VETERANS HEALTH ADMINISTRATION
OFFICE OF QUALITY, SAFETY AND VALUE
PRODUCT EFFECTIVENESS

CAPTAIN JAMES A LOVELL FEDERAL HEALTH CARE CENTER (JAL FHCC)

INFORMATION MANAGEMENT/INFORMATION TECHNOLOGY EVALUATION

INITIAL EVALUATION REPORT

JULY 2015

VERSION HISTORY

Version #	Date	Author	Notes
1.0	12/04/2014	VHA OQSV Product Effectiveness	Initial draft submitted to the FHCC Advisory Board. The Summary of Evaluation Findings section was previously briefed to the FHCC Advisory Board and comments were provided by various stakeholder groups (for the Summary of Evaluation Findings section). An Appendix Volume containing metric-by-metric results accompanies this document.
1.1	05/01/2015	VHA OQSV Product Effectiveness	Final draft submitted to JAL FHCC Site Leadership for concurrence. Concurrence was provided on Version 1.0 by the FHCC Advisory Board, the Health Executive (HEC) Committee Health Architecture Review Board (HARB), HEC Interagency Clinical Informatics Board (ICIB), the Defense Health Agency (DHA), and the Bureau of medicine and Surgery (BUMED). The JAL FHCC Site Leadership did not concur with Version 1.0 primarily due to concerns regarding statements about Consults Orders Portability. Product Effectiveness (PE) has updated the Report for concurrence from JAL FHCC Site Leadership. The updates do not require re-review from the other stakeholder groups.
2.0	7/27/2015	VHA OQSV Product Effectiveness	Final version. Updates were made solely to incorporate information regarding final concurrence from JAL FHCC Site Leadership. Concurrence was received from all stakeholder groups.

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KEY ACRONYMS

Acronym	Definition
AHLTA	Armed Forces Health Longitudinal Technology Application
AVHE	Application Virtualized Hosting Environment
BHIE	Bidirectional Health Information Exchange
BPR	Business Process Reengineering
CAC	Common Access Card
CHCS	Composite Health Care System
CPRS	Computerized Patient Record System
CPU	Central Processing Unit
DEERS	Defense Enrollment Eligibility Reporting System
DHA	Defense Health Agency
DMIX	Defense medical Information Exchange
DMZ	Demilitarized Zone
DoD	Department of Defense
DoN	Department of the Navy
ED	Emergency Department
EHR	Electronic Health Record
EOD	End of Day
ESB	Enterprise Service Bus
FTEE	Full Time Employee Equivalent
FY	Fiscal Year
GAO	Government Accountability Office
GUI	Graphical User Interface
HBSS	Host Based Security System
HEC	Health Executive Committee (previously the Health Executive Council)
iEHR	Integrated Electronic Health Record
IM/IT	Information Management/Information Technology
IMR	Individual Medical Readiness
IOM	Institute of Medicine
IPO	Interagency Program Office
JAL FHCC	Captain James A. Lovell Federal Health Care Center
JIF	Joint Incentive Fund
JLV	Joint Legacy Viewer

Acronym	Definition
JPRS	Joint Patient Registration System
MHS	Military Health System
MPI	Master Patient Index
MSSO/CM	Medical Single Sign on with Context Management
MTF	Military Treatment Facility
MVI	Master Veteran Index
NCVAMC	North Chicago Veterans Affairs Medical Center
NDAA	National Defense Authorization Act
NHCGL	Naval Health Clinic Great Lakes
NME	Navy Medicine East
OIA	Office of Informatics and Analytics
OIT	Veterans Affairs Office of Information & Technology
OQSV	Office of Quality, Safety and Value
ORP	Orders Portability
PE	Product Effectiveness
PHA	Periodic health Assessment
PIV	Personal Identity Verification
RDV	Remote Data Viewer
SME	Subject Matter Expert
SOA	Service Oriented Architecture
SRA	Secure Remote Access
VA	Department of Veterans Affairs
VHA	Veterans Health Administration
VistA	Veterans Health Information Systems and Technology Architecture
VPN	Virtual Private Network

1 SUMMARY OF EVALUATION FINDINGS

1.1 Overview

Authorized as a five year demonstration project by the *National Defense Authorization Act for Fiscal Year 2010*, the Captain James A. Lovell Federal Health Care Center (JAL FHCC) is the first Department of Defense (DoD)/Department of Veterans Affairs (VA) health care facility with one single line of authority to provide comprehensive, compassionate, patient-centered care to DoD and VA beneficiaries while supporting the highest level of operational readiness.[1]

In October 2013, to assist in evaluating the JAL FHCC demonstration project, key leaders from the DoD, VA, and the Department of the Navy (DoN) chartered the Veterans Health Administration (VHA) Office of Quality, Safety and Value (OQSV) Product Effectiveness (PE) organization to conduct an evaluation of the Information Management and Information Technology (IM/IT) investments made to enable JAL FHCC integrated operations.[2]

DoD, VA, and DoN leaders requested PE to focus its evaluation on the following IM/IT capabilities that were funded by a $100.02 million Joint Incentive Fund (JIF), contributed to equally by the DoD and VA:[3]

1. Joint Patient Registration (JPRS),
2. Medical Single Sign-On with Context Management (MSSO/CM),
3. Financial Reconciliation, and
4. Four separate Orders Portability (ORP) Capabilities: Orders Portability for laboratory, radiology, consults, and pharmacy.

PE was also asked to include network infrastructure and communication components in its evaluation that, although not JIF-funded, impact JAL FHCC operations in regards to email, calendaring, file sharing, and general business operations.

PE's IM/IT Evaluation addressed the following three objectives:

1. **Objective 1:** Assess the effectiveness of the JIF-funded IM/IT components.
2. **Objective 2:** Identify challenges and unintended consequences of the common services IM/IT model implemented at JAL FHCC.
3. **Objective 3:** Provide DoD and VA leadership with information for improved decision making in future integrated endeavors.

1.2 Approach

The PE Team developed a comprehensive IM/IT evaluation plan, also referred to as a Benefits Realization Framework, to understand and measure the extent to which IM/IT enables the following JAL FHCC and national DoD/VA benefits enumerated in the *JAL FHCC Executive* Agreement:[4]

1. Improve interagency data sharing.
2. Improve efficiency of JAL FHCC clinical and administrative processes.
3. Improve cost effectiveness of health care delivery.
4. Improve access to health care delivery, including promoting continued beneficiary access to care.
5. Promote operational readiness.
6. Improve staff satisfaction.[5,6]

Using the Benefits Realization Framework as guidance, the PE Team interviewed subject matter experts (SMEs) from the DoD/VA Interagency Program Office, the VHA Office of Informatics and Analytics (OIA), and JAL FHCC. The PE Team reviewed prior evaluations of JAL FHCC, including those conducted by the Government Accountability Office (GAO), the Institute of Medicine (IOM), and by the PE Team. The PE Team also collected system generated data where possible, and reviewed IM/IT documentation created by the DoD/VA IPO-led development teams, independent verification & validation (IV&V) documentation, and other artifacts related to DoD/VA data sharing. In addition, the PE Team completed multiple JAL FHCC site visits to interview personnel, observe processes, and document workflows. Finally, the PE

Team relied upon its own subject matter expertise gained from prior JAL FHCC evaluation efforts, dozens of evaluations for VHA programs and facilities, and evaluations conducted on behalf of the DoD/VA IPO.

1.3 Summary of Findings and Recommendations by Evaluation Objective

1.3.1 Objective 1: Assess the Effectiveness of the JIF-Funded IM/IT Components

The PE Team found that the JIF-funded IM/IT investments have provided a foundation for enabling JAL FHCC enterprise benefits and national DoD/VA interoperability goals. IM/IT investments at JAL FHCC have broken barriers for DoD/VA interoperability initiatives and serve as the agencies' most robust examples of real-time interagency data sharing. Moreover, because the DoD and VA have ceased efforts to jointly develop an integrated electronic health record (iEHR), JAL FHCC serves as a critical achievement in the pursuit of agency-wide interoperability.

IM/IT investments at JAL FHCC have broken barriers for DoD/VA interoperability initiatives and serve as the agencies' most robust examples of real-time interagency data sharing. However, there remain functionality issues with JIF-funded IM/IT investments, policy constraints on the current IM/IT investments' ability to fully enable JAL FHCC benefits, and unintended consequences of the selected IM/IT model.

Time, resource, and policy constraints were present in the JAL FHCC IM/IT planning. Given constraints, DoD and VA implemented IM/IT capabilities that were the most essential to serve both agencies' beneficiaries at JAL FHCC while attempting to maintain each agency's electronic health record (EHR) and support the respective agency missions. JAL FHCC's JIF-funded IM/IT investments also provide DoD and VA with the most extensive view into the complexities, challenges, and successes achieved for interagency data sharing. With the exception of the pharmacy Orders Portability capability (which was deferred, primarily due to policy constraints) and the Financial Reconciliation capability (which is not currently operational), the JIF-funded IM/IT components are functioning according to requirements and have shown consistent improvement since JAL FHCC commenced operations on October 1, 2010.

Therefore, Benefit 1, Improve Interagency Data Sharing, has been achieved through the success of the majority of JIF-funded IM/IT capabilities being implemented and functioning according to the requirements and within policy constraints.

1.3.2 Objective 2: Identify Challenges and Unintended Consequences of the Common Services IM/IT Model Implemented at JAL FHCC

Although the JIF-funded IM/IT investments achieved the benefit of improved interagency data sharing, the IM/IT investments either partially enabled or did not enable the remaining five benefits enumerated in the *JAL FHCC Executive Agreement* and evaluated by the PE Team. (Please note that additional detail regarding IM/IT's enablement of each of the PE-evaluated benefits begins on page 40 of this report).

When viewed solely in terms of delivered functionality, the IM/IT investments made for the JAL FHCC demonstration project are largely functioning as designed, and have realized a significant benefit in support of the DoD and VA's data interoperability and integration goals–as evidenced by the achievement of Benefit 1.

However, when viewed in terms of its ability to enable efficient operations of an integrated DoD/VA facility, the JAL FHCC demonstration project has shown that, in its current form, the selected IM/IT model is not efficiently enabling integrated operations and is not enabling all of the envisioned benefits resulting from an integrated Federal Health Care Center. This is primarily due to the additional burden placed on clinical and administrative personnel because of IM/IT-driven latency and personnel's difficulty in accessing IM/IT systems/tools, and is evidenced by the results captured by the PE Team for Benefit 2, Improve Efficiency of JAL FHCC Clinical and Administrative Processes.

The selected IM/IT model and the associated JIF-funded IM/IT functionality are capable of effectively enabling integrated operations and associated benefits of an FHCC. But, in order to do so, DoD and VA leadership should address key challenges as outlined below:

1. Achieve faster, more seamless access to each agency's EHR by improving the DoD and VA's virtualized environment and/or by altering policies that require the preservation of separate networks with differing network security protocols.
2. Reduce latency experienced by the ORP capabilities by identifying and remediating data transaction bottlenecks, altering network security policies between the agencies, and/or consolidating the use of multiple interoperability solutions, such as using one Enterprise Service Bus (ESB) to manage interagency transactions, rather than two.
3. Pursue a workable solution to pharmacy interoperability within JAL FHCC. The solution may include the use of Computerized Physician Order Entry (CPOE) or changes to one (or both) agency's medication formularies in order to limit the amount of dual EHR usage currently required for the pharmacy process.
4. Address remaining functionality issues experienced by the Financial Reconciliation web tool so that implemented JIF-funded IM/IT capabilities are fully operational and utilized by JAL FHCC personnel.
5. Implement solutions to variances in administrative data capture (e.g., workload data, beneficiary categories) and alleviate concerns regarding the integrity of administrative data in order to effectively utilize the JAL FHCC-developed Financial Reconciliation model and administratively manage JAL FHCC.
6. Explore interoperable IM/IT solutions for JAL FHCC clinical services that are not currently supported by ORP (such as emergency department visits and inpatient care) so that a beneficiary's medical record is complete.

1.3.3 Objective 3: Provide DoD and VA Leadership with Information for Improved Decision Making in Future Integrated Endeavors.

At JAL FHCC, DoD and VA leaders have been seeking, what is termed by members of the FHCC Advisory Board, "optimal integration" rather than complete integration.

Optimal integration preserves each agency's mission, policies, reporting requirements, and patient records. JAL FHCC's IM/IT model and supporting JIF-funded IM/IT investments can enable optimal integration at an FHCC if the items listed in Section 1.3.2 above are addressed.

Before embarking on another attempt to create an FHCC that seeks to achieve optimal integration and replicate JAL FHCC's IM/IT model, DoD and VA leaders should consider the following:

1. Optimize IM/IT performance at JAL FHCC by addressing items one through six listed in Section 1.3.2 above.
2. After optimizing IM/IT performance, conduct a business/clinical process study to ensure JAL FHCC clinical care and operations accommodate efficient workflow.
3. Conduct business case analyses to determine if additional IM/IT investment is needed for JAL FHCC to achieve more comprehensive interoperability and operational success; and finally,
4. Utilize the complexities, challenges, successes, and lessons learned at JAL FHCC to plan for future integrated endeavors.

1.4 Expanded Summary of Findings

The following subsections expand on each of the findings initially presented in the section above:

- IM/IT investments at JAL FHCC have broken barriers for DoD/VA interoperability initiatives and serve as the agencies' most robust examples of real-time interagency data sharing.
- Given time, resource, and policy constraints, DoD and VA implemented the IM/IT capabilities that were the most essential to serve both agencies' beneficiaries at JAL FHCC, while attempting to maintain each agency's EHR and support the respective agency's missions.
- Overall, the IM/IT investments are functioning as designed and have seen consistent improvement since JAL FHCC commenced operations on October 1, 2010.
- There remain functionality issues with JIF-funded IM/IT investments, policy constraints on the current IM/IT investments' ability to fully enable JAL FHCC benefits, and unintended consequences of the selected IM/IT model.

1.4.1 JAL FHCC IM/IT Investments Have Broken Barriers for DoD/VA Interoperability Initiatives

The implemented JAL FHCC IM/IT capabilities have achieved improved interagency data sharing and serve as the agencies' most robust examples of real-time interoperability. Some of the key accomplishments at JAL FHCC include the following:

- Granted authorized DoD employees full access to the VA EHR and granted authorized VA employees full access to the DoD EHR.
- Developed business requirements for key integrated and interoperable IM/IT capabilities: JPRS, MSSO/CM, ORP, and Financial Reconciliation.
- Developed and implemented the JPRS, MSSO/CM, ORP, and Financial Reconciliation capabilities per the Business Requirements Documents (BRDs).
- Mapped thousands of data fields between the DoD EHR and VA EHR to allow for the interoperable transfer of laboratory, radiology, and consult data between EHRs.
- Exceeded a 97% success rate for the transfer of laboratory, radiology, and consult data between the DoD and VA EHRs.[7]
- Enhanced many of the IM/IT capabilities beyond what was initially documented in the BRDs.
- Instituted a Service Oriented Architecture (SOA) that uses distinct pieces of software to provide application functionality as services to other applications.
- Implemented a Demilitarized Zone (DMZ) architecture that maintains a clear separation of DoD/DoN and VA networks, as required by the current policy environment.
- Employed an Application Virtualized Hosting Environment (AVHE) that enables personnel on one agency's network to access and utilize applications on the other agency's network.
- Enabled VA and DoD intranet sites and technologies necessary for daily clinical and business workflows to accept either VA Personal Identity Verification (PIV) Cards or DoD Common Access Card (CAC) Card certificates.
- Established email forwarding to help personnel manage dual email accounts.
- Documented key lessons learned for future joint DoD/VA sites.

The JAL FHCC demonstration project and the IM/IT investments required to support operations were faced with the added challenge of achieving interoperability within an episode of care rather than between episodes of care. As an example, the ORP capability for laboratory had to exchange data between the DoD and VA EHRs in a synchronous, real-time fashion so that a DoD patient's lab order placed in CHCS/AHLTA was received by the laboratory using VistA/CPRS before the patient arrived at the VistA-based lab. This real-time nature adds a level of complexity and required expediency beyond the push of information from one EHR to the other, such as the push of radiology images used by the Wounded Warrior Image Transfer system when a DoD patient is transferred to a VA Polytrauma Center.

Figure 1 shows that the JIF-funded IM/IT investments serve as foundational pieces for achieving interagency data sharing, agency-wide interoperability initiatives, the envisioned JAL FHCC benefits, and complete FHCC consolidation. Figure 1 also depicts that data sharing, from an IM/IT perspective, is the core benefit to be achieved if all other benefits are to succeed with the common services IM/IT model. Therefore, improved efficiency, improved cost effectiveness, improved access, increased satisfaction, and maintained operational readiness are all dependent on effective data sharing at JAL FHCC. Additionally, with the DoD and VA's agency-level decision to move forward with separate EHRs rather than a jointly developed iEHR, the IM/IT investments implemented at JAL FHCC serve as a critical demonstration of potential interoperability tools to achieve an integrated, interoperable health record for service members and veterans, as well as foundational tools for supporting consolidated health centers. As a result, the JIF-funded demonstration of real-time interoperability has been achieved from a functional perspective.

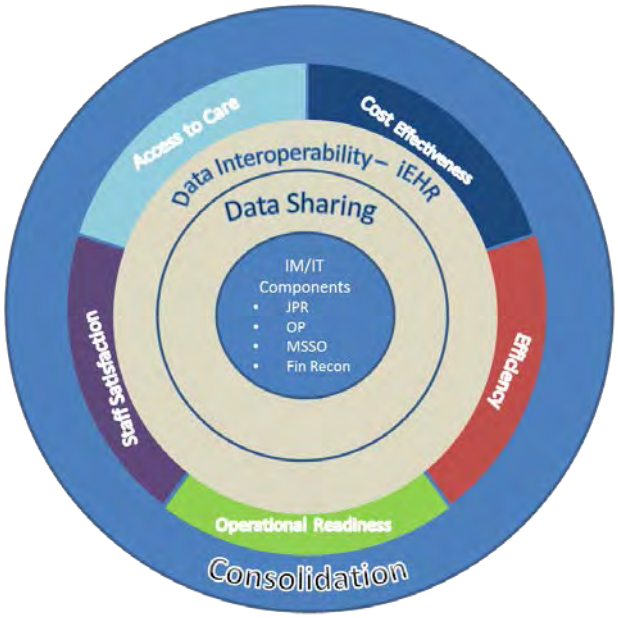


Figure 1: JAL FHCC Data Sharing Model

In terms of optimal integration and consolidation, the demonstration has not shown evidence of efficient or cost effective operations on a consistent basis. As explored in the sections below, there are still challenges and consequences of the IM/IT investments and overall IM/IT model implemented at JAL FHCC. However, the demonstration has broken barriers from an IM/IT perspective and provides a critical lens into the complexities associated with achieving interoperability and supporting consolidated/integrated operations.

1.4.2 Given Constraints, JIF-Funded IM/IT Capabilities Were Strategically Selected to Support JAL FHCC Integrated Operations

Considerable research and strategy went into the selection of the IM/IT common services model and the associated JIF-funded capabilities to support JAL FHCC integrated operations. According to the DoD and VA IM/IT development teams, leadership decisions dictated that the underlying DoD and VA EHRs could not be altered for JAL FHCC. DoD and VA leadership determined that enhancements to the legacy EHRs would require agency-wide input and national IM/IT updates that would not be cost effective for a single demonstration project. The *JAL FHCC Executive Agreement* also states, "All applications, systems, and associated networks will be maintained and funded by the respective Department." Therefore, JAL FHCC planners selected an IM/IT common services model that employed interoperable and integrated IM/IT solutions in place of a single EHR.

Once the IM/IT common services model was selected, specific capabilities were identified that would ensure each agency's mission-specific care model and reporting requirements could be maintained while also potentially reducing costs by leveraging consolidated ancillary and diagnostic services (laboratory, radiology, and pharmacy), along with consolidated inpatient and specialty care.

Both the DoD and VA employ care models that place an emphasis on primary care. The DoD Military Health System (MHS) uses the Patient Centered Medical Home (PCMH) model. Per the *Military Health System Patient Centered Medical Home Guide*, the PCMH model "…is based on the concept that the best healthcare has a strong primary care (PC) foundation with quality and resource efficiency incentives…A PCMH practice is responsible for all of a patient's healthcare needs and for coordinating/integrating specialty healthcare and other professional services."[8]

Similarly, the VA utilizes the Patient Aligned Care Team (PACT) care model. On the PACT website, the VA states that "The PACT model is built on the well-known concept of the patient centered medical home staffed by high-functioning teams."[9]

With both the DoD's and VA's focus on primary care, JAL FHCC planners sought to implement IM/IT capabilities that would allow primary care providers to work in the manner that they would at a non-integrated facility, focusing on IM/IT solutions that enable primary care providers to coordinate care by requesting ancillary, diagnostic, and specialty care services from a single EHR – the patient's native EHR.

As shown in Figure 2, primary care at JAL FHCC is administered separately for DoD and VA beneficiaries. A DoD beneficiary visits his/her DoD primary care provider and care is documented in the DoD's EHR (CHCS/AHLTA). Whereas, a VA beneficiary visits his/her VA primary care provider and care is documented in the VA's EHR (VistA/CPRS). The integration of clinical services almost entirely occurs when a laboratory test, radiology image, specialty consult, emergency department visit, or inpatient stay is invoked and utilized.

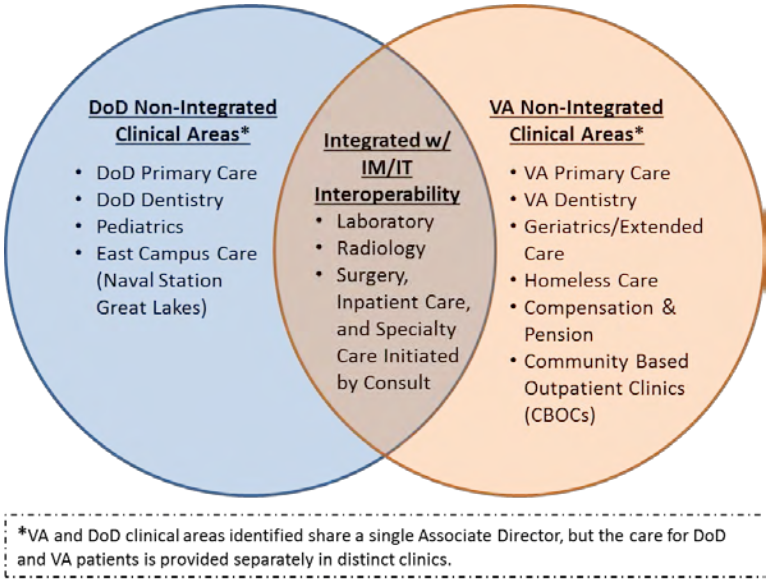


Figure 2: JAL FHCC DoD/VA Integration Supported by Interoperability

The *National Defense Authorization Act for Fiscal Year 2014 (NDAA for FY 2014)* defines ***interoperable*** as "…the ability of different electronic health records system or software to meaningfully exchange information in real time and provide useful results to one or more systems." The *NDAA for FY 2014* defines ***integrated*** as "…the integration of health data from the Department of Defense and the Department of Veterans Affairs and outside providers to provide clinicians with a comprehensive medical record that allows data existing on disparate systems to be shared or accessed across functional or system boundaries in order to make the most informed decisions when treating patients."[10] The JIF-funded IM/IT capabilities provided both interoperable and integrated solutions designed to enable primary care providers to coordinate care from a single EHR in the following manner:

- **Joint Patient Registration (JPRS)** is an enabler of integrated and interoperable IM/IT capabilities. JPRS ensures that JAL FHCC patients have a record in both the DoD's EHR (CHCS/AHLTA) and the VA's EHR (VistA/CPRS), and ensures that those records are correlated (i.e., linked). Because some JAL FHCC services are provided to patients via CHCS/AHLTA and others are provided via VistA/CPRS, JPRS is necessary for patients to receive all available care at JAL FHCC. JPRS is also the IM/IT anchor that enables all other JIF-funded IM/IT capabilities.

- **Medical Single Sign-on with Context Management (MSSO/CM)** is an integrated IM/IT capability. The MSSO component allows primary care providers (along with other clinicians, clinical support personnel, and administrative personnel) one-step access to both the DoD and VA EHRs with a single log-on. The CM component allows the primary care provider to utilize the correlation established in JPRS by toggling between the patient's DoD and VA records. Thus,

although the data must, in many cases, be accessed by toggling between EHRs rather than shown in one unified view, MSSO/CM enables primary care providers and other JAL FHCC personnel to view a patient's complete electronic health record.

- **Orders Portability (ORP)** is an interoperable IM/IT capability. ORP allows primary care providers (along with other clinicians) to place orders for laboratory, radiology, and consults in either agency's EHR so that they can manage, view, and (to some extent) modify orders regardless of the EHR used or type of beneficiary accessed. For example, if an order is placed in the DoD's EHR (CHCS/AHLTA), it is instantly duplicated in the VA's EHR (VistA/CPRS). The order can then be processed in VistA/CPRS, producing results in VistA/CPRS that are instantly duplicated in CHCS/AHLTA. This capability was also intended for pharmacy use, but has been deferred due to various concerns. ORP is critical to primary care providers' ability to coordinate care (and thus critical to the DoD and VA care models) because it allows primary care providers to send their patients for specific types of services.

- **Financial Reconciliation** is an integrated IM/IT capability. Financial Reconciliation enables data from DoD and VA data sources to be aggregated and analyzed to determine each agency's JAL FHCC resource consumption and necessary resource contributions for continued financing of the integrated center. The Financial Reconciliation IM/IT capability impacts primary care providers' coordination of care by removing the process of inter-agency billing and payments and instead uses workload and patient information to calculate each agency's share of JAL FHCC costs annually.

The JIF-funded integrated and interoperable IM/IT capabilities were strategically selected to support JAL FHCC integrated operations, while preserving each agency's unique care model. The capabilities were developed and implemented per specified requirements. Additionally, the DoD and VA IM/IT development teams (overseen by the DoD/VA IPO) implemented further enhancements and capabilities beyond those specified in the initial requirements to address JAL FHCC personnel needs. There remain, however, challenges with the IM/IT common services model and the associated JIF-funded IM/IT capabilities.

1.4.3 Five of Seven JIF-Funded IM/IT Capabilities are Fully Operational, Functioning as Designed, and Have Seen Consistent Improvements

With the exception of the pharmacy ORP capability and the Financial Reconciliation web tool, the JIF-funded IM/IT capabilities are functioning as designed and have seen consistent improvements since initial deployment.

The Health Executive Committee (HEC) initially approved $11.772M of JIF funding in FY 2008 to develop business requirements for essential JAL FHCC IM/IT capabilities. The HEC then approved $100.02M in FY 2009, contributed to equally by the DoD and VA, for the development and implementation of the IM/IT capabilities. When looked at solely from a functionality perspective, without including impacts from the network infrastructure, JPRS, MSSO/CM, and ORP for laboratory, radiology, and consults were designed to the requirements and are fully operational.

1.4.3.1 JPRS

Issues experienced by JPRS are largely due to lack of adherence to procedures when JAL FHCC personnel are registering patients. When a patient is not joint registered, the CM and ORP capabilities cannot work for that patient and a system error is generated. JAL FHCC has engaged a Business Process Reengineering (BPR) team that has helped enhance the Joint Patient Registration (JPR) processes so that patients are consistently joint registered.

1.4.3.2 MSSO/CM

MSSO/CM was implemented as designed and is fully operational. In interviews conducted by the PE Team during JAL FHCC site visits, the CM component of MSSO/CM received the least favorable feedback from JAL FHCC end-users. When asked to rate overall satisfaction for the JIF-funded IM/IT

capabilities, only 30% of respondents were satisfied/very satisfied with the CM component. Whereas, at least 66% of respondents (minimum of nine respondents) were satisfied or very satisfied with the other JIF-funded IM/IT capabilities, as shown in Figure 3.

The dissatisfaction with CM is largely due to incompatibility with the Citrix-based AVHE, which causes instability and difficulty reconnecting to AVHE when CM is enabled.[11] In June 2014, the Defense Health Agency (DHA) AVHE Team worked with Citrix System, Inc. and Harris Corporation (the vendor for one of JAL FHCC's MSSO/CM solutions) to implement a "hotfix" for the AVHE's Citrix client. The DHA AVHE Team and JAL FHCC IM/IT development teams note that the fix, along with the installation of a new Citrix receiver on JAL FHCC workstations, has fixed the compatibility issue. The PE Team, however, was unable to verify improvements in CM stability with end-users or through quantitative data.[12]

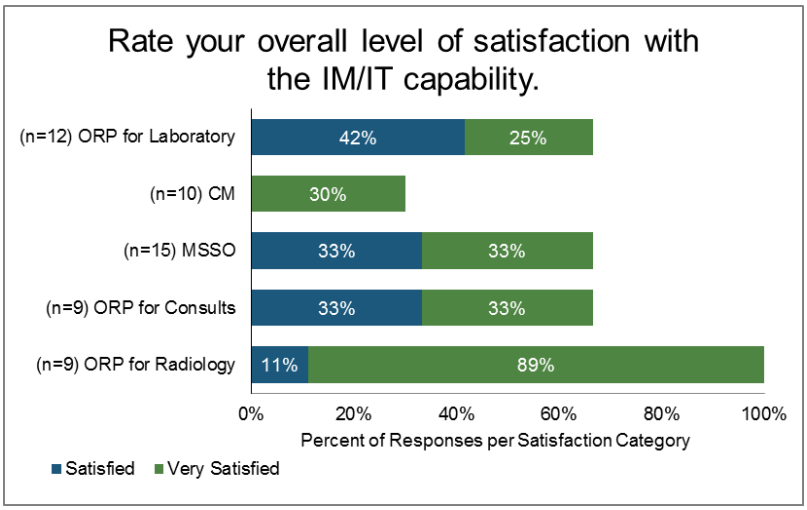


Figure 3: Favorable Responses per JIF-Funded IM/IT Capability

1.4.3.3 ORP

ORP for laboratory, radiology, and consults are fully operational and, as noted above, are routinely achieving transactional success at or above 97%.[13] Transactional ORP failures are primarily due to a lack of adherence to joint patient registration procedures. Most frequently, a patient is not joint registered, causing ORP to fail because the patient's DoD and VA electronic records are not linked.

Although a small percentage of failures do occur, unfavorable end-user perceptions regarding ORP are almost entirely due to latency (i.e., lengthy interagency transaction times). Personnel interviewed by the PE Team provided favorable satisfaction ratings for the ORP capabilities when they do not experience latency. As shown in Figure 3 above, at least 66% of personnel interviewed are satisfied or very satisfied with ORP solutions. JAL FHCC personnel also stated that the ORP capabilities have improved since their initial implementation. ORP for radiology received the most favorable feedback from end-users. The favorable radiology ORP feedback is largely because of the limited impact latency has on radiology workflows. The volume of radiology orders is smaller than those for laboratory and consults, and there is often a less immediate need for radiology reports–especially since providers can often view radiology images directly through other methods.

The pharmacy ORP solution was deferred for multiple reasons. The IOM's 2012 report, entitled *Evaluation of the Lovell Federal Health Care Center Merger: Findings, Conclusions, and Recommendations*, cited patient safety concerns primarily associated with drug interactions as the reason for the deferral of the pharmacy ORP solution.[14] Pharmacy personnel also informed the PE Team that an ORP solution for pharmacy was not a sufficient interoperability solution without changes to each agency's medication formularies. As an example, a DoD patient may have previously been prescribed a medication at a prior Military Treatment Facility (MTF). Unless that medication is on the VA's formulary, that drug cannot be ordered for the DoD patient using VistA/CPRS. Currently, JAL FHCC's pharmacy solution is to place all outpatient medication orders using the patient's native EHR.

1.4.3.4 Financial Reconciliation

The Financial Reconciliation web tool was not operational when observed by the PE Team. The primary end-user of the Financial Reconciliation web tool noted that the tool was initially operational but experienced issues once transitioned from the IM/IT development team to the IM/IT sustainment team. The primary end-user of the Financial Reconciliation web tool stated that when the web tool was operational, the tool reduced the time required to perform monthly reconciliation processes from one week down to one day. The primary end-user of the Financial Reconciliation web tool is currently working with the IM/IT Sustainment Team and JAL FHCC IM/IT support personnel to remedy the issues.

1.4.4 Policy Constraints are Limiting IM/IT's Ability to Fully Enable JAL FHCC Benefits

While improved interagency data sharing has been achieved, the remaining five benefits enumerated in the *JAL FHCC Executive Agreement* and evaluated by the PE Team have either been partially enabled or not enabled by the JIF-funded IM/IT investments. The main barrier to IM/IT's enablement of JAL FHCC benefits is a result of difficult to enact but straightforward policy decisions.

From an IM/IT perspective, the primary policy decision impacting JAL FHCC personnel is the required preservation of separate networks and separate network security policies

From an IM/IT perspective, the primary policy decision impacting JAL FHCC personnel is the required preservation of separate networks and separate network security policies. The network security policies set forth by the DoN, DoD, and VA and enumerated in the *JAL FHCC Executive Agreement* have led to a network infrastructure characterized by the following at JAL FHCC:

- Personnel who work on the JAL FHCC West Campus cannot directly access clinical and business systems hosted on the East Campus' DoN network.
- Personnel who work on the JAL FHCC East Campus cannot directly access clinical and business systems hosted on the West Campus' VA network.
- Personnel are required to use AVHE (a Citrix-based environment) tools hosted on an intermediate Military Health System (MHS)/DHA network to access clinical and business systems located on the alternate campus' network.
- Interoperable electronic transactions (primarily laboratory, radiology, and consult orders) have to traverse the DoD/DoN and VA networks, which add latency to interagency workflow.

Throughout PE's interviews with JAL FHCC end-users and facility and IM/IT leadership, the two major frustrations expressed were difficulty accessing the IM/IT tools personnel need for their daily workflow and the latency associated with electronic interagency transactions.

1.4.4.1 Policy Constraints Impact to Accessing IM/IT Tools

Although some of the IM/IT access issues can be attributed to poor username and password management by end-users, the access issues are largely driven by policy stipulations that require separation of the DoD and VA networks. This stipulation has led to the use of a Citrix-based AVHE.[15] While virtualization has been proven effective in the private and government sector, JAL FHCC has experienced significant AVHE difficulties in the form of instability (e.g., the inability to login, unintended disconnections) and latency (e.g., lengthy processing times). For clinicians, this translates to difficulty accessing the EHRs they need to provide care to patients. For administrative personnel, this translates to difficulty accessing basic business tools needed to manage a joint facility, such as SharePoint and workload data. For all personnel, this translates to added burden executing the joint facility mission and the missions of the respective agencies.

Throughout PE's interviews with JAL FHCC end-users and facility and IM/IT leadership, the two major frustrations expressed were difficulty accessing the IM/IT tools personnel need for their daily workflow and latency associated with electronic interagency transactions.

Difficulty accessing IM/IT tools is most prevalent for JAL FHCC personnel serving DoD patients on the West Campus. The IM/IT systems on the JAL FHCC West Campus are hosted on the VA's network. Therefore, the only way for West Campus personnel to access DoD IM/IT systems/tools is through the AVHE. Among West Campus personnel serving DoD patients, the biggest impact is to DoD primary care providers. DoD primary care providers document in the DoD's EHR (CHCS/AHLTA). Therefore, DoD primary care providers' workflow is almost entirely predicated on having access to CHCS/AHLTA.

A considerable factor in AVHE's performance is incompatibility with one of JAL FHCC's MSSO/CM solutions: the CareFX solution, provided by Harris Corporation. CareFX is the MSSO/CM solution procured by the DoD IM/IT development team for installation on DoD workstations at JAL FHCC. On the West Campus, DoD workstations are primarily used by DoD primary care providers. As described in the section above, JAL FHCC IM/IT support teams are working to ensure CareFX is fully compatible with the AVHE.

For providers who serve DoD patients but are based on VA workstations with the Sentillion MSSO/CM solution, the main challenge accessing IM/IT tools is experienced when prescribing a DoD patient medications in the DoD patient's CHCS/AHLTA-based record. The Sentillion MSSO/CM solution (owned by the vendor Caradigm) was procured by the VA IM/IT development team for VA workstations at JAL FHCC. Inpatient, emergency department (ED), and (with limited exceptions) specialty care providers are all based on VA workstations and work primarily in VistA/CPRS. When serving VA patients, these care providers experience no difficulty accessing their requisite IM/IT tools because they are hosted on the VA network and, therefore, the providers have native access to the tools without utilizing the AVHE. It is only when these care providers are serving DoD patients that the providers may have to access CHCS/AHLTA through AVHE. Even though Sentillion has not experienced the AVHE compatibility issue presented by CareFX, care providers note that accessing AVHE and toggling to another system to place medication orders is an additional workflow step that makes it more cumbersome to provide care.

It should be noted, however, that care providers who serve DoD patients but are based on VA workstations believe that the ability to toggle between EHRs and view a DoD patient's complete CHCS/AHLTA record for reference purposes is superior to utilizing Remote Data Viewer (RDV) solutions, such as the Bidirectional Health Information Exchange (BHIE) viewer and VistAWeb.

Care providers who serve DoD patients on the East Campus experience fewer challenges accessing IM/IT tools necessary for their daily workflow, as the East Campus is hosted on the DoN network and enables native access to the DoD EHR. However, because JAL FHCC leadership is primarily located on the West Campus, many administrative and communication tools (e.g., SharePoint) still require a form of remote access.

Finally, as noted above, there is no difficulty accessing IM/IT tools for JAL FHCC personnel serving VA patients on the West Campus. And, with very few exceptions, all VA patient care is provided on the West Campus. Because the West Campus is hosted on the VA network, JAL FHCC West Campus personnel have direct access to the IM/IT systems they need to provide care–and it is essentially like working in any non-integrated VAMC.

1.4.4.2 Policy Constraints' Impact to Latency

Orders Portability for laboratory, radiology, and consults is routinely achieving transactional success rates above 97%; however, average transaction times for orders originating in the DoD EHR and porting to the VA EHR can experience significant latency. According to the lead VA Program Manager for the DoD/VA IM/IT Development Team, average interagency transaction times at JAL FHCC are two (2) minutes. The VA Program Manager also noted, however, that interagency transaction times can exceed five (5) hours. Interviews with JAL FHCC personnel indicate that lengthy interagency transaction times are a near daily occurrence during peak facility hours.[16]

Although more than 97% of transactions are successfully porting from one EHR to the other, the time it takes for the transaction to successfully occur often causes manual work for ancillary and diagnostic

support personnel (primarily laboratory personnel) and has also led to a lack of trust amongst care providers.

The PE Team was unable to quantifiably pinpoint the source of latency in interagency electronic transactions; however, available network reports and discussions with IM/IT experts indicate that the latency stems from the use of multiple networks, mapping services, ESBs, virtual gateways, and firewalls. JAL FHCC has initiated the process of procuring network diagnostic tools that can trace a transaction from beginning to end and pinpoint the source of latency issues. However, at this time, the PE Team and JAL FHCC IM/IT personnel are only able to view the performance of individual networks in place at JAL FHCC. Network reports show that JAL FHCC is not experiencing capacity or latency issues within an individual network. Therefore, latency is introduced when a transaction traverses from one agency's EHR to the other.

The use of multiple networks, mapping services, ESBs, virtual gateways, and firewalls is policy driven. Starting with the network, the DoD and VA were unwilling to trust one another's network or security protocols, necessitating firewalls and virtual gateways/virtualized environments. Similarly, a singular ESB could support interagency transactions at JAL FHCC. However, differences in network protocols as well as difficulties with interagency contracting resulted in the implementation of two ESBs that contributed an additional step in interagency transactions.

Table 1 summarizes the impact of the above-mentioned policy constraints on the JAL FHCC benefits as evaluated by the PE Team. The key for Table 1 is shown immediately below, and Table 1 is found on the following page.

Table 1: Key	
Symbol	**Meaning**
+	The IM/IT capability is enabling the benefit, even if challenges exist
+/-	The IM/IT capability is partially enabling the benefit
-	The IM/IT capability is not enabling the benefit
N/A	The IM/IT capability is not applicable to the benefit

Table 1: Summary of JIF-Funded IM/IT Capabilities' Enablement of Benefits

IM/IT Tool	Benefit 1 Data Share	Benefit 2 Efficiency	Benefit 3 Cost	Benefit 4 Access	Benefit 5 Readiness	Benefit 6 Satisfaction	Remaining Challenges and Unintended Consequences
JPRS	+	+	+	+/-	+	+	Continued issues with system responsiveness.
							Continued issues with data standardization, terminology, and mapping.
							Dependent on DEERS and VA MPI systems
							JPRS process is not always followed; any patient not joint registered impacts downstream workflow and effectiveness of all other JIF-funded capabilities.
MSSO/CM	+	+/-	+/-	+/-	+/-	+/-	Lacking quantitative system performance data to fully assess MSSO/CM performance.
							CareFx CM tool contributed to latency and instability associated with AVHE.
							Dependent on JPRS to create patient identifiers – does not have an effective way to alert end-user if CM is broken due to lack of correlated patient files.
							Dependent on end-users' maintenance of user credentials at the individual application level, which have different policies and password reset timeframes.
ORP for Laboratory, Radiology, and Consults	+	+/-	+/-	+/-	+/-	+/-	Rad - Data transaction success rate is above 97%, yet not 100%. May lead to incomplete record risks. Volume is manageable compared to consult and lab volumes.
							Lab - Data transaction success rate is above 97%, yet not 100%. May lead to risks of incomplete records. Volume of errors is high /unsustainable.
							Lab - Transaction success rate may be acceptable but latency of transactions does not support needs of synchronous data transactions to support clinical/patient workflow, leading to customer dissatisfaction and risks of patient care inconsistencies.
							Consults - Data transaction success rate is above 97%, yet not 100%. May lead to risks of incomplete records. Volume of errors needs to be assessed as whether this error rate is manageable.
							Consults - Initial and follow-up result notes are returned to the native EHR if protocols are adhered to. A risk of incomplete patient records exists if scheduling and clinical personnel do not adhere to protocols.
							Manual workarounds, including toggling between EHRs used to alleviate ORP errors and latency.
							Two additional FTEEs required in lab due to lab ORP errors/latency.
ORP Pharm	-	-	-	-	+	-	Deferred due to patient safety concerns.
							Lack of ORP solution contributed to five additional FTEE required in pharmacy.
Financial Recon	+/-	+/-	+/-	N/A	N/A	+/-	Further assessment is needed to determine ORP impact on Financial Reconciliation data validity.
							Web based tool not fully functional as of the issuance of this report.
							Significant challenges integrating and normalizing DoD /VA administrative data.

1.4.5 Unintended Consequences

The JAL FHCC demonstration has shown that an integrated health care center that utilizes multiple networks and multiple EHRs will place greater burden on facility-level personnel in terms of IM/IT sustainment, business operations, and care delivery. Key unintended consequence of the JAL FHCC IM/IT common services model are the potential for incomplete patient records (almost entirely for DoD beneficiaries), workflow inefficiencies when administering patient care, and difficulty managing an integrated health care center.

1.4.5.1 Incomplete Patient Records

An unintended consequence of the IM/IT common services model selected for JAL FHCC is that interoperability requirements were not generated for all types of patient encounters; therefore, not all patient data generated at JAL FHCC is transported from one EHR to the other. This has resulted in some patient information being contained in the VA EHR (VistA/CPRS), while other patient information is contained in the DoD EHR (CHCS/AHLTA).

Because a patient's record is correlated through JPRS, providers within JAL FHCC can toggle between a patient's VistA/CPRS and CHCS/AHLTA records. Toggling can be more cumbersome than an integrated presentation of data or than having all data transport from one EHR to the other. However, JAL FHCC providers are able to view a patient's complete electronic health record by accessing each agency's EHR.

The primary concern for incomplete patient records arises when a patient leaves JAL FHCC and goes to another treatment facility (where full access to both the DoD and VA EHRs is not available). Because of JAL FHCC's clinical integration, this unintended consequence almost solely impacts DoD beneficiaries.

