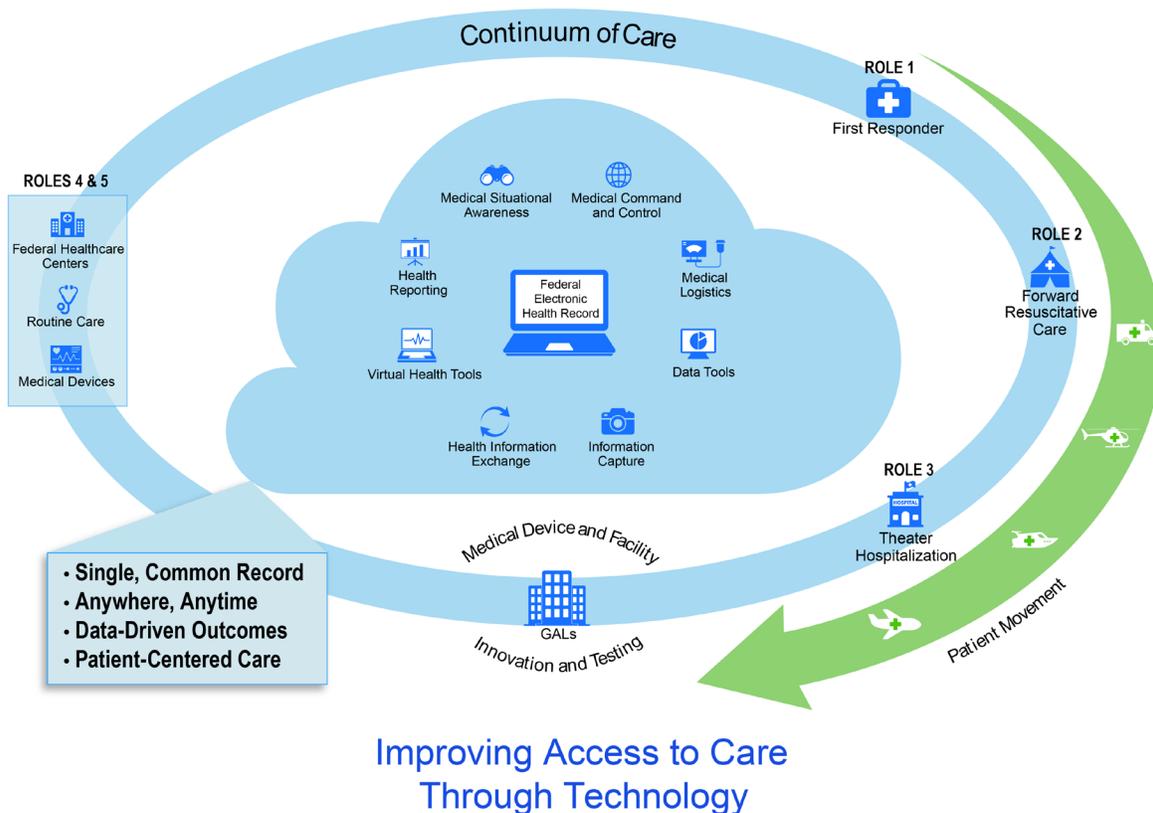


# DoD Healthcare Management System Modernization (DHMSM®)



GAL - Government Approved Laboratory

## Executive Summary

- MHS GENESIS is intended to transform the way the DOD and the Department of Veterans Affairs (VA) provide military and veteran healthcare missions by creating a single health care record for each patient, used by both agencies.
- The Joint Interoperability Test Command (JITC), with Service Operational Test Agency (OTA) assistance, conducted an MHS GENESIS FOT&E during January and February 2020 at four operational Military Medical Treatment Facilities (MTFs) in California and Idaho.
  - MHS GENESIS is operationally effective for basic operations in conventional clinics, but is not operationally effective for certain specialty clinics and business areas. MHS GENESIS demonstrated improvement in performance compared to the July 2018 IOT&E. The MHS GENESIS software still needs work in the areas of medical readiness, provider referrals, business intelligence, billing, coding, and reporting.
  - During the FOT&E, information exchange with required external systems was sporadic, and patient data in MHS GENESIS were sometimes inaccurate and incomplete.
- MHS GENESIS is not operationally suitable because training remains unsatisfactory, dissemination of system change information is inadequate, and usability problems persist.
- JITC completed MHS GENESIS cybersecurity testing in September 2020. Compared to previous testing, cyber defenders were more effective in detecting Naval Information Warfare Center (NAVWAR) Red Team attacks and taking appropriate action to contain the attackers. However, MHS GENESIS is still not survivable in the complex, cyber-contested environment of a major medical facility.
- The Defense Health Agency (DHA) created a Persistent Cyber Operations (PCO) program on August 13, 2020, to emulate a continuous cyber threat against MHS GENESIS, the Medical Community of Interest network, and interfacing systems. This innovative program is one of the best ways to assess and improve the cyber defenses of MHS GENESIS.

