



441 G St. N.W.
Washington, DC 20548

June 13, 2018

Congressional Committees

VA Health Care: Independent Verification and Validation of Patient Self-Scheduling Systems Was Consistent with the Faster Care for Veterans Act of 2016

The Faster Care for Veterans Act of 2016 called for the Department of Veterans Affairs (VA) to conduct a pilot program under which veterans can use an Internet website or mobile application to schedule and confirm appointments at the department’s medical facilities.¹ The act also called for the department to hire a non-governmental, not-for-profit entity with expertise in health information technology to perform independent verification and validation (IV&V) of the patient self-scheduling system used in the pilot program, and any other patient self-scheduling system used by the department.² The IV&V was to determine whether the system or systems included seven minimum capabilities that are specified in the act to support the scheduling of medical appointments. VA subsequently contracted with the MITRE Corporation in April 2017 to conduct the IV&V.

The Faster Care for Veterans Act included a provision calling for us to evaluate the IV&V of VA’s patient self-scheduling systems. Our specific objective was to determine if the IV&V included an evaluation of whether the systems provided the seven minimum capabilities specified in the act and was performed consistent with practices included in the Institute of Electrical and Electronics Engineers’ (IEEE) Standard for System and Software Verification and Validation.³

To address the objective, we obtained and reviewed documentation, including VA’s IV&V contract and performance work statement with MITRE, as well as the contractor’s plans and final IV&V report. Specifically, we reviewed the findings in the final IV&V report with respect to VA’s two patient self-scheduling systems—the On-line Patient Self Scheduling (OPSS) system and the Veteran Appointment Request (VAR) system—and their inclusion of the seven minimum capabilities called for in the act. We did not independently determine whether OPSS and VAR included the minimum capabilities. However, we evaluated the MITRE report to see if it addressed the use of applicable practices identified in the IEEE standard, including practices for ensuring independence, as well as those related to software, system, and hardware validation and verification.

¹Pub. L. No. 114-286, §§ 2-3, 130 Stat. 1459-1461 (2016).

²The purpose of IV&V is to provide an independent review of system processes and products to ensure that quality standards are being met. The use of IV&V is a recognized best practice for system development and acquisition programs and involves an independent organization conducting unbiased reviews of processes, products, and results to verify and validate that they meet stated requirements and standards.

³Institute of Electrical and Electronics Engineers, *IEEE Standard for System and Software Verification and Validation*, IEEE Std. 1012-2012 (New York, N.Y., May 25, 2012). Adapted and reprinted with permission from IEEE. Copyright IEEE 2012. All rights reserved.

We supplemented our analysis with interviews of relevant VA and MITRE officials to gain an understanding of the work that was performed to complete the IV&V. These included officials in VA's Office of Quality, Privacy, and Risk within the Office of Information and Technology, as well as MITRE's project leader and other IV&V report authors. Additionally, we viewed demonstrations of the OPSS and VAR systems.⁴

We conducted this performance audit from December 2017 to June 2018 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.

Background

VA operates the largest health care delivery system in the United States, providing health care to 7 million veterans and their families at more than 1,500 medical facilities. At these facilities, the department provides outpatient care through primary and specialty care clinics. According to VA's fiscal year 2019 congressional budget submission, it expects nearly 118 million outpatient visits from veterans for primary and specialty care.

However, we and others have previously expressed concerns about VA's ability to effectively provide and oversee timely access to health care. For example, we have reported on persistent issues with scheduling patients' medical appointments at the department.⁵ Based on patient scheduling problems and other serious and longstanding concerns about the department's management and oversight of its health care system, we added VA health care to GAO's High Risk List in 2015.⁶

The Faster Care for Veterans Act specified seven minimum capabilities that are to be provided by VA's systems used to support patient self-scheduling of medical appointments. These include the capabilities to schedule, modify, and cancel appointments; support both in-person and telehealth appointments;⁷ view appointment availability in real time; and integrate with the department's health information system—the Veterans Health Information Systems and Technology Architecture (VistA). Table 1 lists the seven minimum capabilities called for in the act.

⁴VAR was renamed the VA Online Scheduling system in December 2017, but at the time of the IV&V was named VAR.