As shown in Figure 4 below, the instances where DoD beneficiaries receive care from clinics that use the VA EHR and data generated from that care does not transport back into the DoD EHR are as follows:

1. Emergency department (ED) visits
2. Care that requires pharmaceutical prescriptions
3. Inpatient care and surgery/specialty care not initiated by a consult

Figure 4: JAL FHCC DoD/VA Integration Supported/Unsupported by Interoperability

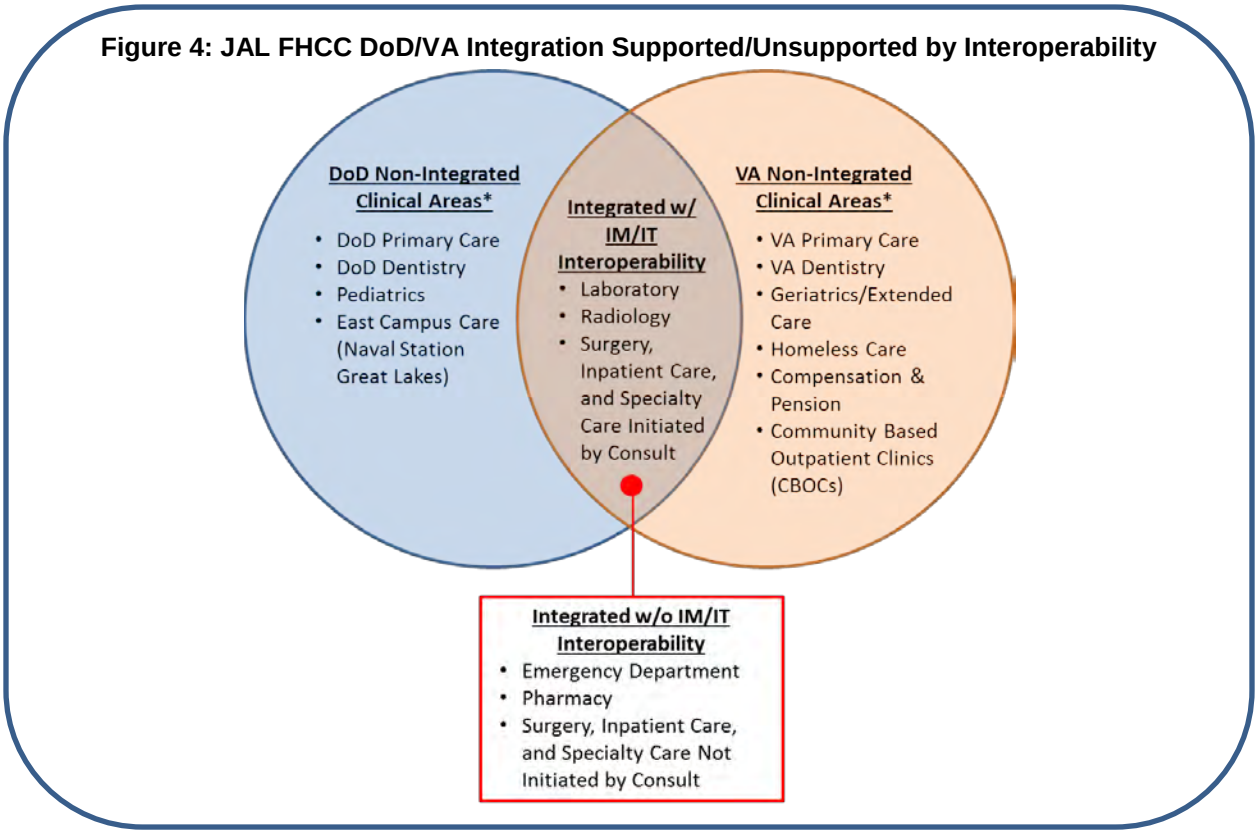


Figure 4 also shows that pharmacy is not supported by IM/IT interoperability. JAL FHCC's interim solution is to order outpatient medications in the patient's native EHR. This ensures that the pharmacy component of a patient's electronic health record is complete. Inpatient care is an exception, where inpatient providers can order patients' prescriptions through VistA/CPRS regardless of the beneficiary's native EHR. However, upon discharge, inpatient providers must order medications using the patient's native EHR.

The JAL FHCC ED uses VistA/CPRS as its EHR. Providers in the ED do not document in CHCS/AHLTA. Additionally, an ED visit is just that – an emergency. Therefore, it is not initiated by a consult and, thus, not supported by interoperability. Also, ED patients can, at times, be transferred to an inpatient ward. All of the inpatient wards at JAL FHCC use the VA's EHR (VistA/CPRS). Therefore, neither the ED visit nor the resultant inpatient stay would be captured in the DoD's EHR (CHCS/AHLTA).

Similarly, all surgery and the majority of specialty care clinics use VistA/CPRS as their EHR. Surgery and specialty care is almost always initiated by a consult and, therefore, supported by interoperability. JAL FHCC planners took careful consideration to transport both the initial consult order and all associated result notes between the two EHRs. As long as certain protocols are followed, surgery and specialty care result notes should be contained in both EHRs.

At times, however, a follow-up surgical or specialty care visit could be scheduled without following protocols to associate that visit with an initial consult. Additionally, the consulting provider could document notes in progress notes rather than the specific consult notes section that is compatible with the ORP capability. Following protocols is incumbent on the scheduler and consulting provider. Nonetheless, because all surgery and specialty care clinics at JAL FHCC use VistA/CPRS, while other clinics use CHCS/AHLTA, there is still the potential for incomplete patient records once the patient leaves JAL FHCC.

Again, because of JAL FHCC's clinical integration, this unintended consequence almost solely impacts DoD beneficiaries. To avoid this unintended consequence and maintain the completeness of DoD patients' CHCS/AHLTA records, DoD care providers, at times, copy and paste or transcribe key information from VistA/CPRS notes into CHCS/AHLTA notes.

1.4.5.2 Workflow Inefficiencies

JAL FHCC clinical and business operations are not as efficient as independent DoD and VA facility operations. In this IM/IT assessment, the majority of inefficiencies identified relate to system/network issues that introduce access challenges and latency.

Clinical providers from the DoD and VA who care for DoD patients experienced the greatest impacts to efficiency. These clinicians routinely stated they have developed work-arounds to accommodate access and latency issues that impact their workflow. Clinical providers indicated that when the system is working well, they appreciate the efficiencies afforded to them by the JIF-funded capabilities; however, they describe the systems as "consistently inconsistent" resulting in the regular instances where additional time is needed to support the EHR documentation/reference components of care delivery.

Clinical providers identify AVHE access and overall IM/IT latency as reasons the JIF-funded capabilities do not always work. Both items contribute to a lack of confidence (amongst clinical providers) that all requisite data has been ported from one EHR into the other. Therefore, clinical providers often toggle between EHRs to obtain the information they need. Of the JAL FHCC personnel interviewed, 50% indicated they toggle (an extra step) between CHCS/AHLTA and VistA/CPRS 81-100% of the time when reviewing patient data.

Ancillary service personnel, specifically personnel in the laboratory and pharmacy, also experience access and latency issues when processing DoD patient orders. Personnel in the main JAL FHCC laboratory are intended to use only VistA. They account for inefficiencies in laboratory ORP through work-arounds. End of Day (EOD) Reports that are generated to assess network/system functionality indicate

success rates consistently above 97% for orders porting from one EHR to the other. However, these reports do not reflect the time it takes a lab order to port over from CHCS/AHLTA to VistA/CPRS (and vice versa), which often necessitates manual intervention.

As noted above, lengthy interagency transaction times can impact workflows on a near daily basis. Information from interviews with laboratory personnel indicates that sometimes the DoD patient reaches the laboratory before the order does. This has resulted in the laboratory having both CHCS/AHLTA and VistA open at the lab reception area so that if a patient arrives, and there is no order in VistA, the lab technician can see if there is an order in CHCS/AHLTA. If so, the lab order is manually entered/ordered in VistA at that time; this also results in a manual entry for that lab result.

If all connections are working, ORP will synchronize the order, the accession, and the result automatically in both EHRs. If not, efficiency is lost as all results must be manually entered back into the CHCS/AHLTA system. The laboratory requires access to both EHRs and performs a series of manual entries between CHCS/AHLTA and VistA/CPRS when orders do not port over in a timely fashion. This has resulted in the need for two additional Full Time Employee Equivalents (FTEEs) at a cost of approximately $100,000 per year.

Pharmacy personnel also intended to use VistA as their primary EHR system; however, the lack of an ORP solution for pharmacy resulted in the current solution to order outpatient medications only in the patient's native EHR, the pharmacy having to use both EHRs, and a number of manual work-arounds that are partially responsible for the need to hire five additional pharmacists at a cost estimated at $1 million per year.[17]

1.4.5.3 Difficulty Managing an Integrated Health Care Center

The use of separate networks and separate EHRs with different reporting and data standards has made it difficult for the single leadership group to manage JAL FHCC operations.

One key managerial difficulty is communication and collaboration. Communicating with all JAL FHCC personnel can be a challenge because SharePoint is hosted on the VA's network, requiring East Campus personnel to access SharePoint through virtualized tools. Although JAL FHCC IM/IT personnel have implemented many solutions to alleviate communication challenges (such as email forwarding, all-hands meetings, and better control over mail groups), challenges still persist that are not present in a non-integrated facility.

Another key challenge is integrating DoD and VA administrative data. DoD and VA have separate data standards for workload capture and patient categories. This makes it challenging to run facility-wide reports that provide actionable information. At the agency level, DoD and VA can sporadically update accounting policies or reporting standards that impact algorithms and processes used to integrated the JAL FHCC administrative data. Additionally, the ORP solution may be causing overstated workload values because of the transactional structure.

1.5 Key Considerations for Future Joint DoD/VA Facilities

An April 2013 *Review and Analysis of VA/DoD Joint Medical Facilities, including Ord Military Community and Fort Benning*, identified that there are five levels of DoD/VA collaboration:[18]

1. Separate facilities without sharing of services
2. Separate facilities with sharing of services
3. Co-occupancy with sharing of ancillary support
4. Co-occupancy with sharing of ancillary support and inpatient and/or specialty care
5. Fully integrated care (i.e., Federal health facility)

For each of these options, the supporting IM/IT model must be selected. An ideal IM/IT model for levels 2-5 would be a single EHR, complete with modules and reporting capabilities to meet DoD and VA requirements. Alternative IM/IT models each involve some level of interoperability and integration of separate EHRs.

DoD and VA leaders selected a common services IM/IT model for JAL FHCC that employed both interoperability and integration solutions in place of a single EHR. After initial alternatives were analyzed for JAL FHCC, it was determined that retaining separate EHRs was the most cost effective way to ensure DoD/DoN operational readiness requirements could be maintained.[19]

Because the DoD and VA have stopped efforts to develop an iEHR, JAL FHCC serves as a critical example of the IM/IT achievements, issues, and constraints encountered at a full-scale integrated medical center. If the IM/IT common services model is replicated, JAL FHCC demonstrates that network trust is essential to efficient operations. Until interoperability solutions are in place that can effectively transport all information from one agency's EHR to the other in a computable format, the two agencies should focus on improving interoperability solutions for ancillary/diagnostic services and making access to legacy EHRs faster and more seamless. DoD and VA should also consider daily data pushes that generate a CHCS/AHLTA encounter record every time a patient is admitted to a VA medical facility and vice versa.

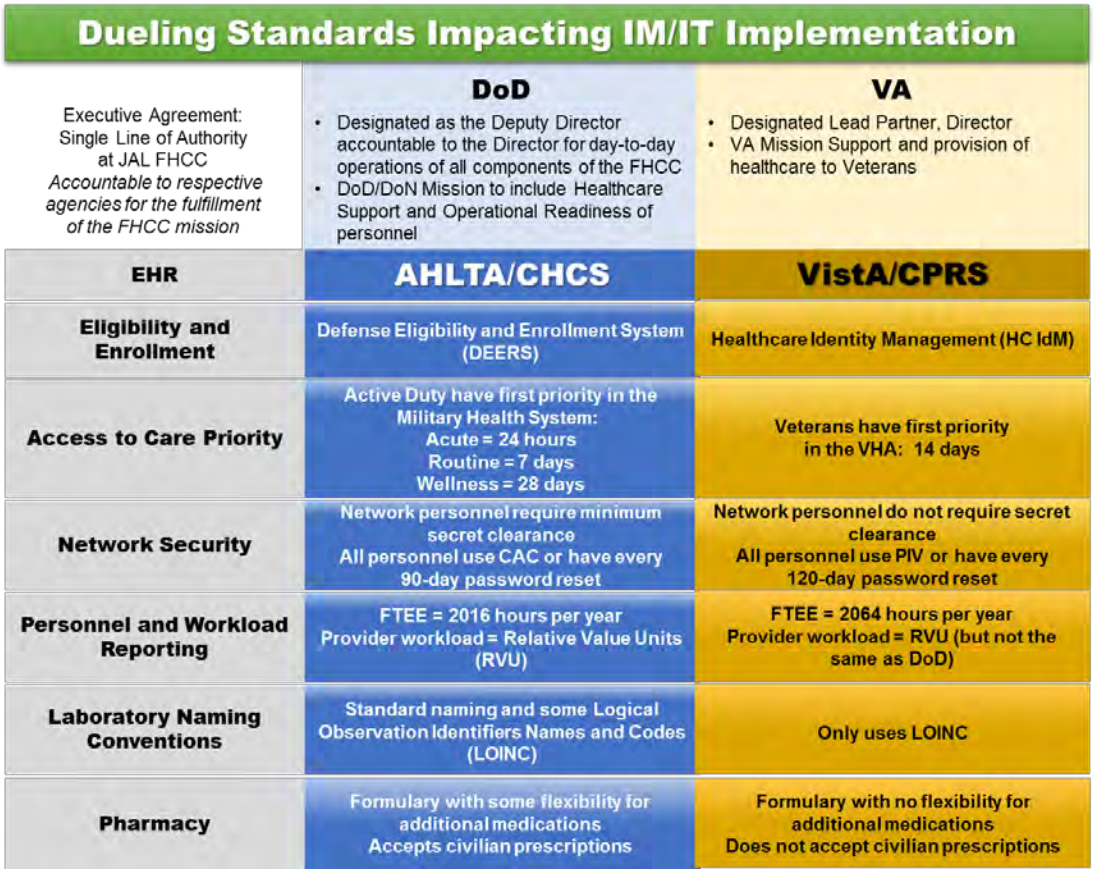
One alternative IM/IT model for future joint DoD/VA facilities is to adopt one of the agency's EHRs and enhance that EHR to meet the needs of the other agency. As an example, JAL FHCC could have adopted VistA/CPRS for both the East and West Campus.[20] JAL FHCC could have then utilized one network and removed performance issues and environmental complexity associated with multiple networks and Active Directory domains administered by separate agencies. JAL FHCC also would have been able to forego Joint Patient Registration, Orders Portability, and Medical Single Sign-On with Context Management investments. However, the DoD and VA would have had to invest in updates to VistA/CPRS to enable the system to meet all of DoD and DoN requirements. The primary investment would have been in the areas of operational readiness and pediatrics. Additionally, the DoD and VA would have had to allow updates to the VA medication formulary to allow for DoD medications to be ordered and administered through VistA/CPRS (or an alternative pharmacy solution would have had to be employed).

The alternative IM/IT model utilizing one of the agency's EHRs should be analyzed further. However, even if this alternative to the IM/IT common services model were to be employed, it is likely that personnel would still want access to the other agency's native EHR. JAL FHCC has shown that care providers want as much patient information as possible in a timely manner. Prior assessments conducted by the PE Team have shown that care providers do not fully trust legacy Remote Data Viewers (RDVs) intended to display the other agency's information, especially as it pertains to real-time information. At JAL FHCC, less than 1% of care providers use the Janus Joint Legacy Viewer (JLV) RDV.[21] Instead, care providers seek to directly refer to the patient's native EHR for information. Even with the new Orders Portability functionality present at JAL FHCC, care providers routinely reference the patient's native EHR to determine if additional, essential information is present.

Therefore, even if an alternative IM/IT model is selected whereby day-to-day operations are performed on a single EHR, it is likely that access to the other agency's native EHR for historical patient information

would still be essential. Under all present options, network security policies and faster, seamless access to both agencies' EHRs remain of utmost importance.

Figure 5: Policy Considerations for DoD/VA Integration



In addition to IM/IT-specific solutions, DoD and VA should consider streamlining policies and operational requirements to better integrate facility operations. The IM/IT investments made at JAL FHCC have been hampered by numerous IM/IT and non-IM/IT policies. Figure 5, above, is intended to depict a sampling of the areas in which the PE Team's IM/IT assessment identified policies that impact IM/IT integration.

1.6 Conclusion

Prior to embarking on the next integrated Federal Health Care Center, DoD and VA leaders must consider the accomplishments, remaining challenges, and lessons learned from the JAL FHCC demonstration project.

The DoD, DoN, and VA have realized considerable IM/IT achievements at JAL FHCC. There are few barriers remaining at JAL FHCC that, if removed, would greatly enhance IM/IT performance and, in turn, enhance IM/IT's ability to fully enable JAL FHCC benefits and national interoperability goals. Until interoperability solutions are in place that can effectively transport *all* information from one EHR to the other in a computable format, the two agencies should focus on improving existing interoperability solutions and making access to legacy EHRs faster and more seamless.

In the near term, IM/IT at JAL FHCC can be improved by concentrating on latency in Orders Portability, remediating data transaction bottlenecks, and improving virtualization environments. In the intermediate term, analyses should be conducted to determine if additional IM/IT investments are needed for clinically

integrated JAL FHCC services that are not currently supported by Orders Portability to ensure the beneficiary's medical record is complete. Also in the intermediate term, the potential for establishing a trusted network environment between the local JAL FHCC DoN and VA networks should be investigated. In the long term, policy decisions regarding network security, medication formularies, data standardization to support each agency's reporting needs, and enhancements to each agency's respective EHR will allow IM/IT to fully enable JAL FHCC benefits and national interoperability goals.

Because the DoD and VA have abandoned efforts to develop an integrated iEHR, JAL FHCC serves as a principle example of achievements, issues, and constraints encountered for interagency data sharing. The IM/IT achievements and constraints experienced at JAL FHCC provide critical information that will assist in planning decisions to select the appropriate IM/IT model to support future integrated DoD/VA facilities, joint ventures, and national interoperability initiatives. Prior to embarking on future integrated DoD/VA facilities, both departments should consider key achievements and constraints experienced at JAL FHCC.

1.7 Footnotes for the Summary of Evaluation Findings

1. A single line of authority refers to the establishment of a unified management structure with a single director as opposed to separate DoD and VA directors. All staff reports through a single management tree.
2. PE's Project Charter is available upon request from Jennifer.ford@va.gov or Gregory.prince@va.gov.
3. On August 10, 2009, a Memorandum from the Health Executive Committee (HEC) Financial Management Work Group authorized the funding of $100.02 million for JAL FHCC IM/IT capabilities. However, the total dollars contributed to IM/IT development, implementation, and maintenance/sustainment is unclear. The cost of IM/IT at JAL FHCC is explored further in section 7.3.3 of the report beginning on page 93.
4. Per the authorization granted in the *National Defense Authorization Act for Fiscal Year 2010* Sections 1701-1706, the Secretaries of the VA, DoD, and DoN executed an *Executive Agreement* in April 2010 for the standup and operation of JAL FHCC. JAL FHCC then commenced operations on October 1, 2010.
5. For the purposes of PE's IM/IT Evaluation, the *Executive Agreement* benefit to promote continued employee benefits will be referred to as "Improve Staff Satisfaction".
6. The *JAL FHCC Executive Agreement* also lists Improve Quality of Care as a benefit. The PE Team did not directly assess IM/IT's impact on quality of care, as this was determined to be overly clinical for an IM/IT assessment.
7. Per End of Day Report summary workbook provided by the DoD/VA IPO Development Team. The success rate is a binary transaction; whereby a success constitutes a transaction that was sent from one agency's Enterprise Service Bus (ESB) and received and acknowledged by the other agency's ESB. This data does not include order and results failures that do not reach the VA's ESB. The stated figure is calculated the number of passed orders as a percent of new orders and does not include ported results.
8. United States. Department of Defense. Tricare Management Activity. *Military Health System Patient Centered Medical Home Guide: June 2011.* June 2011. (Available at: http://www.tricare.mil/tma/ocmo/download/MHSPCMHGuide.pdf).
9. http://www.va.gov/health/services/primarycare/pact/index.asp
10. *National Defense Authorization Act for Fiscal Year 2014* (PL 113-66, Dec. 2013). Sec. 713. (Available at http://www.gpo.gov/fdsys/pkg/CPRT-113HPRT86280/pdf/CPRT-113HPRT86280.pdf).
11. Citrix Systems, Inc. is a Santa Clara, California-based software corporation specializing in cloud, networking, and virtualization technologies.
12. According to the lead DoD Program Manager for the DoD/VA IM/IT Development Team, preliminary reports from the MSSO/CM Operational Assessment conducted following the AVHE hotfix indicate that effectiveness and suitability for MSSO/CM are at 95.5% and 90.8%, respectively.
13. Please see Footnote #6 above.
14. Institute of Medicine of the National Academies, Board on the Health of Select Populations, Committee on Evaluation of the Lovell Federal Health Care Center Merger, *Evaluation of the Lovell Federal Health Care Center Merger: Findings, Conclusions, and Recommendations* (Washington, DC: National Academies Press, 2012), 76-77.
15. JAL FHCC has multiple virtualized environments hosted on multiple servers. At times, for simplicity, this Report refers to all of JAL FHCC's virtualized environments collectively as the Application Virtualized Hosting Environment (AVHE)..
16. Data was initially provided to PE displaying interagency transaction times initiated by the DoD ESB. This data, however, was later deemed to be inaccurate by JAL FHCC IM/IT Support personnel. No quantitative data was able to be provided to PE regarding interagency transaction times. According to JAL FHCC SMEs,

auto-generated alerts are available depicting hourly, daily, weekly, and monthly transaction times. DoD, VA, and JAL FHCC leadership should identify methods of capturing this alert data to routinely monitor interagency transaction times.

17. The figure of $1 million is derived from the IOM's *Evaluation of the Lovell Federal Health Care Center Merger: Findings, Conclusions, and Recommendations,* page 53 (also referenced in Footnote #13 above). Please see section 7.3 of this report (beginning on page 91) for additional information.
18. The *Review and Analysis* was submitted pursuant to House Appropriations Committee report (H. Rept 112-94) accompanying the *Military Construction, Veterans Affairs, and Related Agencies Appropriations Bill*, 2012 (Available at http://www.tricare.mil/DVPCO/reports.cfm).
19. According to the Department of Defense *Evaluation of the TRICARE Program: Fiscal Year 2013 Report to Congress* (Available at http://www.health.mil/Reference-Center/Reports), Readiness means ensuring that the total military force is medically ready to deploy and that the medical force is ready to deliver health care anytime, anywhere in support of the full range of military operations, including humanitarian missions.
20. The use of VistA/CPRS as the single EHR for JAL FHCC is presented as an example of adopting one of the agency's EHRs and enhancing that EHR to meet the needs of the other agency. The example of adopting the DoD's EHR is not directly presented, but it can also been a viable alternative.
21. The PE Team's prior JAL FHCC assessment of the Janus Joint Legacy Viewer is available upon request from Jennifer.ford@va.gov or Gregory.prince@va.gov .

2 SUMMARY OF STAKEHOLDER COMMENTS ON PE'S JAL FHCC IM/IT EVALUATION – INITIAL EVALUATION REPORT

2.1 Overview

PE received comments on Version 1.0 of this Report from the following stakeholder groups:

1. FHCC Advisory Board
2. JAL FHCC Site Leadership
3. HEC Health Architecture Review Board (HARB)
4. HEC Interagency Clinical Informatics Board (ICIB)
5. DoD Defense Health Agency (DHA)
6. DoD US Navy Bureau of Medicine and Surgery (BUMED)

In addition to the groups listed above, the following stakeholder groups provided feedback on PE's Summary of Evaluation Findings (pages 11 through 28 of this report), prior to Version 1.0:

7. DoD Defense Health Agency (DHA) Health Information Technology Directorate representatives
8. DoD Navy Medicine East (NME) representatives
9. DoD-led JAL FHCC IM/IT Development Team (now Defense Medical Information Exchange, DMIX) representatives
10. DoD Military Health System (MHS) Network Security Operations Center representatives
11. VA-led JAL FHCC IM/IT Development Team (VA Office of Information & Technology, OIT) representatives
12. JAL FHCC IM/IT Support Leadership (DoD and VA)
13. JAL FHCC Clinical Leadership (DoD and VA)

2.2 Summary of Stakeholder Comments and Updates

With the exception of JAL FHCC Site Leadership, all of the stakeholder groups who reviewed Version 1.0 of this Report concurred with PE's findings, recommendations, and the Report overall.

The FHCC Advisory Board was PE's primary stakeholder group, as the FHCC Advisory Board members served as PE's Project Charter signatories. The next page displays a cover letter from the FHCC Advisory Board acknowledging their concurrence with PE's Report.

JAL FHCC Site Leadership's non-concurrence with Version 1.0 of PE's Report was primarily due to statements about the Consults Orders Portability (ORP) capability.

JAL FHCC Site Leadership's non-concurrence was regarding an issue of fact, rather than messaging or analysis. The PE Team worked with JAL FHCC IM/IT representatives to gather additional documentation and information regarding the specific disputed Consults ORP capabilities. After further discussions and review, the PE Team agreed with JAL FHCC Site Leadership that specific information regarding Consults ORP capabilities were inaccurate.

PE subsequently submitted Version 1.1 of the Report, which primarily contained updated information regarding Consults ORP. The changes to Version 1.1, however, did not impact the overall findings, conclusions, and recommendations stated in Version 1.0 of the Report. Therefore, re-review of the Report was only requested from JAL FHCC Site Leadership.

After review of Version 1.1, JAL FHCC Site Leadership concurred with PE's Report.

This version of the Report (Version 2.0) solely contains updates to acknowledge formal concurrence of all stakeholder groups. Version 2.0 of this Report is considered Final.

2.3 Detailed Stakeholder Comments

Detailed stakeholder comments, including the enclosures referenced in the FHCC Advisory Board Cover Letter, the concurrence letter provided by JAL FHCC Site Leadership, and PE's responses can be found on page 116 of this report.

2.4 FHCC Advisory Board Cover Letter

2 Mar 15

MEMORANDUM

From: Commander, Navy Medicine East
Acting Network Director, VISN 12
To: VHA Office of Quality, Safety and Value Product Effectiveness (PE)

Subj: CAPT JAMES A. LOVELL FEDERAL HEALTH CARE CENTER (JALFHCC) INFORMATION MANAGEMENT/INFORMATION TECHNOLOGY (IM/IT) INITIAL EVALUATION REPORT

Ref: (a) JALFHCC Advisory Board Meeting Minutes of 13 Jan 15

Encl: (1) Health Architecture Review Board (HARB) Comments
(2) Interagency Clinical Informatics Board (ICIB) Comments
(3) Defense Health Agency (DHA) Comment Matrix
(4) Bureau of Medicine and Surgery (BUMED) Comment Matrix
(5) JALFHCC Leadership Comment Matrix and Cover Letter

1. Per reference (a), enclosures (1) through (5) provide detail comments from the JALFHCC Advisory Board stakeholders regarding the VHA Product Effectiveness evaluation of IM/IT capabilities and infrastructure at JALFHCC.

2. Overall, the advisory board concurs with the findings and recommendations of the report and believes it to be well researched and thorough. While many IM/IT achievements have been made, there remain challenges that should be resolved prior to embarking on future integrated facilities. Among these are latency issues, the inability to transport all information from one agency's electronic health record to the other, and policies that require the preservation of separate networks with differing network security protocols. Further investment in JALFHCC IM/IT solutions would also be required to address functionality issues not achieved as outlined in the original Joint Incentive Fund proposal. This would include a fully operational financial reconciliation tool, pharmacy interoperability, and expansion of orders portability to all departments.

3. The point of contact for the effort is Dr. Deidra Flanary. She may be reach at (757)953-0323 or via e-mail at Deidra.b.flanary.civ@mail.mil.

Renee Oshinski
Acting Network Director, VISN 12

Terry J. Moulton, RDML, MSC, USN
Commander, Navy Medicine East

3 JAL FHCC BACKGROUND

3.1 JAL FHCC Integration History

JAL FHCC is the first DoD/VA health care facility with one single line of authority to provide comprehensive, compassionate, patient-centered care to DoD and VA beneficiaries while supporting the highest level of operational readiness.

Since 1926, the Department of Defense (DoD) operated the Naval Health Clinic Great Lakes (NHCGL) and the Department of Veterans Affairs (VA) operated the North Chicago VA Medical Center (NCVAMC)[22]. The facilities are located less than two miles from one another. By the late 1990s, regional health care demographics presented an opportunity to merge the two facilities, matching existing resources to the areas of greatest need. Beginning in 2003, the DoD adopted a phased approach to send its beneficiaries to the NCVAMC; initially using the NCVAMC for acute inpatient psychiatric services, and later using the facility for inpatient medical, surgical, and emergency services[23]. This shared-service arrangement was considered a joint venture, similar to other DoD/VA joint ventures in which one agency reimburses the other for services received.

In 2005, the Assistant Secretary of Defense for Health Affairs and the VA Under Secretary for Health agreed to adopt the JAL FHCC model to integrate clinical and administrative services under a single line of authority. DoD and VA leadership felt a single organization should be able to provide better care for patients at a lower cost for taxpayers than operating two separate facilities or continuing as a joint venture relationship.[24]

The NDAA for FY 2010 authorized the Secretaries of DoD (in consultation with the Secretary of DoN) and VA to execute an *Executive Agreement* for the joint use of facilities in North Chicago, IL and Great Lakes, IL. The deadline for entering into agreement (if at all) was 180 days after enactment of the NDAA. The Secretaries of the DoD and VA, along with the Secretary of DoN executed the *Executive Agreement for the Department of Defense-Department of Veterans Affairs Medical Facility Demonstration Project: Federal Health Care Center* in April 2010, and JAL FHCC officially commenced operations on October 1, 2010.

3.2 JAL FHCC Operational and Clinical Integration

Leadership from the former NCVAMC and the NHCGL, who led the local working group for integration planning, sought to implement a single organizational structure for operations at JAL FHCC. This differed from a joint venture model because it included a single budget and a unified staff reporting through a single facility-level management structure. While each entity remained responsible for adhering to their individual missions and reporting to their respective agency, they agreed to the joint mission of providing care for patients as efficiently and seamlessly as possible.

Aligning with the vision to provide better care at lower cost for taxpayers, JAL FHCC focused its integration efforts on reducing duplication of shared services while maintaining (or even improving) quality of patient care. Due to differing agency missions and policies, JAL FHCC integrated those clinical areas that could best serve both DoD and VA beneficiaries and preserved relatively separate administration of primary care and other mission-specific types of care.

[22] From 1911 to 2006, the NHCGL was the Naval Hospital Great Lakes. In 2006, inpatient care was discontinued and the facility was renamed the Naval Health Clinic Great Lakes.
[23] IOM *Evaluation of the Lovell Federal Health Care Center Merger: Findings, Conclusions, and Recommendations* pages 48-50.
[24] IOM *Evaluation of the Lovell Federal Health Care Center Merger* page 3.

Physically, JAL FHCC is divided into an East campus, a West campus, and three Community-Based Outpatient Clinics (CBOCs):

- The JAL FHCC East Campus operates as a relatively self-contained DoD outpatient clinic. With very limited exceptions, only Active Duty DoD personnel are served on the JAL FHCC East Campus.
- JAL FHCC's CBOCs (located in Evanston and McHenry, IL and Kenosha, WI) primarily serve VA beneficiaries, and have limited needs for cross-agency integration.
- The JAL FHCC West Campus serves and supports a full spectrum of inpatient and outpatient services for both DoD and VA beneficiaries.[25]

3.3 IM/IT Model to Support JAL FHCC Integration

Because of the unique nature of JAL FHCC's structure, one major component of the integration was the selection of an Information Management/Information Technology (IM/IT) model to support FHCC operations. Rather than developing or procuring a new, single Electronic Health Record (EHR) and rather than converting to one of the agency's legacy EHRs, the DoD and VA selected a common services model for JAL FHCC that would utilize both the legacy VA and DoD EHRs.[26]

3.3.1 Selection of an IM/IT Common Services Model

The determination to use both legacy EHRs was primarily due to constraints on time and the mobility of patient information. At the onset of JAL FHCC integration, the national Task Group charged with developing a detailed operational plan for clinical integration recommended having one patient record system or a single user interface to both EHRs for entering and retrieving patient clinical information. However, the national Clinical Task Group (CTG) concluded that a single EHR system with the functional capabilities necessary to support the myriad of services offered by NCVAMC and NHCGL would not be ready by the time the FHCC opened in 2010.[27] Additionally, the CTG concluded that even if a single EHR were to be developed specifically for the FHCC, the other DoD and VA treatment facilities would still be using the legacy DoD and VA EHRs. Maintaining complete patient records within each agency's native EHR was necessary for clinicians at the agencies' other treatment facilities have access to complete patient information.

DoD beneficiaries frequently move from one military base to another. All military bases and Military Treatment Facilities (MTFs) utilize the DoD's EHR, the Armed Forces Health Longitudinal Technology Application (AHLTA) built upon the Composite Health Care System (CHCS). Although efforts had been made (and continue to be made) to enable CHCS/AHLTA users to access data stored in the VA's EHR, at the time the JAL FHCC was being integrated, interoperability capabilities were limited. Therefore, DoD and VA leadership determined that DoD beneficiary health records must be maintained within CHCS/AHLTA so that other MTFs have easy access to the beneficiary's complete patient record.

Similarly, all VAMCs and Community Based Outpatient Clinics (CBOCs) use the VA's EHR, the Computerized Patient Record System (CPRS) built upon the Veterans Health Information Systems and Technology Architecture (VistA). Although VA beneficiaries do not typically move as frequently as DoD beneficiaries, they do have the option to visit other VAMCs. Additionally, VA beneficiaries do frequently receive care from the VistA/CPRS-based CBOCs. As was the case for DoD personnel, the ability for VistA/CPRS-based VA personnel to access data stored in the DoD's EHR was limited. Therefore, DoD and VA leadership determined that VA beneficiary health records must be maintained within VistA/CPRS so that other VAMCs and CBOCs have easy access to the beneficiary's complete patient record.

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[25] Captain James A. Lovell Federal Health Care Center, *Strategic Plan 2012* (North Chicago, IL: Captain James A. Lovell Federal Health Care Center, 2012), 11.
[26] Department of Defense/Department of Veterans Affairs, *DoD-VA Health Care Sharing Incentive Fund Initiative Proposal: DoD/VA Common Services Strategy Development in Support of the Captain James A. Lovell Federal Health* (North Chicago, IL, DoD/VA, 2009), 1.
[27] IOM *Evaluation of the Lovell Federal Health Care Center Merger* page 78.

DoD and VA leaders were posed with a choice on how to implement the common services model. As the first option, JAL FHCC could take a patient-based approach, in which clinicians switch the EHR they are using based on the type of beneficiary they are serving. For example, if a Cardiologist is caring for a VA beneficiary, he/she would use VistA/CPRS. Whereas, if that same Cardiologist is caring for a DoD beneficiary, he/she would use CHCS/AHLTA. The second option was to take a clinician/clinic-based approach, where clinicians work on one EHR regardless of beneficiary type.

DoD and VA leaders largely chose to implement the clinician/clinic-based approach at JAL FHCC. Under this approach, a provider primarily documents in one EHR regardless of patient.

The clinician/clinic-based approach was primarily selected for staffing, beneficiary population, system functionality, and financial purposes. From a staffing perspective, certain services/clinics had a higher number of VA providers than DoD providers (or vice versa). DoD and VA leadership determined that it would typically make more sense for a clinic to use the EHR system that the majority of its clinicians used. Similarly, certain services/clinics are only used by one beneficiary population. Using the EHR system native to that beneficiary population was logical in order to maintain their complete patient record. In terms of functionality, certain modules were deemed inferior or were simply not available in one agency's EHR. For example, CHCS/AHLTA does not have an inpatient module. Therefore, all inpatient services adopted VistA/CPRS. Finally, DoD and VA leaders analyzed which contractual/lease obligations could be terminated and which fixed assets could be more heavily utilized to minimize any negative financial impact. The remaining financial assets and contractual/lease obligations were typically electronically interfaced with the VA's EHR.

3.3.2 Necessary New IM/IT Components

In order to support the clinician/clinic-based IM/IT common services model, the DoD and VA committed to developing new IM/IT components that would enable clinicians to document in one system, regardless of beneficiary type, while ensuring data would transfer back to the patient's native EHR to become part of his or her permanent patient record.

To this end, the HEC initially approved $11.772 million in FY 2008 to support JAL FHCC IM/IT program management and business requirements development for essential JAL FHCC IM/IT capabilities. Then, in FY 2009, a memorandum signed by the Co-Chairs of the Health Executive Committee (HEC) Financial Management Work Group authorized $100.02 million for the development of the capabilities listed below: The $100.02 million was contributed to equally by the DoD and VA into a Joint Incentive Fund (JIF): [28]

1. Joint Patient Registration System (JPRS)
2. Medical Single Sign-on with Context Management (MSSO/CM)
3. Orders Portability (ORP) for consults, laboratory, radiology, and pharmacy[29]
4. Financial Reconciliation

These components were deemed to be the minimum functionality needed to effectively operate an integrated health care center that uses two separate EHRs. These components also serve as potential building blocks towards the achievement of an integrated EHR for the DoD and VA. Each of these components is detailed further in the following sections.

3.3.2.1 Joint Patient Registration

Joint Patient Registration at JAL FHCC is designed to perform the following functions:

[28] The exact amount of funds contributed by the DoD and VA for the design and implementation of JAL FHCC IM/IT capabilities is unclear. This is further explored in section 7.3.3 of this report, beginning on page 85.

[29] Several factors, including unforeseen complexities of integrating a federal health care facility, prevented full implementation of the Pharmacy Orders Portability capability at JAL FHCC. The potential for efficiency and cost gains will be discussed in this evaluation, under the corresponding Benefits.

1. Verify existence of a patient's record via a common search capability.
2. Use a single Graphical User Interface (GUI) for registering both DoD and VA patients at JAL FHCC.
3. Verify DoD and VA beneficiaries' eligibility, enrollment, and any existing registration at JAL FHCC.
4. Create a new patient record in the DoD and VA EHRs (if no prior patient record exists).
5. Correlate a unique identifier in each of the DoD and VA's underlying databases to anchor all clinical and administrative data related to the individual beneficiary within VistA/CPRS and CHCS/AHLTA.

Joint Patient Registration is essential to the IM/IT common services model at JAL FHCC because it ensures that each JAL FHCC beneficiary has a record in both the DoD and VA EHRs. Since specific services/clinics at JAL FHCC use the DoD's EHR (CHCS/AHLTA) and other services use the VA's EHR (VistA/CPRS), the only way for a beneficiary to receive all JAL FHCC services is to have a record in each EHR system. Additionally, Joint Patient Registration correlates unique patient identifiers that serve as the anchor (i.e., IM/IT touch-point) between a patient's VistA/CPRS record and the patient's CHCS/AHLTA record. The correlated patient records produced in Joint Patient Registration enables Context Management between a patient's CHCS/AHLTA and VistA/CPRS record, enables the Orders Portability IM/IT component, and enables Financial Reconciliation (all detailed further below).

3.3.2.2 Medical Single Sign-On with Context Management

Medical Single Sign-On (MSSO) at JAL FHCC is designed to perform the following functions:

1. Allow for a single authentication point for several applications including: CHCS, AHLTA, VistA, CPRS, VistA Imaging, iMed Consent, and the Janus Joint Legacy Viewer (often referred to as iEHR at JAL FHCC).
2. Integrate with the Active Directory to allow the user to authenticate into a workstation and seamlessly log into the MSSO.

The MSSO/CM solution is designed to allow JAL FHCC staff to quickly and conveniently access multiple applications without the need to log in to each application independently. MSSO/CM provides a toolbar view to the user for ease of access to clinical applications and alert/communication functions to present status of capabilities, such as user and patient context. Aside from these user-facing functional enhancements, the additional capabilities provided by MSSO/CM are handled through non-user-facing capabilities that share both user and patient context in order to better integrate the applications in use.

The level of access and user privileges/passwords, however, are determined at the application level not at the MSSO Level. Once the user is authenticated into the MSSO solution, Context Management will allow for certain application contexts, such as patient name, to be transferred from one application to the other. For example, a clinician user could locate a patient record in VistA/CPRS and immediately view this patient information in CHCS/AHLTA (if available).

3.3.2.3 Orders Portability – Laboratory, Radiology, Consults

Orders Portability at JAL FHCC is designed to perform the following functions:

1. Mirror orders created in either DoD or VA EHR
2. Allow orders to be processed in both EHRs
3. Allow results to populate in both EHRs as computable data
4. Eliminate gaps in the patient's DoD and VA records

ORP is an IM/IT component that serves as an interoperability platform enabling any authorized JAL FHCC clinician to manage, view, and modify orders regardless of the EHR system used or type of beneficiary assessed (DoD or VA). For example, an order placed in the DoD's EHR (CHCS/AHLTA) is instantly duplicated in the VA's EHR (VistA/CPRS). The order can then be processed in a VistA/CPRS-based clinic, producing results in VistA/CPRS that are instantly duplicated in CHCS/AHLTA.

ORP does not provide an enhanced interface. It provides the back-end data mapping to transport orders (and associated results) from one EHR to another. Currently, ORP is deployed for laboratory, radiology, and consults (including consults that are referred to another medical facility/provider, commonly regarded as referrals).

3.3.2.4 Financial Reconciliation

Financial Reconciliation at JAL FHCC is designed to perform the following functions:

1. Provide budget justification data and reports.
2. Provide cost accounting data and reports.
3. Provide workload data and reports.
4. Provide patient level data and reports.
5. Provide resource data and reports.
6. Provide data and reports needed for business planning purposes.
7. Provide and ensure the availability of other data and reports needed for financial management.

The Financial Reconciliation IM/IT component (also known as the Financial Reconciliation web tool) provides automation for an annual reconciliation process that determines each agency's resource consumption and necessary resource contributions to JAL FHCC for continued financing of the integrated center. The Financial Reconciliation IM/IT component removes the process of inter-agency billing and payments and instead uses workload and patient information to calculate each agency's share of JAL FHCC costs annually.

4 EVALUATION OBJECTIVES AND METHODOLOGY

4.1 Evaluation Objectives and Scope

The VHA Office of Quality, Safety and Value (OQSV) Product Effectiveness (PE) organization was asked to design and conduct an evaluation of the IM/IT component of the overall JAL FHCC Demonstration Project, to address the following objectives:

1. Assess the effectiveness of the IM/IT components funded by a $100.02M Joint Incentive Fund (JIF), contributed equally by DoD and VA.
2. Identify challenges and unintended consequences of the common services IM/IT model implemented at JAL FHCC.
3. Provide DoD and VA leadership with information for improved decision making in future integrated endeavors.

PE's evaluation is intended to serve as the IM/IT component of an overall JAL FHCC Demonstration Evaluation required by the National Defense Authorization Act for Fiscal Year 2010 (NDAA for FY 2010). The overall JAL FHCC Demonstration Evaluation has been contracted to Knowesis, Inc. PE collaborated closely with Knowesis, Inc. to ensure commonality between both group's evaluation frameworks. PE also collaborated with Knowesis, Inc. to obtain data, review findings, and provide assurance for similar messaging.

DoD, VA, and DoN leaders requested PE to focus its evaluation on the following JIF-funded IM/IT capabilities:

1. Joint Patient Registration (JPRS),
2. Medical Single Sign-On with Context Management (MSSO/CM),
3. Financial Reconciliation, and
4. Four separate Orders Portability (ORP) capabilities: Orders Portability for laboratory, radiology, consults, and pharmacy.

PE was also asked to include network infrastructure and communication components in its evaluation that, although not JIF-funded, impact JAL FHCC operations in regards to email, calendaring, file sharing, and general business operations.

PE documented its efforts in a *Project Charter* authorized by members of the FHCC Advisory Board, and officially commenced on October 22, 2013.

4.2 Evaluation Methodology

4.2.1 Evaluation Framework

PE developed a comprehensive IM/IT evaluation plan, also referred to as a Benefits Realization Framework, to understand and measure the extent to which IM/IT enables the following JAL FHCC and national DoD/VA benefits enumerated in the *JAL FHCC Executive* Agreement:[3]

1. Improve interagency data sharing.
2. Improve efficiency of JAL FHCC clinical and administrative processes.
3. Improve cost effectiveness of health care delivery.
4. Improve access to health care delivery, including promoting continued beneficiary access to care.
5. Promote operational readiness.
6. Improve staff satisfaction.[4,5]

For each benefit, PE worked with subject matter experts (SMEs) to delivery performance measures and metrics used to evaluate the degree to which each benefit is enabled by IM/IT. PE also conducted site visits to JAL FHCC to gain a thorough understanding of JAL FHCC workflows and the overall organization.

PE recorded its evaluation plan in a *JAL FHCC IM/IT Evaluation Framework* document. The *Framework* document was submitted for stakeholder feedback in February 2014. Feedback was received, and the *Framework* was revised. The *Framework* was then submitted to PE's *Project Charter* signatories in April 2014.

4.2.2 Data Collection

Using the *JAL FHCC IM/IT Evaluation Framework*, PE interviewed SMEs from the DoD/VA Interagency Program Office, the VHA Office of Informatics and Analytics (OIA), and JAL FHCC. PE reviewed prior evaluations of JAL FHCC, including those conducted by the Government Accountability Office (GAO), the Institute of Medicine (IOM), and by PE itself. PE also collected system generated data where possible, and reviewed IM/IT documentation created by the DoD/VA Interagency Program Office (IPO)-led development teams, independent verification & validation (IV&V) documentation, and other artifacts related to DoD/VA data sharing. In addition, PE completed multiple JAL FHCC site visits to interview personnel, observe processes, and document workflows. Finally, PE relied upon its own subject matter expertise gained from prior JAL FHCC evaluation efforts, dozens of evaluations for VHA programs and facilities, and evaluations conducted on behalf of the DoD/VA IPO.

4.2.3 Note Regarding Data Collection

Over the course of this evaluation, PE conducted detailed interviews with 77 personnel who work on site at JAL FHCC, as displayed in Table 2 below. This figure does not include numerous other DoD and VA SMEs interviewed.