# FY20 DOD PROGRAMS

- After a pause in deployments following the FOT&E and the coronavirus (COVID-19) pandemic restrictions, the DHA began fielding MHS GENESIS to additional medical facilities in September 2020. The program has not yet determined when it will conduct the additional operational testing recommended in DOT&E's FOT&E report.

## System

- The Program Office plans to field MHS GENESIS, a modernized Electronic Health Records system, to 205,000 MHS personnel providing care for 9.6 million DOD beneficiaries worldwide. MHS facilities encompass 54 hospitals, 377 medical clinics, and 270 dental clinics.
- MHS GENESIS comprises three major elements:
  - The Millennium suite of applications, developed by Cerner, which provides medical capabilities
  - Dentrax Enterprise, developed by Henry Schein, Inc., which provides dental capabilities
  - Orion Rhapsody Integration Engine, developed by Orion Health, which enables the majority of the external information exchanges
- The Joint Longitudinal Viewer (JLV) bridges medical records between the legacy systems and MHS GENESIS for the DOD, in addition to providing access to both DOD and VA medical

- records. JLV is a web-based application that displays a patient's entire medical record, organized by information type (e.g., allergies, medications, immunizations) in a single view.
- MHS GENESIS will replace legacy healthcare systems including the Armed Forces Health Longitudinal Technology Application (AHLTA), Composite Health Care System (CHCS), and Essentris inpatient system. MHS GENESIS will replace or modernize operational medicine components of the Theater Medical Information Program (TMIP) – Joint software suite.

## Mission

DOD medical staff will use MHS GENESIS to manage delivery of dentistry, emergency department, immunization, laboratory, radiology, operating room, pharmacy, vision, audiology, and inpatient/outpatient services. DOD medical staff will also use MHS GENESIS to perform administrative support, front desk operations, logistics, billing, and business intelligence.

## Major Contractors

- Leidos – Reston, Virginia
- Cerner – Kansas City, Missouri
- Accenture Federal Services – Arlington, Virginia
- Henry Schein, Inc. – Melville, New York

---

## Activity

- JITC conducted an FOT&E of MHS GENESIS Block 2 during January and February 2020 at David Grant Medical Center (DGMC), Travis AFB, California; U.S. Army Health Clinic, Presidio of Monterey, California; Naval Health Clinic Lemoore, Naval Air Station Lemoore, California; and 366th Medical Clinic, Mountain Home AFB, Idaho, with the assistance of the military Services' operational test agencies. The FOT&E was conducted in accordance with a DOT&E-approved test plan.
- The Program Office installed Block 2.5 Millennium enhancements on March 27, 2020. Block 2.5 implemented capabilities required to support the VA's Capability Set 1 and enhancements to Radiology and Emergency Medicine.
- The Program Office installed Capability Block 3 on August 7, 2020. Block 3 implemented the Cerner Millennium Upgrade 2018.03; capabilities to support VA's Capability Set 2; and other system enhancements.
- The DHA created a PCO program on August 13, 2020, to emulate a continuous cyber threat against MHS GENESIS, the Medical Community of Interest network, and interfacing systems. The innovative program will assess the cyber posture of MHS GENESIS and the effectiveness of network tools, cyber defense tools, and cyber defender processes, and is one of the best ways to improve the program's defenses against nation state-level threats.
- JITC and NAVWAR conducted a cooperative vulnerability and penetration assessment (CVPA) at the Cerner Technology

- Center, Kansas City, Missouri, from July 29 to August 9, 2019, a second CVPA at DGMC, Travis AFB, California, from January 6-24, 2020, and an adversarial assessment (AA) encompassing both locations from August 17 to September 1, 2020. The CVPAs and AA were conducted in accordance with a DOT&E-approved test plan.
- The Program Office deployed MHS GENESIS to four Coast Guard pilot sites in California on August 29, 2020. Sites included Base Alameda Clinic, California; Air Station Sacramento Clinic, California; Training Center Petaluma Clinic, California; and the Maritime Safety and Security Team San Francisco Sickbay, California.
  - JITC started remote verification of open IOT&E Incident Reports (IRs) on September 8, 2020. This testing was delayed by 4 months due to COVID-19 restrictions.
  - The Program Office deployed MHS GENESIS at Weed Army Community Hospital, Fort Irwin, California; Naval Hospital Twentynine Palms, California; Beale AFB Clinic, California; Edwards AFB Clinic, California; Mike O'Callaghan Military Medical Center, Nellis AFB, Nevada; Los Angeles AFB Clinic, California; Vandenberg AFB Clinic, California; Naval Air Station Fallon Clinic, Nevada; Port Hueneme Clinic, California; and 1st Dental Battalion, Camp Pendleton, California, on September 26, 2020. These sites were designated "Wave Nellis" sites. The deployment was delayed by 3 months due to COVID-19 restrictions.

