimate • Is adequately reviewed and approved by senior leaders
Accurate	• Has few, if any, minor mathematical errors • Not overly conservative or optimistic, and based on an assessment of costs likely to be incurred • Is regularly updated to reflect the current status of the program
Credible	• Includes a risk and uncertainty analysis that quantifies the risks and identifies the effects of changing assumptions and factors • Includes a sensitivity analysis that identifies a range of possible costs based on varying major assumptions and data inputs • Is compared to an independent cost estimate

Source: GAO, Cost Estimating and Assessment Guide*, GAO-20-195G, March 2020; and VA,* Cost Estimating Guide*, ver. 2.2, August 17, 2016.*

VHA's Cost Estimates Did Not Fully Meet Standards

The OIG team evaluated VHA's two cost estimates that had been formalized as of July 2020 for physical infrastructure upgrades needed to support the new electronic health record system. Neither the June nor the November 2019 cost estimate fully met the four characteristics for reliability. The OIG team's review and analysis of each estimate by characteristic is presented in the following sections. Each section also describes the importance of the respective characteristic based on VA standards.

Cost Estimates Were Not Comprehensive

Comprehensive cost estimates are necessary to provide management officials with reasonable assurance that all possible costs are included so they can make the most well-informed budgetary and investment decisions. Both cost estimates were not comprehensive, as described below.

VHA's November 2019 estimate totaling about $1.1 billion for physical infrastructure did not include costs associated with upgrading cabling at facilities nationwide. The estimate only

reflected about 25 percent of nationwide cabling upgrade costs, understating the costs by at least $481 million. In September 2019, VHA's then executive in charge signed an executive decision memo requiring facilities to replace any cabling below category 6 with category 6a cabling before nationwide system deployment is complete.[22] The memo requiring category 6a cabling is consistent with OEHRM requirements, and industry standards state that this cabling provides better performance because of lower signal loss and the ability to support more bandwidth.[23] The OCAMES director explained nationwide cabling upgrades were not included in the November 2019 estimate because this memo only required cabling to be upgraded nationwide before the 10-year system deployment is complete, and VHA was focused on identifying costs for infrastructure items immediately needed to support the new electronic health record system. However, nationwide cabling costs should be included as part of the cost estimate because upgraded cabling is required prior to full system deployment.

In addition, both the June and November 2019 estimates omitted estimated costs of upgrades paid with minor construction funds. A project is categorized as minor construction if it expands existing VA medical facility square footage and is less than $20 million. As of July 2020, the OIG team noted VHA had awarded contracts for two minor construction projects totaling about $11 million for the construction of new data centers necessary to support the electronic health record system at two VA medical facilities. The director of the Special Engineering Projects team told the OIG audit team in September 2020 that VHA would not have an estimate of total future minor construction costs until December 2020.

Cost Estimates Were Not Well Documented

Sufficient documentation supports the validity of an estimate and provides an audit trail to original source documents allowing the estimate to be easily recreated and updated. For example, a well-documented estimate identifies the methodology used in enough detail to allow an independent party to trace the price per square foot of a material to the documentation used to calculate the expected cost, such as a vendor quote. Estimates should also have evidence of leaders' approvals. Neither cost estimate the team reviewed was well documented.

Both estimates included $458 million in fiber optic cabling costs but lacked documentation to support how VHA estimated these costs. Fiber optic cabling costs represent about 17 percent of the $2.7 billion June 2019 estimate and 41 percent of the $1.1 billion November 2019 estimate. Staff told the OIG team the number was derived from cost estimates for the Seattle and

[22] Memorandum from assistant secretary and chief information officer, Office of Information and Technology, and then executive in charge, VHA, to executive director, OEHRM, "Electronic Health Record Modernization Cabling Infrastructure," September 23, 2019. For more information about cabling concerns previously reported by the OIG, see also *Deficiencies in Infrastructure Readiness for Deploying VA's New Electronic Health Record System*, Report No. 19-08980-95, April 27, 2020.

[23] BICSI, "Telecommunications Distribution Methods Manual," 13th ed., vols. I and II, January 2014.

American Lake VA medical centers, but staff were unable to provide documentation to support the $458 million fiber optic cabling costs.

Both estimates also lacked required supporting documentation that would enable an independent reviewer to determine what costs were included and ensure costs were not double counted in two cost categories: "other infrastructure" and "miscellaneous." Totaled, these cost categories accounted for about 15 percent and 18 percent of the total June and November estimates, respectively. VHA staff were unable to provide documentation indicating what upgrade costs were included in these catchall categories, and the director of the Special Engineering Projects team commented that "placeholders" were used until costs could be further defined.

Additionally, both estimates lacked documented evidence they were approved by senior leaders. The director of the Special Engineering Projects team explained there is implicit approval from leaders when cost estimates are used for VHA's operating plan, as the November 2019 cost estimate was. Other VA leaders told the OIG team they review and approve operating plans, which include a single year of estimated costs. The OIG team does not dispute these statements but notes that VHA can improve controls over its cost estimate approval process by ensuring this process is formalized and documented to demonstrate that senior leaders, including those responsible for program budgeting, approve cost estimates.

Lastly, neither estimate identified cost categories for network patch panel and IT equipment grounding upgrades.[24] The director of OCAMES stated these costs were included in the overall cost estimate; however, the OIG team was unable to confirm they were included as VHA could not provide documentation evidencing the inclusion of these costs.

Cost Estimates Were Not Accurate

An accurate cost estimate ensures the information presented to program management personnel as a basis for decision-making is reasonably correct. An accurate estimate is free of mathematical errors and is not overly conservative or optimistic. Neither cost estimate was accurate.

First, in the June 2019 estimate, formula calculation errors omitted about $90 million of FY 2021 construction design costs, or about 10 percent of total physical infrastructure upgrade costs estimated for the next fiscal year. When questioned by the OIG team, the director of the Special Engineering Projects team agreed this was an error.

Second, the November 2019 estimate erroneously omitted about $138 million in escalation costs for upgrades expected to take place in future years.[25] Incorporating escalation costs is important for ensuring estimates are not overly conservative or optimistic because the prices of goods and

[24] A network patch panel is a connecting hardware system that facilitates cable termination and administration. Equipment grounding is used to enhance personnel safety and reduce the likelihood of a fire hazard.

[25] Escalation is the change in price of goods and services over a period of time, and escalation factors are used to convert present costs into future terms.

services are likely to increase over the 10-year EHRM program deployment. Although the June 2019 cost estimate included escalation costs, the November 2019 cost estimate did not, and the director of the Special Engineering Projects team said this was mistakenly excluded.

As mentioned earlier, VHA's November 2019 cost estimate also did not include the cost of completely upgrading the cabling required at VHA facilities nationwide prior to full system deployment, indicating the estimate was overly optimistic.

Cost Estimates Were Not Credible

Credible cost estimates clearly identify the limitations of the data and assumptions used for decision makers and are measured against independent or third-party cost estimates.[26] Neither cost estimate was credible, as described below.

Both estimates lacked a risk and uncertainty analysis, which is used to disclose the likelihood actual costs may differ from estimated costs.[27] VHA did not conduct this type of analysis or disclose the likelihood that costs may change. For example, VHA decreased its estimated costs for data center upgrades by over 80 percent from an average of $3 million per facility to $500,000 per facility from the June 2019 estimate to the November 2019 estimate. There was no analysis available to justify the reasonableness of this large decrease occurring within a few months. Notably, the June 2020 draft estimate shows a significant increase in these costs from the November 2019 cost estimate. The OCAMES director stated VHA was not able to perform a risk and uncertainty analysis because facility conditions were still being assessed nationwide. As discussed previously, the director of the Special Engineering Projects team explained that scoping sessions are not planned to be completed until the first quarter of FY 2022.