Table 2: JAL FHCC Personnel Interviewed by PE

Department/Service	East Campus	West Campus	N/A	Total
Clinical Departments/Services				
Primary Care	4	12	-	16
Fleet Medicine	6	-	-	6
Dental	4	1	-	5
Specialty Care	-	8	-	8
Emergency Department	-	2		2
Inpatient Care	-	3	-	3
Surgery	-	5	-	5
Mental Health	-	1	-	1
Ancillary and Diagnostic Services				
Laboratory	1	4	-	5
Pharmacy	-	3	-	3
Radiology	-	3	-	3
Administrative and Operational Departments/Services				
Administrative/Operations - Health Care Business	-	3	-	3
Administrative/Operations - OIT/IRM/Information Security	-	7	-	7
Administrative/Operations - Patient Administration	-	6	-	6
Administrative/Operations - Referral Management	-	1	-	1
Administrative/Operations - Site Leadership	-	-	3	3
Total	**15**	**59**	**3**	**77**

Throughout PE's evaluation, quantitative data was limited. During PE's final site visit to JAL FHCC in May 2014, PE conducted Structured Interviews. These Structured Interviews included Likert scale-based questions. The majority of personnel interviewed were unable to provide simple Likert-type responses (e.g., a 1 to 5 rating) because they felt there were too many caveats associated with their ratings. For example, many personnel noted that if the system was working consistently, they would rate it highly.

PE has displayed the results of Likert scale-based questions where appropriate. The vast majority of findings, however, are based on qualitative information provided during interviews, as well as direct observations made by PE team members when on site.

The most substantive quantitative data was provided by End of Day (EOD) Reports used to monitor interagency transactions between the DoD and VA Enterprise Service Buses (ESBs). JAL FHCC IM/IT Support Leadership acknowledged that end-to-end quantitative measures are difficult to obtain due to the current network architecture and authorizations required to monitor interagency performance.

PE believes that this *Initial Evaluation Report* can be utilized to identify areas where more substantial quantitative measurement is required, and can assist DoD, VA, and JAL FHCC leadership in implementing new methods of obtaining quantitative data.

BENEFIT-BY-BENEFIT FINDINGS

5 BENEFIT 1 FINDINGS – IMPROVE INTERAGENCY DATA SHARING

5.1 Benefit 1 Overview

Interagency Data Sharing is the key benefit to support health care facility consolidation efforts and seamless interoperability of patient data to integrate two legacy EHR systems. Additionally, data sharing is the foundational benefit supporting and enabling all other JAL FHCC IM/IT benefits.

Benefit #1

JAL FHCC IM/IT investments have enabled the Improve Interagency Data Sharing Benefit.

Challenges Remaining:

- Continued issues with system responsiveness (driven primarily by network delays) that hinder clinical and business workflows
- Challenges reaching critical business and clinical applications hosted on separate physical and/or virtual networks
- Reliance upon separate agency-level IM/IT organizations
- Gaps in IM/IT interoperability capabilities requiring the maintained use of dual EHRs (i.e., not all data crosses from one EHR to the other)

DoD and VA personnel leading the effort to plan and create JAL FHCC understood that health care delivery is predicated on access to patient information. DoD and VA planners also understood that running an integrated facility requires consolidated administrative information. Finally, DoD and VA planners understood that IM/IT is critical to the delivery and administration of patient care in both the DoD and VA.

The DoD and VA acknowledged the importance that information exchange plays at JAL FHCC by stating in the *JAL FHCC Executive Agreement* that "Information systems at the FHCC will exchange information to the greatest extent permitted by VA and DoD."[30]

Therefore, the DoD and VA took extensive steps to achieve the exchange of information between DoD and VA information systems at JAL FHCC. A critical step was the development of new integrated and interoperable IM/IT capabilities. Both agencies have robust electronic health records (EHRs) and policies associated with the delivery of patient care through EHRs. In order to maintain reporting requirements, continuity of patient documentation, and the method of health care delivery that DoD and VA providers were accustomed to, the DoD and VA had to invest in new IM/IT capabilities to support the integrated operations at JAL FHCC.

The HEC initially approved $11.772 million of JIF funding in FY 2008 to support JAL FHCC IM/IT program management and develop business requirements for essential JAL FHCC IM/IT capabilities. Then, in FY 2009, the DoD and VA each contributed $50.01 million for the development and implementation of the IM/IT capabilities.[31] The JIF funds were specifically for the following IM/IT capabilities (each of which were described the preceding section):

- Joint Patient Registration (JPRS)
- Medical Single Sign-on with Context Management (MSSO/CM)
- Orders Portability (ORP)

[30] *JAL FHCC Executive Agreement* page 11.

[31] On August 10, 2009, a Memorandum from the Health Executive Committee (HEC) Financial Management Work Group authorized the funding of $100.02 million for JAL FHCC IM/IT capabilities. However, it is unclear whether each department contributed $50.01 million, if both departments contributed $50.00 million, or if one department contributed $50.00 million and the other contributed $50.02 million. The Memorandum authorizing the funds can be found at http://www.tricare.mil/DVPCO/joint-init.cfm.

- Financial Reconciliation

In addition to developing new IM/IT capabilities, the DoD and VA implemented the necessary network, data, and application architecture (working within agency-level policy constraints) to support the capabilities. Finally, DoD and VA planners ensured that authorized JAL FHCC personnel would have complete access to each agency's legacy EHR, as a supplement and safeguard for newly developed interoperability solutions.

The steps taken at JAL FHCC were also intended to serve as foundational pieces for larger interoperability and consolidation efforts between the DoD and VA. The IM/IT components enable data sharing, which subsequently enables enterprise business and clinical benefits at JAL FHCC. Additionally, the IM/IT components, data sharing, and enterprise benefits achieved at JAL FHCC have the potential to enable agency-wide data interoperability initiatives and consolidation efforts. The achievement of the Data Sharing Benefit is critical for stakeholders to determine whether this model can be replicated or improved for future DoD/VA integrated ventures and potentially enable business and clinical benefits in other health care environments.

5.2 Benefit 1 Key Findings/Conclusions:

Overall, the benefit of Improved Interagency Data Sharing has been achieved at JAL FHCC.

The JIF-funded IM/IT investments have provided a foundation for enabling JAL FHCC enterprise benefits and national DoD/VA interoperability goals. IM/IT investments at JAL FHCC have broken barriers for DoD/VA interoperability initiatives and serve as the agencies' most robust examples of real-time interagency data sharing. Moreover, because the DoD and VA have ceased efforts to jointly develop an integrated electronic health record (iEHR), JAL FHCC serves as a pinnacle achievement in the pursuit of agency-wide interoperability.

Time, resource, and policy constraints were present in the JAL FHCC IM/IT planning. Given constraints, DoD and VA implemented IM/IT capabilities that were the most essential to serve both agencies' beneficiaries at JAL FHCC while attempting to maintain each agency's electronic health record (EHR) and support the respective agency missions. JAL FHCC's JIF-funded IM/IT investments also provide DoD and VA with the most extensive view into the complexities, challenges, and successes achieved for interagency data sharing. With the exception of the pharmacy Orders Portability capability (which was deferred, primarily due to policy constraints) and the Financial Reconciliation capability (which is not currently operational), the JIF-funded IM/IT components are functioning according to requirements and have shown consistent improvement since JAL FHCC commenced operations on October 1, 2010.

In addition to the JIF-funded IM/IT capabilities, the policy decision to grant authorized JAL FHCC personnel complete access to each agency's respective EHR was a significant achievement in interagency data sharing. Numerous health care providers interviewed by PE stated that they find direct access to each agency's EHR more beneficial than other remote data viewer (RDV) technologies available within the DoD and VA, such as the Bidirectional Health Information Exchange (BHIE) viewer and the Janus Joint Legacy Viewer (JLV). Although access to each agency's EHR requires toggling and does not provide interoperability (in that data is not flowing from one EHR into the other), the ability to view complete information in the other agency's EHR provides the most comprehensive insight into a patient's history.

Despite the benefit of improved interagency data sharing being achieved, there are still further improvements that can be made. Firstly, not all of the JIF-funded capabilities are fully functional. Secondly, there are aspects of JAL FHCC operations that are not supported by interoperable capabilities. And finally, there are performance concerns for the current IM/IT interagency data sharing capabilities that are primarily driven by IM/IT policy decisions.

5.3 JIF-Funded IM/IT Capabilities' Impact to Data Sharing and Other Benefits:

The following tables summarize each of the JIF-funded IM/IT capabilities' direct impact to the Improve Interagency Data Sharing benefit.

Please note that this section is only included for the Benefit 1 report write-up. As Improved Interagency Data Sharing is a foundational benefit for all of the other benefits analyzed in PE's evaluation, the key accomplishments and challenges presented in the tables below impact all remaining benefits.

Table 3: Benefit 1 JPRS Results

Joint Patient Registration System (JPRS)		
JPRS enables Improved Interagency Data Sharing by allowing DoD and VA beneficiaries to be served by clinics that use either the DoD or VA EHRs. **Overall, JPRS has enabled the achievement of Benefit 1 – Improve Interagency Data Sharing.**		
+ = Capability works well according to design and/or the benefit is being largely met, even if challenges exist *+/- =Capability may work but there is something impacting the full achievement of this benefit* *- = Capability is not achieving the benefit either due to functional issues, policy issues, or it is not yet fully developed* *ND= No Data; NA=Not applicable*		
Benefit 1	**Key Accomplishments**	**Remaining Challenges**
+	JPRS creates a correlated record for each beneficiary within both EHRs to enable care delivery for all JAL FHCC services. JPRS creates a unique identifier that helps associate a DoD beneficiary's VistA/CPRS record with his/her native CHCS/AHLTA record, and vice versa for a VA beneficiary. JPRS enables a longitudinal health care record to be viewed across DoD and VA by providing an anchor to patient CM and ORP functions. JPRS provides a single source for verification of a patient's benefits and eligibility for enrollment processing.	JPRS creates a new requirement for recruits to be registered in batches. If an error occurs during batch registration, it will delay the process for new recruits receiving certain initial lab tests, such as for Human Immunodeficiency Virus (HIV). JPRS creates a new requirement that every patient be joint registered or else CM and ORP errors occur. The joint patient registration process is not always adhered to, causing issues with patient identifier matching between the two EHRs and resulting in failure of CM and ORP capabilities; this could lead to patient care inconsistencies. JPRS is dependent on DoD's Defense Enrollment Eligibility Reporting System (DEERS) and VA's Master Patient Index (MPI) identity management systems to be operational; if these agency-level systems are down (or if there is a connectivity problem) JPRS can be unavailable and downstream IM/IT errors can occur.

Table 4: Benefit 1 MSSO/CM Results

MSSO/CM		
MSSO/CM enables Improved Interagency Data Sharing by allowing clinicians to more efficiently view any beneficiary health information stored in either agency's EHR, providing unprecedented access to all required DoD and VA EHR tools. **Overall, MSSO/CM has enabled the achievement of Benefit 1 – Improve Interagency Data Sharing.**		
+ = Capability works well according to design and/or the benefit is being largely met, even if challenges exist *+/- =Capability may work but there is something impacting the full achievement of this benefit* *- = Capability is not achieving the benefit either due to functional issues, policy issues, or it is not yet fully developed* *ND= No Data; NA=Not applicable*		
Benefit 1	**Key Accomplishments**	**Remaining Challenges**
+	From a VistA/CPRS user's perspective, MSSO/CM allows the clinician to efficiently view past medical information stored in CHCS/AHLTA and toggle between the DoD and VA EHRs. Clinicians may require prior medical information to make more informed treatment decisions, especially when treating a DoD patient. The MSSO/CM capability enables clinicians using VistA/CPRS to have more effective access to DoD beneficiary medical information. From a CHCS/AHLTA user's perspective, MSSO/CM allows the clinician to efficiently view a DoD beneficiary's medical information that may have been documented in VistA/CPRS (e.g. laboratory results, consult reports, etc.). Due to a number of investment decisions, certain services at JAL FHCC utilize only the VA's VistA/CPRS system. Therefore, MSSO/CM helps the CHCS/AHLTA user to view all JAL FHCC services provided by VistA/CPRS-based clinics for DoD beneficiaries.	Due to contracting and funding constraints, two different MSSO/CM capabilities were implemented at JAL FHCC. The DoD IM/IT Development Team installed the CareFX solution, (owned by Harris Corporation) on DoD workstations. The VA IM/IT Development Team installed the Sentilliion solution (owned by Caradigm) on VA workstations. Each solution had differences requiring unique support expertise. JAL FHCC is currently transitioning over to the CareFX solution for all workstations. There were compatibility issues between the DoD's CareFX MSSO/CM capability and the Citrix-based AVHE environment that caused stability and latency issues for CareFX-based users. Per the DoD/VA IM/IT Development Team, a fix was implemented; however, PE was unable to confirm whether the stability and latency issues improved. CM is dependent on the JPRS process to correlate patient records. If the JPRS process was not followed, CM will not function. And, per end-user feedback, there is not an effective alert to notify the end-user that CM is not functional. MSSO is dependent on compliance with password policies maintained at the application level. Each application has different password policies, such as password reset times. CM is not always beneficial depending on the use case, and may be abandoned by the user intentionally. For instance, a provider may need to look up a previous patient's lab

		result due to a workflow interruption. The provider will intentionally lookup the result in the appropriate tool, but does not want to be automatically switched to that same patient across all tools so that he/she can seamlessly continue with what they were doing prior to the interruption.

Table 5: Benefit 1 ORP Results

Orders Portability for Laboratory, Radiology, and Consults		
Orders Portability enables Improved Interagency Data Sharing by effectively transferring provider consults and orders (and the associated results) between the CHCS/AHLTA and VistA/CPRS systems. **Overall, the ORP capability for laboratory, radiology, and consults has enabled the achievement of Benefit 1 – Improve Interagency Data Sharing.**		
+ = Capability works well according to design and/or the benefit is being largely met, even if challenges exist *+/- =Capability may work but there is something impacting the full achievement of this benefit* *- = Capability is not achieving the benefit either due to functional issues, policy issues, or it is not yet fully developed* *ND= No Data; NA=Not applicable*		
Benefit 1	**Key Accomplishments**	**Remaining Challenges**
+	If a DoD beneficiary needs radiology, laboratory, or specialty care services, the DoD Primary Care Provider can initiate the order in CHCS/AHLTA which will be "ported" over to the VistA/CPRS-based functions that provide those services. The results of an order are also ported back from VistA/CPRS into CHCS/AHLTA, so they can become part of the DoD beneficiary's permanent record and promote streamlined data sharing between the two EHRs. Radiology transactions (orders and results) are successfully being ported across the DoD and VA EHRs at a rate above 95% (97.8% in May 2014). Laboratory transactions (orders and results) are successfully being ported across the DoD and VA EHRs at a rate above 95% (97.9% in May 2014). Consult transactions (orders and results) are successfully being ported across the DoD and VA EHRs at a rate above 95% (97.1% in May 2014).	Radiology – The data transaction success rate is high (97.8% in May 2014) yet not 100%, which may lead to risks of incomplete records. The volume overall is manageable compared to Consult and Lab ORP transactions. Laboratory – The data transaction success rate is high (97.9% in May 2014) yet not 100%, which may lead to risks of incomplete records. The volume of errors overall is high and unsustainable. Laboratory – Although the transaction success rate may be acceptable, the timeliness of transactions does not support clinical/patient workflow, leading to customer dissatisfaction and risks of patient care inconsistencies. Consults – The data transaction success rate is high (97.1% in May 2014), yet not 100%, which may lead to risks of incomplete records. The volume of errors overall was not noted by end-users as a major concern. Consults – Initial consult result notes are completed and returned to the initiating EHR. Result notes from associated follow-up visits should also be returned the initiating EHR if

		scheduling/clinical personnel follow protocols to associate a follow-up visit with an initial consult. If specific protocols are not adhered to, and a follow-up visit is scheduled without being associated with an initial consult, then notes from that follow-up visit will not be returned to the initiating EHR and there is a potential for incomplete patient records. Because of JAL FHCC's clinical integration, this challenge almost exclusively impacts DoD beneficiaries. There is no ORP solution for pharmacy. There is no ORP solution for inpatient services, the Emergency Department (ED), or specialty care not initiated by a consult.

Table 6: Benefit 1 Financial Reconciliation Results

Financial Reconciliation		
Financial Reconciliation enables Improved Interagency Data Sharing through an algorithm developed by DoD and VA stakeholders that normalizes and reconciles DoD and VA workload and cost data to assign the cost of JAL FHCC operations to the two departments. Financial Reconciliation will enable JAL FHCC to operate under a unified budget in upcoming fiscal years. The Financial Reconciliation web tool allows JAL FHCC Health Care Business personnel to more quickly compile and reconcile DoD and VA cost and workload data to perform the reconciliation. **Overall, Financial Reconciliation has enabled the achievement of Benefit 1 – Improve Interagency Data Sharing.**		
+ = Capability works well according to design and/or the benefit is being largely met, even if challenges exist *+/- =Capability may work but there is something impacting the full achievement of this benefit* *- = Capability is not achieving the benefit either due to functional issues, policy issues, or it is not yet fully developed* *ND= No Data; NA=Not applicable*		
Benefit 1	**Key Accomplishments**	**Remaining Challenges**
+	The integrated financial reconciliation process is operational and has enabled JAL FHCC to provide care without conducting interagency billings.	ORP impact on the validity of financial reconciliation data needs to be assessed further. The web-based Financial Reconciliation tool was not operational when observed by PE.

5.4 Benefit 1: Improve Interagency Data Sharing Performance Measures and Results

The performance measures outlined in the subsequent sections reflect the extent to which the JIF-funded IM/IT components (JPRS, MSSO/CM, ORP, and Financial Reconciliation) and overall IM/IT model enable Interagency Data Sharing at JAL FHCC. Additionally, unintended consequences and challenges of the JIF-funded capabilities and overall IM/IT model will be presented.

Table 7 provides the Benefit 1 performance measures and metric groupings as defined in the PE's *JAL FHCC IM/IT Evaluation Framework*. Each of these performance measures and metrics is expanded upon in the subsequent sections. Supplemental data for these items and individual metrics can be found in the Appendix volume of this report.

Please note that quantitative data was limited. The majority of PE's findings were obtained through interviews and on-site observations.

Table 7: Benefit 1 Performance Measures and Metric Groupings

Benefit 1: Improve Interagency Data Sharing		
	Performance Measure	**Metric Grouping**
	1.1 IM/IT Infrastructure	1.1.1 Network Architecture
		1.1.2 Data Architecture
		1.1.3 Application Architecture
		1.1.4 Presentation Layer
	1.2 IM/IT Performance – Data Availability	1.2.1 Joint Patient Registration
		1.2.2 MSSO/CM
		1.2.3 Orders Portability
		1.2.4 Financial Reconciliation
		1.2.5 Staff Satisfaction with Data Availability
	1.3 IM/IT Performance – Data Completeness	1.3.1 Orders Portability
		1.3.2 Staff Satisfaction with Data Completeness
	1.4 IM/IT Performance – Application and System Responsiveness	Please see the Benefit 2 section of this report beginning on page 68.

5.4.1 Performance Measure 1.1: IM/IT Infrastructure

IM/IT infrastructure identifies the building blocks necessary to achieve interagency data sharing capabilities, including the design and configuration requirements at the network architecture level, data architecture level, application architecture level, and user presentation layers (to include virtualization capabilities).

Before the JIF-funded IM/IT components could enable interagency data sharing, the following building blocks were required:

1. Network architecture configuration requirements allowing:
   a. Establishment of user privileges between the two agencies to enable unprecedented system access to both agencies' EHR systems (CHCS/AHLTA for DoD and VistA/CPRS for VA),
   b. Identification of specific network ports to allow for cross-agency communication across/among three network domains (.navy.mil, .health.mil, and va.gov), and
   c. Effective application functionality (such as JPRS) and data sharing (such as ORP for laboratory, radiology, and consults).

2. Data architecture configuration, design, and development requirements to support tools that enable the exchange of data between systems, to include:
   a. Two Enterprise Service Buses (ESBs),
   b. Terminology mapping services, and
   c. Connections to dependent databases and data warehouses for required data access.

3. Application architecture configuration, design, and development requirements to provide users access to tools and data needed to support their unique workflow processes for clinical or financial reconciliation.

4. Presentation layer configuration, including virtualization capabilities, to provide JAL FHCC end-users with the ability to view information across multiple systems and applications.

This performance measure reflects the magnitude of IM/IT efforts required to provide an effective integrated systems model where the network, data, and application architecture could only be integrated with the introduction of several middleware components to enable data sharing services between each agency's data model. This measurement also demonstrates the complexities for providing access to necessary applications, tools, and data to support user workflow requirements. The effectiveness of the IM/IT infrastructure determines data sharing benefits because users must have data access to experience workflow efficiencies and enable clinical support services.

Figure 6 represents the components of the IM/IT infrastructure that will be referenced in this section to show the interactions of the applications/tools and data transactions across the multiple networks configured to support the JAL FHCC.

Following Figure 6, the results of metric groupings designed to assess IM/IT infrastructure are presented.

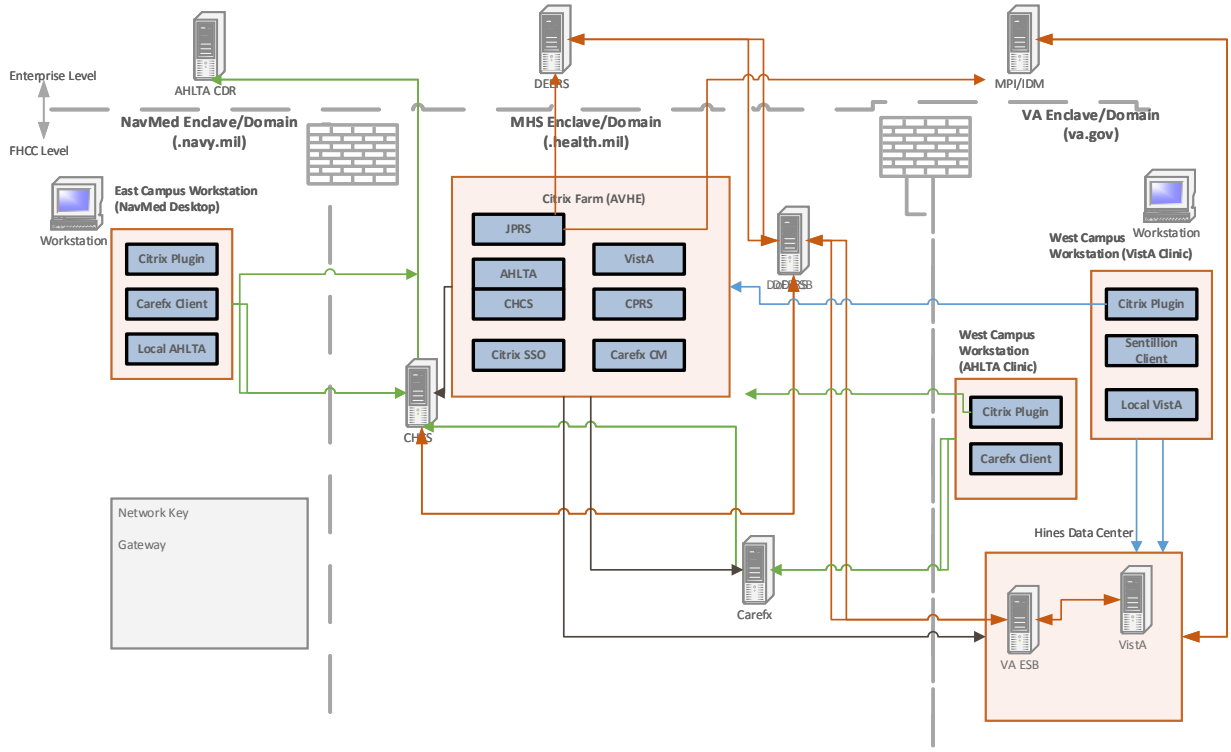

Figure 6: JAL FHCC IM/IT Supporting Architecture

5.4.1.1 Metric Grouping 1.1.1 Network Architecture

PE found that JAL FHCC's network architecture is causing delays in interagency transactions and is hindering interagency data sharing. Also, JAL FHCC IM/IT support personnel have not been provided with diagnostic tools (nor been granted authority by DoD and VA IM/IT support groups) to effectively measure the impacts of network architecture on interagency transactions and interagency data sharing.

5.4.1.1.1 Network Architecture – Multiple Networks, Network Enclaves, and Virtualization

JAL FHCC's IM/IT architecture includes multiple networks to support the overall IM/IT model across both the East and West campuses. This includes two physical networks configured to support multiple sub-networks, at local, regional, and national levels and network enclaves. A network enclave is a segment of an internal network defined by common security policies, and can also be referred to as a security enclave. Network enclaves are necessary when the confidentiality, integrity, or availability of a set of resources differs from those of the general computational environment.

The restrictions of network enclaves are mostly driven by security policies of the respective agencies and have not been modified to support the shared resource needs of JAL FHCC. As a result, many system performance bottlenecks are experienced due to the network architecture design, which previously supported two independent facilities (and two independent IM/IT models) and has not been reengineered to support an integrated Federal health care center model.

Not only is public accessibility denied by default in any network enclave, internal JAL FHCC accessibility is restricted through the use of firewalls, gateways, Virtual Private Networks (VPNs)/Secure Remote Access (SRA), an Application Virtualized Hosting Environment (AVHE), and Network Access Control. The purpose of these network segmentation solutions is to restrict internal access to critical computing devices and only allow access to known/authorized network traffic (which includes system interfaces and data sharing services). This requires that only specific traffic, on specific ports, to specific systems is

allowed, making it inaccessible to the unprivileged network user. Each sub-network presents additional gateways and firewalls that have to be configured to enable communications at the systems level.

The DoD and VA's approach to network segmentation at JAL FHCC enforces a principle of compartmentalization. This approach creates challenges for the facility as it attempts to integrate shared IT services, achieve data sharing, and emulate an iEHR system. Most notably for end-users, JAL FHCC's network segmentation results in delays for interagency electronic transactions and challenges in reaching IM/IT tools hosted on virtualized environments.

The challenge reaching IM/IT tools is most heavily realized by personnel serving DoD patients on the JAL FHCC West Campus. The West Campus is located on the VA's physical network. Therefore, any DoD-hosted systems (the main one being CHCS/AHLTA) must be accessed through SRA to an AVHE managed by the Military Health System's (MHS) Network Security Suite. A September 2011 *Health Care Information Technology Infrastructure Analysis* report developed by The Ambit Group, LLC, provided the following depiction of JAL FHCC's network architecture (Figure 7):[32]

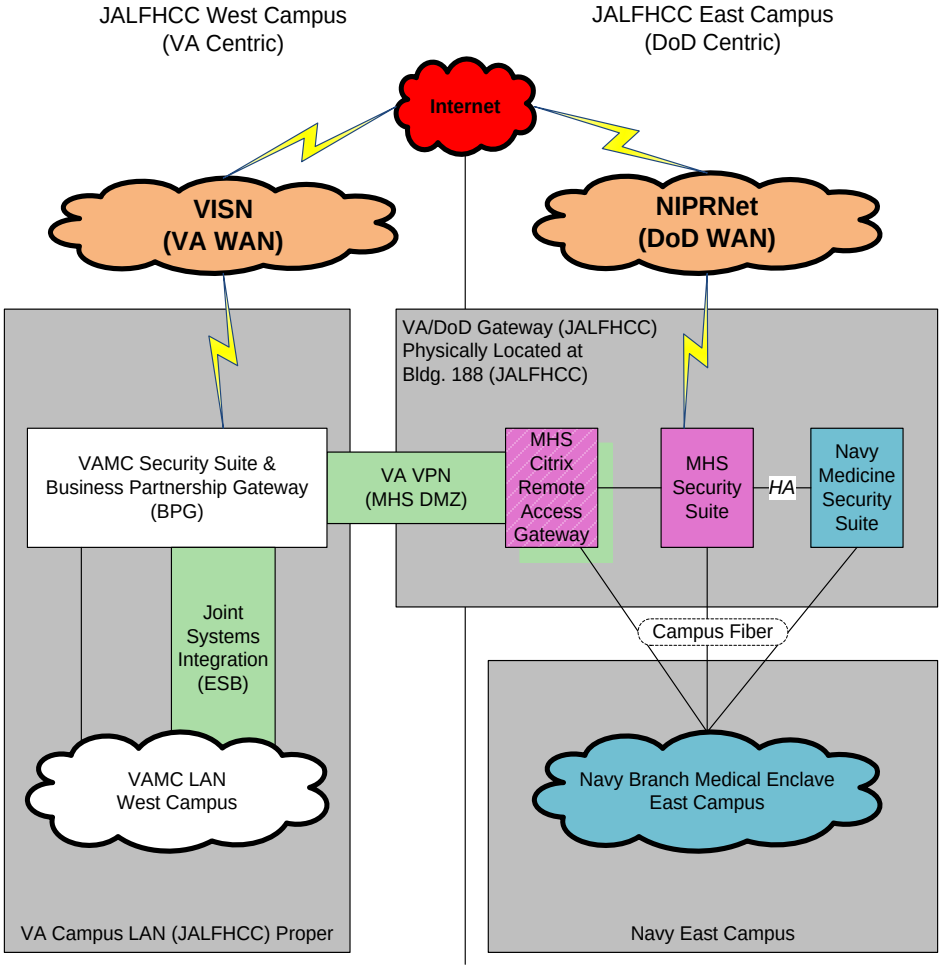

Figure 7: Deployed JAL FHCC Network Architecture (Provided by a *Health Care Information Technology Infrastructure Analysis* report developed by The Ambit Group, LLC)

[32] Report dated September 19, 2011 produced by The Ambit Group, LLC under VA Order #VA701-P-0021, page 12.

In essence, accessing DoD systems/applications such as CHCS/AHLTA on the JAL FHCC West Campus is similar to a remote teleworker accessing their employer-hosted applications through a Citrix environment. As the evaluators noted in the September 2011 *Health Care Information Technology Infrastructure Analysis* report, "…in an environment where users are inherently working together day to day, constantly accessing data from the remote locations, and who are deemed to be trusted entities or employees, SRA [(Secure Remote Access)] appears to be overkill." [33]

5.4.1.1.2 Network Architecture – Implementation and Maintenance

Other challenges to implementing a network enclave environment include added implementation and maintenance costs. Each time a new capability is introduced into the integrated model, the corresponding requirements and network enclaves must be considered to support the user workflow.

When interviewed by PE, IM/IT leadership at JAL FHCC estimated that the configuration and management of three separate network domains managed by the Military Health System (MHS)/Defense Health Agency (DHA), Navy Medicine, and the VA account for at least 75% of current system performance issues.

These issues prevent the JAL FHCC IM/IT support teams from focusing on new tools or resolving other challenges to better support the user community. Interviews with end-users identify a general perception that JAL FHCC IM/IT as a whole is not performing to expectations. Primarily, there are continued concerns with the ability to access necessary IM/IT applications and delays/excessive transaction times associated with interagency transactions (mainly associated with Orders Portability).

Without diagnostic tools to assess the network (such as those provided by OPNET Technologies, Inc.), the root cause of these issues cannot be pinpointed. Without defining the root causes, it is difficult to apply resources to effectively identify and address the issues.

5.4.1.2 Metric Grouping 1.1.2 Data Architecture

PE found that JAL FHCC's data architecture for interagency data sharing is reliant upon two Enterprise Service Buses (ESBs) that map data between legacy EHRs into common fields. The data mapping implemented at JAL FHCC is robust and necessary to accomplish the level of interoperability needed to support a joint laboratory, radiology department, and specialty care services using two separate EHRs. The mapping conducted at JAL FHCC is arguably the most extensive data mapping effort between the DoD and VA. However, the level of data mapping in place at JAL FHCC requires a significant initial mapping effort, and also requires routine maintenance to ensure mappings are updated when a change is made to either legacy EHR. Also, the use of two ESBs rather than a single ESB has caused duplicated support/maintenance requirements and an additional step in interagency transactions (contributing to latency). Therefore, the data architecture at JAL FHCC has achieved improved interagency data sharing, but the architecture will require significant mapping efforts if replicated at another integrated DoD/VA health care center.

An ESB is a software architecture model used for designing and implementing the interaction and communication between mutually interacting software applications in service-oriented architecture (SOA). JAL FHCC has implemented a data architecture model to include ESBs to effectively map data between legacy applications that have different data terminology and data structures.

The use of ESBs and SOA is highly progressive in the Federal space. However, because JAL FHCC leverages two ESBs, an additional burden is placed on the configuration of the systems to support the unique business rules of each respective agency, and in turn drives a need for business process support in the application environment. As a result, data/terminology between the two ESBs has to be clearly mapped and managed to support effective integrated communications. Any time a data transaction crosses between ESBs, there are potential risks in loss of performance due to the different networks that

[33] The Ambit Group, LLC *Health Care Information Technology Infrastructure Analysis* report, page 20.

support the ESBs and a loss in data because of mapping or transaction volumes not being effectively configured by the ESBs. While a single ESB can support multiple applications, such as VistA/CPRS and CHCS/AHLTA, the multiple ESB architecture is largely the result of difficulties in interagency contracting for IM/IT development/implementations and the multiple networks in place to support JAL FHCC's security policies, which are still defined by non-integrated agencies.

Please note that PE requested quantitative data for information such as the total number of Health Level 7 (HL7) interfaces mapped and the total number of data terms to be mapped within terminology mapping tools/services for the different ORP services; however, this data was not provided. Obtaining quantitative data regarding the extent of mapping conducted at JAL FHCC will assist with determining the exportability of the JAL FHCC solution to future integrated DoD/VA health centers.

5.4.1.3 Metric Grouping 1.1.3 Application Architecture

PE found that JAL FHCC's application architecture is predicated on access to two legacy EHRs that are managed by two separate agencies coupled with new middleware applications to bridge the legacy systems.

JAL FHCC's application architecture has improved interagency data sharing; however, the majority of facility personnel interviewed by PE noted that the application architecture is not conducive to intra-facility clinical or administrative workflow.

The majority of JAL FHCC personnel interviewed by PE stated that they would prefer to use one EHR rather than two. However, it was also noted that full access to both legacy EHRs is superior to any of the existing Remote Data Viewer (RDV) solutions currently available (such as Janus JLV).

In order to transition from the use of two EHRs to one EHR, additional IM/IT investments would need to be made so that a single EHR can meet the reporting requirements of both the DoD and VA. Or, policies of at least one of the agencies would have to be amended to meet JAL FHCC's unique reporting requirements, given its status as an FHCC.

JAL FHCC's application architecture was limited by policy, time, and resource constraints. According to the Institute of Medicine's (IOM's) 2012 JAL FHCC evaluation report, the clinical task group established to help plan JAL FHCC recommended using one patient record system, or at least a single user interface between the DoD and VA EHRs.[34] This recommended approach remains the desired solution for the majority of personnel interviewed by PE. However, such a solution was not feasible at JAL FHCC given constraints and, instead (as shown in Figure 8 below), two EHRs were utilized.

[34] IOM *Evaluation of the Lovell Federal Health Care Center Merger: Findings, Conclusions, and Recommendations* page 9.

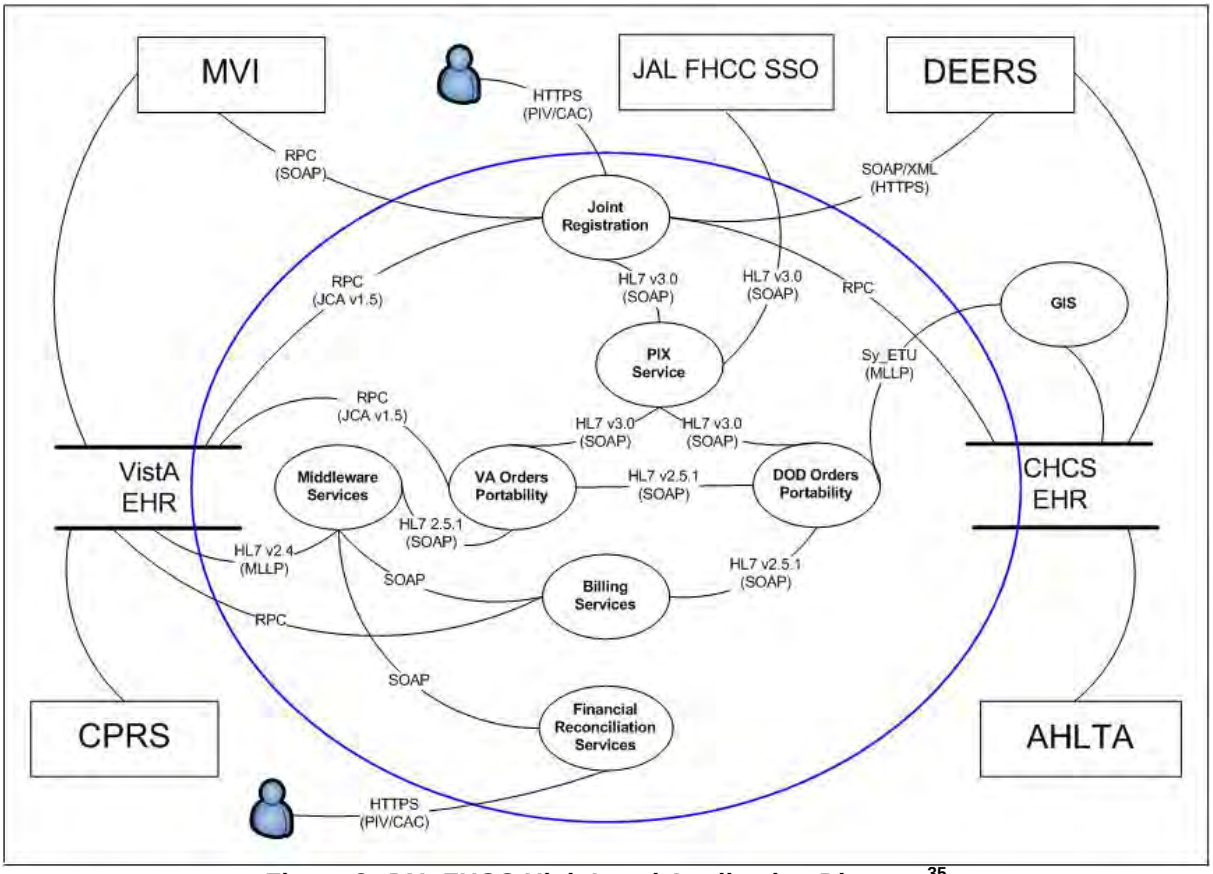

Figure 8: JAL FHCC High Level Application Diagram[35]

5.4.1.3.1 Application Architecture – Multiple EHRs

From an interagency data sharing perspective, the use of two EHRs enables providers to see a patient's complete patient record and provides information that is either not available or not easily locatable in existing RDV solutions.

From the perspective of personnel who serve DoD patients and document in CHCS/AHLTA, full access to both agencies' EHRs is essential because, certain clinical services (such as specialty care and inpatient care) are only documented in VistA/CPRS.

Although data from VistA/CPRS-based visits may be available through RDV solutions, JAL FHCC personnel (who serve DoD patients) state that accessing the information directly in VistA/CPRS is easier than using most RDV solutions and provides them with confidence that the information is complete.

From the perspective of JAL FHCC personnel who serve DoD patients and document in VistA/CPRS (primarily specialty care, inpatient care, and Emergency Department personnel), full access to both agencies' EHRs is essential because they can see the DoD patient's complete patient record in CHCS/AHLTA. Additionally, access to both agencies' EHRs is essential because a pharmacy ORP solution was not implemented; therefore, all DoD outpatient medications must be ordered from CHCS/AHLTA. Data from CHCS/AHLTA-based visits may be available through RDV solutions; however, JAL FHCC personnel who serve DoD patients (and document in VistA/CPRS) state that access the

[35] Captain James A. Lovell Federal Health Care Center Architecture Scrum Team, *JAL FHCC Expansibility of Federal Healthcare Centers: System Architecture Document Version 0.3* (North Chicago, IL: Captain James A. Lovell Federal Health Care Center, June 2013), 5.

information directly in CHCS/AHLTA is easier than using most RDV solutions and provides them with confidence that the information is complete.

Access to both the DoD and VA EHRs is also essential at JAL FHCC because the ORP interoperability solutions funded by the JIF do not exchange data for all of JAL FHCC's clinical services. As shown in Figure 9 below, JIF-funded interoperability solutions are not present for JAL FHCC Emergency Department (ED) encounters, pharmacy orders, or specialty care, surgery, or inpatient care that is not initiated by a consult. With the exception of outpatient pharmacy, for which outpatient orders must be placed in the patient's native EHR, documentation for all of these JAL FHCC services is performed in VistA/CPRS. Although information from these services/encounters may be available through RDV solutions, such as BHIE, direct access to VistA/CPRS gives providers the most complete information available.

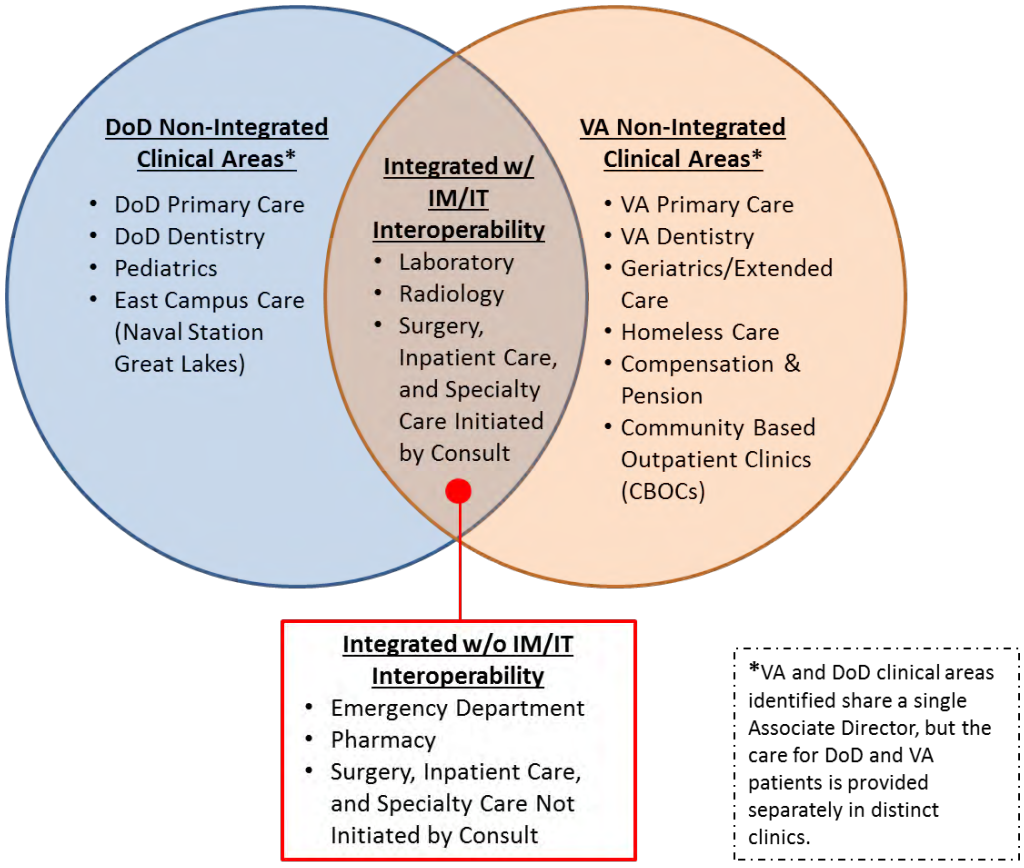

Figure 9: JAL FHCC DoD/VA Integration Supported/Unsupported by Interoperability

The use of two EHRs has minimal impact on personnel who serve VA beneficiaries at JAL FHCC. All of the shared services and specialty care areas at JAL FHCC are based on the VA's EHR (VistA/CPRS). Additionally, as noted above, the West Campus (where nearly all VA beneficiaries are served) operates on the VA's network thus allowing native access to the VA EHR and other VA applications. For personnel who serve DoD beneficiaries, however, the use of two EHRs is an essential component of JAL FHCC's application architecture.

Although an application architecture leveraging two EHRs has presented workflow and satisfaction issues (explored further in later sections of this report), the ability to directly access both EHRs will continue to be essential for the operation of an integrated DoD/VA health care center until one of the following occurs:

- A single EHR is able to meet both agencies' mission-critical needs
- A single presentation layer or RDV solution is able to present all information contained in both EHRs
- Interoperability solutions are able to exchange all information contained in both agencies' EHRs
- Policies for FHCCs are amended so that reporting requirements align to a single agency or are unique for FHCCs

5.4.1.3.2 Application Architecture – JPRS-Dependence

Another key aspect of JAL FHCC's application architecture is the critical role that JPRS plays. JPRS provides a single method of access for enrolling and verifying eligibility of all patients. JPRS serves as the IM/IT anchor (linking a patient's DoD and VA record) on which all other JIF-funded JAL FHCC IM/IT solutions function. This application architecture was necessary for JAL FHCC interoperability solutions; however, it requires that each patient be joint registered to enable MSSO/CM, ORP, and (to the extent that orders and the associated workload data is captured appropriately) Financial Reconciliation. JAL FHCC has experienced issues with personnel adhering to the joint patient registration process. A Business Process Reengineering (BPR) team has been engaged to analyze and improve the JPRS workflow so that patients are consistently joint registered.

5.4.1.3.3 Application Architecture – Agency-Level Dependencies

From a clinical and non-clinical perspective, personnel have to navigate two agencies' systems in order to obtain and report required information. For example, workload data is obtained separately from DoD and VA systems. As another example, each agency requires reporting of different clinical outcome measures. Navigating two agencies' applications can be challenging to learn and maintain competence.

Navigating two agencies' systems can also be challenging for end-users because application username and password credentialing policies are managed at the application level. For example, CHCS/AHLTA passwords expire every 90 days, whereas VistA/CPRS passwords expire every 120 days. Some VA applications also require a Personal Identity Verification (PIV) badge and some DoD applications require a Common Access Card (CAC). Some JAL FHCC personnel maintain both a PIV badge and a CAC so that they can access all of the applications required to perform their job functions.