⁵See, for example, GAO, *VA Health Care: Reliability of Reported Outpatient Medical Appointment Wait Times and Scheduling Oversight Need Improvement*, [GAO-13-130](#) (Washington, D.C.: Dec. 21, 2012); *VA Health Care: Management and Oversight of Consult Process Need Improvement to Help Ensure Veterans Receive Timely Outpatient Specialty Care*, [GAO-14-808](#) (Washington, D.C.: Sept. 30, 2014); and *VA Mental Health: Clearer Guidance on Access Policies and Wait-Time Data Needed*, [GAO-16-24](#) (Washington, D.C.: Oct. 28, 2015). See also Department of Veterans Affairs, Office of Inspector General, *Healthcare Inspection: Gastroenterology Consult Delays, William Jennings Bryan Dorn VA Medical Center, Columbia, South Carolina*, Report No. 12-04631-313 (Washington, D.C.: Sept. 6, 2013); and Department of Veterans Affairs, Office of Inspector General, *Veterans Health Administration, Review of Alleged Patient Deaths, Patient Wait Times, and Scheduling Practices at the Phoenix VA Health Care System*, Report No. 14-02603-267 (Washington, D.C.: Aug. 26, 2014).

⁶GAO, *High Risk Series: An Update*, [GAO-15-290](#), (Washington, D.C.: Feb. 11, 2015).

⁷Telehealth includes telemedicine, which is the use of medical information exchanged from one site to another via electronic communications (such as video or e-mail) to improve a patient's clinical health status through, for example, provision of health care services or clinical monitoring.

Table 1: List of Capabilities that the Faster Care for Veterans Act of 2016 Required the Department of Veterans Affairs to Include in Patient Self-Scheduling Systems

Schedule, modify, and cancel appointments for primary care, specialty care, and mental health.
Support appointments for the provision of health care regardless of whether such care is provided in person or through telehealth services.
View appointment availability in real time.
Make available, in real time, appointments that were previously filled, but later canceled, by other patients.
Provide prompts or reminders to veterans to schedule follow-up appointments.
Be available for use 24 hours per day, 7 days per week.
Integrate with the Veterans Health Information Systems and Technology Architecture (VistA), or such successor information technology system.

Source: Faster Care for Veterans Act of 2016. | GAO-18-442R

In April 2017, VA initiated the pilot patient self-scheduling program called for in the Faster Care for Veterans Act of 2016. The pilot program included the acquisition of OPSS, which the department implemented beginning in December 2017 to allow veterans to use an Internet website or mobile application to schedule appointments at three VA medical centers. In addition, prior to the enactment of the Faster Care for Veterans Act, the department had developed VAR as a system that also was to be used to support appointment self-scheduling. The department began national deployment of VAR in January 2017 and, as of December 2017, had deployed the system at 111 VA medical centers. The act did not specify that existing systems, such as VAR, were to be included in the pilot program, but it did state that such systems were required to meet the seven minimum capabilities and were subject to the IV&V requirement of the act.

Also in April 2017, VA entered into a contract with MITRE to conduct the IV&V called for in the act. MITRE is a non-governmental, not-for-profit entity with expertise in health information technology that operates multiple federally funded research and development centers and conducts work with VA to address the challenges of providing seamless, timely delivery of benefits and services to veterans. MITRE completed its IV&V report on VAR and OPSS in February 2018.

Independent Verification and Validation of VA’s Patient Self-Scheduling Systems Included an Evaluation of Capabilities Specified in the Faster Care for Veterans Act of 2016 and Was Performed Consistent with IEEE Practices

The IV&V that MITRE performed for OPSS and VAR included findings on whether the two systems met each of the seven minimum capabilities called for in the Faster Care for Veterans Act of 2016. The IV&V findings on the extent to which the systems provided the seven capabilities, including strengths and weaknesses as reported by MITRE, are identified in table 2.

Table 2: MITRE Independent Validation and Verification Findings on the Department of Veterans Affairs' (VA) Patient Self-Scheduling Appointment Systems