Both estimates lacked a sensitivity analysis, which is used to explain how much impact each cost factor has on the overall estimate and provides leaders with cost ranges for each category and an explanation of why the cost estimates could change. For example, a sensitivity analysis for upgrading network cabling could have been used to identify how changes in factors such as the number of medical facilities needing upgrades and fluctuations in cabling cost per square foot would have affected the cost estimate.

Both cost estimates were also not compared to a third-party cost estimate, as discussed later in this finding. GAO considers this comparison to be one of the best ways to validate the reliability and reasonableness of a cost estimate. Per GAO guidance, third-party cost estimates typically

[26] A third-party cost estimate is conducted by an independent entity using the same detailed technical information as the program estimate and can be compared with the program estimate to determine whether it is accurate and realistic.

[27] GAO, *Cost Estimating and Assessment Guide*. GAO defines risk as a potential event that could affect the program positively or negatively. GAO defines uncertainty as "a situation in which little to no information is known about the outcome."

incorporate adequate risk and tend to be more conservative by estimating higher costs than a program office would estimate.

Physical Infrastructure Cost Estimates Varied Significantly in Just 12 Months

The June and November 2019 estimates differed by about $1.6 billion, decreasing from $2.7 billion to $1.1 billion. VHA used similar methodology for both estimates; however, substantially different cost assumptions were used, such as those for data center and cabling upgrades, without documentation to support the reasonableness of these assumptions.

In a February 2020 hearing, VHA's then executive in charge reported physical infrastructure upgrades to be about $2.5 billion. This figure does not align with either of the two formal cost estimates. Although not finalized, VHA's draft cost estimate, dated June 2020, estimated total costs to be about $3.1 billion. This is about $400 million and $2 billion higher than the June and November 2019 cost estimates, respectively. The director of the Special Engineering Projects team stated the June 2020 estimate was likely to be more accurate than the other two estimates because it incorporated some facility-specific cost information from completed scoping sessions. The variability between these estimates provided by VHA also suggests the cost estimates are not reliable.

Cost Estimates Were Based on Underestimated Facility Cost Estimates

The team determined physical infrastructure cost estimates were not reliable by reviewing VHA's cost estimate documentation and evaluating the documentation using VA standards. In addition, the team found that VHA relied on underestimated independent government cost estimates at the Seattle and American Lake VA medical centers, two of VA's three initial operating capability sites, to develop some costs in its June and November 2019 cost estimates.[28] An independent government estimate of construction costs is required by the Federal Acquisition Regulation for proposed contracts that exceed the simplified acquisition threshold, and it serves a different purpose than the independent cost estimates discussed elsewhere in this report. This evidence further suggests cost estimates were not reliable. The director of the Special Engineering Projects team stated VHA used the independent government cost estimates to develop totals for many of the costs listed in the two cost estimates. To gauge how accurate the Seattle and American Lake estimates were, the team compared them to planned and obligated

[28] VA's three initial operating capability sites are the Seattle, American Lake, and Mann-Grandstaff VA medical centers in Washington State. These were the first sites expected to deploy the new system prior to deployment schedule changes due to the COVID-19 pandemic. The Mann-Grandstaff VA Medical Center deployed the new system on October 24, 2020.

costs at those sites.[29] This comparison revealed physical infrastructure costs at Seattle and American Lake were underestimated by 57 and 108 percent respectively. Underestimated costs for fiber optic cabling upgrades was the primary contributor to this large difference. Table 2 details this comparison.

Table 2. Estimated Costs Compared to Planned/Obligated Costs

VA medical center	Estimated costs	Planned/ Obligated costs	Increase	Increase proportion
Seattle	$16,560,000	$26,025,000*	$9,465,000	57%
American Lake	$6,500,000	$13,534,162	$7,034,162	108%

Source: Independent government cost estimates dated November 2018, and VHA project tracker of planned and obligated costs dated August 14, 2020.

**Seattle medical center cost amounts are planned because some contracts for necessary upgrades have yet to be awarded.*

Obligated costs through August 14, 2020.

Using the planned and obligated costs at VA's three initial operating capability sites, the OIG team statistically projected program-wide physical infrastructure costs to be between approximately $3.1 and $3.7 billion (see appendix C). This suggests that VHA's June 2019 and November 2019 cost estimates were unreliable and potentially underestimated by as much as $1 billion and $2.6 billion, respectively. Notably, VHA's June 2020 version estimated nationwide physical infrastructure upgrade costs to be about $3.1 billion, which is consistent with the OIG team's low-end projection. Although the OIG team did not assess the reliability of this cost estimate because it had yet to be finalized, the team noted the methodology used incorporated some facility-specific estimates based on known deficiencies identified in self-assessments; therefore, the June 2020 draft estimate indicates that VHA is taking action and working towards the development of a more refined, reliable cost estimate.

Lack of Effective Quality Control Procedures to Evaluate Estimates

Deficient quality controls contributed to the unreliability of both cost estimates. VA's Office of Programming, Analysis and Evaluation (PAE) within the Office of Management is responsible for performing independent cost estimates for all major programs and VA Secretary priorities. This control is used to test the reasonableness of cost estimates.[30] However, PAE did not complete an independent cost estimate for the EHRM program LCCE or the two formal EHRM program-related physical infrastructure cost estimates. Moreover, VHA staff responsible for

[29] Planned and obligated costs show what VHA is likely to pay. "Planned" refers to those costs that are approved and entered in VHA's strategic capital investment plan. "Obligated" refers to those costs awarded under a contract.

[30] VA Financial Policy, "Life Cycle Cost Estimating."

developing the physical infrastructure estimates were not aware of PAE's existence or its responsibilities to perform independent cost estimates.

The assistant secretary for management stated PAE did not get involved with these cost estimates because the office was essentially being disbanded for organizational reasons at the time the cost estimates for the EHRM program were initially created.[31] PAE leaders confirmed the office existed on "paper only," and nearly all positions within PAE were vacant as of June 2020. The assistant secretary for management stated, as of November 2020, the Office of Management, under which PAE is aligned, has yet to redefine PAE's structure, hire staff, and determine how this office will meet its independent cost estimate responsibilities for programs in the future.

An independent cost estimate is complete and fully documented. It is developed external of and independent from the program office and is used to test the reasonableness of the program office's cost estimate. Thus, if one had been completed, it likely would have revealed many of the issues found during the OIG's audit and allowed VHA to take earlier action to improve the reliability of its estimates.

Insufficient Planning at the Program's Start

Inadequate planning for physical infrastructure upgrades from the time the EHRM contract was awarded to Cerner in May 2018 also contributed to unreliable estimates. VHA did not have enough information about the state of VHA facilities or the infrastructure the system required to make fine-tuned cost predictions. In order to develop reliable cost estimates for upgrades, VHA needs to be aware of what physical infrastructure needs exist. However, OEHRM and VHA leaders stated that, at the time the EHRM contract was awarded, they did not know the actual physical infrastructure deficiencies that needed to be addressed for new system deployment nationwide. Without sufficient information on the state of physical infrastructure at facilities or the infrastructure required to support the system, VHA could not begin to prepare reliable cost estimates.

VHA staff stated they were not made aware that physical infrastructure upgrades were needed to support the system until November 2018, when they were notified by engineers at the Seattle VA Medical Center. This notification came nearly six months after VA's contract award to Cerner for the new system, and nearly five months after VA leaders verbally informed Congress of the $16 billion program cost estimate. An OEHRM leader stated that OEHRM's primary focus when the program was established was the EHRM contract with Cerner, rather than infrastructure.