Finally, JAL FHCC's application architecture is heavily impacted by any changes made to applications at the agency level. An example was given to PE regarding a change made to the application used for obtaining key Healthcare Effectiveness Data and Information Set (HEDIS) data. Per the example, at the agency level, DoD switched the application it uses to aggregate and report HEDIS data. JAL FHCC population health personnel, working with primary care personnel, used the DoD agency-level application to obtain HEDIS data and determine if further action/follow-up visits were required for certain patients. When DoD switched to a new HEDIS application, access was not granted to personnel coming from a "va.gov" domain. JAL FHCC and BUMED personnel had to work with other DoD personnel for "va.gov"-based personnel to be granted access to the HEDIS application. Additionally, once access was granted, users had to have CAC credentials to access the new application. Because many providers serving DoD patients at JAL FHCC are VA employees, many do not have a CAC. As this example illustrates, JAL FHCC has unique business processes and a unique application architecture that is not always considered at the agency level.

5.4.1.4 Metric Grouping 1.1.4 Presentation Layer

PE found that, similar to its application architecture, JAL FHCC's presentation layer is predicated on the ability to access each agency's EHRs for complete patient information. The JIF funded an MSSO/CM capability and ORP solutions to enhance JAL FHCC's presentation layer. The MSSO/CM capability was intended to enable easier, more seamless access to both agencies' EHRs. Whereas, the JIF-funded ORP capabilities were intended to reduce personnel's need to toggle between EHRs by transporting data from one EHR into the other. JAL FHCC personnel reported mixed perceptions of the JIF-funded IM/IT components intended to enhance the presentation layer.

PE's findings regarding the presentation layer and the JIF-funded capabilities are largely based on interviews and observations. PE requested quantitative data regarding JAL FHCC personnel's usage of MSSO/CM and the legacy EHRs; however, this data could not be provided.

5.4.1.4.1 Presentation Layer – MSSO/CM

PE found that JAL FHCC personnel viewed the MSSO component of MSSO/CM relatively favorably; however, they regarded the CM solution poorly. The MSSO component enables personnel to login to multiple systems without having to re-enter username and password credentials for each system. This is a potentially time saving capability for JAL FHCC personnel, who often have to view multiple applications to gather all required patient information.

Due to policy stipulations, however, username and password credentials are maintained at the individual application level rather than maintained within the MSSO capability. Therefore, if an end-user's username or password credentials expire for an individual application, then the MSSO capability cannot function for that specific application. The end-user must maintain his/her username and password credentials for each application he/she accesses in order to realize the benefit of the MSSO capability.

Poor perceptions surrounding CM are primarily due to its contributions to system latency and system instability. Poor perceptions are also more strongly held by personnel who work on DoD workstations. This is because the DoD and VA procured separate CM solutions for their respective JAL FHCC workstations and the solutions are configured differently based on each agency's network security policies.

As mentioned previously, the DoD procured the CareFX product supplied by Harris Corporation and alternatively, the VA purchased the Sentillion product from Caradigm. The DoD's CareFX product is published through the Military Health System (MHS)-hosted AVHE and this has endured several challenges.

From a system latency perspective, the AVHE-published CareFX product required a significant amount of Central Processing Unit (CPU) utilization. This is addressed further in section 6.2.1.3 beginning on page 71 of this report.

From a stability perspective, the CareFX CM product was incompatible with the Citrix-based AVHE. The incompatibility contributed to sudden losses of AVHE connection and difficulty logging back in through AVHE. In June 2014, however, the Defense Health Agency (DHA) AVHE Team worked with Citrix System, Inc. and Harris Corporation (the vendor for the DoD's JAL FHCC MSSO/CM solution) to implement a "hotfix" for the AVHE's Citrix client. The DHA AVHE Team and JAL FHCC IM/IT development teams note that the hotfix, along with the installation of a new Citrix receiver on JAL FHCC workstations, has fixed the compatibility issue.[36]

JAL FHCC personnel state that when CM is not noticeably contributing to system latency and instability, they find the ability to toggle between applications while maintain patient context to be a benefit. However, due to performance concerns, personnel often disable CM.

5.4.1.4.2 Presentation Layer – ORP

JAL FHCC personnel acknowledge that ORP solutions have improved consistently since their initial deployment. However, there are still concerns with the timeliness of ORP transactions and concerns regarding transactional errors that may not port all information from one EHR to the other. Therefore, JAL

[36] The hotfix was installed after PE concluded its site visits. According to the lead DoD Program Manager for the DoD/VA IM/IT Development Team, preliminary reports from the MSSO/CM Operational Assessment conducted following the AVHE hotfix indicate that effectiveness and suitability for MSSO/CM are at 95.5% and 90.8%, respectively.

FHCC personnel often revert to toggling between the two EHRs to obtain complete patient information – including information that is supported by the JIF-funded ORP capabilities.

5.4.2 Performance Measure 1.2: IM/IT Performance – Data Availability

Data availability is the extent, or degree, to which data is accessible, or easily and quickly retrievable. Data availability is a key measure of success for interagency data sharing. Data availability reflects the technical capability of each JIF-funded IM/IT capability (JPRS, MSSO/CM, ORP, and Financial Reconciliation) to access and provide the required data needed within the user workflow process. Data availability provides both a quantitative and qualitative means to reflect a user's trust of the data sharing capabilities.

Below, the results of metric groupings designed to assess data availability are presented.

5.4.2.1 Metric Grouping 1.2.1 JPRS

PE found that JPRS provides users with access to the enrollment and eligibility data needed to jointly register a patient. Within the JPRS graphical user interface (GUI), data availability issues arise when there is a connectivity issue between either the DoD's Defense Enrollment Eligibility Reporting System (DEERS) or the VA's Master Patient Index (MPI) identity management systems.

PE also found that when the joint patient registration process is not adhered to, data availability issues can arise in the downstream workflow. JPRS provides the correlation between a patient's DoD and VA electronic health records. Therefore, if a patient has not been joint registered at JAL FHCC, the records are not correlated and other JIF-funded capabilities cannot facilitate the transfer of data from one EHR to the other, and cannot provide an integrated display of that patient's data.

JAL FHCC has engaged a Business Process Reengineering (BPR) team to examine the joint patient registration process and the downstream impacts to data availability when the process is not adhered to. The BPR team determined that at least 50% and as many as 84% of ORP errors (in which data does not cross from one EHR to the other) are due to JPRS-based correlation errors.[37]

5.4.2.2 Metric Grouping 1.2.2 MSSO/CM

PE found that the MSSO/CM capability has a limited impact to data availability. MSSO/CM is intended to improve JAL FHCC personnel's ability to login and toggle between multiple applications that contain patient data. However, even if MSSO/CM is experiencing downtime, JAL FHCC personnel are not inhibited from logging directly into the individual applications. Additionally, JAL FHCC personnel provided mixed feedback regarding MSSO/CM's functionality (explored further in section 6.2 below), and several personnel note that they disable MSSO/CM because it adds further system lag time.

PE requested quantitative data regarding the percent of personnel who routinely login utilizing MSSO/CM; however, this data could not be provided.

5.4.2.3 Metric Grouping 1.2.3 Orders Portability

PE found that data availability facilitated by the JIF-funded ORP solutions has consistently improved since the first ORP capability (for radiology) was placed into full-production in November 2011. Transaction success rates, in which an order and the subsequent result are transferred from one EHR to the other, consistently exceed 95%. However, the timeliness of interagency transactions remains a concern. And, the small percentage of ORP transactions that do not port from one EHR to the other along with initial challenges of ORP solutions has sustained many JAL FHCC providers' reliance on toggling between EHRs to obtain ORP-supported data.

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[37] PowerPoint briefing entitled *JAL FHCC Clinical and Business Process Transformation Business Process Reengineering Initiative Patient Registration/Correlation of Patient Records: Recommendations – Future State Leadership Status Brief*, dated November 9, 2013.

JAL FHCC has ORP capabilities for radiology, consults, and laboratory. The JIF also provided funds for a pharmacy ORP solution. However, various concerns have led the DoD and VA to defer the deployment of the pharmacy ORP solution at JAL FHCC.

ORP capabilities transport orders and the associated results from one EHR to the other EHR at JAL FHCC. The basic message flow for radiology, consult, and laboratory orders initiated in VistA/CPRS is shown in Figure 10 below.

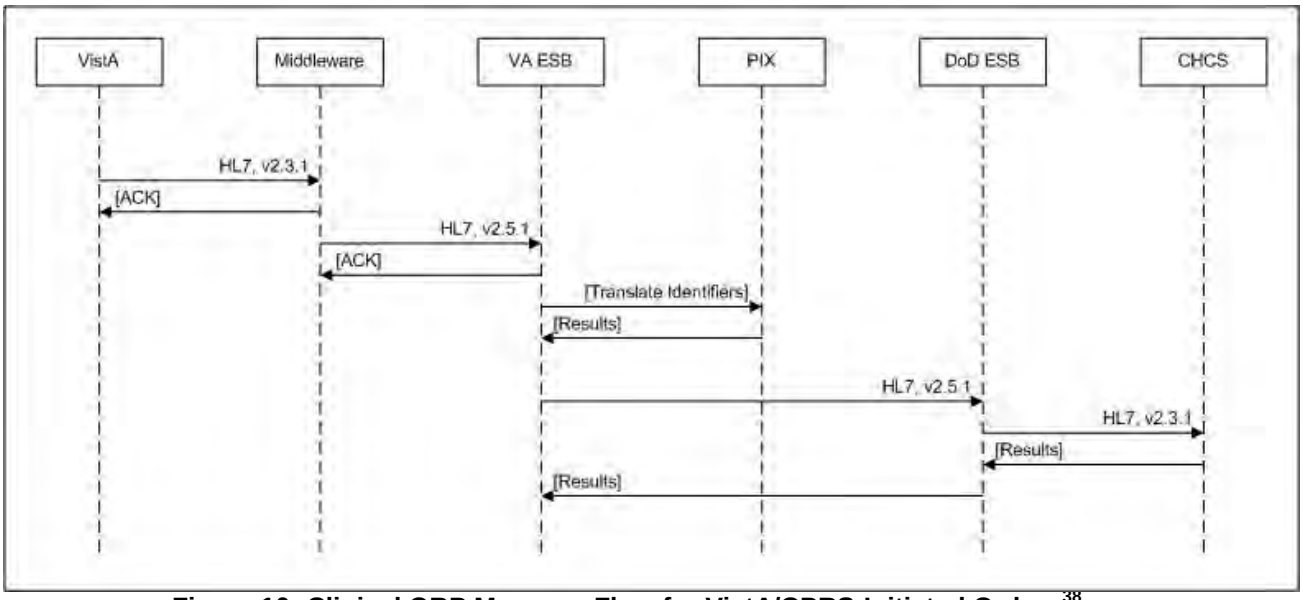


Figure 10: Clinical ORP Message Flow for VistA/CPRS-Initiated Orders[38]

The message flow for radiology, consult, and laboratory orders initiated in CHCS/AHLTA is essentially the same, and is depicted in the more detailed image in Figure 11:

[38] *JAL FHCC Expansibility of Federal Healthcare Centers: System Architecture Document Version 0.3* page 3.

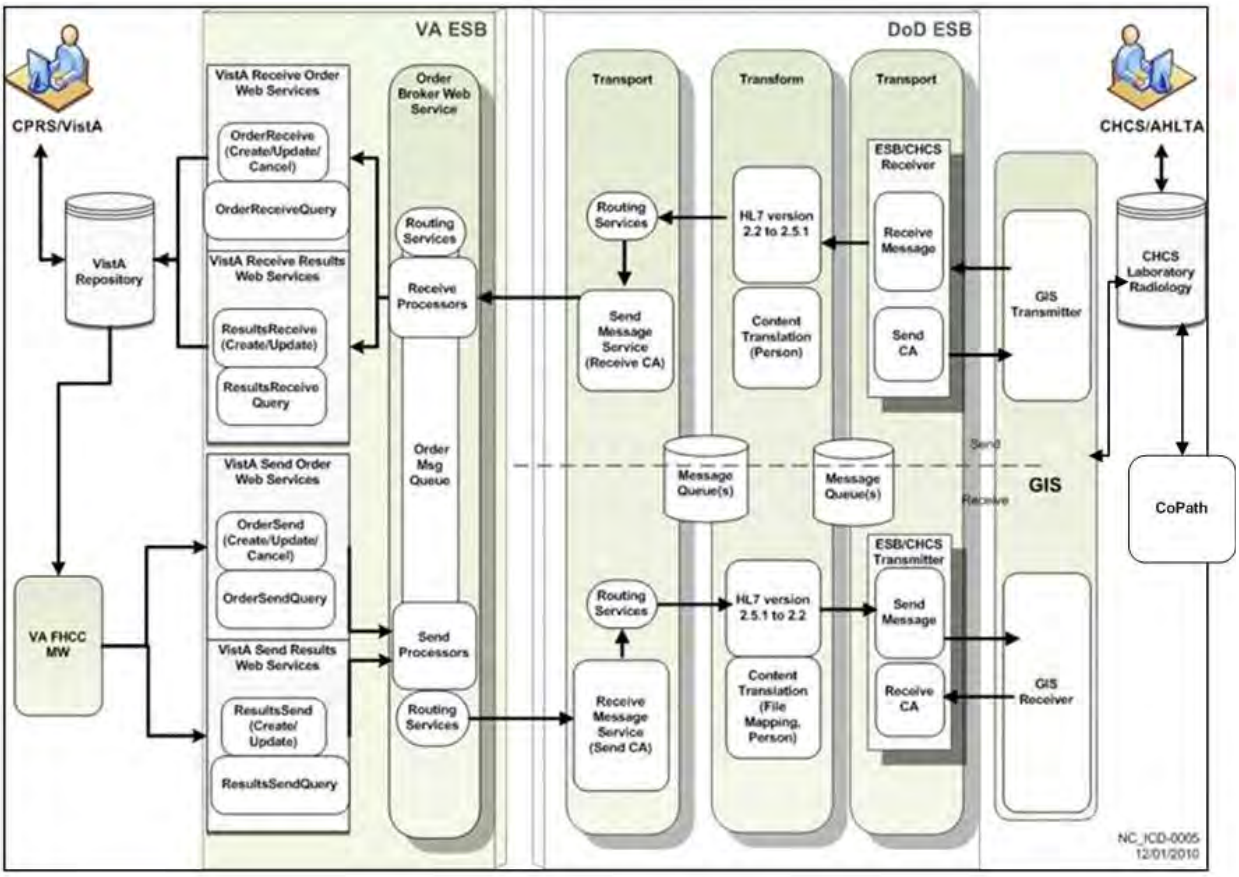


Figure 11: Clinical ORP Message Flow for CHCS/AHLTA-Initiated Orders[39]

ORP capabilities impact JAL FHCC data availability in multiple ways. First, data should transfer from the provider placing the order in one EHR to another provider/clinical service acting on the order in the alternate EHR. Second, data from the provider/clinical service acting on the order should transfer back to the ordering provider, and the results of the order should then be available in both the DoD and VA EHRs. Finally, the timeliness of interagency ORP transactions also impacts data availability, as data must be present in a timely fashion in order for providers/clinical services to take action.

JAL FHCC is provided with End of Day (EOD) Reports in which the transactional success rate (i.e., processing rate) is displayed for each of the ORP capabilities. EOD Reports indicate whether an ORP transaction was successfully sent from one ESB and successfully received by the other ESB. The EOD Reports provide a binary (i.e., yes/no) validation of data exchange. The EOD Reports do not account for transaction times. The EOD Reports also do not account for transactions that were initiated in an EHR but were never received by the sending ESB. For illustration, in Figure 10, an order can be placed in VistA/CPRS on the left-had side of the image but may never be received by the VA ESB. PE was unable to obtain data quantifying the number of transactions that are initiated in an EHR but are never received by the sending ESB.

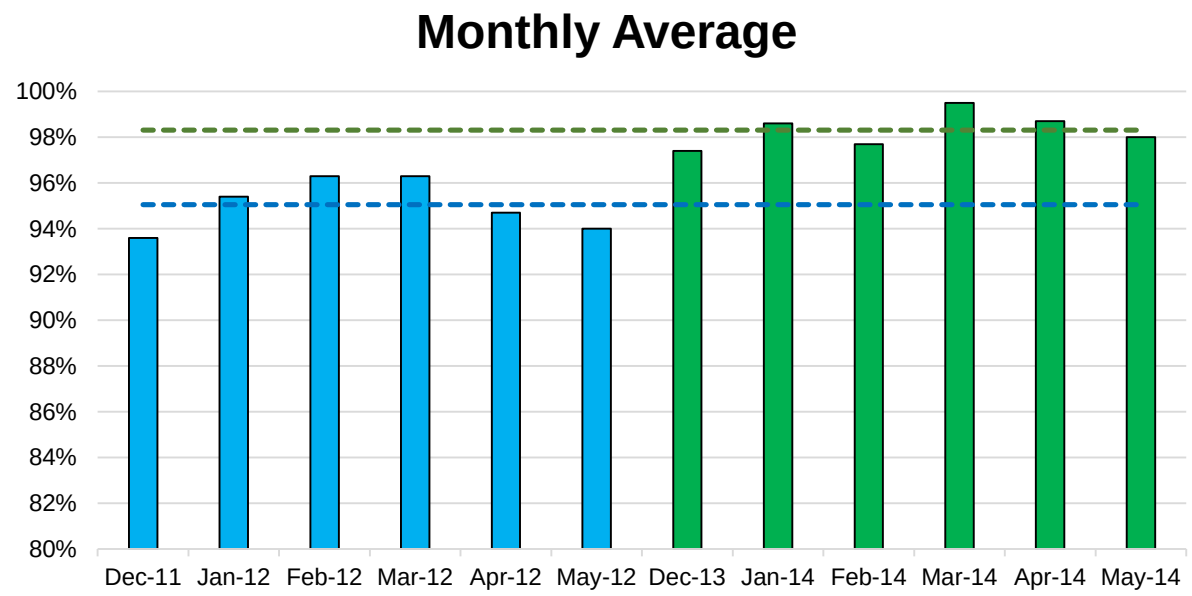
Data availability for each of the three implemented ORP capabilities is explored further below.

[39] *JAL FHCC Expansibility of Federal Healthcare Centers: System Architecture Document Version 0.3* page 14.

5.4.2.3.1 Orders Portability – Radiology

ORP for radiology was initiated in November 2011, and since then has shown improvements in data transactions of nearly 5%, as represented in Figure 12**.** Since December 2013, radiology data has been consistently exchanged at a transactional level of over 97%. As noted in Section 5.4.2.3 above, these figures only represented processing success rates for orders exchanged between the DoD and VA ESBs. These figures do not account for transaction turnaround times (including network delays and latency), nor do they account for transactions that did not reach the sending ESB.

Figure 12: Radiology Orders Portability Success Rate by Month (First Six Complete Months of Data and Latest Six Months of Data Provided)

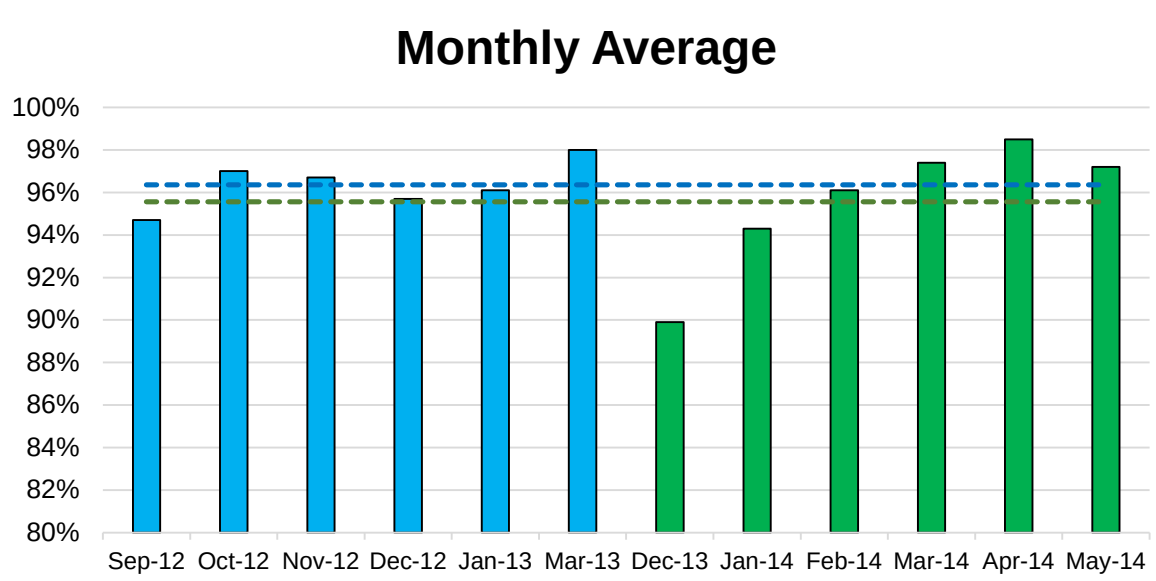


BLUE	Average Monthly Success Rate for Portability of Radiology Orders During the First 6 Months (Dec. 2011–May 2012) – **95.1%** Total 6 Month Average
GREEN	Average Monthly Success Rate for Portability of Radiology Orders During Most Recent 6 Months (Dec. 2013–May 2014) – **98.3%** Total 6 Month Average

5.4.2.3.2 Orders Portability – Consults

Consults portability has remained fairly consistent with an average transaction success rate of 96% since its inception in August 2012. This is reflected in Figure 13 below. As noted in Section 5.4.2.3 above, these figures only represented processing success rates for orders exchanged between the DoD and VA ESBs and do not account for transaction turnaround times (including network delays and latency). These figures also do not account for transactions that did not reach the sending ESB.

Figure 13: Consult Orders Portability Success Rate by Month (First Six Complete Months of Data and Latest Six Months of Data Provided)

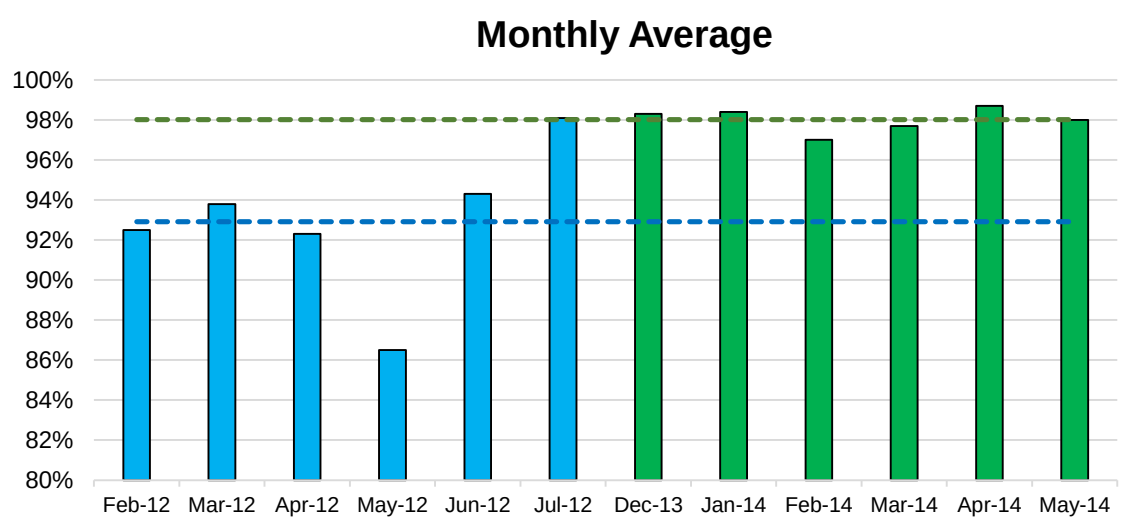


BLUE	Average Monthly Success Rate for Portability of Consultation Orders During the First 6 Months (Sept. 2012–March 2013) – **96.4%** Total 6 Month Average
GREEN	Average Monthly Success Rate for Portability of Consultation Orders During Most Recent 6 Months (Dec. 2013–May 2014) – **95.6%** Total 6 Month Average

5.4.2.3.3 Orders Portability – Laboratory

ORP for laboratory (lab), initiated in January 2012, has experienced nearly the same upward trend as radiology orders (as reflected in Figure 14). Since its inception, ORP for lab has shown a transactional success rate increase of nearly 5%, and has consistently exchanged lab data over 97% of the time from December 2013 through May 2014 (the most recent six months of data analyzed by PE). As noted in Section 5.4.2.3 above, these figures only represented processing success rates for orders exchanged between the DoD and VA ESBs. These figures do not account for transaction turnaround times (including network delays and latency) and do not account for transactions that did not reach the sending ESB.

Figure 14: Laboratory Orders Portability Success Rate by Month (First Six Complete Months of Data and Latest Six Months of Data Provided)



BLUE	Average Monthly Success Rate for Portability of Lab Orders During the First 6 Months of complete data (Feb. 2012–July 2012) – **92.9%** Total 6 Month Average
GREEN	Average Monthly Success Rate for Portability of Lab Orders During Most Recent 6 Months of data provided to PE (Dec. 2013–May 2014) – **98.0%** Total 6 Month Average

5.4.2.3.4 Orders Portability – Transaction Times (Including Network Delays and Latency)

In addition to the transactional measures EOD Report-based metrics which showcases a high degree of data availability facilitated by the JIF-funded ORP capabilities, the timeliness of transactions must also be considered.

Through interviews and observations, PE was informed that ORP transaction times can reach significant lengths on a near daily basis. According to JAL FHCC personnel, transaction times are longest during peak facility hours, typically 8:00 AM to 2:00 PM Monday through Friday.

Lengthy interagency transaction times cause workflow bottlenecks and increase providers' reliance on toggling between EHRs to gather patient data. Workflow bottlenecks are the most prevalent in the laboratory setting. As shown in Table 8, in May 2014, there were nearly five (5) times as many laboratory orders placed than either radiology or consult orders. May 2014 was not unique, as the lab consistently receives a much higher volume of orders than the radiology department or consulting providers. Therefore, the impact of lengthy transaction times is much greater in the laboratory setting. The impacts to laboratory workflow are explored further in the Benefit 2 section of this report.

Table 8: May 2014 Orders Metric by Order Type

Metric / Order Type	Radiology	Consults	Laboratory
VA – Total	5,078	10,493	50,589
VA – Passed	4,960	10,180	49,872
VA - Percent Passed	97.7%	97.0%	98.6%
DoD – Total	2,279	2,249	22,861
DoD – Passed	2,234	2,190	22,071
DoD - Percent Passed	98.0%	97.4%	96.5%
Total Orders	7,357	12,742	73,450
Total Passed	7,194	12,370	71,943
Total Not Passed	163	372	1,507
Total Percent Passed	97.8%	97.1%	97.9%

Per the lead VA Program Manager for the DoD/VA IM/IT Development Team, average interagency transaction times at JAL FHCC are two (2) minutes. The VA Program Manager also noted that transaction times can exceed five (5) hours.

JAL FHCC IM/IT support personnel are currently working to procure network diagnostic tools that will provide greater capabilities to measure interagency transaction times. The tools should also allow JAL FHCC to identify the root cause of lengthy interagency transaction times. The major source of lengthy transaction times is believed to be the network architecture in place at JAL FHCC. Each transaction has to pass through multiple networks, firewalls, gateways, and security protocols. These levels of network architecture and network security add delays to electronic transactions. Additionally, network connectivity issues can cause significant downtime.

Another potential cause of lengthy interagency transaction times is the functionality of the ESBs and associated middleware services. Several JAL FHCC IM/IT personnel view the DoD ESB to be superior to the VA ESB in terms of functionality and processing capability. However, the source of interagency transaction delays/latency cannot be objectively assessed without more advanced network diagnostic tools and the authority to operate those tools across both agencies' networks.

5.4.2.3.5 Orders Portability – Success Criteria

The DoD and VA have not established clear success criteria for ORP data availability. With defined measures of success, resources can be assigned appropriately where most needed. For instance, it is unclear whether two minutes is an acceptable average daily transaction time for interagency transactions. If so, no further investment would be needed once it is confirmed that interagency transaction times have reached this daily average. However, if average daily transaction times exceed this threshold, or if two minutes is deemed to be an unacceptable daily average, then further analysis and investment may be required to improve interagency transaction times.

5.4.2.4 Metric Grouping 1.2.4 Financial Reconciliation

PE found that the JIF-funded Financial Reconciliation web tool is not currently functional. The Financial Reconciliation web tool is designed to automate the aggregation and normalization of multiple DoD and VA data sources for consolidated reporting and analysis of JAL FHCC integrated expenditures. Without the Financial Reconciliation web tool, JAL FHCC Health Care Business personnel must navigate multiple systems to aggregate and input data into Microsoft Excel workbooks.

5.4.2.5 Metric Grouping 1.2.5 Staff Satisfaction with Data Availability

PE found that JAL FHCC personnel, overall, are satisfied with data availability at JAL FHCC; however, there is concern (primarily among personnel who serve DoD patients) that the IM/IT model at JAL FHCC introduces the potential for patient data to be overlooked.

As noted in Section 5.4.1.3 above, JAL FHCC's IM/IT application architecture is predicated on access to two legacy EHRs that are managed by two separate agencies coupled with new middleware applications to bridge the legacy systems.

For JAL FHCC personnel who serve VA patients, with few exceptions, data availability is either no different or better than data availability at any other VA Medical Center (VAMC). Data availability is at least no different because, with the exception of a single Hearing Conservation clinic, all VA patient services are provided on the JAL FHCC West Campus, on the VA network, using VA applications.[40] This means that VA patient care and the IM/IT systems supporting patient care are essentially the same at JAL FHCC as it is at any other VAMC.

Also, many JAL FHCC personnel who serve VA patients actually consider data availability to be better at JAL FHCC than at other VAMCs. This is because JAL FHCC personnel are provided with direct access into the DoD EHR. Obtaining direct access to the DoD's EHR is rare at other VAMCs.

With limited exceptions, all VA patients were previously DoD patients and have an electronic health record in CHCS/AHLTA. Therefore, JAL FHCC personnel who serve VA patients can directly access their patients' prior medical information in their CHCS/AHLTA record. JAL FHCC personnel routinely stated that direct access into CHCS/AHLTA is superior to the Remote Data Viewer (RDV) solutions currently available at other VAMCs.

The few exceptions where data availability may be more limited at JAL FHCC than at another VAMC arise when a VA patient receives care from a CHCS/AHLTA-based clinic. VA patients would almost only receive care from CHCS/AHLTA-based clinics if they are dual beneficiaries. Dual beneficiaries enjoy both VA and DoD Tricare benefits, and can select to receive DoD care if the treatment is not for a service-connected condition.[41] Unless a dual beneficiary's care received at a CHCS/AHLTA-based clinic was associated with a consult, the encounter would only be documented in CHCS/AHLTA.

Dual beneficiaries are not limited to JAL FHCC. Dual beneficiaries exist throughout the VA patient population. Therefore, a dual beneficiary's decision to receive care from an MTF (i.e., a CHCS/AHLTA-based care provider) rather than from a VAMC should be no different than their decision at JAL FHCC. However, dual beneficiaries may exercise their ability to receive care from CHCS/AHLTA-based clinics more frequently at JAL FHCC because the services are conveniently collocated in the same health care center.

Again, even if a VA patient receives care from a CHCS/AHLTA-based clinic, VA providers at JAL FHCC have the ability to directly access CHCS/AHLTA. The high majority of VA providers at other VAMCs cannot directly access CHCS/AHLTA and would not have easily accessible data if their dual beneficiary patient receives care from another MTF. Therefore, the main difference in data availability for personnel who serve VA patients is that dual beneficiary VA patients may exercise their ability to receive DoD-based care (documented in CHCS/AHLTA) more frequently than at other VAMCs.

Alternatively, for JAL FHCC personnel who serve DoD patients, locating all patient data is more challenging than at other MTFs. An additional challenge is introduced because several clinical services are provided by VistA/CPRS-based clinics/departments. For example, with limited exceptions, all

[40] Pages 114 – 119 of the IOM *Evaluation of the Lovell Federal Health Care Center Merger: Findings, Conclusions, and Recommendations* contains a listing of clinical integration status for JAL FHCC.
[41] http://www.tricare.mil/DVPCO/va-direct.cfm

specialty care is documented in VistA/CPRS. JAL FHCC planners sought to minimize this impact by creating ORP for consults. With the Consults ORP capability, an order can be placed for specialty care in CHCS/AHLTA and can be received by the VistA/CPRS-based specialty care provider. Similarly, the consult result note transfers back to CHCS/AHLTA through ORP. Often, the specialty care provider will schedule follow-up appointments with the DoD patient. Those follow-up appointments will be scheduled through VistA/CPRS and the care will be documented in VistA/CPRS. If the specialty care clinic follows protocols outlined by JAL FHCC, then the follow-up visit can be associated with the initial consult in VistA/CPRS, and the consult notes from the follow-up visits will also transport back into CHCS/AHLTA.

However, protocols are not always adhered to for follow-up visits. The provider could document in progress notes rather than the specific consult notes section that is compatible with the ORP capability. Or, the follow-up visit could be scheduled in a manner that does not associate the visit with the initial consult. Although this is primarily a training issue, rather than an IM/IT issue, because of JAL FHCC's clinical integration and supporting IM/IT model, there is the potential for incomplete CHCS/AHLTA records.

If protocols are not adhered to, and specialty care documentation is only contained in VistA/CPRS, then the DoD patient's primary care provider would need to view the VistA/CPRS encounter documentation by toggling to VistA/CPRS, or by using an RDV solution.

In summary, personnel who serve DoD patients at JAL FHCC believe that the decision to provide certain services through VistA/CPRS, while providing DoD primary care and other select clinical services through CHCS/AHLTA, creates increased potential that a patient encounter or key piece of patient data could be overlooked.

5.4.3 Performance Measure 1.3: IM/IT Performance – Data Completeness

Data Completeness is the extent to which data arrives in its entirety; meaning data is not missing and is of sufficient breadth and depth for the task at hand. There was limited quantitative data available regarding data completeness. PE's data was primarily derived from interviews and observations.

Below, the results of metric groupings designed to assess data completeness are presented.

5.4.3.1 Metric Grouping 1.3.1 Orders Portability

PE found that, overall, when ORP data successfully transferred from one EHR to the other, the data was complete. The only instances where JAL FHCC personnel identified incomplete ORP data were regarding "Provider Proxies". Provider Proxies were established by JAL FHCC IM/IT personnel so that orders initiated by providers with expired user credentials would not fail. As an example, for an order placed by a DoD primary care provider to port from the DoD EHR into the VA EHR, the DOD primary care provider would need to have active user credentials in both the DoD and VA EHRs. If either set of user credentials expired, the order would not port. JAL FHCC IM/IT personnel created a Provider Proxy so that the order would still port. The provider's name should be input in the comments field of the order; however, it is possible for the provider's name to be missing.

In general, however, the ORP capabilities experience data availability issues in which data does not port from one EHR to the other. For orders that successfully port from one EHR to the other, the ported data is typically complete.

5.4.3.2 Metric Grouping 1.3.2 Staff Satisfaction with Data Completeness

PE found that, overall, JAL FHCC personnel are satisfied with data completeness at JAL FHCC; however, there is a concern that DoD patient records may be incomplete when the patient transfers to another MTF. As detailed in section 5.4.2.5 of this report, certain clinical services at JAL FHCC are only provided in VistA/CPRS-based clinics/departments. Documentation from those VistA/CPRS-based encounters must be accessed through a Remote Data Viewer (RDV) solution or directly in VistA/CPRS. Therefore,

there is debate whether a DoD patient's CHCS/AHLTA record is truly complete when they are discharged form JAL FHCC.

In order to determine the extent of incomplete CHCS/AHLTA records, an audit of patient records would need to be conducted.

5.4.4 Performance Measure 1.4: IM/IT Performance – Application and System Responsiveness

Application responsiveness is the amount of time for a result to occur or an output to be achieved once it has been requested in the application. Acceptable response time is established by the interagency requirements for data entered and received for all functionalities from both DoD and VA systems/applications.

System responsiveness is the act of a computer user initiating an action and expecting a response in a reasonable amount of time. Performance bottlenecks within complex enterprise application architecture can slow system performance and delay the movement of clinical data through the system, resulting in user dissatisfaction and frustration. Delays in response time can occur anywhere between the database servers, network infrastructure, or local desktop and they can be related to a multitude of technical issues. An example of a system responsiveness measure is the amount of time it takes for a user to login to, or initiate, a system such as AHLTA from an MSSO/CM environment.

Results of application and system responsiveness are shown in the Benefit 2 section of this report under Performance Measures 2.2 – Application Responsiveness and 2.3 – System Responsiveness, beginning on page 81.

6 BENEFIT 2 FINDINGS – IMPROVE EFFICIENCY OF CLINICAL AND ADMINISTRATIVE PROCESSES

6.1 Benefit 2 Overview

Improved Efficiency of Clinical and Administrative Processes occurs when the right combination of people, processes, and technology comes together to enhance the productivity and output of any task using available resources.

The JAL FHCC demonstration project was intended to better align health care services with the needs of two patient populations. JAL FHCC was also designed to achieve economies of scale by integrating underutilized facilities and, thus, maximizing consolidated services for a greater number of beneficiaries. Finally, the JAL FHCC organizational structure was intended to improve efficiencies by establishing one chain of command to oversee facility operations.

Working within constraints established by the respective DoD and VA agencies (such as the required maintenance of two EHRs and separate networks), JAL FHCC planners sought to invest in IM/IT solutions that could enable the efficiency gains envisioned for JAL FHCC.

The IM/IT investments focused on improving efficiencies through the following:

- Enabling the use of integrated ancillary, diagnostic, and specialty care services;
- Minimizing the burden of using two EHRs; and
- Eliminating the burden of interagency billings.

Benefit #2

JAL FHCC IM/IT investments have not enabled the benefit of Improved Efficiency.

Challenges Remaining:

- Policy constraints requiring separate networks, separate security protocols, separate care protocols, and separate reporting requirements
- Lengthy interagency electronic transactions
- Challenges with virtualized applications/tools
- Lack of JIF-funded interoperable IM/IT solutions for clinical services such as pharmacy, Emergency Department (ED) care, and inpatient care
- Functional challenges with the web-based Financial Reconciliation tool
- Reliance upon separate agency-level IM/IT support organizations
- Lack of consistent end-user training

The IM/IT investment in the JPRS and ORP capabilities was intended to enable the use of integrated ancillary, diagnostic, and specialty care services. Orders placed in either EHR could be processed by one laboratory, one pharmacy, one radiology department, or one specialty care clinic. This could improve efficiency by avoiding duplication of resources.

The IM/IT investment in MSSO/CM was intended to minimize the burden of using two EHRs. Providers could seamlessly log into multiple systems and toggle between those systems while viewing information for the same patient. This could improve efficiency by minimizing multiple logins and patient lookups.

Finally, the IM/IT investment in Financial Reconciliation was intended to eliminate the burden of interagency billings. Financial Reconciliation provided an algorithm and web-based tool to calculate the allocation of JAL FHCC integrated services provided between the DoD and VA. Such back-end calculations and supporting IM/IT tools would alleviate the need to conduct routine interagency billings.

At JAL FHCC, IM/IT benefits associated with efficiency are directly linked to the realization of Benefit 1, Improve Interagency Data Sharing. The IM/IT model provides the network, data, and application architectures that act as the foundational building blocks for clinical and administrative efficiencies to be

achieved. The IM/IT solutions should enable both the clinical and business components of health care such that they are seamless to the end-user regardless of whether they originated from the DoD or VA.

This assessment designed to identify where IM/IT-enabled efficiencies have been realized as well as where gaps exist in the achievement of clinical and administrative efficiencies. Stakeholders can leverage these findings to identify gaps in existing processes and system functionality for both improvement at JAL FHCC now and for lessons learned when considering future Federal health care centers.

6.2 Benefit 2 Key Findings/Conclusions:

Overall, the benefit of Improved Efficiency of Clinical and Administrative Processes has not been enabled by IM/IT investments at JAL FHCC.

Although significant achievements were made in terms of interagency data sharing, and granting access to both agencies' EHRs is perceived to be superior to other Remote Data Viewer (RDV) technologies, the following items are hindering clinical and administrative efficiencies:

- Policy constraints requiring separate networks, separate security protocols, separate care protocols, and separate reporting requirements
- Lengthy interagency electronic transactions
- Challenges with virtualized applications/tools
- Lack of JIF-funded interoperable IM/IT solutions for clinical services such as pharmacy, Emergency Department (ED) care, and inpatient care
- Functional challenges with the web-based Financial Reconciliation tool
- Reliance upon separate agency-level IM/IT support organizations
- Lack of consistent end-user training

The JAL FHCC IM/IT investments can enable improved efficiency. However, in order to do so, the barriers listed above (and expanded further below) must be overcome. JAL FHCC IM/IT leadership is continuously working to improve IM/IT performance. DoD and VA agency-level stakeholders should continue supporting JAL FHCC, and determine if additional IM/IT investments are required so that improved efficiencies envisioned for JAL FHCC can be realized.

6.2.1.1 Policy Constraints

Policy constraints are the leading barrier to the IM/IT investments' ability to improve clinical and administrative efficiencies at JAL FHCC. Requirements to maintain separate networks, separate security protocols, separate care protocols, and separate reporting requirements have created lengthy interagency transaction times and have also increased JAL FHCC personnel's need to navigate two agencies' systems/applications.

Although this report is focused on IM/IT, policy constraints impact efficiencies much more broadly. A related evaluation is currently being conducted by Knowesis, Inc. in support of the Demonstration Evaluation Report required by the *National Defense Authorization Act for Fiscal Year 2010*. Knowesis, Inc.'s evaluation will more fully explore policy constraints impact on overall JAL FHCC operations.

Additionally, the Institute of Medicine's (IOM's) 2012 *Evaluation of the Lovell Federal Health Care Center Merger: Findings, Conclusions, and Recommendations* explicitly detailed agency-level policy constraints at JAL FHCC. The following is stated in the IOM's 2012 report summary:

> The biggest constraint was—and is—the existence of the three departments involved—the DoD, the Navy, and the VA. The VA and the DoD have different missions and are separately accountable for their performances to the president of the United States and Congress. Each has its own priorities and goals and associated business processes. Although the Department of the Navy is part of the DoD, it has a certain amount of discretion in how it carries out its business,

> which can be more specific or strict than DoD's policies and procedures (and different from the Army's or the Air Force's policies and procedures).
>
> Ultimately, no matter how seamlessly it conducts its daily business, the Lovell FHCC has to report to the Navy and to the DoD on how well it performs as a military treatment facility (MTF) and to the VA on how well it performs as a VA medical center (VAMC). This set of dual standards and reporting requirements is an extra burden for the FHCC compared with what is required for an MTF or a VAMC. It also limits the feasibility and cost effectiveness of integrating functions.[42]

PE found that the majority of JAL FHCC personnel interviewed concur with the IOM's statement. IM/IT is one critical subcomponent of overall DoD, DoN, and VA policy constraints.

6.2.1.2 Lengthy Interagency Transaction Times

Lengthy interagency transaction times hinder efficiencies at JAL FHCC, primarily for personnel serving DoD patients on the West Campus. Per the lead VA Program Manager for the DoD/VA IM/IT Development Team, average interagency transaction times at JAL FHCC are two (2) minutes. Although two minutes may be acceptable, the VA Program Manager also noted that transaction times can exceed five (5) hours.[43] JAL FHCC personnel stated that lengthy interagency transaction times are a near daily occurrence during peak facility hours.

Lengthy interagency transaction times have the biggest impact on efficiency for laboratory personnel, providers who have placed laboratory orders (that are processed by the main West Campus laboratory) for DoD patients through CHCS/AHLTA, and DoD patients (being served by an East Campus or primary care provider) who require a laboratory test from the main West Campus laboratory. JAL FHCC has multiple laboratories. Certain complex laboratory tests must be processed by the main West Campus laboratory – which is a VistA-based laboratory. When a laboratory order for a DoD patient has been placed in CHCS/AHLTA that requires processing in the main West Campus laboratory, the order should transfer through ORP from CHCS/AHLTA into VistA/CPRS for processing.

Information from interviews with laboratory personnel indicate that sometimes the DoD patient arrives at the main West Campus laboratory before the electronic order arrives. Similarly, the DoD patient can have their lab test conducted, and then return to his/her provider before the laboratory result is available in CHCS/AHLTA. This has contributed to the main West Campus JAL FHCC laboratory having both CHCS/AHLTA and VistA open at the laboratory reception area so that if a patient arrives, and there is no order in VistA, the lab technician can view the order in CHCS/AHLTA. Once the order is viewed in CHCS/AHLTA, the laboratory order is manually entered into the VistA-interfaced laboratory Information System (LIS). The lab result must also often be entered in CHCS/AHLTA after the test is conducted.

When ORP is fully functioning, there are no network connectivity issues, JPRS-based correlation errors, or significant transaction delays, ORP will synchronize the order, the accession, and the result automatically in both EHRs. If not, efficiency is lost as the laboratory toggles between EHRs and performs a series of manual entries between CHCS/AHLTA and VistA/CPRS in order to limit delays for the patient.

DoD patients can feel impacts of the lengthy interagency transactions if they have to wait in the laboratory for personnel to locate the CHCS/AHLTA-based order and then conduct additional manual steps.

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[42] IOM *Evaluation of the Lovell Federal Health Care Center Merger: Findings, Conclusions, and Recommendations* page 5.