## Assessment

- JITC, with Service OTA assistance, conducted the FOT&E at four operational MTFs in California and Idaho. During the FOT&E, operational testers observed users performing their day-to-day tasks at the MTFs while staff from DOT&E monitored the activity.
  - MHS GENESIS is operationally effective for basic operations in conventional clinics, but is not operationally effective for certain specialty clinics and business areas. MHS GENESIS demonstrated improvement in performance compared to the July 2018 IOT&E. Users successfully completed 78 percent of tested measures of performance, compared to only 45 percent completed at Madigan Army Medical Center, Washington, during IOT&E Phase 2. The commercial off-the-shelf software needs improvement in the areas of medical readiness, provider referrals, business intelligence, billing, coding, and reporting. Users frequently did not understand how the new MHS GENESIS workflows and local workarounds affect operations at the enterprise level, further limiting operational effectiveness.
  - Users generated 202 new IRs during the FOT&E; IRs document mission failure, degradation of mission capabilities, or inconveniences using the system. One quarter of these were high priority, indicating complete or partial mission failure. JITC confirmed closure for 80 percent of the retested IOT&E IRs, a significant achievement for both the Program Office and the operational testers. Following the FOT&E, JITC validated the closure of 11 IRs in September and October 2020. MHS GENESIS currently has 158 open high-priority IRs, 44 generated during the FOT&E, and 114 from the previous IOT&E.
  - During the FOT&E, information exchange with required external systems was sporadic, and the data were sometimes inaccurate and incomplete. Thirteen percent of patient allergy, immunization, and medication data did not transfer correctly to MHS GENESIS from the AHLTA and other legacy systems. The dates for some transferred data were incorrect. A training deficiency resulted in providers not routinely reconciling the MHS GENESIS information with legacy systems or with patients at their first encounter using MHS GENESIS to verify that patient information transferred was complete and accurate. When providers did reconcile data manually, the result was often a delay to patient care as providers needed to review data in the JLV, AHLTA, and other systems to obtain a complete health profile of the patient. MHS GENESIS and AHLTA users often could not see all required patient information using the JLV, eroding user trust in both MHS GENESIS and the JLV. The VA may experience similar interoperability problems when MHS GENESIS fielding begins in VA medical facilities.
  - MHS GENESIS is not operationally suitable because training remains unsatisfactory, dissemination of system change information is inadequate, and usability problems persist. Training and site preparation were not sufficient to support MHS GENESIS use at Go-Live. Lack of training on new workflows and operating in the enterprise environment mirrored weaknesses discovered during IOT&E. Because of the scope of this system, and changes to existing processes, the MHS GENESIS enterprise requires additional subject matter experts for problem resolution, content development, continued training, and other operational assistance. Usability has improved on the System Usability Scale since IOT&E Phase 2, from “unacceptable” to “marginal-low.” System availability was 89 percent during the test period. Defense Enrollment Eligibility Reporting System (DEERS) outages accounted for nearly half the of the MHS GENESIS non-availability time. Testing to determine the ability of the MHS GENESIS network infrastructure to sustain the expected number of users at full deployment has not yet been conducted.
- The CVPAs and AA, conducted by JITC and NAVWAR Red Team, showed that MHS GENESIS is not survivable in the complex, cyber-contested environment of a major medical facility. Compared to previous testing, cyber defenders were more effective in detecting NAVWAR Red Team attacks and taking appropriate action to contain the attackers. However, the AA found that 18 of 39 cybersecurity vulnerabilities identified during previous testing remained open, and testing identified 15 new cybersecurity vulnerabilities.

## Recommendations

1. The Under Secretary of Defense (Personnel and Readiness) should provide sufficient resources to DHA to support problem resolution, content development, continued training, and other operational assistance during MHS GENESIS deployment and sustainment.
2. The VA should allow DOT&E and JITC to assist with operational testing of early MHS GENESIS deployments at the VA.
3. The Program Office should:
  - Work with DOT&E to plan another FOT&E of MHS GENESIS to evaluate corrective actions and revised training, focused on capabilities shown to be not effective during this FOT&E. The FOT&E should be conducted no later than the implementation of the Block 4 capability upgrade, currently scheduled for January 2021.
  - Continue to fix deficiencies identified in IRs, focusing on Priority 1 and 2 problems, and verify fixes through operational testing.
  - Improve the overall training program, to include Instructor-Led Training and one-on-one training.
  - Improve interoperability, focusing on interface problems that could affect patient safety.
  - Continue to fix known cybersecurity deficiencies.
  - Conduct periodic capacity and latency assessments during future deployments to ensure that the required quality of service to the users is not degraded.

# FY20 DOD PROGRAMS

4. The DHA should:

- Improve communications with the user base by implementing a consistent method of notifying them about changes to the system.
- Maintain access to the AHLTA at sites operating with MHS GENESIS until resolution of interoperability

problems, including data reconciliation, to ensure providers have access to all historical medical record data.