VHA did not create the group of subject matter experts responsible for identifying facility-specific physical infrastructure deficiencies related to the EHRM program until September 2019 and the leader for this group stated that she was not hired until March 2020—

[31] The assistant secretary for management serves as the chief financial officer for the department.

months after the second estimate was developed. This group ultimately used the information from the self-assessments and scoping sessions to update and refine VHA's nationwide physical infrastructure cost estimate. Before this team was in place, the OCAMES director was responsible for developing cost estimates, which was an ancillary responsibility to his other position duties.

OEHRM, VHA, and VA's Office of Information and Technology officials met to begin defining requirements and discuss upgrades needed at initial operating capability sites in April 2019, and they agreed on an initial set of infrastructure requirements in November 2019, about 18 months after VA's award of the contract to Cerner.[32] At that time, VHA began identifying infrastructure deficiencies at facilities nationwide to estimate associated costs. As mentioned earlier, VHA is in the process of identifying these deficiencies through self-assessments and scoping sessions, a step towards increasing the reliability of estimates.

Because requirements were not finalized at the time VHA established its June 2019 estimate, it was developed without VHA knowing the full extent of needed physical infrastructure upgrades at VA medical centers to support the new electronic health record system. According to the OCAMES director, without requirements it was nearly impossible to develop a reliable estimate. The director stated VHA was able to put together a rough estimate—the June 2019 estimate totaling $2.7 billion—after about 80 percent of the requirements had been defined. According to the director, the estimate's purpose was primarily to inform senior VA leaders of the significant investment needs for physical infrastructure. The director stated that the estimate used the information known at the time utilizing a rough order of magnitude methodology. However, this methodology is intended to be a quick estimate when few details are available, and cost-estimating guidance states that a rough order of magnitude should not be considered a budget-quality cost estimate.

As of January 2021, requirements continued to be defined. For example, power and space requirements for data centers had just been included in the latest draft of the requirements document, which was awaiting signatures from VHA, OEHRM, and Office of Information and Technology leaders for finalization.

Additions to requirements mean VHA staff responsible for developing physical infrastructure cost estimates must react and adjust cost estimates to meet the changing demands. Having a clear definition of the requirements needed to support the new system matters significantly for staff who need to develop reliable cost estimates.[33]

[32] Additional information on the timeline of significant events is included in appendix A.

[33] At the writing of this report, the OIG had an existing, open recommendation for OEHRM to develop and finalize infrastructure requirements, which should address some of the concerns identified. Therefore, the OIG did not make a similar recommendation in this report.

Unreliable Estimates Place Other Facility Needs at Potential Risk and Can Jeopardize the EHRM Program's Success

Without reliable cost estimates, VHA cannot ensure it requests sufficient funding to support needed physical infrastructure upgrades. Most EHRM program-related physical infrastructure upgrades are expected to be paid for with nonrecurring maintenance funds, which are part of VHA's medical facilities appropriation. If the funding for these upgrades is not sufficient because VHA's estimate was understated, VHA would have to reallocate funds intended for other purposes to pay for EHRM program-related upgrades or risk jeopardizing the system's deployment schedule.

Medical facilities' funds are typically used to support the maintenance and operations of hospitals, nursing homes, and other related needs. Using these funds to cover EHRM program-related infrastructure risks funding shortages for other critical facility services and upgrades.

This occurred in FYs 2019 and 2020 when VHA had to use about $6.6 million and $55.8 million, respectively, from the medical facilities' appropriation to fund EHRM program-related upgrades. VA officials have stated the plan is to ensure sufficient funding is available from nonrecurring maintenance to pay for future years' EHRM infrastructure upgrades, and the OIG team noted VA's FY 2021 budget request delineates about $685 million within the nonrecurring maintenance budget to complete physical infrastructure upgrades related to the EHRM program.

However, the risk remains that without reliable estimates, VA's budget requests for nonrecurring maintenance funding may not be sufficient to cover the need. This is particularly concerning because as of May 2020, VHA estimates the nationwide network of medical facilities had a $21.2 billion maintenance backlog.[34] The nonrecurring maintenance program is VHA's primary means of addressing this growing maintenance backlog. VHA will need to improve the reliability of cost estimates to ensure future physical infrastructure upgrades can be planned, budgeted, and timely completed to minimize the impact on patient access to quality care.

Finding 1 Conclusion

In 2012, GAO issued a report finding that the VA cost estimates it evaluated did not meet or only partially met each of the four characteristics of a reliable cost estimate. The OIG team has identified that many of the issues raised by that GAO report persist with respect to cost estimates for physical infrastructure upgrades needed to support the new electronic health record system.

Estimates were likely understated because actual needs had not been well defined in a timely manner. The estimates omitted necessary escalation and cabling upgrade costs and were based on cost estimates at the initial operating capability sites that were themselves underestimated. The

[34] VHA estimate based on capital asset inventory amount reported on May 6, 2020.

OIG team projected that VHA's June 2019 and November 2019 cost estimates were potentially underestimated by as much as $1 billion and $2.6 billion, respectively. Because these estimates support funding requests, there is the risk that VHA will request insufficient funding for EHRM-related infrastructure and would have to use funds intended for other critical facility upgrades.

The OIG team understands that cost estimates are predictions and it is reasonable to assume estimates will be refined over time. Although the OIG team found VHA estimates were not reliable, the team also noted that VHA has initiated work to improve cost estimates through facility self-assessments and scoping sessions.

Recommendations 1–4

The OIG made the following recommendations:

1. The executive director for the Office of Electronic Health Record Modernization should ensure an independent cost estimate is performed for program life cycle cost estimates including related physical infrastructure costs funded by the Veterans Health Administration.
2. The VA assistant secretary for management and chief financial officer should ensure the Office of Programming, Analysis and Evaluation, or another office performing its duties, conducts independent cost estimates as required by VA financial policy, and performs an independent estimate of Electronic Health Record Modernization program life cycle cost estimates including physical infrastructure.
3. The director of special engineering projects for the Veterans Health Administration's Office of Healthcare Environment and Facilities Programs should develop a reliable cost estimate for Electronic Health Record Modernization program-related physical infrastructure in accordance with VA cost-estimating standards and incorporate costs for upgrade needs identified in facility self-assessments and scoping sessions.
4. The director of special engineering projects should also continuously update physical infrastructure cost estimates based on emerging requirements and identified project needs.

Management Comments

The executive director for OEHRM, VA's assistant secretary for management and chief financial officer, and VHA's acting under secretary for health concurred with all four recommendations and provided an action plan for each.

For recommendation 1, OEHRM responded that it is coordinating with the Office of Management to complete an independent cost estimate for LCCEs that will include physical

infrastructure costs. OEHRM provided a targeted completion date of nine to 12 months from contract start.

For recommendation 2, the Office of Management responded that VA will obtain an independent LCCE of the EHRM program that includes physical infrastructure. This should also be complete in nine to 12 months. The Office of Management also stated that the office will clarify roles and responsibilities for cost estimates in financial policy by the end of June 2021.

For recommendation 3, VHA commented that the Office of Healthcare Environment and Facilities Programs is funding personnel to help support development of a reliable cost estimate for EHRM program-related physical infrastructure in accordance with standards. VHA also stated that it will use standard, reliable cost-estimating methodology to develop cost estimates for upgrades needed and identified in facility self-assessments and scoping sessions, and it provided a target completion date of July 2021.

For recommendation 4, VHA stated that EHRM program-related physical infrastructure cost estimates will be continuously updated, and the Special Engineering Projects team will use standard, reliable cost-estimating methodology and "real world" bid pricing to update the cost estimates by July 2021.

VA also provided a technical comment in response to this finding's statistical projection. VA stated the report language suggests a comparison between the June and November 2019 physical infrastructure costs that could lead to misinterpretation by the reader, and that the two cost estimates were developed for different purposes using different assumptions. VA stated the June 2019 estimate was used to communicate to VA leaders the large physical infrastructure investment required to support EHRM, while the November 2019 estimate was developed to communicate physical infrastructure costs over a limited time period and did not include complete replacement of network cable.