[43] According to JAL FHCC SMEs, auto-generated alerts are available for JAL FHCC depicting hourly, daily, weekly, and monthly interagency electronic transaction times. Additionally, an auto-generated alert is created when the average hourly transaction time for interagency transaction times exceed five (5) minutes for the prior hour. This data, however, was not able to be provided to PE.

Similarly, the ordering provider may have to toggle from CHCS/AHLTA to VistA/CPRS if the VistA-processed result has not yet ported back to the DoD EHR.

Lengthy interagency transaction times have little to no impact on VA patients and providers who care for VA patients. All VA patient laboratory orders are processed on the West Campus using VistA/CPRS – which is VA patients' native EHR. Although all orders port from one EHR to the other, VA patient laboratory orders are fully self-contained within VistA/CPRS. Therefore, even if there is a network connectivity issue or lengthy interagency transaction time, it will not impact the processing of VA patient laboratory orders.

6.2.1.3 Virtualized Applications/Tools

Difficulty accessing virtualized applications and tools limit efficiencies at JAL FHCC. Throughout PE's interviews with JAL FHCC end-users and facility and IM/IT leadership, the two major frustrations expressed were the latency associated with electronic interagency transactions and difficulty accessing the IM/IT tools personnel need for their daily workflow.

As discussed further in the Benefit 1 section of this report (beginning on page 40), the network security policies set forth by the DoN, DoD, and VA and enumerated in the *JAL FHCC Executive Agreement* have led to a network infrastructure characterized by the following at JAL FHCC:

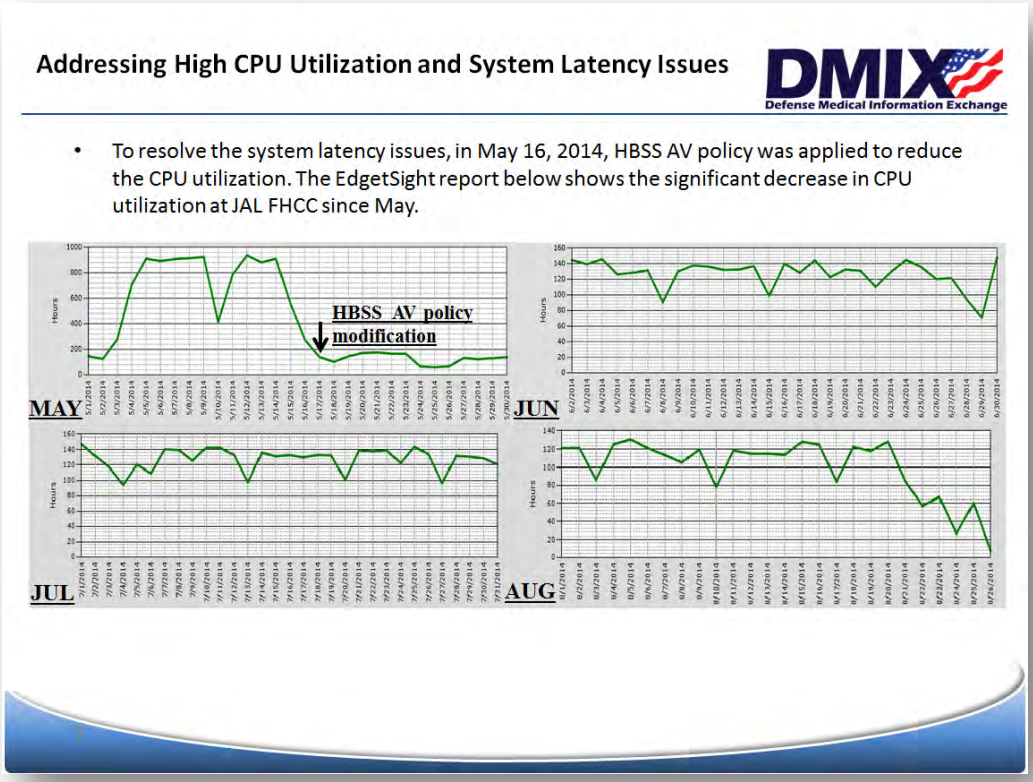
- Personnel who work on the JAL FHCC West Campus cannot directly access clinical and business systems hosted on the East Campus' DoN network.
- Personnel who work on the JAL FHCC East Campus cannot directly access clinical and business systems hosted on the West Campus' VA network.
- Personnel are required to use a Citrix-based AVHE hosted on an intermediate Military Health System (MHS)/Defense Health Agency (DHA) network to access clinical and business systems located on the alternate campus' network.

PE observed multiple instances where AVHE-based applications were unable to load on JAL FHCC East and West Campus workstations. PE also observed multiple instances where the AVHE-based applications were taking several minutes to load. Finally, PE observed instances where connectivity with AVHE dropped.

A key factor in the performance of the AVHE at JAL FHCC is the use of MSSO/CM. The MSSO/CM capabilities were funded by the Joint Incentive Fund (JIF); however, primarily due to separate contracting requirements for DoD and VA, each agency procured a separate MSSO/CM solution for their respective JAL FHCC workstations (i.e., computer terminals). The VA procured Sentillion from the vendor Caradigm. The DoD procured CareFX Controller from Harris Corporation.

The use of MSSO/CM has been a learning process for the JAL FHCC IM/IT Development and Support Teams. According to a briefing provided by the JAL FHCC IM/IT Support Team, MSSO/CM required high Central Processing Unit (CPU) utilization. The high CPU utilization contributed to system latency when MSSO/CM was enabled and applications were being accessed through AVHE. Per the slide (shown in Figure 15 below), a new Host Based Security System (HBSS) Anti-Virus (AV) policy was implemented on JAL FHCC workstations on May 16, 2014. This HBSS AV implementation was performed after PE concluded its site visits at JAL FHCC and was not directly observed; however, the slide shows that CPU utilization was reduced following implementation of the new policy.

Figure 15: MSSO/CM CPU Utilization Slide Provided by JAL FHCC[44]



Another considerable factor in AVHE's performance is incompatibility with the CareFx Controller CM Toolbar solution and the Citrix-based AVHE. As noted above, CareFX is the MSSO/CM solution procured by the DoD IM/IT development team for installation on DoD workstations at JAL FHCC. On the West Campus, DoD workstations are primarily used by DoD primary care providers.

The incompatibility of the CareFx Controller CM Toolbar with the Citrix-bases AVHE causes instability and difficulty reconnecting to AVHE when the CM Toolbar is running in a user's session. As noted in the Summary of Evaluation Findings, in June 2014, the DHA AVHE and MSSO/CM Teams worked with Citrix System, Inc. and Harris Corporation to implement a "hotfix" for the Citrix client installed on JAL FHCC workstations. This hotfix was conducted after PE concluded its site visits and, therefore, was not observed. However, the DHA AVHE and MSSO/CM Teams note that the hotfix has fixed the compatibility issue. According to the lead DoD Program Manager for the DoD/VA IM/IT Development Team, preliminary reports from the MSSO/CM Operational Assessment conducted following the hotfix indicate that effectiveness and suitability for MSSO/CM are at 95.5% and 90.8%, respectively.

Difficulty accessing virtualized IM/IT tools is most prevalent for JAL FHCC personnel serving DoD patients on the West Campus. The IM/IT systems on the JAL FHCC West Campus are hosted on the VA's network. Therefore, the only way for West Campus personnel to access DoD IM/IT systems/tools is through the AVHE. Among West Campus personnel serving DoD patients, the biggest impact is to DoD primary care providers. DoD primary care providers document in the DoD's EHR (CHCS/AHLTA). Therefore, DoD primary care providers' workflow is almost entirely predicated on having access to CHCS/AHLTA through the AVHE.

[44] Please note that the Y-Axis scale shifts from 0 – 1,000 in May 2014 to 0 – 140 and 0 – 160 in June – August 2014.

For providers who serve DoD patients on JAL FHCC's West Campus using VA workstations, the main challenge accessing IM/IT tools is experienced when prescribing medications. Because there is currently no pharmacy ORP solution, JAL FHCC requires all outpatient medication orders to be placed in the patient's native EHR. Therefore, if a provider is ordering a medication from a VA workstation, the provider has to place the order in the AVHE-based CHCS/AHLTA EHR.

VA workstations use the Sentillion MSSO/CM solution. The Sentillion MSSO/CM solution has not experienced the Citrix-based AVHE compatibility issues presented by the CareFX solution. Even though Sentillion has not experienced the AVHE compatibility issue presented by CareFX, care providers state that accessing AVHE and toggling to another system in order to place a medication order is an additional workflow step that makes it less efficient to provide care.

While providers agree that toggling between EHRs to place medication orders causes workflow inefficiency, the efficiency impact of toggling between EHRs to view/reference a DoD patient's CHCS/AHLTA historical record is more complex. Providers believe that the ability to access CHCS/AHLTA directly is more efficient than utilizing a Remote Data Viewer (RDV) to locate prior patient history. However, nearly all personnel interviewed at JAL FHCC believe the most efficient method would be to utilize a single EHR.

For providers that serve DoD patients on JAL FHCC's East Campus, difficulty accessing virtualized IM/IT tools has more limited impact to efficiency. This is because, with very few exceptions, the East Campus provides care exclusively for DoD patients. The East Campus is hosted on the DoN network and, therefore, East Campus personnel have direct access to CHCS/AHLTA and other DoD-based IM/IT applications/tools they need to provide care. East Campus personnel primarily require access to virtualized (i.e., AVHE-based) applications/tools when one of their DoD patients has received care in the ED, has received other specialty care that was not associated with a consult, or if there was an ORP failure for a complex laboratory or radiology order that could only be performed on the West Campus. Additionally, East Campus personnel do need to access administrative tools (primarily SharePoint) through virtualized tools.

For providers that serve VA patients on the West Campus, there is no difficulty accessing IM/IT tools. And, with very few exceptions, all VA patient care is provided on the West Campus. Because the West Campus is hosted on the VA network, JAL FHCC West Campus personnel have direct access to the IM/IT systems they need to provide care–and it is essentially like working in any non-integrated VAMC. It is only when these care providers are serving DoD patients that the providers may have to access CHCS/AHLTA through AVHE.

6.2.1.4 Clinical Services Not Supported by Interoperability

The lack of interoperability solutions for the following clinical services has negatively impacted efficiencies at JAL FHCC:

- Emergency department (ED) services
- Inpatient services
- Surgery and specialty care services not initiated by a consult
- Pharmacy services

The ED, inpatient care units, (with limited exceptions) surgical units, and (with limited exceptions) specialty care units all document in VistA/CPRS. Therefore, the impact to efficiency is almost entirely felt by care providers serving DoD patients at JAL FHCC.

Specialty care and surgical encounters that are initiated by a consult leverage the interoperable ORP capabilities. For example, a DoD patient may be referred to a specialty care provider by their primary care provider. The DoD patient's primary care provider can enter the consult order in CHCS/AHTLA and the

order will port over to the consulting provider on VistA/CPRS. The consult result note documented by the consulting provider will port back to CHCS/AHLTA.
Often, the consulting provider will schedule follow-up appointments with the DoD patient. Those follow-up appointments will be scheduled through VistA/CPRS and the care will be documented in VistA/CPRS. If the consulting clinic follows protocols outlined by JAL FHCC, then the follow-up visit can be associated with the initial consult in VistA/CPRS, and the consult notes from the follow-up visits will also transport back into CHCS/AHLTA.

However, protocols are not always adhered to for follow-up visits. The consulting provider could document in progress notes rather than the specific consult notes section of VistA/CPRS that is compatible with the ORP capability. Or, the follow-up visit could be scheduled in a manner that does not associate the visit with the initial consult. Although this is primarily a training issue, rather than an IM/IT issue, because of JAL FHCC's clinical integration and supporting IM/IT model, there is the potential that notes from specialty care or surgical care will only be documented in VistA/CRPS.

Similarly, documentation in JAL FHCC's inpatient care units and the ED is only documented in VistA/CPRS and does not port back over to CHCS/VistA. In these cases, the DoD primary care provider must either toggle to VistA/CPRS or locate the documentation through an RDV (such as BHIE). Although JAL FHCC personnel state that toggling between EHRs is faster and superior to using RDVs, the step of toggling between EHRs is still an additional workflow step that may not be required at other MTFs.

Regardless of the clinic or department a provider is located in, outpatient pharmacy orders must be placed in the patient's native EHR. JIF funds were provided for the development of pharmacy ORP requirements and the implementation of a pharmacy ORP solution. And, it was intended that JAL FHCC's main West Campus pharmacy would process all orders through VistA. However, the pharmacy ORP solution has been indefinitely deferred for multiple reasons.[45]

The requirement to place all outpatient pharmacy (i.e., medication) orders in the patient's native EHR is one of the primary complaints stated by providers who care for DoD patients, but document in VistA/CPRS. As an example, a specialty care provider may conduct all documentation in VistA/CPRS. The provider can even receive a consult for a DoD patient directly in VistA/CPRS. However, if the specialty care provider needs to order medications for that DoD patient, then the provider must toggle over to CHCS/AHLTA to place the medication order.

The requirement to place all outpatient pharmacy orders in the patient's native EHR has led to the creation of workarounds. Workarounds include use of paper pharmacy orders and, at times, requests from one provider that another provider enter the pharmacy order. The latter occurs if a VistA/CPRS-based provider cannot log into CHCS/AHLTA. At that time, some providers either send a paper pharmacy order or ask another provider who is logged into CHCS/AHLTA to enter the order on their behalf.

Finally, the requirement to place all outpatient pharmacy orders in the patient's native EHR has required the main West Campus pharmacy to utilize both the DoD and VA EHRs to process medications. Pharmacy personnel also have to field paper pharmacy orders and routinely have to ask providers to reenter medication orders in the patient's native EHR. This has impacted efficiency, as pharmacy personnel cannot concentrate their resources on a single system and feel the extra burden of paper-based orders. According to interviews with pharmacy personnel and the IOM's 2012 *Evaluation of the Lovell Federal Health Care Center Merger: Findings, Conclusions, and Recommendations* report, the IM/IT limitations for pharmacy directly contributed to the hiring of five additional pharmacy personnel.[46]

[45] Reasons for the deferral of the pharmacy ORP solution are discussed on page 11 of this report.
[46] The JAL FHCC integration itself allows increased services for both organizations and the increased need for pharmacists associated with these services (e.g., oncology) may also account for the need to have additional pharmacy staff. The exact number of pharmacy personnel hired could not be corroborated with personnel or accounting data.

6.2.1.5 Functional Challenges with Financial Reconciliation Web Tool

Challenges encountered by the Financial Reconciliation web tool have limited efficiency gains for JAL FHCC Health Care Business personnel. The Financial Reconciliation web tool was not operational when observed by PE. The primary end-user of the Financial Reconciliation web tool noted that the tool was initially operational but experienced issues once transitioned from the IM/IT Development Team to the IM/IT Sustainment Team. The primary end-user of the Financial Reconciliation web tool stated that when the web tool was operational, the tool reduced the time required to perform monthly reconciliation processes from one week down to one day.

The primary end-user of the Financial Reconciliation web tool is currently working with the IM/IT Sustainment Team and JAL FHCC IM/IT support personnel to remedy the issues. Once remedied, the Financial Reconciliation web tool should enable administrative efficiencies.

6.2.1.6 Separate Agency-Level IM/IT Support Organizations

The reliance upon separate agency-level IM/IT support organizations has impacted administrative efficiencies. The DoD/VA IPO was given responsibility for the development and implementation of JIF-funded IM/IT investments. Under the DoD/VA IPO, there was a DoD-led IM/IT Development Team and a VA-led IM/IT Development Team. The two teams collaborated and routinely worked together. However, contractual and organizational limitations produced several inefficient results for the JAL FHCC IM/IT model.

Firstly, two Enterprise Service Buses (ESBs) are utilized at JAL FHCC. One ESB is located on the VA network domain and the other ESB is on the DoD's MHS network domain. The use of two ESBs rather than a single ESB produces an additional layer of interagency transactions that add to transaction times. Each ESB also requires unique knowledge to update and maintain. Although a contract was recently established for a single IM/IT Sustainment Team at JAL FHCC, maintaining two ESBs has interfered with IM/IT personnel's ability to focus on enhancements to a single ESB and a single Service Oriented Architecture (SOA).

Secondly, two separate MSSO/CM solutions were procured. As noted above, the DoD procured Harris Corporation's CareFX solution and the VA procured Caradigm's Sentillion solution. The use of two MSSO/CM solutions presented unique challenges and inhibited JAL FHCC IM/IT support personnel's ability to optimize a single MSSO/CM solution. JAL FHCC, however, is currently in the process of converting to the CareFX product as their sole MSSO/CM solution.

Thirdly, JAL FHCC IM/IT personnel have encountered organizational challenges when attempting to monitor the end-to-end IM/IT model at JAL FHCC. As an example, a set of network diagnostic tools was installed to monitor interagency network traffic. The diagnostic tools were intended to identify transaction bottlenecks and root causes so that latency and transaction delays could be remedied (enhancing efficiency for all end-users). The DoD authorized the diagnostic tools to be installed, but requisite authorization could not be obtained from the VA. The network diagnostic tools were subsequently removed. JAL FHCC is currently in the process of procuring new network diagnostic tools and obtaining the required authorizations from both agencies.

Finally, both IM/IT support personnel and end-users at JAL FHCC require ongoing support from two separate agency IM/IT organizations. Understanding which organization is responsible for support can be challenging. And, the agency-level IM/IT organizations do not always take JAL FHCC into account when making agency-wide changes. Even minor changes to one agency's EHR or ancillary systems can impact terminology mapping or JAL FHCC end-user access to the systems.

6.2.1.7 End-User Training

Several IM/IT support personnel as well as JAL FHCC personnel well versed in both EHRs note that a lack of consistent user training is a main cause of workflow inefficiencies. JAL FHCC offers resources that are well versed in both the DoD and VA IM/IT capabilities. However, end-users often stated that they do

not have the time to attend classroom trainings, or do not feel it is necessary to obtain training for IM/IT capabilities that they use infrequently.

PE found that JAL FHCC would benefit from increased cross-agency training, requiring that end-users participate in trainings that cover the following:

- Utilizing both agencies' EHRs
- Utilizing Remote Data Viewer (RDV) solutions
- Maintaining username and password credentials for multiple applications
- Placing pharmacy orders in the patient's native EHR
- Reporting issues and enhancement requests via Help Desk tickets

6.3 Benefit 2: Improve Efficiency of Clinical and Administrative Processes Performance Measures and Results

The performance measures outlined in the subsequent sections reflect the extent to which the JIF-funded IM/IT components (JPRS, MSSO/CM, ORP, and Financial Reconciliation) and overall IM/IT model enable Improved Efficiency of Clinical and Administrative Processes at JAL FHCC. Additionally, unintended consequences and challenges of the JIF-funded capabilities and overall IM/IT model will be presented.

Table 9 provides the Benefit 2 performance measures and metric groupings as defined in the PE's *JAL FHCC IM/IT Evaluation Framework*. Each of these performance measures and metrics is expanded upon in the subsequent sections. Supplemental data for these items and individual metrics can be found in the Appendix volume of this report.

Please note that quantitative data was limited. The majority of PE's findings were obtained through interviews and on-site observations.

Table 9: Benefit 2 Performance Measures and Metric Groupings

Benefit 2: Improve Efficiency of JAL FHCC Clinical and Administrative Processes		
	Performance Measure	**Metric Groupings**
	2.1 Impact to Facility-Level Processes	2.1.1 Medical Single Sign On with Context Management (MSSO/CM)
		2.1.2 Joint Patient Registration System (JPRS)
		2.1.3 Orders Portability
	2.2 Application Responsiveness	2.2.1 MSSO/CM
		2.2.2 Orders Portability
		2.2.3 Joint Patient Registration System
		2.2.4 Financial Reconciliation
	2.3 System Responsiveness	2.3.1 System Uptime / Performance
	2.4 Managerial Decision Support	2.4.1 Integrated Operational Workload Reports
	2.5 Clinical Decision Support	2.5.1 Orders Management Impact to Clinical Decision Support
		2.5.2 MSSO/CM Impact to Clinical Decision Support
	2.6 Staff Satisfaction with	2.6.1 VA Staff Satisfaction

	Integration of Clinical Processes	2.6.2 DoD Staff Satisfaction

6.3.1 Performance Measure 2.1: Impact to Facility-Level Processes

Impact to facility-level processes is the extent to which IM/IT affects workflow processes for clinical and administrative personnel. There was limited quantitative data available regarding impact to facility-level processes. PE's data was primarily derived from interviews and observations.

Below, the results of metric groupings designed to assess IM/IT's impact to facility-level processes are presented.

6.3.1.1 Metric Grouping 2.1.1 MSSO/CM

PE found that MSSO/CM can enable efficiencies for facility-level processes at JAL FHCC; however, to-date, MSSO/CM has encountered compatibility issues and latency, and is heavily dependent on adherence to the joint patient registration process and maintenance of end-user credentials. MSSO/CM's ability to enable efficiencies has also been limited due to the procurement of two separate MSSO/CM products.

MSSO/CM provides end-users with the ability to login and toggle between multiple applications without separately entering usernames and passwords for each. MSSO/CM also maintains patient context so that if a patient's record is opened in one application, that same patient's record will be displayed when the end-user opens another application. When functioning appropriately, MSSO/CM should improve care providers' workflow efficiency by eliminating multiple username/password entries and limiting patient searches.

6.3.1.1.1 MSSO/CM – Incompatibility with AVHE

As noted above, the DoD and VA procured separate MSSO/CM products for their respective computer workstations at JAL FHCC. The DoD-procured CareFX product encountered compatibility issues with the Citrix-based AVHE once CareFX was published through the AVHE in February 2013.[47] The incompatibility led to an unstable virtualized environment, including drops in connectivity and difficulty logging back in. The unstable virtualized environment negatively impacted workflow efficiencies for personnel using DoD workstations.

6.3.1.1.2 MSSO/CM – Latency

Latency associated with MSSO/CM was repeatedly noted by end-users as impacting workflow efficiencies. End-users stated that they are often waiting for applications to load or process before they can complete certain tasks. Several end-users noted that they disable MSSO/CM to reduce system latency.

PE was provided limited quantitative data to assess MSSO/CM's impact to overall system latency. JAL FHCC IM/IT personnel, however, did provide evidence that high CPU utilization contributed to overall system latency. Per information provided by JAL FHCC IM/IT personnel, it is believed that MSSO/CM solution contributed to high CPU utilization. According to data provided by JAL FHCC IM/IT personnel, the implementation of a new Host Based Security System (HBSS) Anti-Virus (AV) policy alleviated the high CPU utilization beginning in May 2014 (please see Figure 15).

6.3.1.1.3 MSSO/CM – Adherence to Joint Patient Registration Processes

Patient context between applications can only be established if the patient has been joint registered at JAL FHCC. If the patient has not been joint registered, a patient's DoD and VA electronic health records will not be correlated and CM cannot function. End-users may be unware that a patient was not joint registered and may simply perceive MSSO/CM to be malfunctioning.

[47] Per interviews with the MHS Office of the Chief Information Officer, Enterprise Infrastructure team on July 7, 2014

6.3.1.1.4 MSSO/CM – Maintenance of End-User Credentials

The ability to use MSSO and maintain end-user context between applications requires the maintenance of up-to-date username and password credentials. Due to DoD and VA policies, username and password credentials are maintained at the individual application level.

Many JAL FHCC personnel (especially personnel who primarily serve VA patients) infrequently attempt to access the alternate agency's applications. Due to the infrequent access, these end-users' username and/or password credentials may have expired. End-users then have to follow the individual application's password reset protocol. The password reset protocol can take time, often requiring IM/IT support personnel's assistance.

Maintenance of up-to-date end-user credentials is the responsibility of each end-user. However, JAL FHCC may want to consider more rigorous training, reminders, and incentives for username and password maintenance.

6.3.1.2 Metric Grouping 2.1.2 JPRS

PE found that JPRS enables administrative staff to quickly joint register a patient. JPRS provides a graphical user interface (GUI) for administrative staff to quickly retrieve demographic information on a patient and correlate (or create) a patient's DoD and VA electronic health records. The single GUI is more efficient than having to toggle between multiple systems to obtain information and create or correlate patient records.

JPRS is also a required IM/IT component in order to enable all other IM/IT-based efficiencies at JAL FHCC. JPRS *does* create a new workflow step unique to JAL FHCC; however, the step should be a one-time occurrence when the patient is initially registered with the facility. If the joint patient registration process is not conducted, then a patient's DoD and EHR records will not be correlated, and MSSO/CM, ORP, and Financial Reconciliation cannot fully function in relation to that patient.

6.3.1.3 Metric Grouping 2.1.3 ORP

PE found that the JIF-funded ORP capabilities can enable efficiencies for facility-level processes at JAL FHCC. To date, however, ORP has encountered lengthy interagency transaction times and network disruptions that have impaired efficiencies for providers and ancillary/diagnostic services personnel. Also, ORP does not support several JAL FHCC clinical services that, if present, could improve workflow efficiencies.

ORP allows data to transfer from one agency's EHR into the other agency's EHR for specific data domains. JAL FHCC personnel state that when ORP is working, they are satisfied with the capability. Personnel also agree that when ORP is working, obtaining radiology, laboratory, and consult results from the EHR in which they perform most of their activities is more efficient than toggling to the other agency's EHR to locate information.

6.3.1.3.1 ORP – Lengthy Interagency Transaction Times

As discussed in section 6.2.1.2 above, interagency transaction times can exceed five hours at JAL FHCC. The lengthy interagency transaction times are primarily driven by the multiple networks, network security protocols, ESBs, and virtual gateways that each interagency message has to traverse. According to the lead VA Program Manager for the DoD/VA IM/IT Development Team, average interagency transactions at JAL FHCC are two minutes. However, interviews conducted by PE indicate that transaction times can far exceed the two minute average on a near daily basis.

The impact of lengthy interagency transaction times has the greatest efficiency impact on the main West Campus laboratory's workflow. This is because the laboratory has a higher volume of orders than the volume of radiology and consult orders and because laboratory orders and results are often needed in a more immediate fashion than orders associated with radiology and consults.

The impact of lengthy interagency transactions is felt at the main West Campus laboratory and not at other JAL FHCC laboratories because the main West Campus laboratory processes orders for both DoD and VA patients using VistA. Orders for DoD patients can originate from CHCS/AHLTA and require the ORP capability to transfer the order into VistA for processing.

Table 10: May 2014 Orders Metric by Order Type

Metric / Order Type	Radiology	Consults	Laboratory
VA – Total	5,078	10,493	50,589
VA – Passed	4,960	10,180	49,872
VA - Percent Passed	97.7%	97.0%	98.6%
DoD – Total	2,279	2,249	22,861
DoD – Passed	2,234	2,190	22,071
DoD - Percent Passed	98.0%	97.4%	96.5%
Total Orders	7,357	12,742	73,450
Total Passed	7,194	12,370	71,943
Total Not Passed	163	372	1,507
Total Percent Passed	97.8%	97.1%	97.9%

As shown in Table 10 (also shown on 46 of this report), in May 2014, there were nearly five (5) times as many laboratory orders placed than either radiology or consult orders. May 2014 was not unique, as the lab consistently receives a much higher volume of orders than the radiology department or consulting providers. Therefore, the impact of lengthy transaction times is much greater in the laboratory setting.

In addition to the order volume, the laboratory workflow inherently has a need for faster electronic data transactions. Providers can place laboratory orders for their patients, and then the patient physically goes to the laboratory to have a test conducted. Depending on the complexity of the test, the patient may also be able to return to his/her ordering provider to review and discuss results. Information from interviews with laboratory personnel indicate that sometimes the DoD patient arrives at the main West Campus laboratory before the electronic order arrives. Similarly, the DoD patient can have their lab test conducted, and then return to his/her provider before the laboratory result is available in CHCS/AHLTA.

Lengthy interagency transaction times have contributed to the main West Campus JAL FHCC laboratory having both CHCS/AHLTA and VistA open at the laboratory reception area so that if a patient arrives, and there is no order in VistA, the lab technician can view the order in CHCS/AHLTA. As noted previously, after the order is viewed in CHCS/AHLTA, the laboratory order is manually entered into the VistA-interfaced Laboratory Information System (LIS) and often, the lab result must also be entered in CHCS/AHLTA once the test is conducted.

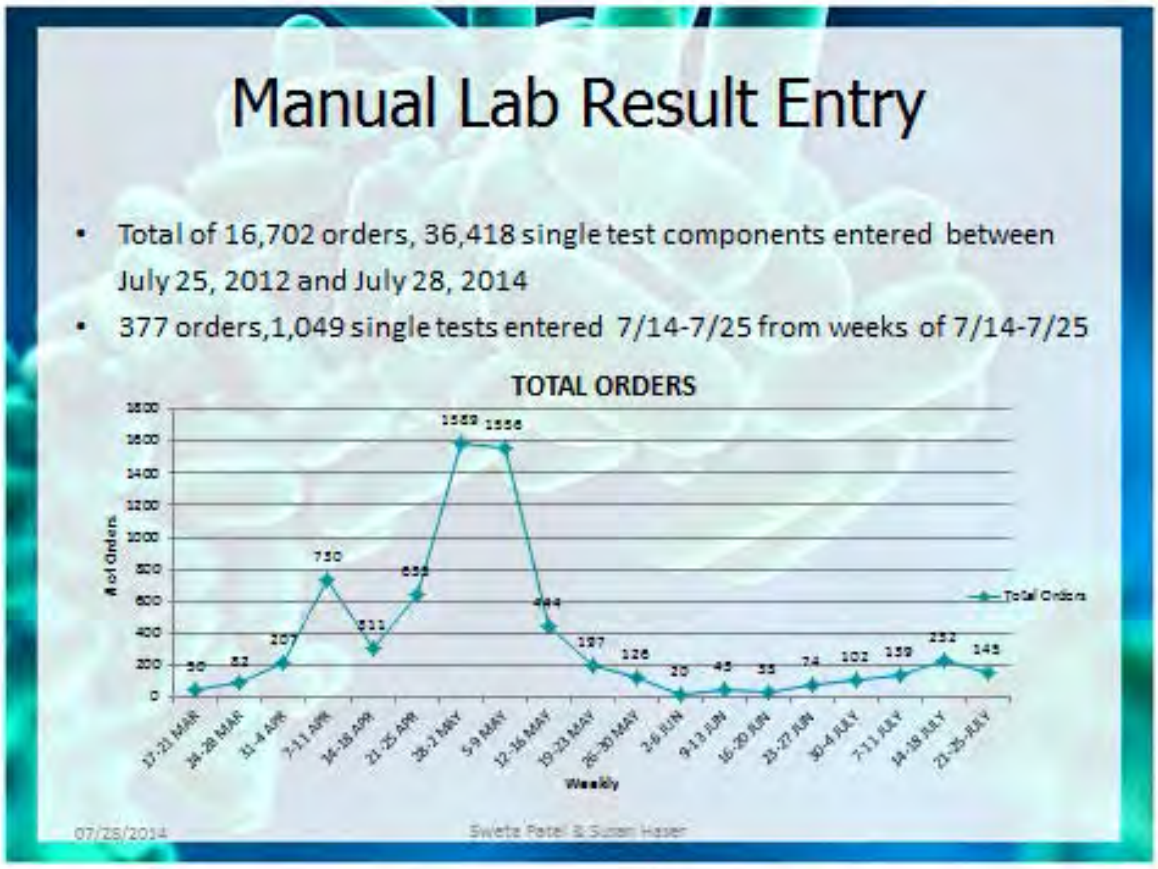


Figure 16: Manual Lab Result Entry Slide Maintained by JAL FHCC Laboratory Personnel[48]

As shown in Figure 16 above, personnel in the main West Campus JAL FHCC laboratory manually entered 16,702 laboratory orders between July 25, 2012 and July 28, 2014. Although most weekly manual result entries are manageable (during the month of June, an average of 43 laboratory orders had to be manually entered per week), there are weeks/months (such as May 2014) in which hundreds or thousands of manual entries are required. Manual entries may be required for a number of reasons, including uncorrelated patient records, errors with the batch joint patient registration process. Lengthy interagency transaction times, however, can necessitate manual entry for laboratory personnel – as laboratory personnel do not want to keep patients and providers waiting.

Lengthy laboratory interagency transaction times have also reduced providers' reliance on ORP capabilities, and increased their reliance on toggling between EHRs. Specifically, personnel who serve DoD patients on the West Campus continue to rely on viewing laboratory results in VistA/CPRS rather than viewing results that have ported over the CHCS/AHLTA through ORP. Personnel acknowledge that ORP has consistently improved since the initial ORP capability was implemented at JAL FHCC in November 2011. However, because of lengthy interagency transaction times and network connectivity issues (causing complete downtime for ORP), providers continue to toggle between systems to ensure that complete lab results are being viewed. Toggling between systems can impact efficiencies, as personnel are searching for information rather than viewing information in a single, consolidated view.

[48] The PowerPoint slide shown in Figure 16 is maintained by JAL FHCC laboratory personnel and routinely reviewed during JAL FHCC Orders Portability status meetings.

Per interviews conducted by PE, lengthy interagency transaction times have had limited impact to the radiology and consult process. The radiology and consult process is typically not as time sensitive as laboratory. Patients often require a separate appointment for a radiological exam or consultation, unlike a laboratory visit which can happen during a patient encounter. Also, as shown in Table 10, the volume of radiology and consult orders is more limited than laboratory. Finally, DoD and VA providers can directly view radiology images over ImPAX (a radiology information system that allows a provider to see the image from both internal and remote locations) or via the MedWeb data viewer – available in the Janus Joint Legacy Viewer (JLV). Therefore, even if a radiology report does not quickly port across EHRs, the provider can directly view the image through other systems.

6.3.1.3.2 ORP – Clinical Services Not Supported by ORP

As noted in section 6.2.1.4 of this report, ORP does not support the following clinical and ancillary services:

- Emergency department (ED) services
- Inpatient services
- Surgery and specialty care services not initiated by a consult
- Pharmacy services

The lack of ORP for these services has required JAL FHCC personnel to rely more heavily on toggling between EHRs and finding other workaround solutions, such as using paper pharmacy orders for medications. The DoD and VA should examine these areas further to determine if an investment in ORP or other interoperable solutions would improve efficiencies for these unsupported services.

6.3.2 Performance Measure 2.2: Application Responsiveness

Application responsiveness is the amount of time for a result to occur or an output to be achieved once it has been requested in the application. There was limited quantitative data available regarding application responsiveness. PE's data was primarily derived from interviews and observations.

Below, the results of metric groupings designed to assess IM/IT's application responsiveness at JAL FHCC are presented.

6.3.2.1 Metric Grouping 2.2.1 MSSO/CM

PE found that perceived latency in MSSO/CM's application responsiveness has impaired clinical and administrative efficiencies at JAL FHCC. However, quantitative data regarding actual application response times for MSSO/CM was limited. As shown in the figures below, less than half of personnel interviewed (46%) agree/strongly agree that the time it takes to login through MSSO is acceptable. Additionally, less than half of personnel interviewed (45%) agree/strongly agree that the time it takes to display patient information in both EHRs via CM is acceptable.

Figure 17: JAL FHCC Respondent Agreement that the Time it takes to login through MSSO feature is acceptable

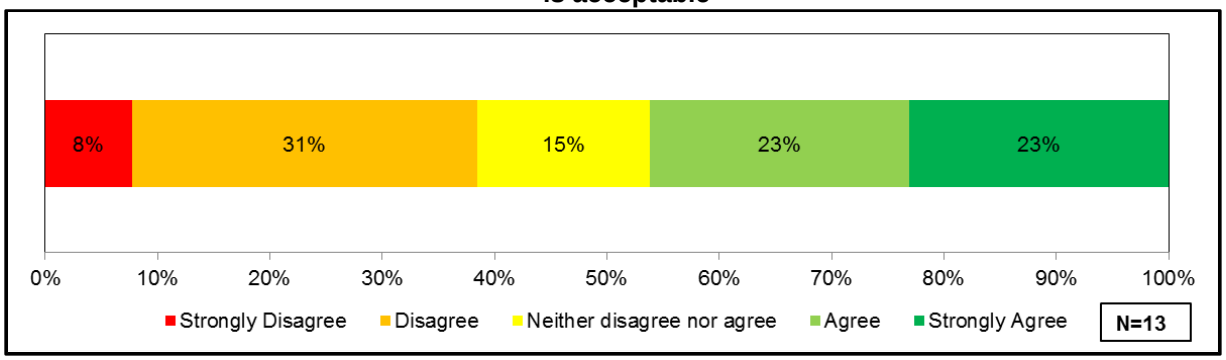
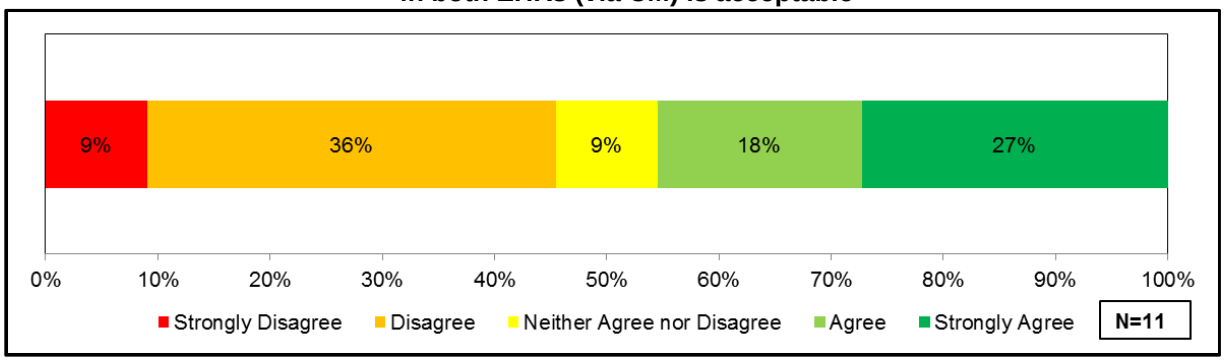


Figure 18: JAL FHCC Respondent Agreement that the Time it takes to display patient information in both EHRs (via CM) is acceptable



Interviews conducted by PE indicate that many personnel disable the MSSO/CM capability because they feel it significantly contributes to system latency. When MSSO/CM is disabled, personnel access applications separately and patient context between applications is not available.

6.3.2.2 Metric Grouping 2.2.2 ORP

PE found that application responsiveness for ORP associated with radiology and consult orders is acceptable to the majority of personnel interviewed. However, application responsiveness for ORP associated with laboratory, although improved, still encounters challenges.

The difference in personnel's satisfaction with ORP application responsiveness is largely based on workflow and order volume. The volume of laboratory orders is significantly higher than the volume of radiology and consult orders. Therefore, any latency in application responsiveness will be more widely and routinely felt for laboratory orders. Also, laboratory orders and the subsequent action required can be done within a single patient encounter, rather than across patient encounters (which is often the case for radiology and consults).

Network connectivity failures can also cause ORP to go down completely. ORP downtime requires personnel to toggle between EHRs for laboratory, radiology, and consult data.

Quantitative data regarding ORP application responsiveness was limited. PE's findings are based on interviews and direct observations.

6.3.2.3 Metric Grouping 2.2.3 JPRS

PE was unable to obtain meaningful results regarding JPRS application responsiveness. JPRS is primarily used by administrative personnel who register patients at the facility.

6.3.2.4 Metric Grouping 2.2.3 Financial Reconciliation

PE found that, at the time this report was developed, the Financial Reconciliation web tool was not fully functional. The primary end-user of the Financial Reconciliation web tool noted that when the tool was initially developed and placed into operation, it reduced the time it took to gather and input data from one week down to one day. Currently, however, the JAL FHCC Health Care Business group (the group responsible for conducting JAL FHCC's financial reconciliation) has reverted to manual processes because the Financial Reconciliation web tool is not fully functional.

6.3.3 Performance Measure 2.3: System Responsiveness

System responsiveness is the act of a computer user initiating an action and expecting a response in a reasonable amount of time. Performance bottlenecks within complex enterprise application architecture can slow system performance and delay the movement of clinical data through the system, resulting in user dissatisfaction and frustration. Delays in response time can occur anywhere between the database servers, network infrastructure, or local desktop and they can be related to a multitude of technical issues. An example of a system responsiveness measure is the amount of time it takes for a user to login to, or initiate, a system such as AHLTA from an MSSO/CM environment.

System responsiveness helps assess the JAL FHCC IM/IT model's enablement of efficiency. A system that is slow to respond to user interactions and data transactions can lead to frustration and inefficient processes.

Below, the results of metric groupings designed to assess IM/IT's system responsiveness at JAL FHCC are presented.

6.3.3.1 Metric Grouping 2.3.1 System Uptime/Performance

PE found that system uptime and performance has impaired efficiencies at JAL FHCC to a greater extent than at a non-integrated VAMC or MTF, specifically for personnel primarily serving DoD patients on JAL FHCC's West Campus.

All VAMCs and MTFs experience scheduled and unscheduled system downtime. Table 11 and Table 12 below display scheduled and unscheduled downtime experienced for CHCS and AHLTA at JAL FHCC from 2011 through 2014 (data for CPRS downtime was only available through reported Help Desk tickets, and was not a reliable source of data to display scheduled/unscheduled system downtime). Although system downtime undoubtedly impedes efficiency, JAL FHCC's CHCS, AHLTA, and CPRS downtime figures will be similar to other VAMCs and MTFs across the nation.

Table 11: Scheduled System Downtime (per JAL FHCC-provided CHCS/AHLTA Reports)

System	Year	Count of Scheduled Downtime Incidents	Average Downtime Duration (Hours)	Maximum Downtime Duration (Hours)
CHCS	2011	11	1.1	2.8
	2012	16	1.1	3.9
	2013	7	2.3	4.0
	2014 (Thru April)	3	11.0	26.0
AHLTA	2011	0	N/A	N/A
	2012	0	N/A	N/A
	2013	1	0.3	0.3
	2014 (Thru April)	N/A	N/A	N/A
CPRS	Data Not Provided			

Table 12: Unscheduled System Downtime (per JAL FHCC-provided CHCS/AHLTA Reports)

System	Year	Count of Unscheduled Downtime Incidents	Average Downtime Duration (Hours)	Maximum Downtime Duration (Hours)
CHCS	2011	15	2.93	13.00
	2012	11	1.61	3.00
	2013	5	34.74	116.53
	2014 (Thru April)	0	N/A	N/A
AHLTA	2011	25	2.40	11.00
	2012	14	4.70	41.25
	2013	7	24.70	110.53
	2014 (Thru April)	2	10.08	17.50
CPRS	Data Not Provided			

The most unique system uptime/performance aspect for JAL FHCC is the amount of work performed through the AVHE. Because the JAL FHCC West Campus is hosted on the VA network, all DoD systems/tools (including CHCS/AHLTA) must be accessed through AVHE. Similarly, the JAL FHCC East Campus is hosted on the DoN network, and all VA systems/tool (including VistA/CPRS) must be accessed through AVHE. Therefore, downtime and system performance issues experienced with AVHE will greatly impact efficiency for any JAL FHCC personnel who require access to the other agency's systems.

As shown in Table 13 below, there have been 151 AVHE incidents documented in the MHS Remedy Help Desk system for the 12 month period ending June 30, 2014. According to JAL FHCC and MHS IM/IT support personnel, the MHS Remedy Help Desk system is the most comprehensive method by which JAL FHCC AVHE access issues and downtime is tracked. IM/IT support personnel note that not all AVHE access issues are reported via MHS Remedy tickets (as it is reliant on end-user to self-report). Interviews conducted by PE indicate that AVHE uptime/system performance issues are perceived to be frequently experienced by JAL FHCC personnel.

Table 13: AVHE System Incidents Reported for the 12 Months Ending June 30, 2014

System	Type of Incident	Count of AVHE Incidents	Average Access Issue Duration (Hours)	Maximum Access Issue Duration (Hours)
AVHE	Access Issue	130	No Duration Data Provided	No Duration Data Provided
	Citrix Connection Issue	9	No Duration Data Provided	No Duration Data Provided
	Network Issue	1	No Duration Data Provided	No Duration Data Provided
	Other Error	11	No Duration Data Provided	No Duration Data Provided
	Total	151	No Duration Data Provided	No Duration Data Provided

In addition to the AVHE, the number of electronic interagency transactions conducted within an episode of patient care is unique to JAL FHCC. As discussed in multiple proceeding sections of this report, interagency transaction times have been slowed because of multiple networks, network security protocols, virtual gateways, and ESBs. Interagency transactions also cannot successfully cross when one of the agency's systems are down.

6.3.4 Performance Measure 2.4: Managerial Decision Support

Managerial Decision Support is the use of data and information to facilitate decision making at the strategic, tactical, and operational levels within an organization. The type of information required is directly related to the level of management and their intended use of the data. This measure is intended to assess the availability and completeness of data needed to assist managers with operational decisions. Operational decisions can include staffing, utilization, scheduling, procurement, and other factors that impact care delivery and the efficiency of care delivery.

Below, the results of metric groupings designed to assess IM/IT's impact on managerial decision support at JAL FHCC are presented.

6.3.4.1 Metric Grouping 2.4.1 Integrated Operational Workload Reports

PE found that integrated operational workload reports and overall integrated operational reports are difficult to develop and effectively utilize at JAL FHCC.

Leadership at JAL FHCC is consistently trying to improve integrated measurement and reporting in order to drive efficiencies; however, there is still a significant amount of effort required to achieve desired integrated measurement and reporting capabilities.

