

**GAO**

Testimony

Before the Subcommittee on Military  
Construction, Veterans' Affairs, and  
Related Agencies; House Committee on  
Appropriations

---

For Release on Delivery  
Expected at 10:00 a.m. EDT  
Thursday, March 12, 2009

**INFORMATION  
TECHNOLOGY**

**Challenges Remain for  
VA's Sharing of Electronic  
Health Records with DOD**

Statement of Valerie C. Melvin, Director  
Information Management and Human Capital Issues



**G A O**

Accountability \* Integrity \* Reliability

---



Highlights of GAO-09-427T, a testimony before the Subcommittee on Military Construction, Veterans' Affairs, and Related Agencies; House Committee on Appropriations

## Why GAO Did This Study

For over a decade, the Department of Veterans Affairs (VA) and the Department of Defense (DOD) have been engaged in efforts to improve their ability to share electronic health information. These efforts are vital for making patient information readily available to health care providers in both departments, reducing medical errors, and streamlining administrative functions. In addition, Congress has mandated that VA and DOD jointly develop and implement, by September 30, 2009, electronic health record systems or capabilities that are fully interoperable and compliant with applicable federal interoperability standards. (Interoperability is the ability of two or more systems or components to exchange information and to use the information that has been exchanged.)

The experience of VA and DOD in this area is also relevant to broader efforts to advance the nationwide use of health information technology (IT) in both the public and private health care sectors—a goal of both current and past administrations.

In this statement, GAO describes VA's and DOD's achievements and challenges in developing interoperable electronic health records, including brief comments on how these apply to the broader national health IT effort.

View GAO-09-427T or key components. For more information, contact Valerie Melvin at (202) 512-6304 or melvinv@gao.gov.

## INFORMATION TECHNOLOGY

### Challenges Remain for VA's Sharing of Electronic Health Records with DOD

#### What GAO Found

Through their long-running electronic health information sharing initiatives, VA and DOD have succeeded in increasing their ability to share and use health information. In particular, they are sharing certain clinical information (pharmacy and drug allergy data) in computable form—that is, in a format that a computer can understand and act on. This permits health information systems to provide alerts to clinicians on drug allergies, an important feature that was given priority by the departments' clinicians. The departments are now exchanging this type of data on over 27,000 shared patients—an increase of about 9,000 patients between June 2008 and January 2009. Sharing computable data is considered the highest level of interoperability, but other levels also have value. That is, data that are only viewable still provide important information to clinicians, and much of the departments' shared information is of this type. However, the departments have more to do: not all electronic health information is yet shared, and although VA's health data are all captured electronically, information is still captured on paper at many DOD medical facilities.

To share and use health data has required, among other things, that VA and DOD agree on standards. At the same time, they are participating in federal standards-related initiatives, which is important both because of the experience that the departments bring to the national effort, and also because their involvement helps ensure that their adopted standards are compliant with federal standards. However, these federal standards are still emerging, which could complicate the departments' efforts to maintain compliance.

Finally, the departments' efforts face management challenges. Specifically, the effectiveness of the departments' planning for meeting the deadline for fully interoperable electronic health records is reduced because their plans did not consistently identify results-oriented performance goals (i.e., goals that are objective, quantifiable, and measurable) or measures that would permit progress toward the goals to be assessed. Further constraining VA's and DOD's planning effectiveness is their inability to complete all necessary activities to set up the interagency program office, which is intended to be accountable for fulfilling the departments' interoperability plans. Defining goals and ensuring that these are met would be an important part of the task of the program office. Without a fully established office that can manage the effort to meet these goals, the departments increase the risk that they will not be able to share interoperable electronic health information to the extent and in the manner that most effectively serves military service members and veterans. Accordingly, GAO has recommended that the departments give priority to fully establishing the interagency program office and develop results-oriented performance goals and measures to be used as the basis for reporting interoperability progress. The departments concurred with these recommendations.