OIG Response

Responsive action plans were provided for each of the four recommendations, and the OIG will consider them open until VA has provided sufficient evidence to demonstrate the cited corrective actions have been implemented.

In response to VA's technical comment, the OIG discussed the purpose of the June 2019 cost estimate in this finding and acknowledged that the June 2019 and November 2019 cost estimates were developed using different cost assumptions. VA also commented that the November 2019 estimate only included costs for a four-year time period. However, a documented assumption in this same estimate indicated that all physical infrastructure upgrades would be completed in four years. Therefore, the November 2019 cost estimate should have included these costs. VA also commented that the November 2019 estimate did not include complete replacement of cable and mentioned the September 2019 memorandum. In response,

the OIG maintains that these costs should have been included as part of the cost estimate because upgraded cabling is required prior to full system deployment.

Finding 2: OEHRM Did Not Include Cost Estimates for Upgrading Physical Infrastructure in Reports to Congress

Although VHA had prepared cost estimates for physical infrastructure upgrades necessary for the success of the EHRM program and provided its June 2019 cost estimate to OEHRM, that office did not include those costs in the LCCE reported to Congress. The program's LCCE did not include $2.7 billion for physical infrastructure upgrades as identified in the June 2019 estimate VHA provided to OEHRM. As detailed in this finding, OEHRM did not believe that these estimates and any related reporting of physical infrastructure upgrades fell within its area of responsibility because VHA was responsible for upgrades to medical facilities. While some of these upgrade needs are long-standing, they are nonetheless necessary to the successful implementation and sustainment of the system and, therefore, should have been included in the LCCE that OEHRM reported to Congress.

As of January 2021, all eight of VA's congressionally mandated quarterly reports, the formal mechanism OEHRM uses to present the program's LCCE to Congress, omitted these significant physical infrastructure upgrade costs.[35] Despite these omissions, it may appear to readers of those reports that these costs were included because seven of the eight mandatory reports contained language that infrastructure costs include "physical infrastructure at VA medical centers and other sites."

In multiple hearings, VA officials reported the total program cost to be $16 billion. Almost two years after signing the Cerner contract, VA publicly disclosed to Congress the significant costs associated with physical infrastructure upgrades that VA determined were needed for system deployment. During a February 2020 hearing before the House Committee on Appropriations, VHA's then executive in charge testified that billions in VHA funding would be needed for VA's physical infrastructure to support the system. This funding is distinct from and in addition to the $16 billion EHRM program costs included in the LCCE reported to Congress on multiple occasions prior to February 2020. OEHRM officials confirmed they had not included those costs in the program's LCCE. They stated the associated funding and upgrade efforts were outside their scope of responsibility and that the office of VHA's chief financial officer verbally informed OEHRM it was VHA's responsibility to report these upgrades. This left the program's publicly reported LCCE significantly understated, leaving VA, the veteran community, and the congressional oversight committee without a comprehensive picture of total program costs.[36]

[35] OEHRM's eight submitted congressionally mandated reports on the oversight of the EHRM program are dated May 2019, July 2019, October 2019, January 2020, April 2020, June 2020, October 2020, and January 2021.

[36] The House Committee on Veterans' Affairs, Subcommittee on Technology Modernization, was created in July 2018 and has oversight responsibility for the EHRM program.

This finding details that

- physical infrastructure upgrade costs are program-related, as upgrades are critical to program success;
- reported cost estimates do not include all program-related costs; and
- OEHRM did not believe physical infrastructure costs needed to be included in LCCEs.

What the OIG Did

The OIG team evaluated eight congressionally mandated reports submitted by VA and congressional hearing transcripts from May 17, 2018, the date of the EHRM contract award to Cerner, through January 2021. The team also reviewed applicable laws and guidance and gathered evidence from VA officials, including records held by OEHRM and VHA. In addition, the team conducted interviews with staff from OEHRM, VHA, and VA's Office of Management. Finally, the team reviewed VHA's physical infrastructure cost estimate, dated June 2019, to compare it with other reported costs. For more on the scope and methodologies, see appendixes B and C.

Physical Infrastructure Upgrade Costs Are Program-Related, as Upgrades Are Critical to Program Success

As previously noted, under the Veterans Benefits and Transition Act of 2018, beginning in the second quarter of FY 2019, the VA Secretary is required to submit quarterly updates on the status of the EHRM program, including annual and life cycle cost estimates, for a minimum of five specific cost categories to include government labor, contractor labor, hardware, software, and testing and evaluation. The Act defines the EHRM program as "*any activities* … to procure or implement an electronic health or medical record system to replace" the existing electronic health record system and "any contracts or agreements entered into by [VA] to carry out, support, or analyze" these activities (emphasis added).

Because physical infrastructure upgrades are necessary for implementation of the new system, those costs should be included in LCCEs under the plain language of the statute. Moreover, VA guidance on cost estimates states LCCEs should include costs for all resources and associated cost elements required to successfully deploy and sustain a program, regardless of funding source. Both OEHRM and VHA cite the importance of these upgrades to support the system in internal documents. Further, OEHRM also cites the importance of physical infrastructure upgrades in an internal document stating they are critical and should be completed at facilities six months before the system is turned on to support system implementation.

One example of a significant physical infrastructure upgrade OEHRM requires at facilities nationwide is network cabling. Adequate cabling will ensure the network can provide one gigabit of connectivity to end-user devices like desktops and laptops and meet the recommended

specifications to reduce signal loss. VHA leaders told the audit team that VHA's then executive in charge had created an internal goal for upgrades to be prioritized wherever possible and completed nationwide by FY 2024 in order to support system deployment and sustainment. In September 2019, VHA's then executive in charge issued a memo requiring cabling upgrades to be completed before nationwide system implementation in FY 2028.[37] While this upgrade will bring existing infrastructure up to VA and industry standards, it should also be considered a necessary cost for the EHRM program as it is required by OEHRM to deploy and sustain the new system.

Reported Cost Estimates Do Not Include All Program-Related Costs

As of January 2021, all eight of VA's congressionally mandated quarterly reports omitted significant physical infrastructure costs. Table 3 is an excerpt from the May 2019 congressionally mandated report showing the program's LCCE. OEHRM leaders confirmed the infrastructure category refers solely to IT infrastructure costs, such as end-user devices, and does not include any physical infrastructure costs funded by VHA.

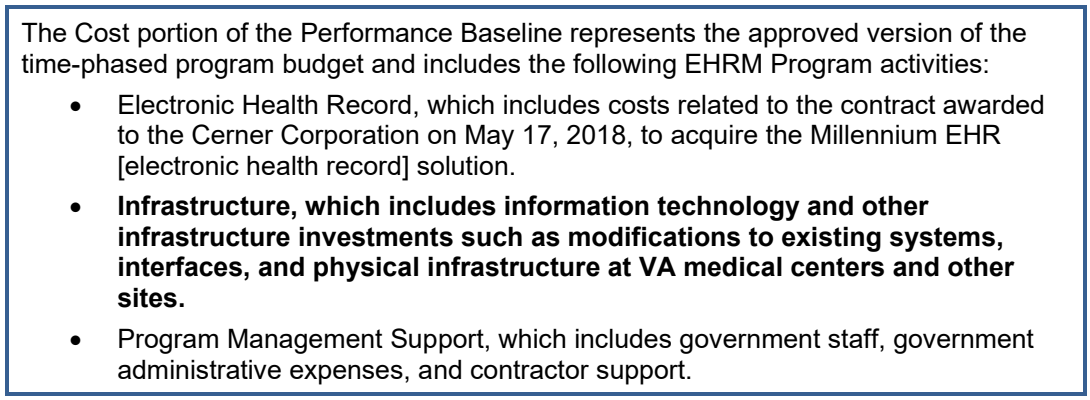
Table 3. EHRM Program Life Cycle Cost Estimate

Category	Amount (in billions of dollars)
EHRM contract	10.0
IT-related infrastructure	4.3
Program management	1.8
Total	**16.1**

Source: VA congressionally mandated report on the oversight of the EHRM program, May 2019.
Note: Amounts are rounded.