In August 2014, JAL FHCC convened a "Data Summit" to discuss the "lack of comparative performance information for the FHCC."[49] Challenges regarding the lack of comparative performance information for JAL FHCC have previously been referenced by the Government Accountability Office (GAO) and the Institutes of Medicine (IOM). Additionally, a recent study of the JAL FHCC financial reconciliation model conducted by Altarum Institute identified the following concerns:

- Complications integrating Military Health System (MHS) data into Veterans Health Administration (VHA) systems;

[49] PowerPoint entitled *FHCC Data Integration/Normalization Initiative: FHCC Data Summit Summary Brief* dated October 15, 2014.

- Differences in terminology hinder “apples-to-apples” comparisons;
- Business process remains reactive; and,
- Shifting allocation structures and national advisory groups add complexity.[50]

Given these challenges and concerns, the August 2014 Data Summit aimed “To create mechanisms to allow sharing and reporting of FHCC data across both DoD and VA data systems in a consistent and reproducible manner. Allowing for like reporting of FHCC in comparisons with its VA and DoD peers. Supporting users at the local, regional and headquarters levels.”[51]

Participants in the Data Summit included personnel from JAL FHCC, the VA’s Allocation Resource Center (ARC), the VA’s Managerial Cost Accounting Office (MCAO), the VA Informatics and Computing Infrastructure (VINCI), BUMED, DHA, and industry subject matter experts.

According to JAL FHCC’s Head of Health Care Business Operations Department, “The Summit was a strong start and, with continued support by the FHCC AB [(Advisory Board)], can drive the development of mission-specific workgroups to focus on targeted action items.”

Next steps identified at the Data Summit that may require agency-level intervention include:

- Establishing access to both agencies’ reporting systems.
- Providing personally identifiable encounter data in the Financial Reconciliation workload report.
- Developing means to transmit personally identifiable time and labor data from the Defense medical Human Resource System internet (DMHRSi) to the VA’s MCAO.

Additionally, the following managerial decision support efforts are ongoing at JAL FHCC:

- The evaluation of exiting agency data crosswalks and analyzing any gaps.
- The development of interface control documents for data exchanges.
- The development of an interagency terminology matrix.
- The creating and updating of data system flow charts.

The next steps and ongoing efforts described above will assist JAL FHCC in obtaining more effective data for managerial decisions support that can, in turn, drive clinical and administrative efficiencies.

6.3.5 Performance Measure 2.5: Clinical Decision Support

Clinical Decision Support is the use of IM/IT to link health observations with health knowledge to influence health care choices by clinicians. Assistance and access to data, information, and knowledge at the point of care are key to computer/clinician interaction. Clinical decision support systems enable the quality and effectiveness of delivered care and the reduction of adverse events.

Below, the results of metric groupings designed to assess IM/IT’s impact on clinical decision support at JAL FHCC are presented.

6.3.5.1 Metric Grouping 2.5.1 Orders Management Impact to Clinical Decision Support

PE Found that the JIF-funded ORP capabilities assist with clinical decision support and can, in turn, drive clinical efficiencies when the ORP capabilities are functioning effectively. ORP enables providers to view laboratory, radiology, and consult orders in their primary EHR, rather than toggling between EHRs. Therefore, ORP can assist with clinical decision support by providing more complete information in one consolidated location. ORP can save time for providers and allow them to make more informed clinical decisions for their patients.

[50] Altarum Institute, *James A. Lovell Federal Health Care Center Reconciliation Model Validation Study: Final Report* (October 3, 2014), Executive Summary.
[51] PowerPoint entitled *FHCC Data Integration/Normalization Initiative: FHCC Data Summit Summary Brief* dated October 15, 2014.

As noted in the preceding sections of this report, providers note that ORP routinely encounters lengthy interagency transaction times and connectivity issues. When such functionality issues are encountered, providers must revert to toggling between two EHRs to locate ORP-supported data.

6.3.5.2 Metric Grouping 2.5.2 MSSO/CM Impact to Clinical Decision Support

PE found that the JIF-funded MSSO/CM capability assists with clinical decision support and can, in turn, drive clinical efficiencies when MSSO/CM is functioning effectively. MSSO/CM is designed to allow providers to access multiple applications with critical medical information with one login, rather than repeating the login process. MSSO/CM is also designed to maintain patient context across applications, ensuring that the same patient's information is being viewed in multiple applications. Therefore, MSSO/CM can make locating information needed for a clinical decision less cumbersome.

As noted in the preceding sections of this report, providers not that MSSO/CM routinely encounters latency and stability issues. When such functionality issues are encountered, providers must login to applications separately and conduct multiple patient lookups.

6.3.6 Performance Measure 2.6: Staff Satisfaction with Integration of Clinical Processes

An objective of integrating clinics within JAL FHCC is to provide a more efficient health care organization in terms of clinical processes, patient care coordination, and supporting administrative processes. All of these result in improved staff satisfaction. The ability of IM/IT capabilities to support the effective integration of clinical processes will help determine whether staff are more satisfied compared to previous processes, assuming some level of process re-engineering has taken place with the integration.

Below, the results of metric groupings designed to assess staff satisfaction with the integration of clinical processes at JAL FHCC are presented.

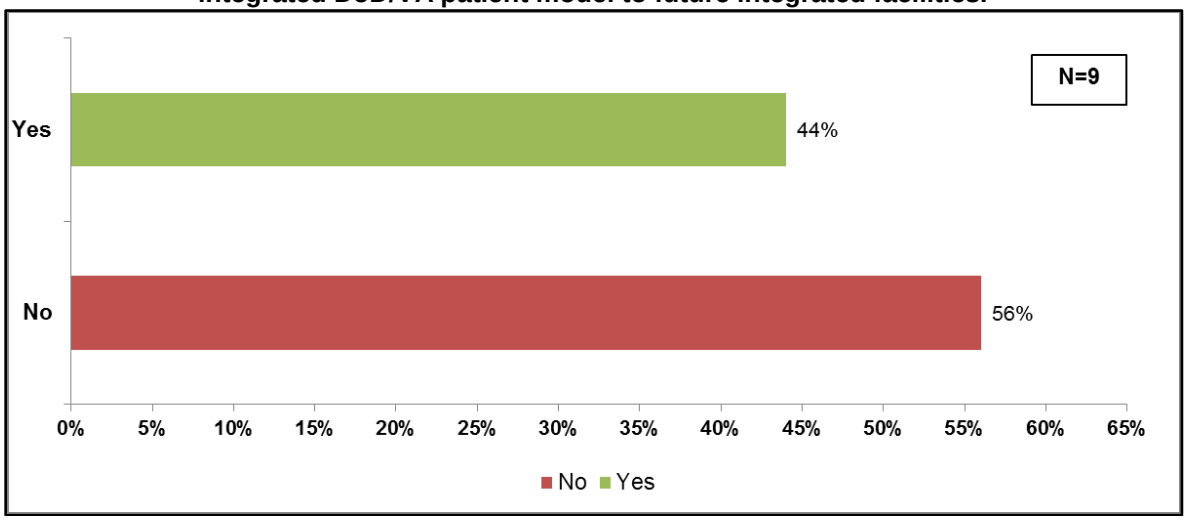
6.3.6.1 Metric Grouping 2.6.1 VA Staff Satisfaction and Metric Grouping 2.6.2 DoD Staff Satisfaction

PE found that personnel are satisfied with the new opportunities that JAL FHCC's integrated scope of clinical practices has afforded them. However, JAL FHCC personnel are mixed in their satisfaction regarding the IM/IT capabilities provided for integrated services, and also differ in their agreement that JAL FHCC has enabled clinical efficiencies.

Staff satisfaction is explored in greater detail in the Benefit 6 section of this report, beginning on page 108. In the Benefit 6 section, it is noted that staff satisfaction varies widely by staff roles and staff workflow.

As shown in Figure 19 below, when prompted with the question "Would you recommend JAL FHCC's integrated DoD/VA patient model to future integrated facilities?", providers at JAL FHCC were divided in their responses: 44% said yes, while 56% said no.

Figure 19: JAL FHCC Respondents' Agreement that they would Recommend JAL FHCC's integrated DoD/VA patient model to future integrated facilities.



These percentages, however, are based off an extremely limited number of responses (n = 9). PE conducted in-depth interviews with more than 75 personnel during site visits, and spoke with dozens more throughout this assessment. Most personnel interviewed did not feel that they could provide a simple yes/no answer. Personnel noted that their desire would be to create a more fully integrated health care center utilizing one set of policies and on EHR.

The majority of personnel believes that JAL FHCC could be more integrated and enhance both DoD and VA beneficiaries' access to care by unifying policies, procedures, scheduling processes, and converting to a single EHR. However, they noted that if such a scenario is not possible, then it is important to optimize the current IM/IT solutions in use at JAL FHCC. If the solutions can be optimized to have more consistent performance, then they would recommend JAL FHCC's IM/IT solutions and overall integrated model for future integrated DoD/VA health care facilities.

7 BENEFIT 3 FINDINGS – IMPROVE COST EFFECTIVENESS OF HEALTH CARE DELIVERY

7.1 Benefit 3 Overview

The JAL FHCC demonstration project was intended to achieve Improved Cost Effectiveness of Health Care Delivery by serving two patient populations in one integrated facility.

The IM/IT model implemented at JAL FHCC was designed to enable improvements in cost effectiveness by making it feasible to leverage consolidated shared services, and by allowing any provider to serve any patient.

The IM/IT investments in the JPRS and ORP capabilities were intended to enable the use of integrated ancillary, diagnostic, and specialty care services. Orders placed in either EHR could be processed by one laboratory, one pharmacy, one radiology department, or one specialty care clinic. This could improve cost effectiveness by avoiding duplication of resources.

The IM/IT investment in MSSO/CM was intended to more easily allow any JAL FHCC provider to utilize either the DoD or VA's EHR. The investment in MSSO/CM was coupled with a policy decision granting authorized personnel access to both agencies' EHRs. Granting access to both EHRs and investing in MSSO/CM theoretically allow any provider to serve any patient at JAL FHCC. JAL FHCC providers can see the complete electronic health record for either DoD or VA patients, and are not limited in their ability to obtain information that is essential to patient care. This could improve cost effectiveness by managing provider utilization rates (essentially matching supply to demand) without over-utilizing one agency's providers and underutilizing the other agency's providers.

Benefit #3

JAL FHCC IM/IT investments have not enabled the benefit of Improved Cost Effectiveness, but JAL FHCC IM/IT investments may provide cost savings for future integrated endeavors.

Challenges Remaining:

- Challenges remaining for the achievement of improved efficiencies have limited achievements in cost effectiveness
- Lack of an interoperable IM/IT solution for pharmacy has contributed to the hiring of additional pharmacy personnel
- Lengthy interagency transaction times and Orders Portability failures have contributed to the hiring of additional laboratory personnel

Finally, the IM/IT investment in Financial Reconciliation can enable cost effectiveness by allowing each agency to accurately monitor their respective share of JAL FHCC service costs. Accurately monitoring each agency's JAL FHCC costs provides for more effective budgeting ad funding.

At JAL FHCC, IM/IT's enablement of improved cost effectiveness is directly linked to the realization of Benefit 1, Improve Interagency Data Sharing, and Benefit 2, Improve Efficiency of Clinical and Administrative Processes. The IM/IT model provides the network, data, and application architectures that act as the foundational building blocks for clinical and administrative efficiencies to be achieved. Achieving efficiencies should, in turn, drive improvements in cost effectiveness.

This report focuses on IM/IT's ability to enable the achievement of improved cost effectiveness at JAL FHCC. This report will also identify challenges that IM/IT poses to the achievement of improved cost effectiveness. Stakeholders can leverage these findings for both improvement at JAL FHCC now and for lessons learned when considering future Federal health care centers.

7.2 Benefit 3 Key Findings/Conclusions:

Overall, investments in IM/IT have not enabled the benefit of Improved Cost Effectiveness of Health Care Delivery for JAL FHCC; however, the IM/IT investments may provide cost savings for future integrated endeavors.

Improvements in cost effectiveness go beyond the limits of IM/IT. The overall Demonstration Evaluation being conducted by Knowesis, Inc. (as required by the *National Defense Authorization Act for Fiscal Year 2010* (NDAA for FY 2010)) will explore cost effectiveness beyond the limits of this report. However, the manner in which care is delivered at JAL FHCC (and across DoD and VA) is heavily dependent on IM/IT. IM/IT is utilized for everything from scheduling appointments to placing medication orders to documenting patient care.

7.2.1 IM/IT Impacts to Cost Effectiveness at JAL FHCC

From an IM/IT perspective, improvements in cost effectiveness at JAL FHCC have been hindered by the same challenges detailed in the Benefit 1 and Benefit 2 sections of this report. Most critically, policies requiring separate networks and separate network security protocols have inhibited access to IM/IT tools and contributed to overall system latency and instability. When IM/IT tools cannot be accessed quickly, when IM/IT performance is slow, or when IM/IT is not functioning, improvements in cost effectiveness are difficult to achieve.

The impact of poor IM/IT performance and functionality on cost effectiveness can be seen directly in the laboratory. According to interviews with JAL FHCC laboratory personnel, challenges with laboratory ORP have resulted in the need for two additional Full Time Employee Equivalents (FTEEs) in the main West Campus laboratory a cost of approximately $100,000 per year.[52] The additional laboratory FTEEs assist with manually inputting laboratory orders and results that do not port between the DoD and VA EHRs. The additional laboratory FTEEs also assist with ORP troubleshooting and clearing out backlogs of orders that did not port appropriately.

Similarly, the cost impact of not having any interoperable IM/IT solution can be seen directly in the pharmacy. According to interviews with pharmacy personnel, the lack of an interoperable IM/IT solution for the pharmacy has contributed to the hiring of several additional pharmacists. Per the Institute of Medicine's (IOM's) 2012 *Evaluation of the Lovell Federal Health Care Center Merger: Findings, Conclusions, and Recommendations,* five additional pharmacy FTEEs were hired at a cost of roughly $1 million.[53]

The 2012 IOM report stated that the additional pharmacists were devoted full time to "…manually check both EHR systems for possible drug allergies and interactions."[54] PE's interviews with JAL FHCC personnel indicate that the new pharmacy FTEEs are devoted to more than performing manual drug checks. Interviews conducted by PE indicate that the JAL FHCC integration itself created increased services for both the DoD and VA, and also increased the need for pharmacists associated with these services (such as oncology). Additionally, the exact number of pharmacy FTEEs hired could not be corroborated with personnel or accounting data. Several personnel say five FTEEs were hired, while others indicate it was only three.

Nonetheless, it was clearly stated by JAL FHCC pharmacy personnel that the current IM/IT solution for pharmacy (which is reliant on the use of both the DoD and VA EHRs) has created additional work for pharmacy staff and requires additional personnel. An example of the additional work is the need for

[52] PE was unable to corroborate this interview-based information with personnel or accounting data.
[53] IOM *Evaluation of the Lovell Federal Health Care Center Merger: Findings, Conclusions, and Recommendations* page 53.
[54] IOM *Evaluation of the Lovell Federal Health Care Center Merger: Findings, Conclusions, and Recommendations* page 15.

pharmacy personnel to call providers and remind them to place orders in the patient's native EHR, rather than placing the order in the provider's primary EHR. Also, several providers at JAL FHCC have reverted to paper medication orders, rather than toggling between EHRs. JAL FHCC pharmacy personnel either have to process the paper order, or follow up with the provider to ensure the medication order is input in the patient's EHR.

Beyond the costs of additional laboratory and pharmacy FTEEs, quantitative data regarding IM/IT's impact on cost effectiveness at JAL FHCC was limited. PE was not provided with a detailed breakdown of the $100.02M Joint Incentive Fund (JIF) IM/IT expenditures. PE was also not provided with a detailed breakdown of IM/IT staffing and associated staffing costs, or the maintenance and licensing costs associated with the JAL FHCC IM/IT capabilities.

7.2.2 IM/IT Impacts to Cost Effectiveness for Future Integrated Endeavors

The JAL FHCC demonstration project required significant initial monetary investments in IM/IT. However, these invested costs have the potential to benefit future integrated endeavors.

An initial investment of $11.772M was needed to identify and document business requirements for a set of IM/IT capabilities that would enable interagency data sharing and integrated clinical workflow at JAL FHCC. If JAL FHCC's JIF-funded IM/IT capabilities are used for other integrated facilities, the investment for requirements development should not be necessary because the requirements have already been identified for the JAL FHCC demonstration project. The subsequent $100.02M investment to develop and implement the IM/IT capabilities may also be reduced for future facilities because the agencies now have critical lessons learned from the JAL FHCC demonstration project.

Even if JAL FHCC's IM/IT model is not replicated at other integrated facilities, the demonstration project in itself has provided critical lessons regarding successes and challenges that can be utilized for future integrated endeavors.

7.3 Benefit 3: Improve Cost Effectiveness of Health Care Delivery Performance Measures and Results

The performance measures outlined in the subsequent sections reflect the extent to which the JIF-funded IM/IT components (JPRS, MSSO/CM, ORP, and Financial Reconciliation) and overall IM/IT model enable Improved Cost Effectiveness of Health Care Delivery at JAL FHCC. Additionally, unintended consequences and challenges of the JIF-funded capabilities and overall IM/IT model will be presented.

Table 14 provides the Benefit 3 performance measures and metric groupings as defined in the PE's *JAL FHCC IM/IT Evaluation Framework*. Each of these performance measures and metrics is expanded upon in the subsequent sections. Supplemental data for these items and individual metrics can be found in the Appendix volume of this report.

Please note that quantitative data was limited. Knowesis Inc., the team conducting the overall JAL FHCC Demonstration Evaluation required by the NDAA for FY 2010, is working with DoD and VA subject matter experts to obtain more comprehensive cost data. Cost effectiveness will be analyzed to a greater extent in the report provided by Knowesis, Inc.

Table 14: Benefit 3 Performance Measures and Metric Groupings

Benefit 3: Improve Cost Effectiveness of Health Care Delivery		
	Performance Measure	**Metric Grouping**
	3.1 Cost of Purchased Care	3.1.1 Overall Cost
		3.1.2 Surgical Services
		3.1.3 Emergency Department (ED)
	3.2 Cost of Clinic and Service Lines	3.2.1 Overall Staffing Cost
	3.3 Cost of IM/IT Services	3.3.1 Legacy Systems
		3.3.2 IM/IT Capabilities
	3.4 Financial Reconciliation	3.4.1 IM/IT Enabled Success factors

7.3.1 Performance Measure 3.1: Cost of Purchased Care

Purchased Care is a program authorizing and paying for a broad range of health care services for eligible DoD and VA beneficiaries and their dependents, outside of the DoD- and VA-authorized care providers. This represents care that JAL FHCC is not able to provide to its beneficiary population for various reasons. When care cannot be provided internally by JAL FHCC, DoD and VA beneficiaries can become eligible to receive care from an outside provider that is paid for by the DoD or VA. Purchased Care numbers aid in identifying trends in patient care costs; they also highlight IM/IT impact when JAL FHCC beneficiaries are seen by non-DoD or non-VA care providers.

PE was unable to obtain sufficient data to analyze or produce findings regarding IM/IT's impact to the cost of purchased care at JAL FHCC.

7.3.2 Performance Measure 3.2: Cost of Clinic and Service Lines

Cost of Clinic and Service Lines measures the utilization of clinic appointments against the number and nature of appointments that are available. JAL FHCC offers integrated specialty clinics, where providers from the DoD and VA treat both DoD and VA beneficiary patients. This performance measure compares utilization of clinic appointments against the number and nature of appointments that are available. Availability of appointments impacts the number of patients sent outside of the network for care, the associated costs, and timeliness of information for clinical decision-making. The latter provides insight into the IM/IT impact on cost effectiveness and the relative success achieved by the integrated facility.

Below, the results of metric groupings designed to assess IM/IT's impact to the cost of clinic and service lines are presented.

7.3.2.1 Metric Grouping 3.2.1 Overall Staffing Costs

PE was unable to obtain sufficient data to fully analyze or produce findings regarding IM/IT's impact to overall staffing costs.

As noted in section 7.2 above, information obtained from interviews indicates that as many as seven additional FTEEs had to be hired in the laboratory and pharmacy largely due to IM/IT challenges. It is unclear whether additional clinical or administrative personnel (other than IM/IT personnel, detailed in the section below) had to be hired due to IM/IT challenges. It is also unclear whether any staffing costs were avoided through the use of integrated facilities (enabled by IM/IT) because policy constraints prohibited JAL FHCC from reducing either agency's personnel as part of the integration.

Additionally, as detailed in the Benefit 2 section of this report, IM/IT has not enabled improved efficiencies at JAL FHCC. Until IM/IT performance is optimized, IM/IT staff utilization (and staffing costs) will have to account for IM/IT challenges and inefficiencies.

7.3.3 Performance Measure 3.3: Cost of IM/IT Services

The cost of IM/IT services provides insight into the overall cost effectiveness of IM/IT because it reflects the financial investment required to implement and maintain physical hardware, networks, software, and FTEE support, among other things.

Below, the results of metric groupings designed to assess the cost of IM/IT services at JAL FHCC are presented.

7.3.3.1 Metric Grouping 3.3.1 Legacy Systems and Metric Grouping 3.3.2 IM/IT Capabilities

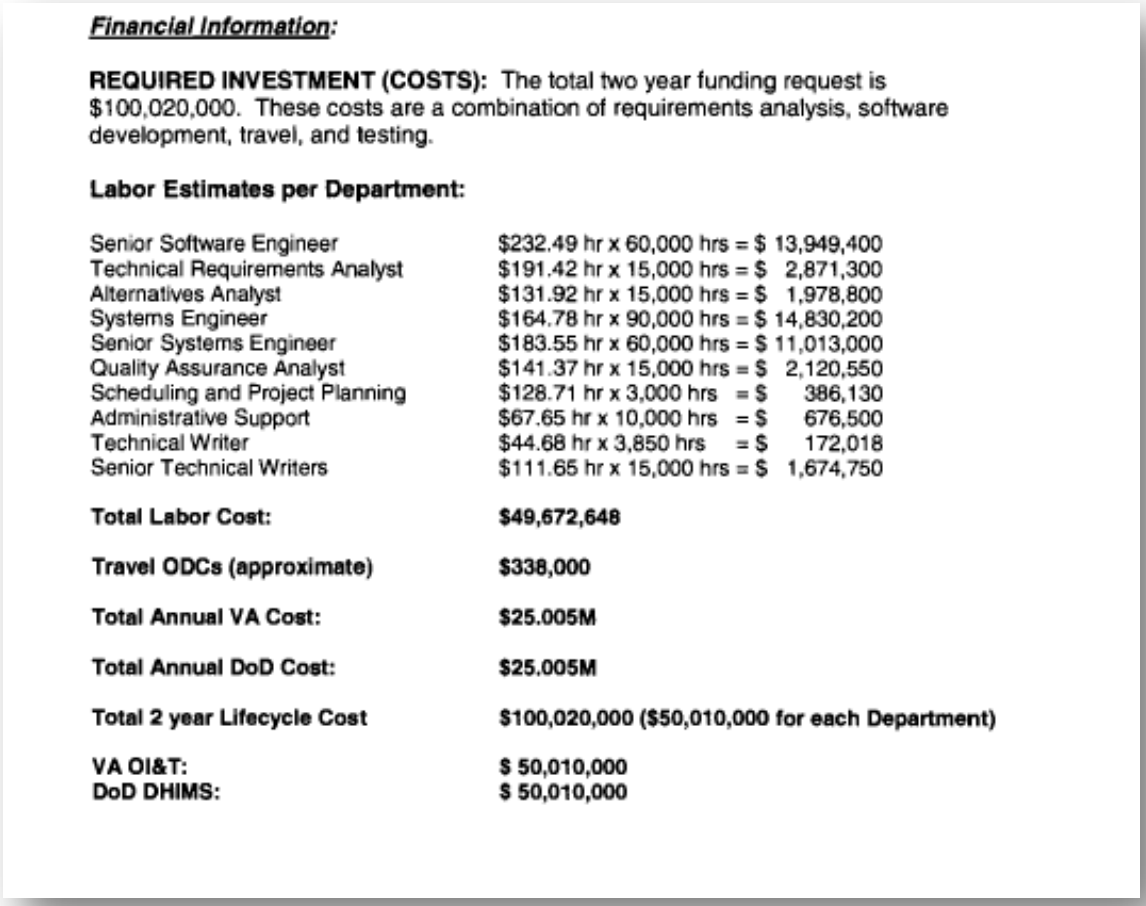
PE was unable to obtain sufficient data to fully analyze or produce findings regarding the costs of IM/IT services and the impact on overall improved cost effectiveness for JAL FHCC.

The total dollars contributed to IM/IT development, implementation, and maintenance/sustainment is unclear. PE was unable to obtain a detailed combined breakdown of DoD and VA expenditures from the $100.02M JIF. PE was also unable to obtain a breakdown of JAL FHCC IM/IT costs that were not funded by the JIF (primarily IM/IT support personnel costs funded directly by JAL FHCC's operating budget). Below, information that PE was able to obtain regarding the cost of IM/IT services at JAL FHCC is presented.

7.3.3.2 Cost of IM/IT Services – Initial IM/IT Funding

In August 2009, a memorandum signed by the Co-Chairs of the Health Executive Committee (HEC) Financial Management Work Group authorized $100.02M for the development of IM/IT at JAL FHCC. The $100.02M figure was based off a *DoD-VA Health Care Sharing Incentive Fund Initiative Proposal* submitted by the Director of the VA's Office of Information Technology's (OIT's) Joint Solutions Division and the Program Manager for the DoD's Defense Health Information Management System. The *Initiative Proposal* requested two years of funding, broken down as shown in Figure 20 below.

Figure 20: Investment Request from the DoD-VA Health Care Sharing Incentive Fund Initiative Proposal for JAL FHCC IM/IT



Financial Information:

REQUIRED INVESTMENT (COSTS): The total two year funding request is $100,020,000. These costs are a combination of requirements analysis, software development, travel, and testing.

Labor Estimates per Department:

Senior Software Engineer	$232.49 hr x 60,000 hrs = $ 13,949,400
Technical Requirements Analyst	$191.42 hr x 15,000 hrs = $ 2,871,300
Alternatives Analyst	$131.92 hr x 15,000 hrs = $ 1,978,800
Systems Engineer	$164.78 hr x 90,000 hrs = $ 14,830,200
Senior Systems Engineer	$183.55 hr x 60,000 hrs = $ 11,013,000
Quality Assurance Analyst	$141.37 hr x 15,000 hrs = $ 2,120,550
Scheduling and Project Planning	$128.71 hr x 3,000 hrs = $ 386,130
Administrative Support	$67.65 hr x 10,000 hrs = $ 676,500
Technical Writer	$44.68 hr x 3,850 hrs = $ 172,018
Senior Technical Writers	$111.65 hr x 15,000 hrs = $ 1,674,750
Total Labor Cost:	**$49,672,648**
Travel ODCs (approximate)	**$338,000**
Total Annual VA Cost:	**$25.005M**
Total Annual DoD Cost:	**$25.005M**
Total 2 year Lifecycle Cost	**$100,020,000 ($50,010,000 for each Department)**
VA OI&T:	**$ 50,010,000**
DoD DHIMS:	**$ 50,010,000**

Half of the $100.02M JIF funds were released immediately upon signing of the HEC Financial Management Work Group memo, and the other half were released in FY 2010.

In addition to the $100.02M JIF- funds for the development and implementation of IM/IT capabilities, initial JIF funding of $11.772M was approved by the HEC in FY 2008 to support JAL FHCC IM/IT program management and develop business requirements for , JAL FHCC's IM/IT capabilities. A VA *JAL FHCC Executive Summary Briefing* dated December 10, 2013 also references an additional $4.8M that was provided by the DoD/VA Interagency Program Office (IPO).[55] Finally, GAO's 2012 Report entitled, *VA/DoD Federal Health Care Center: Costly Information Technology Delays Continue and Evaluation Plan Lacking*, states that "…as of March 2012, VA and DoD have spent more than $122 million on IT capabilities at the FHCC."[56]

[55] It is unclear whether $4.8M provided by the DoD/VA IPO reflects the combined amount provided by the IPO to both the DoD and VA, or whether $4.8M is only the portion of funds provided by the IPO to the VA.

[56] U.S. Government Accountability Office. 2012. *VA/DoD Federal Health Care Center: Costly Information Technology Delays Continue and Evaluation Plan Lacking.* GAO-12-669. Washington, DC: GAO. (Available at: http://www.gao.gov/assets/600/591895.pdf).

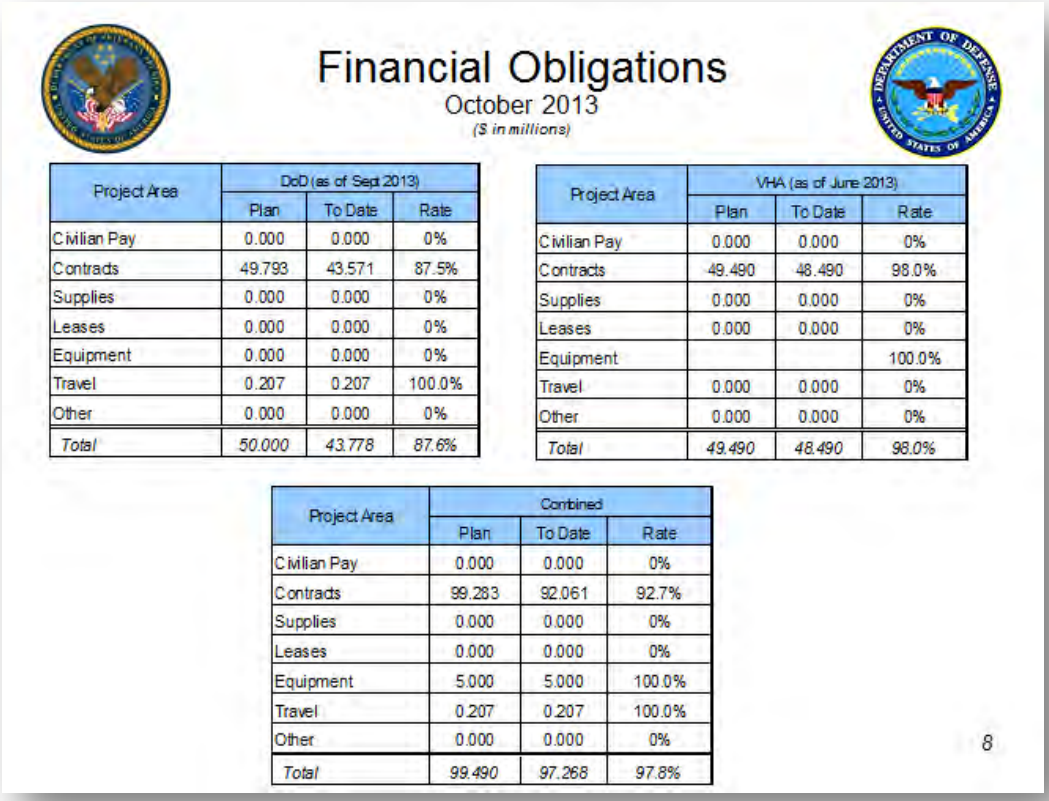
7.3.3.3 Cost of IM/IT Services – Specially-Funded IM/IT Expenditures at JAL FHCC

PE was unable to obtain a comprehensive breakdown of IM/IT expenditures at JAL FHCC.

PE was able to obtain a summary of combined financial obligations from October 2013 and a breakdown of JIF expenditures from the VA (i.e., one half of the expenditures) from December 2013.

Figure 21 below is taken from a *JIF Interim Project Review* briefing dated October 3, 2013. As shown in Figure 21, as of the date of the briefing, $97.268M of JIF funds had been obligated, with 94.6% being directed to IM/IT contracts.[57]

Figure 21: Summary of DoD/VA JAL FHCC IM/IT Financial Obligations from an October 2013 JIF Interim Project Review



Financial Obligations

October 2013

($ in millions)

Project Area	DoD (as of Sept 2013)		
	Plan	To Date	Rate
Civilian Pay	0.000	0.000	0%
Contracts	49.793	43.571	87.5%
Supplies	0.000	0.000	0%
Leases	0.000	0.000	0%
Equipment	0.000	0.000	0%
Travel	0.207	0.207	100.0%
Other	0.000	0.000	0%
Total	*50.000*	*43.778*	*87.6%*

Project Area	VHA (as of June 2013)		
	Plan	To Date	Rate
Civilian Pay	0.000	0.000	0%
Contracts	49.490	48.490	98.0%
Supplies	0.000	0.000	0%
Leases	0.000	0.000	0%
Equipment			100.0%
Travel	0.000	0.000	0%
Other	0.000	0.000	0%
Total	*49.490*	*48.490*	*98.0%*

Project Area	Combined		
	Plan	To Date	Rate
Civilian Pay	0.000	0.000	0%
Contracts	99.283	92.061	92.7%
Supplies	0.000	0.000	0%
Leases	0.000	0.000	0%
Equipment	5.000	5.000	100.0%
Travel	0.207	0.207	100.0%
Other	0.000	0.000	0%
Total	*99.490*	*97.268*	*97.8%*

8

Figure 222 below is a breakdown of the VA's IM/IT development and marginal sustainment expenditures from a *JAL FHCC Executive Summary Briefing* dated December 10, 2013. As shown in Figure 222, as of December 10, 2013, approximately $28.549M was expended for IM/IT development and $20.959M was expended for marginal sustainment.

The expenditures displayed in Figure 222 are funded by the $100.02M JIF, the $11.772M JIF, and $4.8M provided by the DoD/VA IPO. The expenditures include Independent Verification & Validation (IV&V)

[57] It is unclear why the planned JIF financial obligations sum to $99.49M rather than $100.02M, as authorized by the HEC Financial Management Work Group.

costs, infrastructure costs, equipment costs, and license costs. The expenditures displayed in Figure 222 are only the VA's portion of specialy-funded JAL FHCC IM/IT expenditures.

Figure 22: VA IM/IT Development and Marginal Sustainment Costs from December 2013 JAL FHCC Executive Summary Briefing

Cost by capability for development and marginal sustainment (MS):

	Development Actuals	\	MS Actuals	\	MS Forecast	\	Total
-- Medical SSO/CM	$1,624,721	\	$32,685	\	$28,326	\	$1,685,732
-- Registration	$1,496,782	\	$2,965,182	\	$698,756	\	$5,160,720
-- Radiology	$2,013,835	\	$4,493,205	\	$695,778	\	$7,202,818
-- Laboratory	$4,548,788	\	$5,541,041	\	$1,529,495	\	$11,619,324
-- Consults	$5,319,080	\	$2,012,050	\	$1,150,482	\	$8,481,612
-- Financial Management	$10,049,628	\	$3,019,030	\	$1,199,483	\	$14,268,141
-- Pharmacy	$3,495,923	\	$2,896,039	\	$791,209	\	$7,183,171
Total:	$28,548,757	\	$20,959,232	\	$6,093,529	\	$55,601,518

7.3.3.4 Cost of IM/IT Services – Non-Specially-Funded IM/IT Expenditures at JAL FHCC

In addition to IM/IT costs funded by the JIF, initial "seed" money provided by the VA, and initially funding from the DoD/VA IPO, JAL FHCC IM/IT requires ongoing IM/IT support costs that are funded by JAL FHCC's operating budget.

As of October 1, 2014, JAL FHCC IM/IT was deemed to be in "sustainment" rather than development. A new contract was awarded for IM/IT sustainment support. The amount of the award is not known to PE at this time.

In addition to a contracted IM/IT sustainment team, JAL FHCC has on-site IM/IT support Full Time Employee Equivalents (FTEEs) for both DoD and VA IM/IT infrastructure, systems, and applications. The cost of JAL FHCC IM/IT support FTEEs could not be obtained by PE.

7.3.4 Performance Measure 3.4: Financial Reconciliation

Financial Reconciliation provides a system for fair and equitable contributions from DoD and VA to support JAL FHCC operations, without the need for interagency billing. JAL FHCC design mandated a single, unified budget to operate the integrated facility and the consequent Financial Reconciliation web tool automated components of the financial reconciliation process.

Below, the results of metric groupings designed to assess the Financial Reconciliation web tool's impact to cost effectiveness are presented.

7.3.4.1 Metric Grouping 3.4.1 IM/IT Enabled Success Factors

PE found that the Financial Reconciliation web tool is currently not fully functional. When functioning, the web tool provided an enhanced means to perform the financial reconciliation process. Although the financial reconciliation process (enabled by IM/IT) was deemed to have met JAL FHCC legislative requirement by an independent Reconciliation Model Validation Study, the study identified the following concerns:

- Complications integrating Military Health System (MHS) data into Veterans Health Administration (VHA) systems;
- Differences in terminology hinder "apples-to-apples" comparisons;

- Business process remains reactive; and,
- Shifting allocation structures and national advisory groups add complexity.[58]

The concerns listed above were also noted in PE's interviews with JAL FHCC Health Care Business personnel.

From an IM/IT perspective, the ORP capabilities implemented at JAL FHCC may be impacting the accuracy of financial reconciliation data and, ultimately, may be impacting the effectiveness of the DoD/VA cost sharing process. Specifically, laboratory tests that are "bundled" in a single lab order may be ported as multiple laboratory orders, impacting workload calculations.

In Altarum Institute's *James A. Lovell Federal Health Care Center Reconciliation Model Validation Study: Final Report,* the following potential solutions were recommended to add assurance for ORP-based reconciliation data:

- Establish routine reviews (daily/weekly/monthly) to test data traceability and accuracy;
- Monitor system crosswalks with tracer tests to identify broken or dead-end linkages; and,
- Verify workload performed against clinical documentation to support patient encounters.

[58] Altarum Institute, *James A. Lovell Federal Health Care Center Reconciliation Model Validation Study: Final Report* (October 3, 2014), Executive Summary.

8 BENEFIT 4 FINDINGS – IMPROVE ACCESS TO HEALTH CARE DELIVERY

8.1 Benefit 4 Overview

The JAL FHCC demonstration project was intended to achieve Improved Access to Health Care Delivery by providing consolidated services to DoD and VA beneficiaries that were formerly served by two separate but closely located health care centers.

In creating the new JAL FHCC, DoD and VA health care leaders envisioned a state-of-the-art facility that would deliver health care to both DoD and VA beneficiaries from Northern Illinois to Southern Wisconsin, providing service members and veterans seamless access to an expanded array of medical services.[59]

Benefit #4

JAL FHCC IM/IT investments have partially enabled the benefit of Improved Access to Health Care Delivery.

Challenges Remaining:

- Policy constraints necessitate mission-specific services that are delivered separately for DoD and VA beneficiaries
- Lack of JIF-funded interoperable IM/IT solutions for clinical services such as pharmacy, Emergency Department (ED) care, and inpatient care

From the veterans' perspective, JAL FHCC ensured that clinical services previously available at the North Chicago VA Medical Center (NCVAMC) would remain available at the new integrated health care center. The JAL FHCC integration also added approximately 44 DoD providers specializing in services such as Dermatology, Gynecology, Mental Health, and Physical Therapy to both types of beneficiaries.[60]

From the DoD beneficiaries' perspective, the integration allowed DoD beneficiaries to access services provided by the NCVAMC that were not previously available at the Naval Health Clinic Great Lakes (NHCGL). Many DoD beneficiaries were already receiving services from the NCVAMC as part of a joint venture relationship established between NHCGL and NCVAMC. However, JAL FHCC would offer a single collocated facility where a wider array of services could be received.

Finally, the JAL FHCC integration was designed to improve access for DoD beneficiaries by waiving the copay required by the former NCVAMC for Active Duty members and Active Duty dependents enrolled in TRICARE Prime.

This report focuses on IM/IT's ability to enable the achievement of improved access to health care delivery at JAL FHCC. This report will also identify challenges that IM/IT poses to the achievement of improved access. Stakeholders can leverage these findings for both improvement at JAL FHCC now and for lessons learned when considering future Federal health care centers.

8.2 Benefit 4 Key Findings/Conclusions:

Overall, IM/IT capabilities introduced at JAL FHCC provide the necessary technical framework to enable more accessible care for both DoD and VA beneficiaries. However, several clinical services at JAL FHCC

[59] IOM *Evaluation of the Lovell Federal Health Care Center Merger,* Briefing.
[60] IOM *Evaluation of the Lovell Federal Health Care Center Merger* Table 4-1 on page 111. Per Table 4-1 in the IOM Report, 60.79 Full Time Equivalent (FTE) clinical personnel were moved from the NHCGL to the JAL FHCC West Campus. Of these, PE identified 43.95 FTE clinical personnel who provided services to both DoD and VA beneficiaries.

are not supported by interoperable IM/IT capabilities. And, policy constraints limit the amount of operational and IM/IT-based integration that can be achieved.

8.2.1 JAL FHCC Foundational Enablement of Improved Access to Health Care Delivery

Given existing constraints, the DoD and VA invested in the IM/IT capabilities that were most essential to make care accessible to both agencies' beneficiaries, while preserving each agency's unique care model and mission-specific requirements.

As explained in the Summary of Evaluation Findings section of this report, the JIF-funded IM/IT capabilities provided both interoperable and integrated solutions designed to enable both agencies' primary care-driven care models:

- **Joint Patient Registration** is an enabler of integrated and interoperable IM/IT capabilities. JPRS ensures that JAL FHCC patients have a record in both the DoD's EHR (CHCS/AHLTA) and the VA's EHR (VistA/CPRS), and ensures that those records are correlated (i.e., linked). Because some JAL FHCC services are provided to patients via CHCS/AHLTA and others are provided via VistA/CPRS, JPRS is necessary for patients to receive all available care at JAL FHCC. JPRS is also the IM/IT anchor that enables all other JIF-funded IM/IT capabilities.

- **Medical Single Sign-on with Context Management** is an integrated IM/IT capability. The MSSO component allows primary care providers (along with other clinicians, clinical support personnel, and administrative personnel) one-step access to both the DoD and VA EHRs with a single log-on. The CM component allows the primary care provider to utilize the correlation established in JPRS by toggling between the patient's DoD and VA records. Thus, although the data must, in many cases, be accessed by toggling between EHRs rather than shown in one unified view, MSSO/CM enables primary care providers and other JAL FHCC personnel to view a patient's complete electronic health record.

- **Orders Portability** is an interoperable IM/IT capability. ORP allows primary care providers (along with other clinicians) to place orders for laboratory, radiology, and consults in either agency's EHR so that they can manage, view, and (to some extent) modify orders regardless of the EHR used or type of beneficiary accessed. For example, if an order is placed in the DoD's EHR (CHCS/AHLTA), it is instantly duplicated in the VA's EHR (VistA/CPRS). The order can then be processed in VistA/CPRS, producing results in VistA/CPRS that are instantly duplicated in CHCS/AHLTA. This capability was also intended for pharmacy use, but has been deferred due to various concerns. ORP is critical to primary care providers' ability to coordinate care (and thus critical to the DoD and VA care models) because it allows primary care providers to send their patients for specific types of services.

- **Financial Reconciliation** is an integrated IM/IT capability. Financial Reconciliation enables data from DoD and VA data sources to be aggregated and analyzed to determine each agency's JAL FHCC resource consumption and necessary resource contributions for continued financing of the integrated center. The Financial Reconciliation IM/IT capability impacts primary care providers' coordination of care by removing the process of inter-agency billing and payments and instead uses workload and patient information to calculate each agency's share of JAL FHCC costs annually.

In addition to the JIF-funded IM/IT capabilities, authorized JAL FHCC personnel were granted full access to both the DoD and VA EHR's. This policy decision enables any authorized provider to view the complete electronic health record of both DoD and VA beneficiaries; and, technically allows any beneficiary to be served by any provider at JAL FHCC.

8.2.2 JAL FHCC Clinical Services Unsupported by IM/IT Interoperability

Several clinical services that deliver care to both DoD and VA beneficiaries do not have interoperable IM/IT capabilities. The lack of interoperable IM/IT capabilities may not directly impair access to health care delivery. However, several DoD providers stated that they are more confident in issuing referrals for their patients to receive DoD purchased external care rather than sending patients to JAL FHCC clinical services that are not supported by IM/IT interoperability. When patients are sent for DoD purchased external care, there is a requirement that the medical documentation be sent back to the DoD. JAL FHCC then has Referral Management personnel who scan the medical documentation into the DoD patient's CHCS/AHLTA record.

Patients are typically referred to external care for specialty care or surgical services that cannot be performed at JAL FHCC. With limited exceptions, all surgery and specialty care performed at JAL FHCC is documented in VistA/CPRS. Therefore, the concern over clinical services that are unsupported by IM/IT interoperability is almost entirely limited to personnel who serve DoD beneficiaries (namely DoD primary care personnel).

DoD and VA planners recognized that the documentation recorded for DoD patients' specialty care services at JAL FHCC should port from VistA/CPRS into CHCS/AHLTA. The need for complete patient records, along with easier care coordination, was the driving force behind the development of the consults ORP capability. The consults ORP capability does allow for a consult result note to port from VistA/CPRS back into CHCS/AHLTA when the consult was initiated by an order placed in CHCS/AHLTA. However, subsequent visits may be scheduled with the consulting provider and/or the consult may lead to an inpatient stay or a surgical procedure. With limited exceptions, any subsequent specialty care visits, inpatient care, or surgical procedure would solely be documented in VistA/CPRS.[61] If the subsequent care was not properly associated with the initial consult, then the DoD patient's primary care provider would only be able to access the VistA/CPRS-based documentation by toggling to the VA's EHR or potentially by navigating a Remote Data Viewer (RDV) solution. Also, the VistA/CPRS-based documentation would likely only be available to other Military Treatment Facilities (MTFs) through RDV solutions.[62]

8.2.3 Policy Constraints

Policy constraints limit the amount of operational and IM/IT-based integration that can be achieved at JAL FHCC. Improved access is closely associated with increased integration. Because the DoD and VA have separate agency-level policies and requirements, optimal (rather than complete) integration is being sought after at JAL FHCC.