---

Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today to discuss the efforts of the Department of Veterans Affairs (VA) to advance the use of health information technology to achieve interoperable electronic health records with the Department of Defense (DOD). VA has been working with DOD for over a decade to pursue initiatives to share data between the two departments' health information systems. To expedite the departments' efforts, the National Defense Authorization Act for Fiscal Year 2008<sup>1</sup> included provisions directing VA and DOD to jointly develop and implement, by September 30, 2009, fully interoperable electronic health record systems or capabilities that are compliant with applicable federal interoperability<sup>2</sup> standards. Such systems and capabilities are important for making patient information more readily available to health care providers in both departments, reducing medical errors, and streamlining administrative functions.

The experience of VA and DOD in this area is also relevant to broader efforts to advance the nationwide use of health information technology (IT) in both the public and private health care sectors — a goal of both current and past administrations. As you are aware, a nationwide effort is currently under way to promote the use of health IT to help improve the efficiency and quality of health care. In April 2004 an executive order called for widespread adoption of interoperable electronic health records by 2014,<sup>3</sup> and it set up the Office of the National Coordinator for Health Information Technology within the Department of Health and Human Services (HHS) to help guide efforts leading to this goal. Most recently, in February, the American Recovery and Reinvestment Act of 2009

---

<sup>1</sup>The National Defense Authorization Act for Fiscal Year 2008, Pub. L. No. 110-181, Section 1635 (Jan. 28, 2008).

<sup>2</sup>Interoperability is the ability of two or more systems or components to exchange information and to use the information that has been exchanged. Further discussion of levels of interoperability is provided later in this testimony.

<sup>3</sup>Executive Order 13335, *Incentives for the Use of Health Information Technology and Establishing the Position of the National Health Information Technology Coordinator* (Washington, D.C.: Apr. 27, 2004).

---

established the office in law, giving the National Coordinator responsibility for coordinating health IT policy and standards, among other things.<sup>4</sup>

Since 2001, we have been reviewing aspects of the various federal efforts undertaken to implement IT for health care and public health solutions. We have reported on VA's and DOD's electronic health information sharing initiatives, as well as on HHS's national health IT initiatives.<sup>5</sup> Overall, our studies have recognized progress made by these departments, but we have also pointed out challenges and other areas of concern. At your request, in this statement, we will describe some of VA's and DOD's achievements and challenges in developing interoperable electronic health records, including brief comments on how these apply to the broader national health IT effort.

In developing this testimony, we relied largely on our previous work. We conducted our work in support of this testimony during February 2009 and March 2009, in Washington, D.C. All work on which this testimony is based was performed in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

---

<sup>4</sup>Health Information Technology for Economic and Clinical Health (HITECH) Act, sec. 13101, Title XIII of the American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, Feb. 17, 2009, adding sec. 3001 to the Public Health Service Act, 42 U.S.C. sec. 300jj-11.

<sup>5</sup>GAO, *Computer-Based Patient Records: Better Planning and Oversight by VA, DOD, and IHS Would Enhance Health Data Sharing*, GAO-01-459 (Washington, D.C.: Apr. 30, 2001); *Computer-Based Patient Records: VA and DOD Efforts to Exchange Health Data Could Benefit from Improved Planning and Project Management*, GAO-04-687 (Washington, D.C.: June 7, 2004); *Health Information Technology: HHS Is Continuing Efforts to Define its National Strategy*, GAO-06-1071T (Washington, D.C.: Sept. 1, 2006); *Information Technology: DOD and VA Have Increased Their Sharing of Health Information, but More Work Remains*, GAO-08-954 (Washington, D.C.: July 28, 2008); and *Electronic Health Records: DOD's and VA's Sharing of Information Could Benefit from Improved Management*, GAO-09-268 (Washington, D.C.: Jan. 28, 2009).

---

---

## Background

The use of IT to electronically collect, store, retrieve, and transfer clinical, administrative, and financial health information has great potential to help improve the quality and efficiency of health care and is critical to improving the performance of the U.S. health care system. Historically, patient health information has been scattered across paper records kept by many different caregivers in many different locations, making it difficult for a clinician to access all of a patient's health information at the time of care. Lacking access to these critical data, a clinician may be challenged to make the most informed decisions on treatment options, potentially putting the patient's health at greater risk. The use of electronic health records can help provide this access and improve clinical decisions.<sup>6</sup>

Electronic health records are particularly crucial for optimizing the health care provided to military personnel and veterans. While in military status and later as veterans, many VA and DOD patients tend to be highly mobile and may have health records residing at multiple medical facilities within and outside the United States. Making such records electronic can help ensure that complete health care information is available for most military service members and veterans at the time and place of care, no matter where it originates.