All but one of the eight mandated reports incorrectly stated that infrastructure costs include physical infrastructure at VA medical facilities and other sites. The remaining report did not include this same statement. See the second bullet in figure 1 below for an excerpt of the language from the April 2020 congressionally mandated report.

[37] VA memorandum, "Electronic Health Record Modernization Cabling Infrastructure," September 23, 2019.


The Cost portion of the Performance Baseline represents the approved version of the time-phased program budget and includes the following EHRM Program activities:

- Electronic Health Record, which includes costs related to the contract awarded to the Cerner Corporation on May 17, 2018, to acquire the Millennium EHR [electronic health record] solution.
- **Infrastructure, which includes information technology and other infrastructure investments such as modifications to existing systems, interfaces, and physical infrastructure at VA medical centers and other sites.**
- Program Management Support, which includes government staff, government administrative expenses, and contractor support.

Figure 1. *Excerpt from page 45 of the April 2020 OEHRM congressionally mandated report, describing infrastructure as including physical infrastructure (emphasis added).*

VA leaders reported in two congressional hearings that the total EHRM program costs are expected to be $16 billion and referred to this total in a third:

- In a June 26, 2018, House Veterans' Affairs committee hearing, both the then acting VA Secretary and the OEHRM executive director cited the total program cost to be $16 billion.
- In a November 14, 2018, House Veterans' Affairs subcommittee hearing, the OEHRM executive director replied to a question about the $16 billion program cost as being recently updated to ensure it captured staff salaries.
- In a March 6, 2019, House Appropriations committee hearing, both the then acting VA deputy secretary and the OEHRM executive director cited the total program cost to be $16 billion.

In June 2019, VHA provided OEHRM leaders with its initial $2.7 billion cost estimate for physical infrastructure upgrades. During a February 2020 appropriations hearing, VHA's then executive in charge publicly disclosed that billions of dollars would be needed to upgrade VA's physical infrastructure to support the electronic health record system. OEHRM leaders did not provide evidence they informed Congress or other public stakeholders of this significant electronic health record system-related cost even after being provided VHA's estimate and the then executive in charge's statement. The OIG team queried the director of OCAMES, who was involved in VHA's cost estimate development for physical infrastructure upgrades, and the deputy assistant under secretary for health for support as to whether VHA reported the costs for physical infrastructure upgrades to Congress outside this hearing. They both replied that they were unaware of this dollar figure being communicated to Congress on another occasion. As of January 2021, OEHRM had submitted seven congressionally mandated reports after being made aware of VHA's estimate, and none of them included these significant physical infrastructure costs.

OEHRM Did Not Believe Physical Infrastructure Costs Needed to Be Included in Program Life Cycle Cost Estimates

As mentioned earlier, when the OIG team asked OEHRM officials why the estimated costs of EHRM program-related physical infrastructure upgrades have not been disclosed in the congressionally mandated reports, they responded that those upgrades were not within OEHRM's scope of funding responsibility, so they do not need to report related costs. Moreover, an OEHRM official stated that many of the upgrades have been needed for years to bring VA's aging facilities up to current VA and industry standards, which is VHA's responsibility, and that the VHA chief financial officer's office verbally informed OEHRM leaders that it was VHA's responsibility to fund these upgrades. This section discusses a VA legal opinion, related guidance on cost estimating, and a congressional inquiry that are inconsistent with OEHRM's stance that it is not responsible for reporting to Congress physical infrastructure upgrade costs needed to implement the new electronic health record system.

Scope of Funding and Mandate to Report

In response to audit team inquiries regarding the basis for not reporting physical infrastructure costs, OEHRM officials referenced a January 2019 opinion from VA's Office of General Counsel. That opinion stated that physical infrastructure costs could not be funded by OEHRM and could only be funded from accounts specifically available for construction-type purposes, such as from VHA's nonrecurring maintenance account within the medical facilities appropriation. Internal communications reviewed by the audit team between OEHRM, the Office of General Counsel, and the Office of Management suggested that, prior to this opinion, the parties intended that funds needed for physical infrastructure improvements would be transferred from VHA appropriations to the EHRM program funding account to allow for traceability and transparency of all program costs. While the opinion states that OEHRM appropriations cannot be used to fund physical infrastructure upgrades, it does not address the reporting of those costs.

Moreover, as previously indicated, VA's own cost-estimating guidance states that an LCCE "encompasses all past (or sunk), present, and future costs for every aspect of a program, *regardless of funding source*" (emphasis added).[38] The OIG determined that even though OEHRM cannot fund physical infrastructure costs as explained by the Office of General Counsel opinion, these upgrades are needed to support the program and their associated costs should be included in the LCCE reported by OEHRM in accordance with VA guidance.

Further, a congressional inquiry evidences that members of Congress intended for these program costs to be reported. A December 2018 letter to VA from members of the House Committee on Veterans' Affairs requested that OEHRM's executive director provide a detailed breakdown of

[38] *VA Cost Estimating Guide*, ver. 2.2.

any actual or anticipated expenditures from any accounts other than the EHRM account needed to support the program.[39] The letter expressed the committee's concern about "cost uncertainty in the program" and stated that a detailed breakout of all program-related costs was necessary in order to provide meaningful oversight of the program.

When the audit team discussed the omission of EHRM program-related physical infrastructure costs from the congressionally mandated reports, an OEHRM leader indicated that, because of congressional interest, OEHRM considered including these physical infrastructure costs as a footnote for transparency reasons. As of the January 2021 congressionally mandated report, OEHRM had yet to include this footnote. The OIG believes this disclosure would provide Congress with valuable information for overseeing the EHRM program.

Upgrades Were Needed for Years

OEHRM officials stated they did not include the physical infrastructure estimated costs in the program LCCE because many of the upgrades have been needed for years to bring VA's aging infrastructure up to current VA and industry standards, which is VHA's responsibility. An OEHRM official stated that, in fact, the EHRM program was the catalyst driving VHA to prioritize and complete these upgrades.

The OIG team recognizes the age of VHA facilities, along with years of potentially deferred maintenance, likely contributed to the significant need for physical infrastructure upgrades. Nevertheless, because these upgrades are critical to implementing and sustaining the new system, they should be disclosed in the program's LCCE in accordance with VA policy.

Finding 2 Conclusion

Significant physical infrastructure upgrade costs critical to system implementation were not included in the EHRM program's LCCE presented in congressionally mandated reports. The first time VA publicly announced this significant cost associated with the EHRM program was in a February 2020 hearing, close to two years after the contract with Cerner was signed. This lack of transparency has resulted in the total estimated cost to implement the new electronic health record system being underreported by $2.7 billion, according to an estimate for physical infrastructure upgrades VHA provided to OEHRM in June 2019.

Including physical infrastructure upgrades in LCCEs will ensure OEHRM complies with internal guidance and that the department accurately reports the total cost of implementing the new electronic health record system to all stakeholders. This will help ensure that Congress has all

[39] US House of Representatives, Committee on Veterans' Affairs, Subcommittee on Technology Modernization, letter to the OEHRM executive director and VA's assistant secretary for management and chief financial officer, December 11, 2018.

available cost information regarding the program and will inform taxpayers of how much the new system is projected to cost.