As one example, the DoD and VA have separate access to care standards. This partially drives separate scheduling system and processes used for DoD vs. VA beneficiaries at JAL FHCC. The differing standards and scheduling solutions make fully integrating JAL FHCC accessibility a difficult task. Improved access can be achieved only to the extent that services are integrated and available for both sets of beneficiaries at JAL FHCC.

8.3 Benefit 4: Improve Access to Health Care Delivery Performance Measures and Results

The performance measures outlined in the subsequent sections reflect the extent to which the JIF-funded IM/IT components (JPRS, MSSO/CM, ORP, and Financial Reconciliation) and overall IM/IT model enable Improved Access to Health Care Delivery at JAL FHCC. Additionally, unintended consequences and challenges of the JIF-funded capabilities and overall IM/IT model will be presented.

[61] A limited number of JAL FHCC specialty care providers document in the patient's native EHR.

[62] The majority of MTFs do not have access to VistA/CPRS. RDVs such as the Bidirectional Health Information Exchange provide capabilities to view the other agency's EHR documentation; however, providers note that most of the DoD/VA RDV solutions are difficult to utilize and contain incomplete information.

Table 15 provides the Benefit 4 performance measures and metric groupings as defined in the PE's *JAL FHCC IM/IT Evaluation Framework*. Each of these performance measures and metrics is expanded upon in the subsequent sections. Supplemental data for these items and individual metrics can be found in the Appendix volume of this report.

Please note that quantitative data was limited. Knowesis Inc., the team conducting the overall JAL FHCC Demonstration Evaluation required by the NDAA for FY 2010, is working with DoD and VA subject matter experts to obtain more comprehensive access data. Access will be analyzed to a greater extent in the report provided by Knowesis, Inc.

Table 15: Benefit 4 Performance Measures and Metric Groupings

Benefit 4: Improve Access to Health Care Delivery		
	Performance Measure	**Metric Grouping**
	4.1 Access to Specialty Care	4.1.1 Utilization of Specialty Care
	4.2 IM/IT Enabling Access to Care	4.2.1 Joint Patient Registration System (JPRS)
		4.2.2 Orders Portability (ORP) - Laboratory
		4.2.3 ORP - Radiology
		4.2.4 ORP - Consults
	4.3 IM/IT Enabling Continuity of Care	4.3.1 Radiology- Mammography
		4.3.2 Laboratory – A1C
	4.4 Staff and Patient Satisfaction with Access to Care	4.4.1 Staff and Patient Satisfaction

8.3.1 Performance Measure 4.1: Access to Specialty Care

JAL FHCC allows improved access to health care for both DoD and VA beneficiaries through combined specialty services such as cardiology, dermatology, oncology, and urology. The integration presented new avenues for receiving care that may or may not have been available prior. This measure highlights the utilization of specialty care for DoD and VA clinics pre- and post-integration. This data also provides an indication of how the IM/IT components have improved or hindered access to specialty clinics. Because of the IM/IT capabilities introduced, patients who might not have had convenient access to specialty services, as well as inpatient and acute care, can now receive care at the integrated facility.

Below, the results of metric groupings designed to assess IM/IT's impact to access to specialty care are presented.

8.3.1.1 Metric Grouping 4.1.1 Utilization of Specialty Care

PE was unable to obtain sufficient data to analyze or produce findings regarding IM/IT's impact to the utilization of specialty care at JAL FHCC. IM/IT's enablement of access to care, including specialty care, is explored further in section 8.3.2 below.

8.3.2 Performance Measure 4.2: IM/IT Capabilities Enabling Access to Care

The existing IM/IT model is critical to the seamless data flow that enables patient information to be in the right place at the right time. How well IM/IT applications are enabling access to care is influenced by key components of the IM/IT enablers, such as the ability to login, the ability to identify a patient in both

EHRs, the ability to access patient information, and the ability to order diagnostic tests and receive results regardless of the native system in which they were ordered.

Below, the results of metric groupings designed to assess IM/IT's impact to access to care are presented.

8.3.2.1 Metric Grouping 4.2.1 JPRS

PE found that JPRS has enabled improved access to care. JPRS provides a single graphical user interface (GUI) for JAL FHCC personnel to register DoD and VA beneficiaries. The JPRS system also creates (or links) a patient record in both the DoD and VA EHRs. Because some JAL FHCC services are performed using CHCS/AHLTA and other services are performed using VistA/CPRS, patient must have electronic health records in both EHRs in order to have access to all available clinical services at JAL FHCC. Without JPRS (given the IM/IT model selected), DoD and VA beneficiaries would not have access to all of JAL FHCC's clinical services.

8.3.2.2 Metric Grouping 4.2.2 ORP – Laboratory, Metric Grouping 4.2.3 – Radiology, and Metric Grouping 4.2.4 – ORP - Consults

PE found that the ORP capabilities for laboratory, radiology, and consults have enabled improved access to care, when fully functional.

When fully functional, the ORP capabilities enable more seamless coordination of care between primary care and the laboratory, radiology department, and specialty care clinics. Because the main JAL FHCC laboratory and radiology department, along with specialty care clinics utilize the VA's EHR, the ORP capabilities primarily improve access to care for DoD patients. For VA patients, ORP has essentially produced no impact on their access to care – as all care is coordinated within VistA/CPRS as it was previously at the North Chicago VA Medical Center (NCVAMC).

For DoD patients, they can see their primary care provider and have access to a more robust laboratory, radiology department, and specialty care offerings without requiring approvals for DoD purchased care. This adds convenience for DoD patients, along with the collocated facilities that JAL FHCC provides.

As noted in prior sections, the ORP capabilities (primarily ORP for laboratory) have experienced performance issues, driven largely by network delays. The IM/IT performance issues experienced by the ORP capabilities do not restrict a beneficiary's access to care; however, it can make the care delivery process more time consuming. As an example, if ORP for laboratory is experiencing lengthy interagency transaction times, then a DoD patient may arrive at the laboratory for testing before the laboratory order has come through. This could introduce additional wait times for the patient.

Additionally, because there is no ORP or interoperable IM/IT solution for pharmacy, additional delays may be introduced for filling patient prescriptions.

8.3.3 Performance Measure 4.3: IM/IT Enabling Continuity of Care

Continuity of Care is the process by which the patient and the provider are cooperatively involved in ongoing health care management toward the goal of high quality, cost-effective health care. It encompasses all steps in the health care process, during which health care professionals interact with patients, review pertinent medical record information, offer diagnoses, and plan subsequent care.

PE was unable to obtain sufficient to support the analysis of the specific metric groupings (4.3.1 Radiology – mammography and 4.3.2 Laboratory – A1C).

PE found, however, that the overall IM/IT model selected for JAL FHCC has enabled continuity of care in specific areas and has hindered continuity of care in other areas.

8.3.3.1 Agency-Wide Continuity of Care

Given constraints, DoD and VA planners selected an IM/IT common services model for JAL FHCC; whereby both the DoD and VA EHRs would be utilized. In theory, maintaining the use of both agencies' EHRs maintains continuity of care throughout each agency's health care system.

For example, the Military Health System (MHS) utilizes CHCS/AHLTA as its EHR. JAL FHCC maintains CHCS/AHLTA as DoD patients' primary electronic health record. Therefore, when a DoD patient is transferred to another Military Treatment Facility (MTF) within the MHS, the continuity of that patient's record should be maintained.

In practice, however, not all services offered to DoD patients at JAL FHCC are documented in CHCS/AHLTA. Several clinical services are only documented in VistA/CPRS. DoD and VA planners understood this risk and attempted to ensure all patient documentation was ported back to the patient's native EHR. Specifically, the ORP capabilities were designed to port information documented in VistA/CPRS back into CHCS/AHLTA.

The ORP capabilities have helped maintain agency-wide continuity of laboratory services, radiology services, and consults when fully functioning and all associated workflow processes have been adhered to. As noted in preceding sections, the ORP capabilities have experienced both functionality- and workflow-based challenges. From a continuity of care perspective, the biggest challenge is posed by non-adherence to the joint patient registration workflow; because if a patient is not joint registered, then his/her orders cannot port between EHRs.

Despite functionality- and workflow-based challenges associated with ORP, the capabilities have helped maintain agency-wide continuity of care. The larger hindrance to agency-wide continuity of care posed by JAL FHCC's IM/IT model is that there are several instances where DoD patients receive care from a VistA/CPRS-based clinical service, and the data does not port back to CHCS/AHLTA. This mainly occurs in the following instances:

- Emergency Department (ED) visits,
- Inpatient stays, and
- Specialty care visits and/or surgical procedures that are not properly associated with a consult.

Therefore, from a DoD perspective, the use of each agency's EHR coupled with ORP has enabled DoD-wide continuity of care for primary care, medication documentation, laboratory services, radiology services, and consults. However, there are several instances in which a DoD patient's CHCS/AHLTA-based record would be incomplete.

From a VA perspective, the use of each agency's EHR *has* maintained VA-wide continuity of care. And, the use of ORP has had essentially no impact on VA patients' agency-wide continuity of care. Because, with extremely limited exceptions, all care provided to VA patients at JAL FHCC is completely contained within VistA/CPRS.

8.3.3.2 Facility-Level Continuity of Care

Within JAL FHCC, the selected IM/IT model has had the following impacts to continuity of care:

- Continuity of care has been hindered for DoD beneficiaries primarily served by JAL FHCC's West Campus (i.e., non-Active Duty DoD beneficiaries).
- Continuity of care has largely been maintained for DoD beneficiaries primarily served by JAL FHCC's East Campus (i.e., Active Duty DoD beneficiaries).
- Continuity of care has been entirely maintained and essentially unaffected for VA beneficiaries.

8.3.3.2.1 Facility-Level Continuity of Care – DoD Beneficiaries Primarily Served by JAL FHCC's West Campus

JAL FHCC's West Campus serves non-Active Duty DoD beneficiaries as well as Active Duty beneficiaries that require more complex services that cannot be provided on the East Campus. All DoD primary care

clinics at JAL FHCC (both on the East and West Campuses) utilize CHCS/AHLTA. However, nearly all West Campus ancillary, diagnostic, and specialty care services that DoD beneficiaries may require are documented in VistA/CPRS.[63] Additionally, the majority of surgical procedures and all inpatient care and ED visits are only documented in VistA/CPRS.

The DoD and VA invested in JAL FHCC's ORP capabilities to alleviate the chance that patient documentation would only be contained in one EHR. However, as noted in the preceding section, ORP has encountered both functionality- and workflow-based challenges. And, there are several JAL FHCC clinical services that are not supported by ORP. Therefore, there are many instances where providers serving DoD beneficiaries on the West Campus have to toggle between the DoD and VA EHRs to locate complete patient information. Therefore, continuity of care has been hindered for DoD beneficiaries primarily served by JAL FHCC's West Campus.

8.3.3.2.2 Facility-Level Continuity of Care – DoD Beneficiaries Primarily Served by JAL FHCC's East Campus

JAL FHCC's East Campus almost exclusively serves Active Duty DoD beneficiaries, with the largest portion of the patient population being Navy recruits. All clinical services provided on JAL FHCC's East Campus are documented in CHCS/AHLTA. Therefore, for a large number of DoD beneficiaries served by the East Campus, JAL FHCC's IM/IT model has enabled continuity of care – because all of their care is performed/documented in CHCS/AHLTA.

The hindrance to continuity of care occurs when a patient requires care from the West Campus. Care initiated by a consult, or a complex laboratory or radiology service that must be performed on the West Campus should port back to CHCS/AHLTA through ORP. However, if the patient has an ED visit, has a surgical procedure, has an inpatient stay, or has a follow-up specialty care visit, the documentation will only be contained within VistA/CPRS.[64]

8.3.3.2.3 Facility-Level Continuity of Care – VA Beneficiaries

Continuity of care has been entirely maintained and essentially unaffected for VA beneficiaries, as all patient care provided for VA beneficiaries is conducted in VistA/CPRS.[65]

8.3.4 Performance Measure 4.4: Staff and Patient Satisfaction with Access to Care

Staff and patient perception of access to care reflects general sentiment among patients and providers at the integrated facility; whether patients feel they have the access they need, and whether facility-level IM/IT capabilities are successfully integrating services and health records for provider workflow. Staff and providers have the greatest insight into whether the IM/IT model is enabling the continuum of care: facilitating patient registration, patient visits, and provider treatment standards. It is critical to understand the impacts to the patient experience, and how patients are reacting to new opportunities in their efforts to receive care.

Below, the results of metric groupings designed to assess IM/IT's impact to staff and patient satisfaction with access to care are presented. Please note that there are a number of existing measures utilized to asses patient satisfaction with access to care, including metrics utilized by the *JAL FHCC Integration*

[63] A limited number of specialty care clinics document in both VistA/CPRS and CHCS/AHTLA (depending on the patient being served). And, the main exception is the West Campus pharmacy – which utilizes both EHRs.
[64] There are some exceptions to this statement. A limited number of specialty care clinics and surgical subspecialties document in both VistA/CPRS and CHCS/AHTLA (depending on the patient being served).
[65] There are dual beneficiaries who can receive care from both VistA/CPRS and CHCS/AHLTA-based clinics; however, the scenario would be no different at JAL FHCC than at any other VAMC. And, JAL FHCC provides VA providers with direct access into CHCA/AHLTA – something not available the large majority of VA providers at other VAMCs.

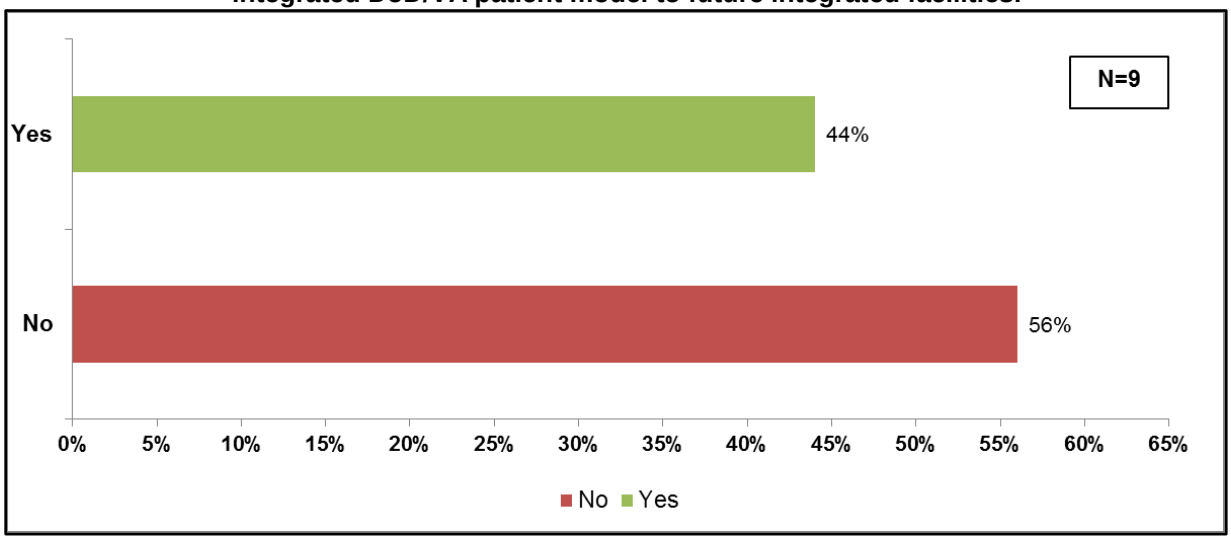
Scorecard.[66] PE did not analyze or present results from the *JAL FHCC Integration Scorecard*, as this is addressed by the Government Accountability Office (GAO) and will also be addressed by the overall Demonstration Evaluation being conducted by Knowesis, Inc.

8.3.4.1 Metric Grouping 4.4.1 Staff and Patient Satisfaction with Access to Care

PE found that JAL FHCC personnel are mixed in their agreement that IM/IT at JAL FHCC has improved access to care. No personnel interviewed by PE indicated that the IM/IT model has hindered beneficiaries' ability to receive care. However, many personnel who primarily serve DoD beneficiaries on JAL FHCC's West Campus indicated that coordination of care is more challenging at JAL FHCC because of the use of two EHRs.

When prompted with the question "Would you recommend JAL FHCC's integrated DoD/VA patient model to future integrated facilities?", providers at JAL FHCC were divided in their responses: 44% said yes, while 56% said no.

Figure 23: JAL FHCC Respondents' Agreement that they would Recommend JAL FHCC's integrated DoD/VA patient model to future integrated facilities.



These percentages, however, are based off an extremely limited number of responses (n = 9). PE conducted in-depth interviews with more than 75 personnel during site visits, and spoke with dozens more throughout this assessment. Most personnel interviewed did not feel that they could provide a simple yes/no answer. Personnel noted that their desire would be to create a more fully integrated health care center utilizing one set of policies and on EHR.

The majority of personnel believe that JAL FHCC could be more integrated and enhance both DoD and VA beneficiaries' access to care by unifying policies, procedures, scheduling processes, and converting to a single EHR. However, they noted that if such a scenario is not possible, then it is important to optimize the current IM/IT solutions in use at JAL FHCC. If the solutions can be optimized to have more consistent performance, then they would recommend JAL FHCC's IM/IT solutions and overall integrated model for future integrated DoD/VA health care facilities.

[66] The *JAL FHCC Executive Agreement* required the development to Integration Benchmarks to "define the degree of integration success." These Benchmarks were converted to an Integration Scorecard tracked by JAL FHCC. One of the Scorecard Benchmarks is to "Meet all access to care standards."

9 BENEFIT 5 FINDINGS – PROMOTE OPERATIONAL READINESS

9.1 Benefit 5 Overview

Operational Readiness requires that Naval recruits and Active Duty service members are able to deploy to combat or humanitarian missions, or transfer to another military location on short notice. As part of operational readiness, a service member must be fit for duty and his/her health must be maintained.

The DoD has identified Individual Medical Readiness (IMR) elements required for Active Duty service members and the Reserve Components of the Uniformed Services to be fit for duty and medically ready to deploy anywhere. The IMR elements consist of the following:

- Periodic Health Assessment (PHA), including Pre/Post-Deployment Assessments
- Deployment Limiting Conditions (e.g., pregnancy)
- Dental Readiness
- Immunizations Status
- Readiness Laboratory Status
- Individual Medical Equipment (e.g., optical inserts, hearing protection)[67]

Benefit #5

JAL FHCC IM/IT investments have promoted operational readiness because the operational readiness process is largely contained to East Campus activities performed within CHCS/AHLTA and through paper processes.

Challenges Remaining:

- Lack of JIF-funded interoperable IM/IT solutions for clinical services such as Emergency Department (ED) care, inpatient care, and specialty care not initiated by a consult
- Challenges associated with Improved Interagency Data Sharing and Improved Efficiency have impacted East Campus activities

The *JAL FHCC Executive Agreement* reiterated that the formation of JAL FHCC could not compromise operational readiness. The *JAL FHCC Executive Agreement* went as far as establishing a patient priority to ensure that if JAL FHCC encountered resource or space limitations, Active Duty service members would receive top priority for care delivery.

To maintain a service member's health, having access to a complete medical record is of critical importance. Additionally, medical records must be mobile and available to any DoD facility that provides care to the service member.

The IM/IT model selected for JAL FHCC was designed to promote operational readiness by maintaining a complete CHCS/AHLTA record and ensuring all necessary IMR elements could be documented and tracked per DoD policy requirements.

This report focuses on IM/IT's ability to promote operational readiness at JAL FHCC. This report will also identify challenges that IM/IT poses to the promotion of operational readiness. Stakeholders can leverage these findings for both improvement at JAL FHCC now and for lessons learned when considering future Federal health care centers.

[67] U.S. Department of Defense. *Department of Defense Instruction: Individual Medical Readiness* (Number 6025.19). 2014. (Available at: http://www.dtic.mil/whs/directives/corres/pdf/602519p.pdf)

9.2 Benefit 5 Key Findings/Conclusions:

Overall, the IM/IT investments at JAL FHCC have had a limited impact on operational readiness. The decision to maintain the DoD's EHR has largely helped maintain operational readiness because IMR processes can continue as they would at any non-integrated Military Treatment Facility (MTF). The ORP capabilities for laboratory, radiology, and consults have helped maintain operational readiness when they are fully functional. The primary detriment to operational readiness is the lack of interoperable IM/IT solutions for certain clinical services such as the ED, inpatient care, and surgical procedures and specialty care that is not associated with a consult.

9.3 Benefit 5: Promote Operational Readiness Performance Measures and Results

The performance measures outlined in the subsequent sections reflect the extent to which the JIF-funded IM/IT components (JPRS, MSSO/CM, ORP, and Financial Reconciliation) and overall IM/IT model enable Promoted Operational Readiness at JAL FHCC. Additionally, unintended consequences and challenges of the JIF-funded capabilities and overall IM/IT model will be presented.

Table 16 provides the Benefit 5 performance measures and metric groupings as defined in the PE's *JAL FHCC IM/IT Evaluation Framework*. Each of these performance measures and metrics is expanded upon in the subsequent sections. Supplemental data for these items and individual metrics can be found in the Appendix volume of this report.

Table 16: Benefit 5 Performance Measures and Metric Groupings

Benefit 5: Promote Operational Readiness		
	Performance Measure	**Metric Grouping**
	5.1 Individual Medical Readiness (IMR) Data Completeness	5.1.1 IMR Checklist
	5.2 Staff Perception of IM/IT Impact to Operational Readiness	5.2.1 IM/IT Impact on Operational Readiness Perception

9.3.1 Performance Measure 5.1: IMR Data Completeness and Performance Measure 5.2: Staff Perception of IM/IT Impact to Operational Readiness

Individual Medical Readiness (IMR) data completeness is the seamless movement of medical data directly impacting the IMR element rating, which determines a service member's readiness for operational deployment.

PE found that the JAL FHCC integration and the associated IM/IT investments required to support integrated operations have had a limited impact to operational readiness. The majority of operational readiness activities are still contained within CHCS/AHLTA or done through paper processes. The JIF-funded IM/IT capabilities have provided benefits when they are fully functioning. For example, several East Campus personnel said that the ORP capability for laboratory when complex laboratory results performed on the West Campus are ported back to CHCS/AHLTA. However, the East Campus personnel also note that lengthy interagency transaction times and ORP transactional failure have hindered ORP's benefits.

The primary impact to operational readiness is when Active Duty service members require clinical services from JAL FHCC's West Campus that are not supported by interoperable IM/IT capabilities. The most prevalent occurrence is ED visits. If an Active Duty service member visits the ED on JAL FHCC's West Campus, the patient encounter will only be documented in VistA/CPRS. The lack of documentation in CHCS/AHLTA could potentially impact operational readiness if the ED visit related to any of the IMR elements.

10 BENEFIT 6 FINDINGS – IMPROVE STAFF SATISFACTION

10.1 Benefit 6 Overview

The JAL FHCC demonstration project sought to improve staff satisfaction by expanding personnel's scope of practice, providing them with opportunities to work with a more diverse patient population and a more diverse group of clinical and administrative personnel.

The JAL FHCC demonstration project also sought to improve staff satisfaction by providing personnel with the most advanced IM/IT capabilities capable of supporting integrated operations.

This section focuses on IM/IT's impact to staff satisfaction at JAL FHCC. Stakeholders can leverage these findings for both improvement at JAL FHCC now and for lessons learned when considering future Federal health care centers.

Benefit #6

JAL FHCC IM/IT investments have partially enabled the benefit of Improved Staff Satisfaction.

Challenges Remaining:

- Challenges associated with all of the preceding Benefits have impacted staff satisfaction
- Inconsistent IM/IT functionality leads to end-users' lack of confidence in the capabilities' performance

10.2 Benefit 6 Key Findings/Conclusions:

Overall, the IM/IT investments at JAL FHCC have partially enabled the benefit of improved staff satisfaction at JAL FHCC. Personnel interviewed by PE indicate that when the JIF-funded IM/IT capabilities are working, they work well. However, there is an overarching sentiment that the IM/IT capabilities are "consistently inconsistent," meaning that IM/IT tools are often difficult to access or experience latency.

The challenges detailed in the Benefit 1 (Improve Interagency Data Sharing) and Benefit 2 (Improve Efficiency of Clinical and Administrative Processes) sections of this report both impact overall staff satisfaction with IM/IT.

Additionally, IM/IT's effect on staff satisfaction varies widely by staff roles and staff workflow, as summarized below:

- **Personnel who primarily serve VA patients on the West Campus** are largely unaffected by the JAL FHCC IM/IT investments. Nearly all of their activities are maintained within the VA's EHR and other VA systems. Because the West Campus is hosted on the VA's network, these personnel have direct access to the VA's EHR and other ancillary VA systems. These personnel also have direct access to communication tools such as the VA email system and the JAL FHCC SharePoint.

- **Personnel who primarily serve DoD patients on the East Campus** are also somewhat unaffected by the JAL FHCC IM/IT investments; however, they are more affected and also less satisfied than personnel who primarily serve VA patients on the West Campus.

  Personnel who primarily serve DoD patients on the East Campus conduct nearly all of their workflow within the DoD's EHR and other DoD systems. Because the East Campus is hosted on the DoD's network, these personnel have direct access to the DoD's EHR and other ancillary DoD systems. These personnel are more impacted by JAL FHCC IM/IT investments because certain complex laboratory and radiology services, as well as all emergency department (ED)

care, and, with limited exceptions, specialty care, and surgeries are performed on the West Campus using the VA's EHR.

East Campus personnel note that when the IM/IT investments are fully functioning, they work well. However, they note that the ORP capabilities can experience lengthy interagency transaction times and the MSSO/CM capability can experience considerable latency.

East Campus personnel like the ability to view their patients' complete VistA/CPRS record, and believe that toggling between EHRs using the Citrix-based AVHE is superior to current Remote Data Viewer (RDV) solutions. However, East Campus personnel note that the AVHE often experiences system performance issues, including latency and downtime.

Finally, East Campus personnel note that JAL FHCC's network architecture is not conducive to cross-campus communication. They feel that it is difficult to access communication tools (primarily SharePoint) that is hosted on the VA's network. East Campus personnel almost unanimously stated that the current IM/IT model at JAL FHCC is a limited solution in place of having a single network and a single integrated EHR.

- **Personnel who primarily serve DoD patients on the West Campus** are the most dissatisfied with the JAL FHCC IM/IT investments and overall IM/IT model. These personnel primarily document in CHCS/AHLTA and utilize other DoD ancillary systems/tools. Because the West Campus is hosted on the VA's network, West Campus personnel must access CHCS/AHLTA and other DoD systems/tools through the Citrix-based AVHE. As detailed in preceding sections of this report, the AVHE has experienced a number of performance challenges, especially when coupled with MSSO/CM.

  Personnel who primarily serve DoD patients on the West Campus note that when the JIF-funded IM/IT capabilities are fully functional, they work well. However, they note that the ORP capabilities can experience lengthy interagency transaction times and the MSSO/CM capability can experience considerable latency. These personnel often revert to toggling between EHRs in order to obtain all of the information they need. Because many clinical services on the West Campus are documented in VistA/CPRS, the need to toggle between systems is more prevalent than for personnel who primarily serve DoD patients on the East Campus (where there are separate laboratory and radiology departments that can perform a number of procedures documented in CHCS/AHLTA).

  West Campus personnel who primarily serve DoD patients almost unanimously stated that the current IM/IT model at JAL FHCC is a limited solution in place of having a single network and a single integrated EHR.

- **Personnel who serve a mix of DoD and VA patients** are relatively satisfied with the JAL FHCC IM/IT investments and overall IM/IT model. Personnel who serve a mix of DoD and VA patients, with extremely limited exceptions, are all based on JAL FHCC's West Campus and utilize VistA/CPRS as their primary EHR.

  These personnel note that they like the ability to view their patients' complete VistA/CPRS and CHCS/AHLTA records, and believe that toggling between EHRs using the Citrix-based AVHE is superior to current RDV solutions. However, these personnel note that the AVHE often experiences system performance issues, including latency and downtime.

  The primary aspect of dissatisfaction is the lack of an interoperable pharmacy solution, requiring personnel to input medications in the patient's native EHR. Because the majority of personnel who serve both DoD and VA patients are primarily documenting in VistA/CPRS, the lack of an

interoperable pharmacy solution requires them to toggle to CHCS/AHLTA to input medication orders for DoD patients.

Finally, personnel who serve a mix of DoD and VA patients almost unanimously stated that the current IM/IT model at JAL FHCC is a limited solution in place of having a single network and a single integrated EHR.

In summary, JAL FHCC personnel would only recommend the JAL FHCC IM/IT capabilities if the tools were working consistently, and if it was not feasible to utilize a single EHR. Personnel nearly unanimously stated that they would prefer to use a single EHR on a single network; and, personnel recommended that a single EHR be used at future integrated sites.

10.3 Benefit 6: Improve Staff Satisfaction Performance Measures and Results

The performance measures outlined in the subsequent sections reflect the extent to which the JIF-funded IM/IT components (JPRS, MSSO/CM, ORP, and Financial Reconciliation) and overall IM/IT model enable Improved Staff Satisfaction at JAL FHCC. Additionally, unintended consequences and challenges of the JIF-funded capabilities and overall IM/IT model will be presented.

Table 17 provides the Benefit 6 performance measures and metric groupings as defined in the PE's *JAL FHCC IM/IT Evaluation Framework*. Each of these performance measures and metrics is expanded upon in the subsequent sections. Supplemental data for these items and individual metrics can be found in the Appendix volume of this report.

Table 17: Benefit 6 Performance Measures and Metric Groupings

Benefit 6: Improve Staff Satisfaction		
	Performance Measure	**Metric Grouping**
	6.1 Staff Satisfaction with IM/IT Integration	6.1.1 Overall Staff Satisfaction with System Capabilities
	6.2 Staff Satisfaction with IM/IT Training	6.2.1 IM/IT Training / Perception of Effectiveness
	6.3 Staff Satisfaction with IM/IT Usability	6.3.1 Ease of Use of IM/IT
		6.3.2 Satisfaction with Individual Component Functionality
	6.4 Staff Satisfaction with Technical Support	6.4.1 Satisfaction with Technical Support
	6.5 Staff Satisfaction with Communication	6.5.1 Satisfaction with System Upgrade Notifications

10.3.1 Performance Measure 6.1: Staff Satisfaction with IM/IT Integration

Introducing new IM/IT capabilities will result in both positive and negative satisfaction among end-users. These responses are often based on how much change is required by that end-user and how it impacts his/her workflow. Assessing staff satisfaction can help identify best practices and areas for improvement to ensure the IM/IT capabilities are achieving their intended benefits. Understanding the end-user's perception of new technologies allows leadership to identify and understand the effectiveness of the IM/IT investment and subsequent impacts to other expected benefits.

Below, the results of metric groupings designed to assess staff satisfaction with IM/IT integration at JAL FHCC are presented.

10.3.1.1 Metric Grouping 6.1.1 Overall Staff Satisfaction with System Capabilities

PE found that the majority of personnel interviewed are unable to provide a Likert-based satisfaction rating for JAL FHCC's overall IM/IT model and system capabilities, stating that "when it works, it works well" but that overall IM/IT at JAL FHCC is "consistently inconsistent".

PE spoke with more than 75 individuals during site visits and phone interviews. PE also conducted in-depth observations of JAL FHCC end-user workflows. Of those interviewed, 16 personnel provided a Likert-based satisfaction rating for their overall satisfaction with the DoD and VA EHRs' ability to exchange information. As shown in Figure 24, 56% of respondents are neither satisfied nor dissatisfied with the EHRs' ability to exchange information, 32% are satisfied/very satisfied, and 12% are dissatisfied/very dissatisfied.

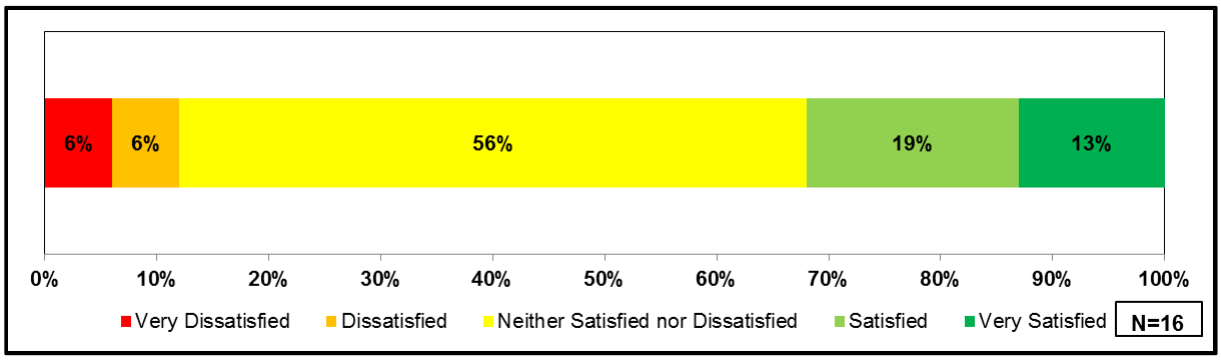
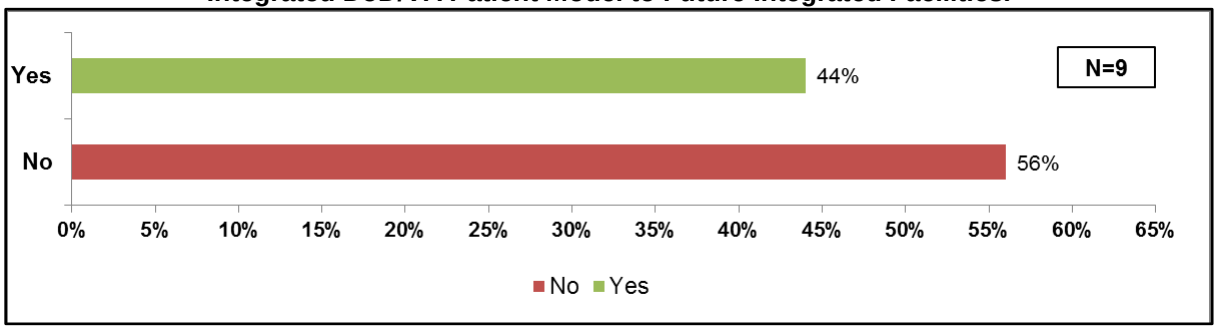


Figure 24: Overall Satisfaction with the DoD and VA EHRs' Ability to Exchange Information

JAL FHCC personnel overwhelmingly stated that they would prefer to be on a single network with a single integrated EHR. Although personnel believe that maintaining full access to both agencies' EHRs is superior than using Remote Data Viewer (RDV) solutions, personnel also believe that the use of multiple EHRs (along with dual policies and reporting requirements) in a single facility adds unnecessary burden to their daily workflow.

Personnel, again, had limited willingness to provide a Likert-based response when asked if they would recommend JAL FHCC's integrated DoD/VA patient model to future integrated facilities. Overall, personnel noted that they would only recommend the model if the agencies could optimize IM/IT performance and if a unified set of policies, reporting requirements, and IM/IT capabilities (i.e., a single EHR) were not possible. From a Likert-scale perspective, 56% of personnel interviewed that they would not recommend JAL FHCC's integrated DoD/VA patient model to future integrated facilities (as shown by the figure below).

Figure 25: JAL FHCC Respondents' Agreement that they would Recommend JAL FHCC's Integrated DoD/VA Patient Model to Future Integrated Facilities.



Despite IM/IT's challenges, 54% of respondents agreed/strongly agreed that the interoperable IM/IT tools at JAL FHCC enable them to provide excellent care to both DoD and VA patients. The remaining

respondents neither agreed nor disagreed, and no respondents disagreed/strongly disagreed. This indicates that JAL FHCC personnel believe they are able to provide excellent patient care regardless of IM/IT challenges. Additionally, the high level of personnel who neither agreed nor disagreed indicates that a limited number of JAL FHCC personnel routinely serve both beneficiary populations.

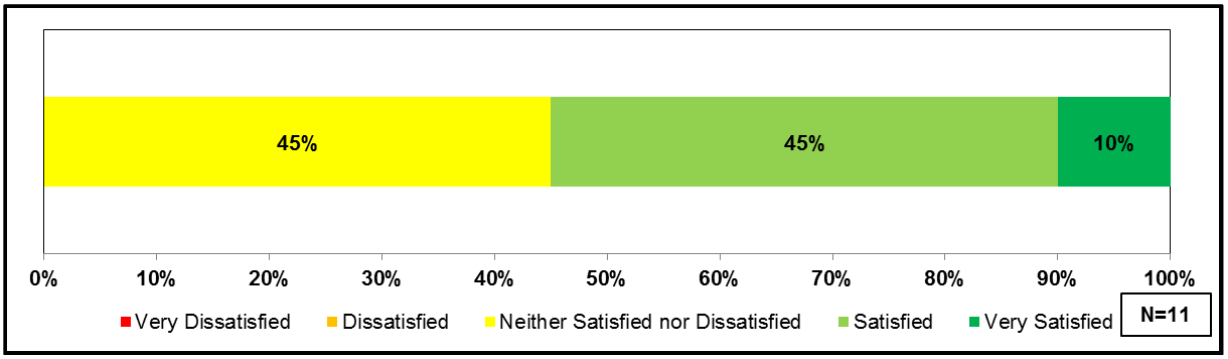


Figure 26: Agreement that Interoperability IM/IT at JAL FHCC Enables the Provision of Excellent Care

10.3.2 Performance Measure 6.2: Staff Satisfaction with IM/IT Training

This measure captures processes in place to ensure that end-users of the IM/IT capabilities are prepared to use new tools and systems. This measure also captures the end-user's understanding of these new tools and systems, and the degree of education they received to achieve this understanding.

Below, the results of metric groupings designed to assess staff satisfaction with IM/IT training at JAL FHCC are presented.

10.3.2.1 Metric Grouping 6.2.1 IM/IT Training / Perception of Effectiveness

PE found that JAL FHCC has DoD- and VA-specific trainers that provide new employee orientation training and also assist with ad hoc training, as needed. However, cross-agency training detailing the capabilities of each agency's EHRs appears to be inconsistently provided.

JAL FHCC offers resources that are well versed in both the DoD and VA IM/IT capabilities. However, end-users often stated that they do not have the time to attend classroom trainings, or do not feel it is necessary to obtain training for IM/IT capabilities that they use infrequently.

PE found that JAL FHCC would benefit from increased cross-agency training, requiring that end-users participate in trainings that cover the following:

- Utilizing both agencies' EHRs
- Utilizing Remote Data Viewer (RDV) solutions
- Maintaining username and password credentials for multiple applications
- Placing pharmacy orders in the patient's native EHR
- Reporting issues and enhancement requests via Help Desk tickets

10.3.3 Performance Measure 6.3: Staff Satisfaction with IM/IT Usability

This measure captures whether the staff members who use the IM/IT capabilities found maximum utilization in the integrated model, or alternatively, whether the IM/IT capabilities were not meeting expectations of functionality and usability. Staff satisfaction with IM/IT seeks to measure the usefulness of the JIF-funded IM/IT tools, the ease of managing IM/IT tools, and the success of the IM/IT tools that enable data sharing between the two former DoD and VA medical facilities. The usability of a tool is an important component of its functionality and effectiveness, as well as a key indicator of user satisfaction. This measure will qualitatively assess user satisfaction of how easy it is to sign into the systems and the ability to retrieve or enter data into the system.

Below, the results of metric groupings designed to assess staff satisfaction with IM/IT usability at JAL FHCC are presented.

10.3.3.1 Metric Grouping 6.3.1 Ease of Use of IM/IT and Metric Grouping 6.3.2 Satisfaction with Individual Component Functionality

PE found that JAL FHCC personnel find the use of two EHRs to be easier and more effective to use than Remote Data Viewer (RDV) solutions. Regarding individual JIF-funded IM/IT capabilities, the majority of personnel are satisfied/very satisfied with all of the capabilities except Context Management (CM), as shown in Figure 27. Additionally, personnel caveat that their level of satisfaction is dependent on whether the capabilities are fully functional. Overall, there is a perception that the JIF-funded IM/IT capabilities have improved, but are often not functional or experience latency. Additionally, nearly all personnel communicated that utilizing a single EHR would be superior to the current IM/IT model.

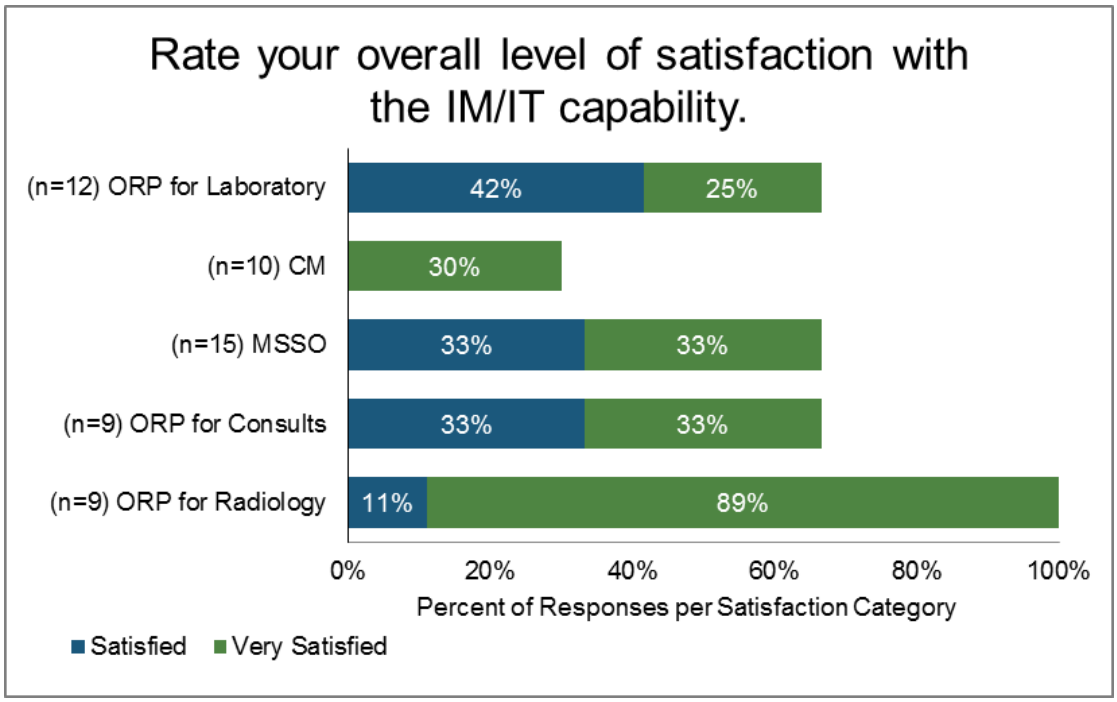


Figure 27: Favorable Responses per JIF-Funded IM/IT Capability

Please note that JPRS and the Financial Reconciliation web tool are not included in Figure 27. The JPRS capability is primarily used by administrative personnel. No significant instances of dissatisfaction were noted with JPRS.

The Financial Reconciliation web tool is primarily utilized by a single end-user at JAL FHCC. When observed by the PE (and per follow-up interviews with the tool's primary end-user), the Financial Reconciliation web tool was not functional. The primary end-user of the Financial Reconciliation web tool stated that when the web tool was operational, the tool reduced the time required to perform monthly reconciliation processes from one week down to one day. The primary end-user of the Financial Reconciliation web tool is currently working with the IM/IT Sustainment Team and JAL FHCC IM/IT support personnel to remedy the issues.

Personnel's satisfaction with IM/IT usability and the individual JIF-funded capabilities is largely dependent on a particular capabilities' impact to their workflow. All respondents (100%) were satisfied/very satisfied

with the ORP capability for radiology. This is in part because there is a more limited volume of radiology orders processed (as compared to laboratory or pharmacy). Personnel can also view radiology images through other systems outside of the ORP capability. In comparison, roughly two-thirds (67%) of respondents were satisfied/very satisfied with the ORP capability for laboratory. This is in part because laboratory has a much high transactional volume and impacts personnel more frequently. If a JAL FHCC provider is reliant on ORP in order to view laboratory results (typically providers who serve DoD patients), then they must toggle between EHRs to view laboratory results when ORP is experience functional challenges.

Similarly, CM received the lowest satisfaction ratings because it is associated with challenges connected to the AVHE. Challenges connected to the AVHE were detailed in sections 5.2 (page 42) and 6.2 (page 69) of this report. In summary, AVHE challenges present difficulty in accessing IM/IT tools and also introduce latency when paired with CM. As shown in Figure 28, only 42% of respondents agreed/strongly agreed that the time it takes to display patient information in both EHRs is acceptable.