Capability identified in the Faster Care for Veterans Act of 2016	Finding for the Veteran Appointment Request (VAR) System	Finding for the On-line Patient Self-Scheduling System (OPSS)
Schedule, modify, and cancel appointments for primary care, specialty care, and mental health.	The system provided capabilities to schedule and cancel appointments, but did not provide the capability to modify appointments.	The system provided these capabilities, but did not operate as expected for mental health appointments.
Support appointments for the provision of health care regardless of whether such care is provided in person or through telehealth services.	The system provided the capability for veterans to self-schedule in person appointments. Telehealth appointments requested by veterans were not directly scheduled by veterans.	The system did not provide an ability to directly schedule telehealth appointments.
View appointment availability in real time.	The system accurately provided this capability for the services that VA offers veterans to directly schedule appointments.	The system accurately but inconsistently provided this capability for the services that VA offers veterans to directly schedule appointments.
Make available, in real time, appointments that were previously filled but later canceled by other patients.	Previously scheduled appointments, when canceled, were accurately presented as available in the user interface in real time.	Previously scheduled appointments, when canceled, were accurately presented as available in the user interface in real time.
Provide prompts or reminders to veteran to schedule follow-up appointments.	The system provided this capability in the form of "Notifications" in the user interface. The system integrated with the VA Recall Reminder system to provide veterans with such notifications.	The system did not operate as expected when providing veterans with prompts or reminders to schedule follow up appointments.
Be available for use 24 hours per day, 7 days per week.	There was minimal information provided or found as evidence (e.g., operational up-time/downtime, failure statistics, and recovery ability) of the system's ability to reliably operate 24x7 under expected operational conditions, such as expected and peak loads; upgrades; and faults with the system, networks, and integrated systems.	There was minimal information provided or found as evidence (e.g., operational up-time/downtime, failure statistics, and recovery ability) of the system's ability to reliably operate 24x7 under expected operational conditions, such as expected and peak loads; upgrades; and faults with the system, networks, and integrated systems.
Integrate with the Veterans Health Information Systems and Technology Architecture (VistA), or such successor information technology system.	The system's integration with VistA resulted in accurate real time data being presented to users. VAR's architecture was observed to be adaptable for integrating with potential future successor systems.	The system's integration with VistA resulted in some data being accurately presented to users. However, OPSS does not receive complete scheduling and reminder data from VistA.

Source: MITRE IV&V report on VA Patient Self-Scheduling Appointment Systems for the Faster Care for Veterans Act of 2016. | GAO-18-442R

Independent Verification and Validation Was Consistent with the IEEE Standard

In addition to addressing whether OPSS and VAR included the minimum requirements called for in the Faster Care for Veterans Act, the IV&V conducted by MITRE was consistent with the IEEE standard for performing such evaluations. Specifically, this standard recommends that an IV&V be performed by personnel who are not involved in the development of the system under evaluation. Additionally, the standard specifies that managerial and financial responsibility for the IV&V be placed in an organization separate from the system development and program management organizations.

We determined that VA and MITRE took appropriate steps to ensure independence of the contractor's staff who conducted the IV&V. Specifically, VA assigned the task order for the IV&V to an office in the department that was separate from the organization that managed other work MITRE was performing. Additionally, the MITRE staff that worked on the IV&V were fully dedicated to the effort and did not work on other task orders that the organization held with VA. Further, the MITRE IV&V team was not involved in supporting the development of VAR or the acquisition of OPSS. Lastly, MITRE asserted in its IV&V report for the two systems, that all assessment criteria for the IV&V were developed and assessed independent of VA and of the product teams for the systems evaluated.

The IV&V also was consistent with the IEEE standard for conducting verification and validation activities. This standard calls for the IV&V to, among other things, include activities that are grouped into three verification and validation areas: system verification and validation, software verification and validation, and hardware verification and validation. The IV&V that MITRE performed for OPSS and VAR addressed each of the specific activities in the three areas outlined in the standard, as discussed in detail below.

With regard to system verification and validation, the IEEE standard identifies seven activities that are to be performed, as listed in table 3.

Table 3: Institute of Electrical and Electronics Engineers Standard for System Verification and Validation (V&V) Activities

Verification and validation standard activities
Requirements analysis V&V includes an assessment of whether the system requirements specify all required characteristics for the system.
Stakeholder requirements definition V&V includes an assessment of whether the stakeholder requirements are traceable to the originating stakeholders.
Architectural design V&V assures that the architecture satisfies the system requirements.
Implementation V&V verifies that the implementation activities performed produces a system that conforms to the system requirements.
Integration V&V assures that the system integration strategy is consistent with the system architecture.
Transition V&V assesses that the system is installed in its operational location in accordance with the transition plan.
Maintenance V&V is to assess that the maintenance strategy is comprehensive and explicitly documented.

Source: Institute of Electrical and Electronics Engineers | GAO-18-442R

Note: IEEE Standard for System and Software Verification and Validation, IEEE Std. 1012-2012 (New York, N.Y., May 25, 2012). Adapted and reprinted with permission from IEEE. Copyright IEEE 2012. All rights reserved.

The IV&V for OPSS and VAR indicates that MITRE addressed all seven system verification and validation activities described in the IEEE standard. For example, MITRE’s report indicated that the IV&V addressed the requirements analysis verification and validation activity by analyzing the seven minimum requirements for self-scheduling appointment systems specified in the Faster Care for Veterans Act . In addition, MITRE’s report provided evidence that the IV&V assessed whether stakeholder requirements were traceable to the originating stakeholders. MITRE’s report also indicated that the IV&V addressed the maintenance verification and validation activity by evaluating whether the VAR and OPSS support mechanisms included long-term sustainment actions, such as monitoring system performance and providing administrative support.