Recommendation 5

The OIG made the following recommendation to the executive director for the Office of Electronic Health Record Modernization:

5. Ensure costs for physical infrastructure upgrades funded by the Veterans Health Administration or other sources needed to support the Electronic Health Record Modernization program are disclosed in program life cycle cost estimates presented to Congress.

Management Comments

The executive director for OEHRM concurred with recommendation 5, and OEHRM responded that physical infrastructure upgrades provided by VHA will be included in all future congressionally mandated OEHRM reports. OEHRM provided a target completion date of July 31, 2021.

A technical comment was also provided on this finding. The comment stated that OEHRM has only been reporting program costs under its appropriation, and that it will work with the Office of Management to incorporate physical infrastructure costs into cost estimates to provide Congress with a broader, more comprehensive enterprise-wide perspective.

OIG Response

OEHRM provided a responsive action plan to the recommendation and the OIG will consider it open until the office has provided sufficient evidence to demonstrate the cited corrective actions have been implemented. Regarding the technical comment that "OEHRM has only been reporting program costs under its appropriation," the explanation is discussed in this finding and no additional report changes are required.

Overall Conclusion

Reliable cost estimates for physical infrastructure upgrades are critical to ensuring VA leaders have the information needed to successfully plan, prepare for, and execute necessary upgrades that are critical to OEHRM's system deployment schedule. These estimates are used by VA to develop budget requests, conduct acquisition activity, and monitor execution. The OIG team found the cost estimates that VHA developed for physical infrastructure upgrades were not reliable according to VA standards. VHA's estimates were also likely understated, increasing the risk that funding for EHRM program-related infrastructure would be insufficient and that funds intended for other critical medical facility upgrades would need to be reallocated.

Furthermore, OEHRM did not include needed physical infrastructure upgrade costs in the EHRM program's LCCE reported to Congress. OEHRM should include these costs moving forward so that Congress has all available information to make informed budgetary and investment decisions, and to inform the veteran community and public of the new electronic health record system's total projected costs.

Appendix A: Background

VA has long recognized the need to modernize its electronic health record system, the Veterans Health Information Systems and Technology Architecture. However, several previous attempts to modernize the system did not result in a single interoperable system with the Department of Defense, which would give healthcare providers a more comprehensive picture of veterans' medical histories. In May 2018, VA awarded a contract for nearly $10 billion to Cerner Government Services Inc. to replace the system. VA's new system is meant to connect to the Department of Defense's electronic health record system, which will create a lifetime health record for military service members and ultimately improve and inform the delivery of quality care to veterans. As a result, healthcare providers could access more comprehensive medical histories for the over 9 million veterans enrolled in the VA healthcare program.

Implementation of the system has experienced delays, but the Mann-Grandstaff VA Medical Center in Spokane, Washington, became the first facility to implement the new electronic health record system on October 24, 2020. Nationwide system deployment is expected by 2028.

VA's OEHRM is responsible for ensuring VA successfully prepares for, deploys, and maintains the new electronic health record solution and supporting health IT tools, and collaborates with VHA and the Office of Information and Technology. For physical infrastructure, OEHRM is the accountable entity for developing EHRM infrastructure requirements, but VHA is the accountable entity for ensuring physical infrastructure meets those requirements. In September 2019, VHA's Office of Healthcare Environment and Facilities Programs established the Special Engineering Projects team to identify and resolve EHRM program-related physical infrastructure needs. Its work includes reviewing completed facility self-assessments, identifying needed projects, and developing cost estimates for EHRM program-related physical infrastructure upgrades.

Timeline of Significant EHRM Program Events

The timeline below shows significant EHRM program events that are discussed in this report.

- **June 2017:** The then VA Secretary signed a "determination and findings" document declaring that VA would acquire a new electronic health record system from Cerner.[40]
- **May 2018:** VA awarded its EHRM contract to Cerner.

[40] This determination was made using the public interest exception to the requirement for full and open competition, per Federal Acquisition Regulation 6.302-7.

- **November 2018:** VHA's Veterans Integrated Service Network 20 and OCAMES staff were first notified by Seattle VA Medical Center engineers of EHRM program-related physical infrastructure upgrades.
- **December 2018:** The Veterans Benefits and Transition Act of 2018 was enacted.[41]
- **January 2019:** VA's Office of General Counsel issued an opinion that EHRM appropriations could not be used for physical infrastructure upgrades, indicating that VHA would need to fund these necessary upgrades.
- **April 2019:** OEHRM, VHA, and the Office of Information and Technology met to begin defining requirements and to discuss upgrades needed at initial operating capability sites.
- **May 2019:** OEHRM submitted its first congressionally mandated report with an EHRM program LCCE of $16 billion, which excluded physical infrastructure costs.
- **June 2019:** VHA's OCAMES completed the first cost estimate of $2.7 billion for EHRM program-related physical infrastructure upgrades nationwide.
- **July 2019 through January 2021:** OEHRM submitted seven congressionally mandated reports subsequent to the May 2019 report, all of which excluded physical infrastructure costs.[42]
- **September 2019:** VHA established the Special Engineering Projects team to provide support in resolving physical infrastructure upgrade needs and develop cost estimates.
- **October 2019:** Memorandum issued to all VHA facilities requiring the completion of self-assessments to identify physical infrastructure upgrade needs.
- **November 2019:** VHA's Special Engineering Projects team developed the second cost estimate of $1.1 billion for EHRM program-related physical infrastructure upgrades nationwide. Also, in November 2019, the first infrastructure requirements document was agreed upon and signed by OEHRM, VHA, and the Office of Information and Technology.
- **March 2020:** VHA's Special Engineering Projects team director was hired.

[41] The proposed legislation was first introduced in the Senate and House of Representatives in November 2017. The House Veterans Affairs Committee, Subcommittee on Disability Assistance and Memorial Affairs, held a legislative hearing on March 7, 2018, where members of Congress expressed the need for VA to notify them quickly if there is any significant adverse event such as a cost increase, schedule delay, or security breach.

[42] The seven reports are dated July 2019, October 2019, January 2020, April 2020, June 2020, October 2020, and January 2021.

Appendix B: Scope and Methodology

Scope

The OIG team conducted its work from June 11, 2020, through March 3, 2021. The audit scope encompassed VA's cost estimates and reporting of physical infrastructure upgrades needed to support the EHRM program since the award of the EHRM contract on May 17, 2018, through July 31, 2020, as well as congressionally mandated reports submitted by VA in October 2020 and January 2021. Additionally, the scope included contract awards for EHRM program-related physical infrastructure upgrades through June 30, 2020. Physical infrastructure refers to the underlying foundation that supports the electronic health record system, such as electrical work, cabling, and heating, ventilation, and cooling.

Methodology

The OIG team reviewed applicable laws, requirements, policies, and VA and GAO guidance. The team gathered evidence from various VA offices, including records held by OEHRM, VHA, and VA's Office of Congressional and Legislative Affairs. The team also interviewed staff from OEHRM, VHA, and VA's Office of Management, including executive leaders involved with EHRM program infrastructure readiness and the development of physical infrastructure upgrade cost estimates.

The OIG team also coordinated with the Office of Counselor to the Inspector General for legal guidance and with an OIG statistician to develop a projection for nationwide EHRM program-related physical infrastructure upgrade costs. Due to the COVID-19 pandemic, the team did not travel to conduct site visits. All site visits and staff interviews were conducted virtually. To assess VA's reporting of EHRM program LCCEs to Congress, the OIG team evaluated eight submitted congressionally mandated reports and numerous congressional transcripts from hearings held during the last several years at which VA officials provided oral testimony.

The team evaluated two VHA cost estimates for physical infrastructure upgrades to determine whether they met VA standards for reliability: a June 2019 estimate totaling $2.7 billion and a November 2019 estimate totaling $1.1 billion. The team also reviewed a draft June 2020 VHA cost estimate for informational purposes only, as VHA had not finalized calculations.