---

### VA Has Been Working with DOD to Exchange Health Information for Over a Decade

VA and DOD have been working to exchange patient health data electronically since 1998. As we have previously noted,<sup>7</sup> their efforts have included both short-term initiatives to share information in existing (legacy) systems, as well as a long-term initiative to develop modernized health information systems—replacing their legacy systems—that would be able to share data and, ultimately, use interoperable electronic health records.

---

<sup>6</sup>An electronic health record is a collection of information about the health of an individual or the care provided, such as patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data, and radiology reports.

<sup>7</sup>GAO-08-954.

---

In their short-term initiatives to share information from existing systems, the departments began from different positions. VA has one integrated medical information system—the Veterans Health Information Systems and Technology Architecture (VistA)—which uses all electronic records and was developed in-house by VA clinicians and IT personnel.<sup>8</sup> All VA medical facilities have access to all VistA information.

In contrast, DOD uses multiple legacy medical information systems, all of which are commercial software products that are customized for specific uses. For example, the Composite Health Care System (CHCS) which was formerly DOD’s primary health information system, is still in use to capture pharmacy, radiology, and laboratory information.<sup>9</sup> In addition, the Clinical Information System (CIS), a commercial health information system customized for DOD, is used to support inpatient treatment at military medical facilities.

The departments’ short-term initiatives to share information in their existing systems have included several projects. Most notable are two information exchange projects:

- The Federal Health Information Exchange (FHIE), completed in 2004, enables DOD to electronically transfer service members’ electronic health information to VA when the members leave active duty.
- The Bidirectional Health Information Exchange (BHIE), also established in 2004, was aimed at allowing clinicians at both departments viewable access to records on shared patients (that is, those who receive care from both departments—veterans may receive outpatient care from VA clinicians and be hospitalized at a

---

<sup>8</sup>VistA began operation in 1983 as the Decentralized Hospital Computer Program. In 1996, the name of the system was changed to the Veterans Health Information Systems and Technology Architecture.

<sup>9</sup>According to DOD, CHCS applications are now accessed through its modernized health information system, AHLTA.

---

military treatment facility).<sup>10</sup> The interface also allows DOD sites to see previously inaccessible data at other DOD sites.

As part of the long-term initiative, each of the departments aims to develop a modernized system in the context of a common health information architecture that would allow a two-way exchange of health information. The common architecture is to include standardized, computable data; communications; security; and high-performance health information systems: DOD's AHLTA<sup>11</sup> and VA's HealthVet. The departments' modernized systems are to store information (in standardized, computable form) in separate data repositories: DOD's Clinical Data Repository (CDR) and VA's Health Data Repository (HDR). For the two-way exchange of health information, in September 2006 the departments implemented an interface named CHDR,<sup>12</sup> to link the two repositories.

Beyond these initiatives, in January 2007, the departments announced their intention to jointly determine an approach for inpatient health records. On July 31, 2007, they awarded a contract for a feasibility study and exploration of alternatives. In December 2008, the contractor provided the departments with a recommended strategy for jointly developing an inpatient solution.

---

<sup>10</sup>To create BHIE, the departments drew on the architecture and framework of the information transfer system established by the FHIE project. Unlike FHIE, which provides a one-way transfer of information to VA when a service member separates from the military, the two-way interface allows clinicians in both departments to view, in real time, limited health data (in text form) from the departments' existing health information systems.

<sup>11</sup>The department considers AHLTA the official name of the system. (It was formerly an abbreviation for Armed Forces Health Longitudinal Technology Application). Previously, AHLTA was known as CHCS II.

<sup>12</sup>The name CHDR, pronounced "cheddar," combines the names of the two repositories.