With respect to software verification and validation, the IEEE standard identifies 10 activities that are to be performed. These activities are listed in table 4.

Table 4: Institute of Electrical and Electronics Engineers Standard for Software Verification and Validation (V&V)

Verification and validation standard activities
Software concept V&V verifies the allocation of system requirements, validate the selected solution, and assure that no false assumptions have been incorporated in the solution.
Software requirements V&V assures the correctness, completeness, accuracy, testability, and consistency of the system software requirements.
Software design V&V demonstrates that the design is a correct, accurate, and complete transformation of the software requirements and that no unintended features are introduced.
Software construction V&V verifies and validates that the system design that is transformed into code is correct, accurate, and complete.
Software integration test V&V assures that the software requirements and system requirements allocated to software are validated as each software component is incrementally integrated.
Software qualification test V&V assures that the integrated software product satisfies its requirements.
Software acceptance test V&V assures that the software satisfies its acceptance criteria and to enable the customer to determine whether or not to accept the integrated software product.
Software installation and checkout V&V verifies and validates the correctness of the software installation in the target environment.
Software operation V&V assesses the proposed system changes and their impact on the software, and evaluate the operating procedures for correctness and usability.
Software maintenance V&V assesses the proposed software system changes and their impact on the software.

Source: Institute of Electrical and Electronics Engineers | GAO-18-442R

Note: IEEE Standard for System and Software Verification and Validation, IEEE Std. 1012-2012 (New York, N.Y., May 25, 2012). Adapted and reprinted with permission from IEEE. Copyright IEEE 2012. All rights reserved.

The IV&V for OPSS and VAR indicates that MITRE addressed all 10 software verification and validation activities identified in the IEEE standard. For instance, MITRE’s report indicated that it addressed the software requirements verification and validation activity by assessing OPSS’s and VAR’s capabilities against those called for in the Faster Care for Veterans Act. MITRE’s report also provided evidence that the IV&V evaluated test cases and design scenarios for the systems to address this activity. Further, MITRE’s report indicated that the IV&V addressed the software design verification and validation activity by conducting design observation scenarios to provide insight into the level of quality and completeness of functionality when the systems were in a production environment using scheduling data. The software acceptance test activity was addressed by conducting analyses of test cases, including user acceptance testing, that compared test cases to the requirements of OPSS and VAR.

With regard to hardware verification and validation, the IEEE standard specifies 10 activities that are intended to verify that hardware components satisfy the hardware specifications. These 10 hardware verification and validation activities are listed in table 5.

Table 5: Institute of Electrical and Electronics Engineers Standard for Hardware Verification and Validation (V&V)

Verification and validation standard activities
Hardware concept V&V verifies that all system requirements allocated to the hardware components are addressed and validates that the selected hardware concepts satisfy the system needs.
Hardware requirements V&V verifies that the hardware requirements correctly, completely, and accurately satisfy the system requirements allocated to the hardware element and validates that the hardware requirements, in total, satisfy the system needs.
Hardware design V&V verifies that all hardware design components satisfy the hardware requirements specification of the hardware element.
Hardware fabrication V&V verifies that the final fabrication elements comply with the hardware design and to validate that each fabricated hardware component satisfies the overall system performance, safety, and reliability requirements.
Hardware integration test V&V verifies that hardware parts conform to the hardware element requirements during the integration process and validates that the hardware element satisfies the system requirements.
Hardware qualification test V&V verifies that the hardware element as tested satisfies the hardware requirements and validates that the hardware element satisfies system requirements.
Hardware acceptance test V&V verifies that the hardware element meets the acceptance criteria and requirements and validates that the system requirements allocated to this particular hardware element are satisfied.
Hardware transition V&V verifies and validates the correctness of the hardware installation in the operational environment.
Hardware operation V&V assesses proposed system changes and their impact on the hardware and evaluate operating procedures for correctness and usability.
Hardware maintenance V&V assesses proposed hardware changes and their impact on the system.

Source: Institute of Electrical and Electronics Engineers | GAO-18-442R

Note: IEEE Standard for System and Software Verification and Validation, IEEE Std. 1012-2012 (New York, N.Y., May 25, 2012). Adapted and reprinted with permission from IEEE. Copyright IEEE 2012. All rights reserved.