The team also evaluated contracts awarded for EHRM program-related physical infrastructure upgrades through June 30, 2020. The universe consisted of 40 purchase orders related to 37 different contract or delivery/task orders awarded for physical infrastructure upgrades falling into the category of nonrecurring maintenance. Another three purchase orders were related to three different contract or delivery/task orders awarded for physical infrastructure upgrades falling into the category of minor construction. Obligated amounts for these nonrecurring maintenance and minor construction upgrades totaled about $69.8 million. The team excluded

purchases made using government purchase cards because those charges fall below the micro-purchase threshold of $10,000 and represent less than 0.1 percent of the total.

Internal Controls

The OIG team assessed internal controls and underlying principles to determine whether they were significant to the audit objective in accordance with GAO's *Standards for Internal Control in the Federal Government.*[43] The team concluded that three components and three underlying principles were significant to the audit objective. For each internal control component and underlying principle determined to be significant, the team performed steps to gain an understanding of internal controls. Table B.1 summarizes the significant internal control components and principles and any identified deficiencies in internal control based upon the audit work performed. These deficiencies are also presented in the Results and Recommendations section of this report.

Table B.1. OIG Analysis of Internal Control Components and Principles Identified as Significant

Component and principle	Deficiency identified by this report
Control environment	
3. Establish structure, responsibility, and authority	OEHRM did not understand its reporting responsibilities for EHRM program-related physical infrastructure upgrade cost estimates.
Control activities	
12. Implement control activities	VHA did not comply with VA financial policy to have an independent cost estimate performed.
Information and communication	
15. Communicate externally	Cost estimates for physical infrastructure upgrades needed to support the EHRM program were not transparently reported to Congress.

Fraud Assessment

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

- soliciting the OIG's Office of Investigations for indicators and

[43] GAO, *Standards for Internal Control in the Federal Government*.

- interviewing personnel and management from OEHRM and VHA to determine whether they knew of fraudulent activity or weaknesses that could potentially lead to fraud or that would affect the scope of this audit.

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

Data Reliability

To assess the reliability of the data, the OIG team interviewed VHA staff who were responsible for creating cost estimates and performed some basic reasonableness checks of the data. Through detailed testing performed during fieldwork and as outlined in finding 1 of this report, the team identified issues with the reliability of the data. For example, finding 1 identified concerns with the accuracy of the information because there were mathematical errors in the June 2019 cost estimate. The team made recommendations within this report to address the reliability of the data.

The team assessed the reliability of the project tracking spreadsheets for the initial operating capability sites and the facility self-assessments the team used to project nationwide EHRM program-related physical infrastructure upgrade cost estimates. To assess the reliability of the project tracking spreadsheets, the team interviewed the capital asset manager responsible for accuracy and completeness of the spreadsheets. To verify the accuracy of the data, the team traced obligated amounts to contract documents for the Mann-Grandstaff VA Medical Center and American Lake Medical Center of the Puget Sound Health Care System. For the Seattle VA Medical Center, also within the Puget Sound Health Care System, the team traced planned amounts to information contained in VA's strategic capital investment planning database. The team did not use the Seattle VA Medical Center's obligated amounts for projecting nationwide costs because contracts for some of the physical infrastructure upgrades for the new electronic health record system had not been awarded at the time of the audit. To assess completeness, the team independently confirmed with relevant staff at the Mann-Grandstaff VA Medical Center and Puget Sound Health Care System that the spreadsheets included all projects.

The team also attempted to evaluate the reliability of the facility self-assessments that were used to determine if physical infrastructure upgrades needed at the initial operating capability sites were representative of VHA facilities nationwide in terms of complexity and magnitude of work. Each assessment was completed by local facility engineering staff with support from VA's Office of Information and Technology staff using a predeveloped template. As of August 20, 2020, there were completed self-assessments for 129 of the 170 VA medical centers and associated outpatient sites. The team was unable to determine the reliability of the data because of the volume of the self-reported facility assessments and limited access to staff and facilities to validate the information in the assessments as a result of the COVID-19 pandemic. However, the individuals responsible for compiling and reviewing the facility assessments agreed that the assessment results, in general, identified physical infrastructure upgrade needs consistent with

those identified at the initial operating capability sites. Even though the team notes a limitation because the reliability could not be determined, the aggregate information was only used to make general overall comparisons, and the team determined it could still be used for that purpose.

To determine the reliability of the EHRM program-related physical infrastructure upgrade contracts awarded through June 30, 2020, the OIG team requested a listing of awards from VHA's Special Engineering Projects team. Once received, the OIG team corroborated the list independently with the relevant network contracting offices. Using the information independently corroborated or provided by the network contracting offices, the team filled in missing fields or added contract awards to the list to ensure completeness. The team then tested the unified listing by reconciling information in key fields back to contract documentation and/or purchase orders. The testing to source documentation identified no material concerns with the data, and therefore, the team considers the listing sufficiently reliable for the purposes of this audit.

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: Statistical Projection Methodology

Approach

To accomplish the objective, the OIG team sought to determine if VHA's two physical infrastructure cost estimates were potentially inaccurate. The OIG team reviewed planned and obligated physical infrastructure upgrade funding for VA's three initial operating capability sites at the Mann-Grandstaff, Seattle, and American Lake VA medical centers as of August 14, 2020. The OIG team also reviewed completed VHA self-assessments of physical infrastructure at individual VA medical centers and associated facilities as of August 20, 2020. The team projected planned or obligated funding at the initial operating capability sites to VA's 170 medical centers to estimate EHRM program-related physical infrastructure costs at VA medical centers nationwide.

Population of VA Facility Self-Assessments

The universe consisted of the total number of telecommunications rooms in 170 VA medical centers and over 1,000 associated outpatient sites, including VA's three initial operating capability sites in Washington State (Mann-Grandstaff, Seattle, and American Lake VA medical centers).

Selection Design

The OIG team selected 100 percent of the telecommunications rooms for VA medical centers and associated off-site facilities that had completed self-assessments in VHA Healthcare Environment and Facilities Programs' SharePoint site. As of August 20, 2020, there were completed self-assessments for 129 VA medical centers and associated off-site facilities with 7,094 telecommunications rooms. The OIG team also selected 100 percent of the 162 telecommunications rooms at VA's original three initial operating capability sites identified from self-assessments and documentation provided by VA. In total, the OIG team selected 7,256 telecommunications rooms at 132 VA medical centers and associated outpatient sites.

The OIG team used facility self-assessments, contract documents, and physical inspections performed by the team during a prior audit to identify the percentage of telecommunications rooms with adequate network cabling; uninterruptible power supplies; heating, ventilation, and cooling; and room size. The OIG statistician found there to be no statistically significant difference between the percentage of adequate telecommunications rooms at the 129 VA medical centers and associated outpatient sites and the percentage of adequate telecommunications rooms at the three initial operating capability sites. Additionally, both the OCAMES director and the Special Engineering Projects team director told the OIG team they consider initial operating

capability sites representative of VHA facilities nationwide in terms of the complexity and magnitude of upgrades needed.

Projections and Margins of Error

The OIG team totaled obligated dollars for the Mann-Grandstaff and American Lake VA medical centers and planned dollars for the Seattle VA Medical Center for EHRM program-related physical infrastructure upgrades obtained from VHA internal physical infrastructure upgrade project tracking spreadsheets. The team verified the dollar amounts using contract documentation and VA's strategic capital investment planning automated tool. This total was divided by the number of telecommunications rooms at these three sites to result in a cost per initial operating capability site telecommunications room, which was then used by the OIG statistician to project to VA's 170 medical centers and associated outpatient sites.