---

---

## VA and DOD Have Increased Information Sharing, but Continue to Face Challenges in Developing and Implementing Interoperable Health Records

VA and DOD have increased their ability to share and use health information, sharing both computable and viewable data. This achievement has required years of effort by the two departments, involving, among other things, agreeing on standards and setting priorities for the kind of information to be shared and the appropriate level of interoperability to work toward.

Interoperability—the ability to share data among health care providers—is key to sharing health care information electronically. Interoperability enables different information systems or components to exchange information and to use the information that has been exchanged. This capability is important because it allows patients’ electronic health information to move with them from provider to provider, regardless of where the information originated. If electronic health records conform to interoperability standards, they can be created, managed, and consulted by authorized clinicians and staff across more than one health care organization, thus providing patients and their caregivers the necessary information required for optimal care. (Paper-based health records—if available—also provide necessary information, but unlike electronic health records, do not provide decision support capabilities, such as automatic alerts about a particular patient’s health, or other advantages of automation.)

Interoperability can be achieved at different levels.<sup>13</sup> At the highest level, electronic data are computable (that is, in a format that a computer can understand and act on to, for example, provide alerts to clinicians on drug allergies). At a lower level, electronic data are

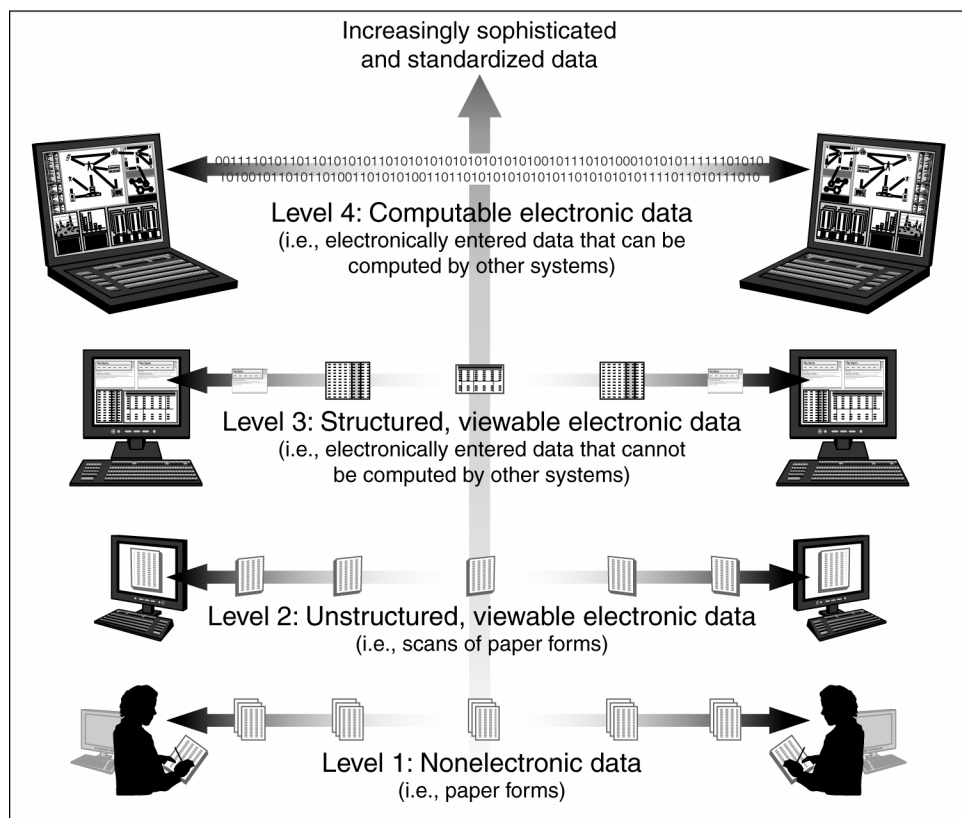
---

<sup>13</sup>These levels were identified by the Center for Information Technology Leadership, which was chartered in 2002 as a research organization established to help guide the health care community in making more informed strategic IT investment decisions. According to VA and DOD, the different levels of interoperability have been accepted for use by the Office of the National Coordinator for Health Information Technology.



structured and viewable, but not computable. The value of data at this level is that they are structured so that data of interest to users are easier to find. At still a lower level, electronic data are unstructured and viewable, but not computable. With unstructured electronic data, a user would have to find needed or relevant information by searching uncategorized data. Beyond these, paper records can also be considered interoperable (at the lowest level) because they allow data to be shared, read, and interpreted by human beings. Figure 1 shows the distinction between the various levels of interoperability and examples of the types of data that can be shared at each level.