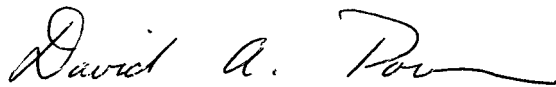
The IV&V for OPSS and VAR indicates that MITRE addressed all 10 of the hardware verification and validation activities described in the IEEE standard, including the hardware integration test verification and validation activity. This activity calls for a determination of whether hardware conforms to requirements during the integration process. MITRE’s report indicated that the IV&V addressed this activity by evaluating whether the two systems integrated with VistA and other data sources needed for scheduling appointments and clinical data exchange. In addition, MITRE’s report provided evidence that the IV&V addressed the hardware transition verification and validation activity by determining whether the scheduling systems supported mechanisms to ensure proper initial operation and sustainment. Hardware design verification and validation was also addressed in the IV&V by checking the level of quality and completeness of functionality when the scheduling systems were used with live patient scheduling data on the VA network.

Agency Comments and Our Evaluation

VA provided written comments on a draft of this report, which are reprinted in the enclosure. In its comments, the department concurred with our assessment that MITRE's IV&V was performed consistent with the IEEE standards for software, system, and hardware verification and validation. The department also agreed with our determination that the IV&V had reviewed whether VAR and OPSS included the seven minimum capabilities specified in the Faster Care for Veterans Act.

We are sending copies of this report to the Committees on Veterans' Affairs of the Senate and the House of Representatives and the Committees on Appropriations, Subcommittees on Military Construction, Veterans Affairs, and Related Agencies, of the Senate and the House of Representatives; and to the Acting Secretary of Veterans Affairs. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staffs have any questions on this report, please contact me at (202) 512-9286 or pownerd@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs are on the last page of this report. Key contributors to this report were Mark Bird (assistant director), Eric Trout (analyst in charge), Rebecca Eyler, Paris Hawkins, and Christy Tyson.



David A. Powner
Director, Information Technology Management Issues

Enclosure



DEPARTMENT OF VETERANS AFFAIRS
WASHINGTON DC 20420

May 29, 2018

David A. Powner
Director
Information Technology Management Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Mr. Powner:

The Department of Veterans Affairs (VA) has reviewed the Government Accountability Office's (GAO) draft report, "**VA HEALTH CARE: Independent Verification and Validation of Patient Self-Scheduling Systems Was Consistent with the Faster Care for Veterans Act of 2016**" (GAO-18-442R).

The enclosure provides our general comment. VA appreciates the opportunity to comment on your draft report.

Sincerely,

A handwritten signature in black ink, appearing to read "Peter M. O'Rourke".

Peter M. O'Rourke
Chief of Staff

Enclosure

Enclosure

Department of Veterans Affairs (VA) Comments to
Government Accountability Office (GAO) Draft Report
***“VA HEALTH CARE: Independent Verification and Validation
of Patient Self-Scheduling Systems Was Consistent
with the Faster Care for Veterans Act of 2016”***
(GAO-18-442R)

General Comment:

The Government Accountability Office's (GAO) Draft Report titled ***“VA HEALTH CARE: Independent Verification and Validation of Patient Self-Scheduling Systems Was Consistent with the Faster Care for Veterans Act of 2016”*** (GAO-18-442R) listed two specific GAO objectives. The first was that the MITRE independent verification and validation (IV&V) was performed consistent with practices included in the Institute of Electrical and Electronics Engineers' (IEEE) standards for System, Software, and Hardware verification and validation (V&V). The Veterans Health Administration (VHA) concurs that MITRE's IV&V met the IEEE standards for System, Software, and Hardware V&V.

The second objective was to determine if the MITRE IV&V included an evaluation of whether the Veteran Appointment Request (VAR) (now known as VA Online Scheduling) and the Online Patient Self-Scheduling (OPSS) systems provided the seven minimum capabilities specified in the Act. VHA agrees that MITRE reviewed the seven minimum capabilities for VAR and OPSS and judged their compliance based on IV&V standards.

Using these standards, MITRE reported telehealth capability was not observed with OPSS. While VA appreciates MITRE had to use the IV&V standards to judge the telehealth standard accordingly, the capability for OPSS to make telehealth appointments does exist. At the time of the MITRE assessment, the OPSS systems pilot was less than 60 days old and the OPSS software was deployed to limited clinics at 3 pilot sites. Although available, the sites had not yet set-up the clinic profiles to demonstrate telehealth appointing at that time. VA wishes to assure the public that the seven capabilities required by the Act do in fact exist.

List of Committees

The Honorable Johnny Isakson
Chairman
The Honorable Jon Tester
Ranking Member
Committee on Veterans' Affairs
United States Senate

The Honorable John Boozman
Chairman
The Honorable Brian Schatz
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Subcommittee on Military Construction,
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