The OIG statistician employed statistical analysis software utilizing Monte Carlo simulations, which is a methodology that models the probability of different outcomes in financial forecasts and estimates. Random outcomes enable the statistician to model situations that present uncertainty and then replicate them on a computer thousands of times. Typically, three-point estimates—that is, best, most likely, and worst-case estimates—are used to develop the probability distributions for these costs. After distributions are developed, the Monte Carlo simulation uses random numbers and continues this random selection thousands of times, creating a new point estimate.

The point estimate (that is, the estimated error) is an estimate of the population parameter obtained by sampling. The margin of error and confidence interval associated with each point estimate is a measure of the precision of the point estimate that accounts for the sampling methodology used. If the OIG team repeated this audit with multiple samples, the confidence intervals would differ for each sample but would include the true population value 90 percent of the time.

Projections

Based on the audit results, the OIG team estimates that EHRM program-related physical infrastructure upgrades at the 170 VA medical centers nationwide will cost approximately $3.4 billion. Table C.1 details the statistical projections for physical infrastructure upgrades.

Table C.1. Statistical Projection for Physical Infrastructure Upgrade Costs for VA Medical Centers Nationwide
(*Dollar values in thousands*)

Area	Point estimate	Margin of error based on 90 percent confidence interval	90 percent confidence interval lower limit	90 percent confidence interval upper limit	Sample size
Physical infrastructure upgrade costs	$3,411,400	$330,000	$3,081,400	$3,741,400	132

Source: VA OIG statistical analysis of sample results projected over the audit universe.

The dollar amounts in table C.1 reflect a 7.8 percent downward adjustment to account for price differences between Washington State, where VA's three initial operating capability sites are located, and the national average. The OIG team used Bureau of Economic Analysis price parity data for all consumption goods and services as of May 18, 2020.

Appendix D: Management Comments

Department of Veterans Affairs Memorandum

Date: March 31, 2021

From: Assistant Secretary for Management and Chief Financial Officer (004)

Acting Under Secretary for Health (10)

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

Subj: Response to Draft Report "Deficiencies in Reporting Reliable Infrastructure Cost Estimates for the Electronic Health Record Modernization Program" (Project Number 20-03178-R9-0002) (VIEWS 4311723)

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

1. Thank you for the opportunity to review the Department of Veterans Affairs Office of Inspector General (OIG) draft report "Deficiencies in Reporting Reliable Physical Infrastructure Cost Estimates for the Electronic Health Record Modernization Program." The report contains recommendations for the Office of Management (OM), the Veterans Health Administration (VHA) and the Office of Electronic Health Record Modernization (OEHRM).

2. We concur with the findings and recommendations in this report. We have included as attachments to this memorandum consolidated technical comments on the report from our organizations and an action plan to address the recommendations.

The OIG removed point of contact information prior to publication.

(Original signed by)

Jon J. Rychalski Richard A. Stone, M.D. John H. Windom

Attachments

Attachment

Department of Veterans Affairs

Technical Comments

OIG Draft Report: Deficiencies in Reporting Reliable Physical Infrastructure Cost Estimates for the Electronic Health Record Modernization Program, Project Number: 20-03178-R9-0002

Date of Draft Report: March 9, 2021

Draft location: Page 4

Current language: Statistical projections made by the OIG audit team suggest that VHA's two formal estimates for physical infrastructure costs, dated June 2019 and November 2019, may be underestimated by as much as $1 billion and $2.6 billion, respectively.

Comment and justification: The current report language suggests a comparison between the June 2019 and November 2019 physical infrastructure costs that could lead to misinterpretation by the reader. The two cost estimates were developed for different purposes and based on different assumptions. The June 2019 estimate represents a rough order magnitude cost estimate used to communicate to VA leadership the large physical infrastructure investment required to support EHRM. The November 2019 estimate was developed to communicate physical infrastructure costs over a 4-year time period and did not include complete replacement of cable documented in the "EHRM Cabling Infrastructure" memorandum dated September 23, 2019 and signed by Mr. James Gfrerer (then Chief Information Officer) and Dr. Richard Stone (then Executive in Charge for Veterans Health Administration, current Acting Under Secretary for Health).

Draft location: Page 17

Finding 2: OEHRM Did Not Include Cost Estimates for Upgrading Physical Infrastructure in Reports to Congress

Comment and justification: OEHRM has only been reporting program costs under its appropriation. OEHRM will work with OM to incorporate physical infrastructure costs into its cost estimates to provide Congress with a broader, more comprehensive enterprise-wide perspective.

Attachment

Department of Veterans Affairs

Action Plan

OIG Draft Report: Deficiencies in Reporting Reliable Physical Infrastructure Cost Estimates for the Electronic Health Record Modernization Program, Project Number: 20-03178-R9-0002

Date of Draft Report: March 9, 2021

Recommendations/Actions	Status	Completion Date

Recommendation 1: The executive director for the Office of Electronic Health Record Modernization should ensure an independent cost estimate is performed for program life cycle cost estimates including related physical infrastructure costs funded by the Veterans Health Administration.

OEHRM Comments: Concur. OEHRM is coordinating with Office of Management (OM) to ensure completion of an independent cost estimate for life cycle cost estimates that will include related physical infrastructure costs funded by VHA.

Status: In Progress Target Completion Date: 9 – 12 months from contract start

Recommendation 2: The VA Assistant Secretary for Management and Chief Financial Officer should ensure the Office of Programming, Analysis and Evaluation, or another office performing its duties, conducts independent cost estimates as required by VA financial policy, and performs an independent estimate of Electronic Health Record Modernization program life cycle cost estimates including physical infrastructure.

Office of Management Comments: Concur. VA will obtain an independent life cycle cost estimate of the Electronic Health Record Modernization program including physical infrastructure. The target date for completion of the independent cost estimate is nine to twelve months from initiation of the assessment. OM will revise VA financial policy to clarify roles and responsibilities for cost estimates by June 30, 2021.

Status: In Progress Target Completion Date: 9 – 12 months from contract start

Recommendation 3: The director of Special Engineering Projects for the Veterans Health Administration's Office of Healthcare Environment and Facilities Programs should develop a reliable cost estimate for Electronic Health Record Modernization program-related physical infrastructure in accordance with VA cost-estimating standards and incorporate costs for upgrade needs identified in facility self-assessments and scoping sessions.

VHA Comments: Concur. VHA Office of Healthcare Environment and Facilities Programs is funding personnel on the existing OEHRM Program Management Organization contract to provide supplemental and independent program engineers to support development of a reliable cost estimate for EHRM program-related physical infrastructure in accordance with VA cost-estimating standards, among other duties necessary to support EHRM non-recurring maintenance project obligation and execution. VHA will

use standard, reliable cost estimating methodology to develop cost estimates for upgrade needs identified in facility self-assessments and scoping sessions.

Status: In Progress Target Completion Date: July 2021

Recommendation 4: The director of Special Engineering Projects should also continuously update physical infrastructure cost estimates based on emerging requirements and identified project needs.

VHA Comments: Concur. Physical infrastructure cost estimates are updated and will continuously be updated based on emerging requirements and identified project needs. Additionally, Healthcare Environment and Facilities Programs Special Engineering Projects will use standard, reliable cost estimating methodology and real-world bid pricing to update physical infrastructure cost estimates.

Status: In Progress Target Completion Date: July 2021

Recommendation 5: Ensure costs for physical infrastructure upgrades funded by the Veterans Health Administration or other sources needed to support the Electronic Health Record Modernization program are disclosed in program life cycle cost estimates presented to Congress.

OEHRM Comments: Concur. Physical infrastructure upgrades provided by VHA will be included in all future OEHRM congressionally mandated reports.

Status: In Progress Target Completion Date: July 31, 2021

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

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