**Figure 1: Levels of Data Interoperability**



Source: GAO analysis based on data from the Center for Information Technology Leadership.

VA and DOD have adopted a classification framework like the one in the figure to define what level of interoperability they are aiming to

---

achieve in various information areas. For example, in their initial efforts to implement computable data, VA and DOD focused on outpatient pharmacy and drug allergy data because clinicians gave priority to the need for automated alerts to help medical personnel avoid administering inappropriate drugs to patients. As of January 31, 2009, the departments were exchanging computable outpatient pharmacy and drug allergy data through the CHDR interface on over 27,000 shared patients—an increase of about 9,000 patients since June 2008.

However, according to VA and DOD officials, not all data require the same level of interoperability, nor is interoperability at the highest level achievable in all cases. For example, unstructured, viewable data may be sufficient for such narrative information as clinical notes. According to the departments, much of the information being shared today is currently at the structured, viewable level. For example, through BHIE, the departments exchange surgical pathology reports, microbiology results, cytology reports, chemistry and hematology reports, laboratory orders, vital signs, and other data in structured, viewable form. Some of this information is from scanned documents that are viewable but unstructured. With this format, a clinician would have to find needed or relevant information by scanning uncategorized information. The value of viewable data is increased if the data are structured so that information is categorized and easier to find. Nonetheless, achieving even a minimal level of electronic interoperability is valuable for potentially making all relevant information available to clinicians.

However, the departments have more to do: not all electronic health information is yet shared. In addition, although VA's health data are all captured electronically, information is still captured on paper at many DOD medical facilities.

---

## VA and DOD Have Adopted Standards to Allow Sharing and Are Taking Steps to Follow Evolving Federal Standards

Any level of interoperability depends on the use of agreed-upon standards to ensure that information can be shared and used. In the health IT field, standards may govern areas ranging from technical

---

issues, such as file types and interchange systems, to content issues, such as medical terminology.

- For example, *vocabulary standards* provide common definitions and codes for medical terms and determine how information will be documented for diagnoses and procedures. These standards are intended to lead to consistent descriptions of a patient's medical condition by all practitioners. Without such standards, the terms used to describe the same diagnoses and procedures may vary (the condition known as hepatitis, for example, may be described as a liver inflammation). The use of different terms to indicate the same condition or treatment complicates retrieval and reduces the reliability and consistency of data.
- Another example is *messaging standards*, which establish the order and sequence of data during transmission and provide for the uniform and predictable electronic exchange of data. For example, they might require the first segment to include the patient's name, hospital number, and birth date. A series of subsequent segments might transmit the results of a complete blood count, dictating one result (e.g., iron content) per segment. Messaging standards can be adopted to enable intelligible communication between organizations via the Internet or some other communications pathway. Without them, the interoperability of health IT systems may be limited, reducing the data that can be shared.

VA and DOD have agreed upon numerous common standards that allow them to share health data. These are listed in a jointly published common set of interoperability standards called the Target DOD/VA Health Standards Profile, updated annually. The profile includes federal standards (such as data standards established by the Food and Drug Administration and security standards established by the National Institute of Standards and Technology); industry standards (such as wireless communications standards established by the Institute of Electrical and Electronics Engineers and Web file sharing standards established by the American National Standards Institute); and international standards (such as the Systematized Nomenclature of Medicine Clinical Terms, or SNOMED CT, and security standards established by the International Organization for Standardization).

---

For the two kinds of data now being exchanged in computable form through CHDR (pharmacy and drug allergy data), VA and DOD adopted the National Library of Medicine data standards for medications and drug allergies, as well as the SNOMED CT codes for allergy reactions. This standardization was a prerequisite for exchanging computable medical information—an accomplishment that, according to the Department of Health and Human Services' National Coordinator for Health IT, has not been widely achieved.

Further, VA and DOD are continuing their historical involvement in efforts to agree upon standards for the electronic exchange of clinical health information by participating in ongoing initiatives led by the Office of the National Coordinator under the direction of HHS. These initiatives have included the designation of standards-setting organizations tasked to reach consensus on the definition and use of standards. For example, these organizations have been responsible for, among other things,

- developing *use cases*,<sup>14</sup> which provide the context in which standards would be applicable;
- identifying competing standards for the use cases and *harmonizing* the standards;
- developing interoperability specifications that are needed for implementing the standards;<sup>15</sup> and
- creating certification criteria to determine whether health IT systems meet standards accepted or recognized by the Secretary of HHS, and then certifying systems that meet those criteria.

---

<sup>14</sup>Use cases are descriptions of events that detail what a system (or systems) needs to do to achieve a specific mission or goal; they convey how individuals and organizations (actors) interact with the systems. For health IT, use cases strive to provide enough detail and context for follow-up activities to occur related to specific health care areas of high priority, such as standards harmonization, architecture specification, certification consideration, and detailed policy discussions to advance the national health IT agenda.

<sup>15</sup>An interoperability specification codifies detailed implementation guidance that includes references to the identified standards or parts of standards and explains how they should be applied to specific health care topic areas.

---

The involvement of the two departments in these initiatives is important both because of the experience that the departments can offer the national effort, and also because their involvement helps ensure that the standards they adopt are consistent with the emerging federal standards. DOD and VA have made progress toward adopting health data interoperability standards that are newly recognized and accepted by the Secretary of HHS. The departments have identified these new standards, which relate to three HHS-recognized use cases,<sup>16</sup> in their most recent Target Standards Profile.

Nonetheless, the need to be consistent with the emerging federal standards adds complexity to the task faced by the two departments of extending their standards efforts to additional types of health information. The National Coordinator recognized the importance of their participation and stated it would not be advisable for VA and DOD to move significantly ahead of the national standards initiative; if they did, the departments might have to change the way their systems share information by adjusting them to the national standards later, as the standards continue to evolve.

---

## VA and DOD Plans Lack Results-Oriented Performance Goals and Measures, and Interagency Program Office Is Not Fully Set Up

Using interoperable health IT to help improve the efficiency and quality of health care is a complex goal that requires the involvement of multiple stakeholders in both departments, as well as numerous activities taking place over an expanse of time. In view of this complexity, it is important to develop comprehensive plans that cover the full scope of the activities needed to reach the goal of interoperable health capabilities or systems. To be effective, these plans should be grounded in results-oriented goals and performance measures that allow the results of the activities to be monitored and assessed, so that the departments can take corrective action if needed.

---

<sup>16</sup>Specifically, the profile now includes the use cases for Electronic Health Records Laboratory Results Reporting, Biosurveillance, and Consumer Empowerment.

---

In the course of their health IT efforts, VA and DOD have faced considerable challenges in project planning and management. As far back as 2001 and 2002, we reported management weaknesses, such as inadequate accountability and poor planning and oversight, and recommended that the departments apply principles of sound project management.<sup>17</sup> The departments' efforts to meet the recent requirements of the National Defense Authorization Act for Fiscal Year 2008 provide additional examples of such challenges, raising concerns regarding their ability to most effectively meet the September 2009 deadline for developing and implementing interoperable electronic health record systems or capabilities.

The departments have identified key documents as defining their planned efforts to meet this deadline: the November 2007 *VA/DOD Joint Executive Council Strategic Plan for Fiscal Years 2008–2010* (known as the VA/DOD Joint Strategic Plan) and the September 2008 *DOD/VA Information Interoperability Plan* (Version 1.0). These plans identify various objectives and activities that, according to the departments, are aimed at increasing health information sharing and achieving full interoperability. However, of the 45 objectives and activities identified in their plans, we previously reported that only 4 were documented with results-oriented (i.e., objective, quantifiable, and measurable) performance goals and measures that are characteristic of effective planning.<sup>18</sup>

- An example of an objective, quantifiable, and measurable performance goal is DOD's objective of increasing the percentage for inpatient discharge summaries that it shares with VA from 51 percent as of March 2009, to 70 percent by September 30, 2009.
- However, other goals in the plans are not measurable: For example, one objective is the development of a plan for interagency sharing of essential health images. Another objective is to review national health IT standards. In neither case are tangible deliverables

---

<sup>17</sup>GAO, *Veterans Affairs: Sustained Management Attention Is Key to Achieving Information Technology Results*, GAO-02-703 (Washington, D.C.: June 12, 2002) and GAO-01-459.

<sup>18</sup>GAO-09-268.

---

described that would permit the departments to determine progress in achieving these goals.

In view of the complexity and scale of the tasks required for the two departments to develop interoperable electronic health records, the lack of documented results-oriented performance goals and measures hinder their ability to measure and report their progress toward delivering new capabilities. Both departments agreed with our January 2009 recommendation that they develop results-oriented goals and associated performance measures to help them manage this effort.<sup>19</sup> Until they develop these goals and measures, the departments will be challenged to effectively assess their progress.

In addition, we previously reported that the departments had not fully set up the interagency program office that was established in the National Defense Authorization Act for Fiscal Year 2008. According to department officials, this office will play a crucial role in coordinating the departments' efforts to accelerate their interoperability efforts. These officials stated that having a centralized office to take on this role will be a primary benefit. Further, defining results-oriented performance goals and ensuring that these are met would be an important part of the task of the program office. However, the effort to set up the program office was still in its early stages. The departments had taken steps to set up the program office, such as developing descriptions for key positions and beginning to hire personnel, but they had not completed all necessary activities to meet their December 2008 deadline for the office to be fully operational. Both departments agreed with our July 2008 recommendation that the departments give priority to fully establishing the interagency program office.<sup>20</sup> Since we last reported, the departments have continued their efforts to hire staff for the office with 18 of 30 positions filled as of March 5, 2009, but the positions of Director and Deputy Director are not yet filled with permanent hires.

---

<sup>19</sup>GAO-09-268.

<sup>20</sup>GAO-08-954.

---

Until the departments complete key activities to set up the program office, it will not be positioned to be fully functional, or accountable for fulfilling the departments' interoperability plans. Coupled with the lack of results-oriented plans that establish program commitments in measurable terms, the absence of a fully operational interagency program office leaves VA and DOD without a clearly established approach for ensuring that their actions will achieve the desired purpose of the act.

---

In closing, Mr. Chairman, VA and DOD have made important progress in achieving electronic health records that are interoperable, but the departments continue to face challenges in managing the activities required to achieve this inherently complex goal. These include the need to continue to agree on standards for their own systems while ensuring that they maintain compliance with federal standards, which are still emerging as part of the effort to promote the nationwide adoption of health IT. In addition, the departments' efforts face managerial challenges in defining goals and measures and setting up the interagency program office. Until these challenges are addressed, the risk is increased that the departments will not achieve the ability to share interoperable electronic health information to the extent and in the manner that most effectively serves military service members and veterans.

This concludes my statement. I would be pleased to respond to any questions that you or other members of the subcommittee may have.

---

## Contacts and Acknowledgements

If you have any questions on matters discussed in this testimony, please contact Valerie C. Melvin, Director, Information Management and Human Capital Issues, at (202) 512-6304 or [melvinv@gao.gov](mailto:melvinv@gao.gov). Other individuals who made key contributions to this testimony are Mark Bird, Assistant Director; Barbara Collier; Neil Doherty; Rebecca LaPaze; J. Michael Resser; Kelly Shaw; and Eric Trout.



---

---

This is a work of the U.S. government and is not subject to copyright protection in the United States. The published product may be reproduced and distributed in its entirety without further permission from GAO. However, because this work may contain copyrighted images or other material, permission from the copyright holder may be necessary if you wish to reproduce this material separately.

---