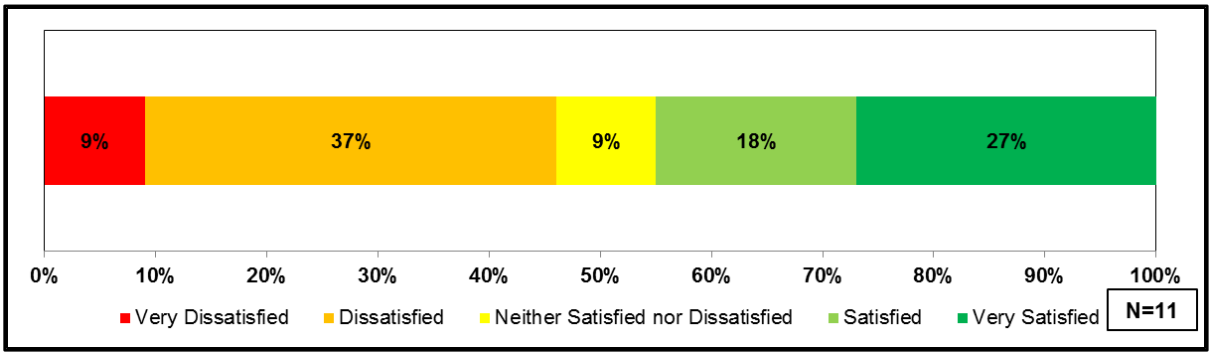


Figure 28: Time Required to Display Patient Info in both EHRs

10.3.4 Performance Measure 6.4: Staff Satisfaction with Technical Support

This measure assesses user input related to availability of help desk resources, technical support policies and procedures, and the effectiveness of help desk support. Effective technical support helps to ensure that users can continue to fully utilize IM/IT capabilities, and that any issues that arise are resolved promptly. When there is a problem with the software or hardware, the user may experience a work stoppage or delays that may affect care delivery. in reduced frustration, reduce duplicate efforts, and encourage the use of the IM/IT components.

Below, the results of metric groupings designed to assess staff satisfaction with technical support at JAL FHCC are presented.

10.3.4.1 Metric Grouping 6.4.1 Satisfaction with Technical Support

PE found that JAL FHCC personnel believe the on-site help desk is responsive and generally able to solve problems. There are a number of more complex issues, often involving the AVHE or ORP that cannot be quickly resolved and need to be escalated to higher tiers of help desk support. Finally, there are network connectivity failures, network delays, and instances of agency-level system downtime that cannot be resolved by JAL FHCC and must be solved by the agencies' respective IM/IT support organizations.

When issues must be raised beyond JAL FHCC's tier of support, understanding which organization is responsible for support can be challenging. And, agency-level IM/IT support personnel are not always well versed in JAL FHCC's unique IM/IT infrastructure.

JAL FHCC leadership expressed frustration that agency-level IM/IT organizations do not always take JAL FHCC into account when making agency-wide system updates. Even minor changes to one agency's EHR or ancillary systems can impact terminology mapping or JAL FHCC end-user access to the systems.

PE also found that JAL FHCC IM/IT personnel have encountered organizational challenges when attempting to monitor the end-to-end IM/IT model at JAL FHCC. As an example, a set of network diagnostic tools was installed to monitor interagency network traffic. The diagnostic tools were intended to identify transaction bottlenecks and root causes so that latency and transaction delays could be remedied (enhancing efficiency for all end-users). The DoD authorized the diagnostic tools to be installed, but requisite authorization could not be obtained from the VA. The network diagnostic tools were subsequently removed. JAL FHCC is currently in the process of procuring new network diagnostic tools and obtaining the required authorizations from both agencies.

10.3.5 Performance Measure 6.5: Staff Satisfaction with IM/IT Communication

This measure assesses end-users' satisfaction with how well the IM/IT policies and procedures are being communicated at all levels at JAL FHCC to include: communication between management and staff;

Below, the results of metric groupings designed to assess staff satisfaction with IM/IT communication at JAL FHCC are presented.

10.3.5.1 Metric Grouping 6.5.1 Satisfaction with System Upgrade Notifications

PE found that JAL FHCC personnel are largely dissatisfied with IM/IT communication. They perceive the IM/IT capabilities to be "consistently inconsistent" and do not feel well apprised of when IM/IT is not functioning effectively. Much of this communication cannot be managed by JAL FHCC's IM/IT Support Team or JAL FHCC leadership, as many system performance issues are unforeseen. JAL FHCC, however, would benefit from more robust network diagnostic tools and overall IM/IT monitoring capabilities – in order to effectively monitor IM/IT performance, communicate IM/IT performance, and level set realistic expectations.

11 DETAILED STAKEHOLDER COMMENTS

As noted in Section 2, PE received comments on Version 1.0 of this Report from the following stakeholder groups:

1. FHCC Advisory Board
2. JAL FHCC Site Leadership
3. HEC Health Architecture Review Board (HARB)
4. HEC Interagency Clinical Informatics Board (ICIB)
5. DoD Defense Health Agency (DHA)
6. DoD US Navy Bureau of Medicine and Surgery (BUMED)

In addition to the groups listed above, the following stakeholder groups provided feedback on PE's Summary of Evaluation Findings (pages 11 through 28 of this report), prior to Version 1.0:

7. DoD Defense Health Agency (DHA) Health Information Technology Directorate representatives
8. DoD Navy Medicine East (NME) representatives
9. DoD-led JAL FHCC IM/IT Development Team (now Defense Medical Information Exchange, DMIX) representatives
10. DoD Military Health System (MHS) Network Security Operations Center representatives
11. VA-led JAL FHCC IM/IT Development Team (VA Office of Information & Technology, OIT) representatives
12. JAL FHCC IM/IT Support Leadership (DoD and VA)
13. JAL FHCC Clinical Leadership (DoD and VA)

Finally, as noted in Section 2, PE received a non-concurrence memorandum from JAL FHCC Site Leadership for Version 1.0 of this Report, primarily due to statements about the Consults Orders Portability (ORP) capability.

PE subsequently submitted Version 1.1 of the Report, which primarily contained updated information regarding Consults ORP. The changes to Version 1.1, did not impact the overall findings, conclusions, and recommendations stated in Version 1.0 of the Report. Therefore, re-review of the Report was only requested from JAL FHCC Site Leadership.

After review of Version 1.1, JAL FHCC Site Leadership concurred with PE's Report.

Comments from all stakeholder groups, pertaining to Version 1.0 and the Summary of Evaluation Findings from before Version 1.0, along with PE's responses, are displayed below. Also below is JAL FHCC Site Leadership's concurrence memorandum for Version 1.1.

11.1 Comments from the FHCC Advisory Board

The FHCC Advisory Board provided the Cover Letter shown below. PE did not provide a response, as none was required. PE thanks the FHCC Advisory Board for its guidance and cooperation during this evaluation.

2 Mar 15

MEMORANDUM

From: Commander, Navy Medicine East
Acting Network Director, VISN 12
To: VHA Office of Quality, Safety and Value Product Effectiveness (PE)

Subj: CAPT JAMES A. LOVELL FEDERAL HEALTH CARE CENTER (JALFHCC) INFORMATION MANAGEMENT/INFORMATION TECHNOLOGY (IM/IT) INITIAL EVALUATION REPORT

Ref: (a) JALFHCC Advisory Board Meeting Minutes of 13 Jan 15

Encl: (1) Health Architecture Review Board (HARB) Comments
(2) Interagency Clinical Informatics Board (ICIB) Comments
(3) Defense Health Agency (DHA) Comment Matrix
(4) Bureau of Medicine and Surgery (BUMED) Comment Matrix
(5) JALFHCC Leadership Comment Matrix and Cover Letter

1. Per reference (a), enclosures (1) through (5) provide detail comments from the JALFHCC Advisory Board stakeholders regarding the VHA Product Effectiveness evaluation of IM/IT capabilities and infrastructure at JALFHCC.

2. Overall, the advisory board concurs with the findings and recommendations of the report and believes it to be well researched and thorough. While many IM/IT achievements have been made, there remain challenges that should be resolved prior to embarking on future integrated facilities. Among these are latency issues, the inability to transport all information from one agency's electronic health record to the other, and policies that require the preservation of separate networks with differing network security protocols. Further investment in JALFHCC IM/IT solutions would also be required to address functionality issues not achieved as outlined in the original Joint Incentive Fund proposal. This would include a fully operational financial reconciliation tool, pharmacy interoperability, and expansion of orders portability to all departments.

3. The point of contact for the effort is Dr. Deidra Flanary. She may be reach at (757)953-0323 or via e-mail at Deidra.b.flanary.civ@mail.mil.

Renee Oshinski
Acting Network Director, VISN 12

Terry J. Moulton, RDML, MSC, USN
Commander, Navy Medicine East

11.2 Comments from JAL FHCC Site Leadership (FHCC Advisory Board Cover Letter Enclosure #5)

11.2.1 Report Version 1.0 Comments

JAL FHCC Site Leadership provided both a Cover Letter and Comments Matrix. PE has responded to comments in the Comments Matrix.

Captain James A. Lovell
Federal Health Care Center
3001 Green Bay Road
North Chicago, Illinois 60064

IN REPLY REFER TO:

JAN 28 2015

From: Director, Captain James A. Lovell, Federal Health Care Center
Deputy Director/Commanding Officer, Captain James A. Lovell, Federal Health Care Center
To: VHA Office of Quality, Safety, and Value Product Effectiveness (PE)

Subj: CAPT JAMES A. LOVELL FEDERAL HEALTH CARE CENTER (JAL FHCC) INFORMATION MANAGEMENT/INFORMATION TECHNOLOGY (IM/IT) INITIAL EVALUATION REPORT - NONCONCURRENCE

Ref: (a) eKM Action - VHA PE EVALUATION (NME-09S-15-0004)

Encl: (1) FHCC Leadership Comments Matrix

1. Overall the VHA PE Evaluation report did a nice job capturing the strengths, weaknesses, challenges, and benefits of what the JAL FHCC has been trying to accomplish with the merger of two agencies, two different EHRs, and creating a proving ground for interoperability. After complete review, there are a few important areas within the document that need further clarification; the most critical finding is the references to follow-up consults and Orders Portability. Until this Orders Portability information is updated , JAL FHCC will not concur with this report.

2. Throughout the document, they discuss that there is no information passing to AHLTA for follow-up consult visits when booked in the specialty clinic leading to the potential for an incomplete DoD patient medical records. Since late 2013, all follow-up visits booked from the initiated consult are ported over into the patient's AHLTA record. Recommend having PE team review with Consults SME at JAL FHCC to further evaluation of the initial assessment and have the document updated to reflect new findings.

3. Per reference (a) and based on review, we have also included additional findings and recommendations within the Comments Matrix (Encl. 1) for consideration. Our Point of Contact at the JAL FHCC is CDR Donna Poulin and she can be reached at (224) 610-8525 or donna.poulin@va.gov.

STEPHEN R. HOLT, MD, MPH, MSNRS
Director

ROBERT G. BUCKLEY, CAPT, MC, USN
Deputy Director/Commanding Officer

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
1	1.4.4.2 (various other locations as well)	S	Recommend highlighting that similar to no problems of JAL FHCC on West Campus serving VA patients because of access to applications on the VA network. Very limited examples of the reverse of the East Campus personnel have direct access to IM/IT systems they need to provide care - essentially like working at an MTF.	Amended. An example from the East Campus has been added.
2	1.4.5.1 (various other locations as well)	C	There is a lack of understanding how the consults ORP works. Consistent statements that consults do not port over for follow-up visits and lack of documentation in AHLTA record. This is incorrect or lack of understanding of the work flow by the PE team how the consults work. BLUF: Referral (Consult) made from AHLTA clinic. Visit booked in CPRS off the referral (consult). Documentation is then placed in the CPRS clinical note and ported over. All follow-up visits booked from the consult ports over keeping the referral (consult) associated. Recommend having PE team review with Consults SME at JALFHCC as there is a misunderstanding between work flow of the consults ORP how it works. This capability has been available since around late 2013.	Amended. PE revised the Summary of Evaluation Findings section and all applicable sections of this Report to provide corrected information regarding Consults ORP capabilities. PE appreciates the additional information and documentation provided by JAL FHCC to clarify the Consults ORP capabilities associated with result notes and follow-up visits.
3	1.4.5.1 (various other locations as well)	S	Correct with statement that inpatient and ED services don't have service directly document in AHLTA. Should have footnote or statement to reflect that ED and inpatient services were used prior to 2010 and this lack of documentation was a problem when NHCL GL and North Chicago were separate agencies.	No change made. Because ED interoperability issues were experienced prior to the formation of JAL FHCC, they would have been considered when developing JAL FHCC IM/IT requirements.
4	1.4.5.3	C	SharePoint isn't associated with AVHE services. It is hosted and accessible via the VA Citrix. Significant to identify this as it demonstrates the additional complexity of having to utilize another Citrix service to access business/administrative	Amended. The term “AVHE” has been replaced with “virtualized tools”. This change was made to section 1.4.5.3, and to other applicable sections of the Report.

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
			applications for those not on the VA network.	Additionally, Footnote #15 has been added regarding the multiple virtual environments present at JAL FHCC.
5	5.4.1.3.3	C	Incorrect statement: about many maintain both PIV badge and CAC to access applications. Also no longer required to have CAC for HEDIS. Recommend validating this number as it is less than 1% of employees (50 out of over 3000 employees). As new applications come up that are srnartcard are enabled, local IRM team immediately works with host agency to identify requirement, we issue CAC cards temporary and once accessible retrieve cards back. List of sites still being worked can be provided if needed.	Amended. The term "many" has been changed to "some." PE did not amend the example regarding HEDIS measures. This was from a direct example provided by a JAL FHCC Clinical Executive.
6	5.4.1.4	S	MSSO/CM recommend explaining that CareFx presents all applications from Citrix environment and Sentillion is a hybrid with VA applications not from a virtual environment. This proves to be challenging to compare the two applications and their performance.	No change made. PE agrees that JAL FHCC's IM/IT infrastructure is highly complex, and believes this complexity was highlighted throughout this report.
7	5.4.3.2	S	Agree that audit should be done for the extent of incomplete records. Find that there are staff not fully versed on how the different IM/IT capabilities have matured resulting in misinformed information being shared during interviews or when meeting with others.	No change made. The commenters are in agreement with PE's statements.
8	5.4.4	S	Responsiveness. No defined benchmark to measure what is acceptable. There should be recommendation to have this defined for all future efforts to help with measuring success. At this time, facility has not seen the defined performance measure for response to measure or aim for.	No change made. PE was unable to obtain substantive quantitative data for system responsiveness and relied upon observations and end-user interviews. The need for transaction time success criteria is noted in the Benefit 1 section of the supporting Report, specifically on page 64.
9	7.2.1	C	Recommend validating the actual number of personnel hired (specifically in Pharmacy) compared	No change made. PE was unable to obtain quantitative personnel or accounting data to

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
			to was reported in 2012 IOM report not confident that is accurate. Last update is only 3 pharmacist hired.	verify the number of pharmacists hired.
10	6.3.3.1 (various areas in document)	C	Comment about exceed 5 hrs. Need to ensure that it is understood what the 5 hr is a result of major issues and it is an exception not the norm. Agree with comment by interviewers there is a feeling it exceeds 2 minutes.	No change made. Quantitative data regarding transaction times was not made available to the PE team to substantiate average transaction times.
11	N/A	S	Understanding the challenges they, along with FHCC team, had getting qualitative data, it is still unclear how they measure to show acceptable performance/response of systems. Are they measurable or subjective? Recommend them adding into future interoperability efforts that these measure be defined to establish a benchmark to measure and strive for.	No change made. PE was unable to obtain substantive quantitative data for system responsiveness and relied upon observations and end-user interviews. The need for transaction time success criteria is noted in the Benefit 1 section of the supporting Report, specifically on page 64.
12	N/A	S	Because they reference the IOM report from 2012 in various places, I would recommend possibly adding to the appendix or within the document a timeline which reflects the dates of the different capabilities as the rolled out and fixes/patches which provided further enhancements. This may provide a clearer picture of the current state and the different phases/timeframes that it took us to get there, as many reading the document may have not received or understand the latest status past the comprehensive IOM report.	No change made. PE acknowledges that the IM/IT environment at JAL FHCC is highly complex and dynamic.

11.2.2 Report Version 1.1 Comments

JAL FHCC Site Leadership provided the following memorandum of concurrence for Version 1.1 of PE's Report. PE did not provide a response, as none was required. PE thanks JAL FHCC Site Leadership for their guidance and cooperation during this evaluation.

Captain James A. Lovell
Federal Health Care Center

Memorandum

Date: 23 Jun 2015

From: Director, Captain James A. Lovell, Federal Health Care Center
Deputy Director/ Commanding Officer, Captain James A Lovell, Federal Health Care Center

Subj: CAPT JAMES A. LOVELL FEDERAL HEALTH CARE CENTER (JAL FHCC) INFORMATION MANAGEMENT/INFORMATION TECHNOLOGY (IM/IT) INITIAL EVALUATION REPORT – NONCONCURRENCE

To: VHA Office of Quality, Safety, and Value Product Effectiveness (PE)

Thru: Commander, Navy Medicine East (NME)

Encl: (1) FHCC Cover Letter and Comment Matrix dated 28 Jan 2015

1. After review of requested changes related to the follow-up consults documentation identified in enclosure (1), we have found that all requested corrections based off our original non-concurrence have been properly reflected in the updated VHA Product Effectiveness (PE) Final Draft document dated May 2015. Some of the additional suggested recommendations identified in enclosure (1) were also reflected or commented on within the matrix providing additional clarification. Based on the above, the FHCC now concurs with the Final Draft document dated May 2015.

2. The point of contact at the JAL FHCC is Dr. Frank Maldonado who can be reached at Frank.Maldonado@va.gov or CDR Donna Poulin who can be reached at Donna.M.Poulin.mil@mail.mil.

STEPHEN R. HOLT, MD, MPH, MSNRS
Director

ROBERT G. BUCKLEY, CAPT, MC, USN
Deputy Director/Commanding Officer

11.3 Comments from the HEC HARB (FHCC Advisory Board Cover Letter Enclosure #1)

The Health Executive Committee (HEC) Health Architecture Review Board (HARB) provided the following comments. PE provided no response, as none was required.

Request: Provide your committee's thoughts on report findings and recommendations and state whether concur with the report findings and recommendations.
Due: NLT 9 January

Below is the HARB review executive summary followed by additional supporting detail.

HARB Review Executive Summary

1. **Concur with Findings and Recommendations:** Overall the HARB finds the report to be well researched and we concur with its findings and recommendations.
    a. Concur with recommendations in 1.3.2 (*Identify Challenges and Unintended Consequences of the Common Services IM/IT Model Implemented at JAL FHCC*) to address key challenges. (p.12)
    b. Concur with recommendations in 1.3.3 (*Provide DoD and VA Leadership with Information for Improved Decision Making in Future Integrated Endeavors*) on actions needed before embarking on another attempt to create an FHCC. (p. 12) Further, the HARB also suggests leadership consider ways to go beyond "optimal integration" (see elaboration below).

2. **Leadership Decision Needed on Future Vision**: Our biggest concern not addressed (and out of scope for this evaluation) is how the DoD and VA approach of using common APIs and interoperable electronic health record (EHR) systems impact this Federal Health Care Center (FHCC) and other potential FHCCs. We believe that leadership must decide whether they intend to continue to have Joint Medical Facilities with fully integrated care and, if so, their vision for delivery of care at these facilities. This functional decision will drive the technical solutions and their supporting IM/IT capabilities. A timely decision is especially important in light of the ongoing modernization efforts of both Departments. Secondly, the HEC should be reviewing all the policy issues between the Departments that influence and drive the impediments to interoperability. The challenges for a solution at FHCC have been influenced by the need to work around these policy issues.

3. **Strongly Endorse Recommendation to Fix Latency Issues:** As leadership is deciding on the future of the JAL FHCC in particular, and FHCCs in general, we agree with the report conclusion that latency issues must be addressed in the near-term. Further, the HARB suggests that analysis of possible solutions address the implications of the DoD evolving to the use of a single medical network (i.e., the DoD Medical Community of Interest).

4. **Use Findings to Inform Joint Strategy:** The HARB recommends that these findings be used to inform the Joint Executive Committee (JEC) Strategic Plan refresh, the IT Framework being considered under the recent Health Executive Committee (HEC) decision to restructure its IM/IT oversight, and the updated DoD/VA Joint Interoperability Plan. The HARB wants to particularly stress the importance of establishing a standardized and streamlined approach for front-end evaluation of IM/IT project plans and their associated risks including checklists leveraging JAL FHCC lessons learned.

HARB Review Additional Details

Leadership Decision on Future of FHCCs
The JAL FHCC was authorized as 5 year demonstration project in 2010 and therefore is nearing the end of the demonstration period. This demonstration project was implemented at a time when the Departments were pursuing a single joint electronic health record system. To state the obvious, the Departments are at a decision point on the JAL FHCC in particular, and the use of FHCCs in general. As noted above, the HARB believes that leadership must set a vision for care delivery at Joint Medical Facilities as this will drive technical solutions and IM/IT capabilities.

Fix Latency Issues
The HARB strongly endorses the recommendation to fix latency issues at JAL FHCC in the near-term. According to the report, latency times for orders portability capabilities are very long. The average interagency latency times are two (2) minutes, however the interagency latency times can exceed five (5) hours, with reports of nearly daily lengthy interagency transaction times. (p. 19) One notable finding (p. 50) is that JAL FHCC IM/IT leaders estimate that at least 75% of current system performance issues are caused by the configuration and management of three separate network domains. The report also documents that infrastructure support with two agencies responsible introduces challenges. (pp. 112-113) The use of multiple networks is policy driven (p. 20) and thus could be changed.

Therefore the HARB concurs with the suggestion in the report to consider the use of a single network in an integrated facility to allow consistent support, a single communications approach, and a single organization for contracting and approval. Further, the HARB suggests that analysis of possible solutions address the implications of the DoD evolving to the use of a single medical network (i.e., the DoD Medical Community of Interest).

Go Beyond "Optimal Integration"
Section 1.3.3 (*Provide DoD and VA Leadership with Information for Improved Decision Making in Future Integrated Endeavors*) notes that JAL FHCC leaders have been seeking "optimal integration" rather than complete integration. Optimal Integration "preserves each agency's mission, policies, reporting requirements, and patient records." (p. 12)

The HARB concurs with the recommendations in section 1.3.3 but also recommends that leadership consider ways to go beyond "optimal integration." In other words, rather than preserve fully each agency's mission, policies, reporting requirements, and patient records, consider where they may be aligned to simplify, reduce costs, and progress toward the intended outcome of "provide comprehensive, compassionate, patient-centered care to DoD and VA beneficiaries while supporting the highest level of operational readiness." (p. 10)

According to the report, different policies and reporting requirements make care integration and integrated Health Care Center (HCC) management challenging. Section 1.4.5.3 describes Integrated HCC management challenges (i.e., communications and collaboration; integrating DoD and VA administrative data). (p. 24) Integrated measurement and reporting are problematic (p. 83) and the quantitative data needed to assess value and return on investment was lacking. Figure 5 on page 26 provides great examples of where differing DoD and VA policies impact IM/IT integration. Aligning Department policies where possible would make care coordination and the operation of FHCCs more viable.

Given these findings, the HARB recommends that if FHCCs are to continue, the Departments consider aligning policies and reporting requirements where feasible. For example, the DoD and VA could consider setting key common performance metrics; instrument to collect data for these measurements as well as Department unique measures; and agree upon reporting channels.

Considerations for the Future
As noted above, the HARB believes a Joint decision on the DoD/VA vision for fully integrated care at FHCCs will drive technical solutions and supporting IM/IT capabilities. The HARB concurs that decisions are needed on the desired IM/IT model for Joint DoD/VA Facilities. (p. 25) Assuming one or more FHCCs continue, the HARB recommends the DoD and VA assess how the future approach of common APIs and interoperable systems impact this integrated HCC and any other potential integrated HCCs.

This assessment must consider full interoperability needs (i.e., beyond DoD-VA interoperability to include other trading partners). It should also consider potential new approaches such as using Software as a Service (SaaS) for some components. Developing a plan for joint facilities in the future, as a new DoD system is acquired and the VA system is modernized, is critical as FHCCs must not only coordinate between episodes of care but also within episodes of care. In an ideal world there would be no need for unique IM/IT capabilities at FHCCs.

Assuming FHCCs continue, possible futures include:

A. Keep JAL FHCC as unique experiment
Resolve existing high priority issues (see recommendations in 1.3.2) and consider implementing some improvements as a proof-of-concept of the planned future approach.

B. If preferred model for fully integrated care (i.e., a level 5 Joint DoD/VA Facility (p. 25)) is to use a single EHR system, have JAL FHCC evolve to a single EHR system and network
The report findings often cited a desire for the use of "one system." The report identified one alternative IM/IT model for joint DoD/VA facilities to adopt one of the agency's EHR and enhance that EHR to meet the needs of the other agency. The report recommends that using one agency's EHR should be analyzed further. This analysis could also consider the use of an abstraction layer (see below) as an enabler of full semantic interoperability between the departments and with external providers. This model could leverage the findings and tools developed for JAL FHCC where appropriate (e.g., JPRS to ensure patient records in each Department's EHR system are created and linked).

C. If preferred model for fully integrated care is to use native IM/IT systems and share health records, have JAL FHCC evolve to full cross-domain interoperability
If this alternative is to be analyzed further, the HARB suggests the analysis include consideration for the use of an abstraction layer to facilitate the definition and capture of all data needed for both Departments. At the FHCC, a common user interface could then be used that employs the abstraction layer and APIs to access native Department systems transparently.

Abstraction Layer / Virtualization Layer

> **Data virtualization** is any approach to data management that allows an application to retrieve and manipulate data without requiring technical details about the data, such as how it is formatted or where it is physically located. [Wikipedia – accessed December 30, 2014]

A data abstraction layer or data virtualization layer would provide a common representation of data and would identify the superset of data needed for both Department's EHR, common concepts as well Department specific concepts. A DoD/VA data abstraction layer could become a proof-of-concept for what constitutes a full lifetime service treatment record to include computable data for contracted care. The abstraction layer would need to map each department's data to the abstraction layer. Use of a common abstraction layer allows the underlying EHR system (or systems) used to be transparent. An agreed upon abstraction layer could help meet the need identified on page 26 for interoperability solutions that "can effectively transport *all* information from one EHR to the other in a computable format." An abstraction layer could also help Departments evolve to a more web-based approach where care providers access data where it is owned rather than replicate it in multiple EHR systems.

11.4 Comments from the HEC ICIB (FHCC Advisory Board Cover Letter Enclosure #2)

The Health Executive Committee (HEC) Interagency Clinical Informatics Board (ICIB) provided the following comments. PE provided no response, as none was required.

25 February, 2015

To: Jonathan Woodson, MD, DoD Health Executive Committee Co-Chair
Carolyn Clancy, MD, VA Health Executive Committee Co-Chair

Subject: Review of the Captain James A Lovell Federal Health Care Center Information Management/Information Technology Initial Evaluation Report

The Co-Chairs of the Captain James A Lovell Federal Health Care Center Advisory Board (JAL FHCC AB) requested that the Interagency Clinical Informatics Board (ICIB) be provided with an opportunity to review and comment on the draft report prepared by the Veterans Health Administration (VHA) Performance Evaluation (PE) Team to assess the Joint Incentive Funding (JIF) funded and developed Information Management (IM)/Information Technology (IT) capabilities. JAL FHCC AB Co-Chairs specifically requested that the ICIB share whether they concur with the report findings and recommendations.

The ICIB generally concurs with draft report's findings and recommendations and overall, finds the report to be well researched.

The JAL FHCC program is not a model that should be implemented as a solution as it cannot be cost effectively replicated at other DoD/VA sites. However, there were two capabilities, the Joint Patient Registration System and Medical Single Sign On, that many users believe would be beneficial and cost-effective to implement at other FHCC or joint venture sites with very close resource sharing agreements. Even these solutions should not be implemented without closely examining lessons learned from the JAL FHCC experience.

Key concerns noted in this demonstration program included a lack of common policies and network trust between the Departments that impacted system performance and clinical efficiencies. These policies included the requirements that the Departments' systems:

- Run on separate networks
- Retain separate IT security policies
- Use separate enterprise service buses
- Use separate EHRs which could not be modified in a substantive way
- Use separate Medical Single Sign On with Context Management (MSSO/CM) products (CareFX versus Sentillion)

The Financial Reconciliation and Pharmacy Orders Portability requirements were not achieved due to many unanticipated challenges.

1 Enclosure 2

The JAL FHCC experience provided invaluable lessons–learned for potential future FHCCs and DoD/VA sites that have integrated health care partnerships. Any similar future undertakings should carefully consider the lessons learned from the JALFHCC experience.

GREIG.THOMAS.WEST.1082931151

COL THOMAS GREIG, M.D.
DoD Co-Chair, Interagency Clinical Informatics Board

Walter P. Nichol 231447

PAUL NICHOL, M.D.
VA Co-Chair, Interagency Clinical Informatics Board

11.5 Comments from the DoD DHA (FHCC Advisory Board Cover Letter Enclosure #3)

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
1			**DHA Health Information Technology (HIT):** Given that they did not include most of the comments from the previous round we have nothing additional to add.	No change made. Please see page 135 for PE's responses to previous DHA comments.
2	5.3 (Table 3)	S	**DHA Program Executive Office (PEO) Defense Healthcare Management Systems (DHMS):** JPRS creates a new requirement for recruits to be registered in batches. Point of clarification: The current "Recruit Batch Registration Process" is a user requested enhancement to seamlessly integrate the existing registration process (some manual intervention) with both MEPCOM and DMDC processes. It is a supplement to the existing process and not a new requirement generated by implementation of the JPRS application. If an error concurs processing the batch registration, the site has the ability to re-run the process. Errors may occur for several reasons to include incomplete data or missing information in the sources files.	No change made. PE acknowledges that the IM/IT environment at JAL FHCC is highly complex and dynamic.
3	6.2	S	**DHA PEO DHMS:** Lack of JIF-funded interoperable IM/IT solutions for clinical services such as pharmacy. Response: Unlike other clinical services Pharmacy was funded but an acceptable solution was never developed. The shortfalls were primarily related to the following but not limited to: unresolved differences in business processes and clinical work flows between Departments; patient safety and legal concerns for proposed ORP solution; terminology mapping differences. To date, both development	No change made. PE acknowledges that the IM/IT environment at JAL FHCC is highly complex and dynamic.

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
			teams continue working with the functional SMEs via the Pharmacy IPT to explore interim solutions such as Allergy Synchronization and CHCS Terminology Standardization projects which will benefit the FHCC.	

11.6 Comments from DoD BUMED (FHCC Advisory Board Cover Letter Enclosure #4)

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
1	N/A	S	Concur with Report. Primary concern was the willingness of DoD and VA leadership to dismiss the lived experiences of staff with regards to latency. Overall the system difficulties seem to be affecting primarily the DoD clinics (smaller and out of the way as I understand it), which may lead to some of the dismissal. -While many lessons have been learned from this attempt, it is clear from the difficulty and cost in achieving the incomplete successes of today do NOT warrant trying to replicate this solution at any other facilities. -Further efforts may be best focused on culling lessons and turning to strategizing how this will work (or not work) with the new EHR DoD is purchasing. BUMEDINST 6000.16 directs our Navy bedded facilities to appoint a Chief Nursing Informatics Officer and a Chief Medical Informatics Officer and provide them with a 0.25 FTE of time to do the work. To date we have not held FHCC as one of the facilities that must comply. However, given the apparent disconnect between clinicians and IT	No change made. The commenters are in agreement with PE's report.

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
			experiences evidenced in the FHCC IM/IT report it may behoove them to adopt this model to optimize existing functionality and mitigate risk with any further updates or changes. (Given the complexity of FHCC, I would personally recommend a full FTE for each, 0.5 at a bare minimum.)	
2	1.4.3	S	The following statement is not factually correct: "*The VA initially contributed $11.772M in 2008 to develop business requirements for essential JAL FHCC IM/IT capabilities."* Please change to "The HEC approved $11.772M JIF funding in FY2008 to support FHCC IM IT program management and business requirements development" Justification: Please see attached three documents which provide you with detailed information regarding the FY2008 HEC approved JIF project to support IMIT requirements related to stand up of FHCC. (JIF funding is provided from the Joint Incentive Fund account to which DoD and VA equally contribute.)	Amended. The majority of the recommended language has been utilized.
2	Figure 5	S	The following wording in 2nd column, 3rd row is not accurate: "*Active Duty have first priority in the Tricare health benefit program"* Should be changed to: "Active Duty have first priority to healthcare in the military healthcare system. "	Amended. The recommended language has been utilized.

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
			Justification: Active Duty have priority for care in the military direct health care system and if their care needs cannot be met there, they then may access the TRICARE network managed by contractors. (TRICARE is akin to the VA's PC3 program)	
3	Figure 5	S	In 3rd column, 7th row did you mean to use the word "*accept"* instead of "access" Current wording is: Formulary with no flexibility for additional medications. Does not *access* civilian prescriptions.	Amended. The word "access" has been replaced with "accept" to correct the identified typo.
4	3.3.2	S	The following statement is not factually correct: "*To this end, the VA initially contributed $11.772M in 2008 to develop business requirements for essential JAL FHCC IM/IT capabilities."* Please change to "The HEC approved $11.772M JIF funding in FY2008 to support FHCC IM IT program management and business requirements development" Justification: Please see attached three documents which provide you with detailed information regarding the FY2008 HEC approved JIF project to support IMIT requirements related to stand up of FHCC. (JIF funding is provided from the Joint Incentive Fund account to which DoD and VA equally contribute monies.)	Amended. The majority of the recommended language has been utilized.
5	5.1	S	See comments above for page 33	Amended. The majority of the recommended language has been utilized.

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
6	5.4.1.3.3	S	In 2nd paragraph it states that *"**Many** JALFHCC personnel maintain both a PIV and a CAC so they can access all the applications ….."* For the most part only DoD employees are issued CAC cards. Our understanding is that VA employees are not able to obtain CAC cards. Given that the civilian workforce is almost entirely VA employees, the only personnel who would have CAC cards would be the active duty members and the select few Dept of Navy civilians still employed at JALFHCC who constitute the staff minority.	Amended. The term "many" has been changed to "some."
7	2nd para	S	The following statement is not factually correct: "In addition to the JIF-provided funds, *the VA initially contributed $11.772M in 2008 to develop business requirements for essential JAL FHCC IM/IT capabilities."* Please change to "In addition to the FY 2009 JIF funding, the HEC had approved $11.772M JIF funding in FY2008 to support FHCC IM IT program management and business requirements development" Justification: Please see attached three documents which provide you with detailed information regarding the FY2008 HEC approved JIF project to support IMIT requirements related to stand up of FHCC. (JIF funding is provided from the Joint Incentive Fund account to which DoD and VA equally contribute monies.)	Amended. The majority of the recommended language has been utilized.
8	Figure 21	S	As acknowledged in the report, the report does not provide the details of how the Joint Incentive Funds	No change made. PE agrees with comment and reiterates the challenges in obtaining

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
			(JIF) for IM/IT investments were allocated to accomplish the technology interoperability goals for FHCC. Readers would likely want to gain a better understanding of the total FHCC IM/IT investments and specifically how the over $111.8M in JIF funds were executed. It seems that the costs for these investments were higher than would have been estimated, and perhaps would not efficiently enable fully integrated operations nor all of the envisioned benefits resulting from an integrated Federal Health Care Center including (1) Improved interagency data sharing, (2) Improved efficiency of JAL FHCC clinical and administrative processes, (3) Improved cost effectiveness of health care delivery, (4) Improved access to health care delivery, including promoting continued beneficiary access to care, (5) Operational readiness, and (6) Improved staff satisfaction. Specifically, the report writers were unable to obtain the details regarding where/how/whom/why the funds were distributed and the sustainment costs necessary for each system, Report drafters stated there were difficulties in obtaining this financial and programmatic information. Figure 21: *Summary of DoD/VA FHCC IM/IT Financial Obligations from an October 2013 JIF Interim Project Review* reflects a very high level overview of spending by the VA with no similar information for DoD. In order to have better financial oversight and to be	transparent, accurate data regarding the JIF expenditures.

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
			able to accurately translate the lessons learned from the first pilot of a Federal Healthcare site and the costs needed to integrate care (of which IM/IT can be one of the most costly), it is necessary to have this additional financial and system implementation information and unfortunate that the report drafters were not able to obtain it.	
9	Last Para	S	The expenditures include Independent Verification & Validation (IV&V) costs, infrastructure costs, equipment costs, and license costs. The expenditures displayed in The following statement is not factually correct: "The expenditures displayed in Figure 222 are funded by the JIF, the VA's initial contribution of $11.8M, and $4.8M provided by the DoD/VA IPO." Please change to "*The expenditures displayed in Figure 22 are funded by the JIFand $4.8M provided by the DoD/VA IPO."* Justification: Please see attached three documents which provide you with detailed information regarding the FY2008 HEC approved JIF project to support IMIT requirements related to stand up of FHCC. (JIF funding is provided from the Joint Incentive Fund account to which DoD and VA equally contribute monies.)	Amended. The majority of the recommended language has been utilized.

11.7 Comments from DoD NME Representatives (Provided for the Summary of Evaluation Findings Section Submitted Prior to Report Version 1.0)

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
1	1.4.2	S	Last sentence, third paragraph-lists ER as integrated w/interoperability. I thought the ER was one of the non-integrated areas.	Amended for clarity. The Emergency Department (ED) is integrated, in that it serves both DoD and VA beneficiaries. From an IM/IT perspective, all documentation is performed in VistA/CPRS.
2	1.4.5.2	S	Additional costs for hiring IMIT work arounds could be added. You mention 2 for lab and 5 for pharmacy, but I think there were/still are more people hired because of IMIT issues.	No change made. The potential costs of IM/IT are discussed in the Benefit 3 section of the supporting Report, specifically on page 93.

11.8 Comments from DoD-led JAL FHCC IM/IT Development Team (now DMIX) Representatives (Provided for the Summary of Evaluation Findings Section Submitted Prior to Report Version 1.0)

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
1	1.1.	S	Each Department's effort were funded by a $50M JIF allocation; the VA provided advance "seed" money for this effort in excess of the allocated amount. Need to clarify the excess $20K annotated.	No change made. Information regarding the cost of JAL FHCC IM/IT investments, including JIF-funded efforts are included in the Benefit 3 section of this report, specifically on page 93.
2	1.3.2	S	Need to clarify comments related to "This is primarily due to the additional burden placed on clinical and administrative personnel because of IM/IT-driven latency and personnel's difficulty in accessing IM/IT systems/tools……"	No change made. Details of IM/IT-driven latency, personnel's difficulty in accessing IM/IT systems/tools, and the additional burden caused are presented throughout the Summary and supporting Report.
3	1.3.2	S	As previously mentioned a follow on meeting is required to understand how the information was derived for comments related to "Reduce latency experienced by the ORP capabilities….."	No change made. One follow-up meeting was held between PE and DMIX personnel. Additional follow-up meetings can also be accommodated.
4	1.3.2	S	No data offered that consolidating interoperability	No change made. PE has noted that policy

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
			solutions would be beneficial. There are pros and cons for consolidation that should be identified. The key point missed is that current policy disconnects impact or prevent leveraging joint development and infrastructure contracts.	constraints are a significant barrier to the consolidation of DoD/VA IM/IT infrastructure.
5	1.4.1	S	Development teams provided supplemental information on the additional enhancements delivered to improve interoperability; those accomplishments are not listed.	No change made. Additional enhancements delivered to improve interoperability are discussed throughout the supporting Report.
6	1.4.2	S	Request clarification on the following sentence: "In terms of optimal integration and consolidation, the demonstration has not shown evidence of efficient or cost effective operations on a consistent basis." Was a determination of scope of effectiveness a piece of the VHA evaluation? Please identify how it was determined; what are the references or data that lead to this conclusion?	No change made. PE's primary evaluation objective was to assess the effectiveness of the JIF-funded IM/IT components. PE's findings are based on review of documentation, interviews with SMEs, interviews with JAL FHCC personnel, site visits, and direct observations. Data is presented throughout the Summary and supporting Report to substantiate PE's findings.
7	1.4.3.2 MSSO-CM	S	Request that the results/feedback from the interviews conducted be provided to the DoD and VA CIO in order for the development teams to determine where additional improvements can be made.	No change made. The comment is noted. This Summary and the supporting Report are intended to provide the results and feedback from JAL FHCC interviews and direct observations to determine where additional improvements can be made.
8	1.4.3.2 MSSO-CM 1.4.4.1 Policy Constraints	S	Comments should be updated to reflect recent software deliverables in 3QFY14 and 4QFY14. Comments stating, "the PE Team, however, was unable to verify improvements in CM stability with end-users or through quantitative" are not accurate. If requested from the VHA PE POC, the DoD development team can provide additional information on the current operational status of MSSO-CM. The MSSO-CM Operational Assessment (OA) preliminary reports (User Opinion Survey Data) are available from the AMEDDBD indicate that Effectiveness and Suitability were scored at 95.5% and 90.80% respectively.	Amended. A footnote was added, and the OA reports are noted in section 6.2.1.3 of the supporting Report.

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
			- A considerable factor in AVHE's performance is incompatibility with one of JAL FHCC's MSSO/CM solutions: the CareFX solution, provided by Harris Corporation. Should cite on the VA CM is deployed in comparison to the CareFx for an accurate comparison.	
9	1.4.4.2	S	Need a follow on meeting to discuss reported/documented latency issues.	No change made. One follow-up meeting was held. Additional follow-up meetings can also be accommodated. Per JAL FHCC IM/IT Support personnel, latency/transaction time data requested could not be provided.
10	1.5	S	There are pros and cons with adopting each Departments EHR at JALFHCC; recommended the VHA remain neutral (as advertised) and not suggest adoption of any one departments EHR.	Amended. A footnote was added stating that CHCS/AHLTA could also be a viable alternative. The example given states that "One alternative IM/IT model for future joint DoD/VA facilities is to adopt one of the agency's EHRs and enhance that EHR to meet the needs of the other agency." Adopting VistA/CPRS was provided as one example. Adopting CHCS/AHLTA is the second example.

11.9 Comments from DoD MHS Network Security Operations Center representatives (Provided for the Summary of Evaluation Findings Section Submitted Prior to Report Version 1.0)

#	Page #	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
1	11	1.4.3.2	N/A	Second Paragraph (first on page), lines 2 – 21, recommend changing to read: …largely due to the CareFX Controller (CM Toolbar) incompatibility with the Citrix-based AVHE, which causes instability and difficulty reconnecting to AVHE when the CM Toolbar is running in a user's session.[11] In June 2014, the Defense Health Agency (DHA) AVHE and MSSO/CM Teams worked with Citrix System, Inc. and Harris Corporation (the vendor for one of JAL FHCC's MSSO/CM solutions) to implement a "hotfix" for the Citrix client installed on JAL FHCC workstations. The DHA AVHE and MSSO/CM Teams and JAL FHCC IM/IT development teams note that the new Citrix receiver on JAL FHCC workstations, has fixed the compatibility issue.	No change made. The specific CM capability is referenced in section 1.4.4.1 of the Summary. Language provided per this comment is also used in in the Benefit 2 section of the supporting Report, beginning on page 68.
2	12	1.4.4.1	N/A	Paragraph 1, halfway through - Recommend changing to read: This stipulation has led to the use of a Citrix-based AVHE. While virtualization has been proven effective in the private and government sector, JAL FHCC has experienced difficulties in the form of instability (e.g., the inability to login, issues reconnecting to Citrix sessions with the CM Toolbar running) and latency (e.g., lengthy processing times).	Amended. The recommended language has been utilized.
3	13	1.4.4.1	N/A	Paragraph 1 – Recommend to read: A considerable factor in AVHE's performance is incompatibility with one of JAL FHCC's MSSO/CM solutions: the CareFX Controller (CM Toolbar), provided by Harris Corporation. CareFX is the MSSO/CM solution procured by the DoD IM/IT development team for installation on DoD workstations at JAL FHCC. On the West Campus, DoD workstations are primarily used by DoD primary care providers. As described in the section above, JAL FHCC IM/IT support teams are working to ensure CareFX is fully compatible with the AVHE.	Amended. The majority of recommended language has been utilized.
4	13	1.4.4.1	N/A	Paragraph 2 – Recommend to read: … The Sentillion MSSO/CM solution has not experienced the Citrix compatibility issues presented by the CareFX solution.	Amended. Section 1.4.4.1 was amended per comments provided by DMIX, JAL FHCC IM/IT Support

#	Page #	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
				Inpatient, emergency department (ED), and (with limited exceptions) Specialty Care Providers are all based on VA workstations and work primarily in VistA/CPRS. When serving VA patients, these care providers experience no difficulty accessing their requisite IM/IT tools because they are hosted on the VA network and, therefore, the providers have native access to the tools on the same network and domain as their workstations. It is only when these care providers are serving DoD patients that the providers may have to access CHCS/AHLTA through AVHE. Even though Sentillion has not experienced the AVHE compatibility issue presented by CareFX, care providers note that accessing AVHE over Citrix and toggling to another system is an additional workflow step that makes it more cumbersome to provide care.	Leadership (DoD), and JAL FHCC Clinical Leadership (VA).
5	14	1.4.4.3	N/A	MSSO/CM, Second Remaining Challenge – Recommend changing to read: CareFx CM Controller toolbar primarily contributed to latency and instability associated with AVHE. For reference, the AVHE team reconfigured McAfee Antivirus (AV) Host Based Security System (HBSS) policy applied by the AVHE team on May 16, 2014 to address some reported latency issues. - High CPU Utilization: The controller toolbar is consuming a higher CPU utilization than previous versions. This is a negative impact to processor availability and hardware requirements. Status: This issue was closed on June 13, 2014. The CPU usage has been stabilized with the reconfigured McAfee Antivirus (AV) Host Based Security System (HBSS) policy applied by the AVHE team on May 16, 2014.	No change made to Summary. Reference to the HBSS revision is included in the Benefit 2 section of the supporting Report (specifically, on page 71).

#	Page #	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
				- System Latency: The site experiences unstable connectivity during early hours of operation. Status: This issue was closed on June 13, 2014. The CPU has been stabilized with the reconfigured McAfee Antivirus (AV) Host Based Security System (HBSS) policy applied by the AVHE team on May 16, 2014. Additionally, during the MSSO-CM Operational Assessment in April 2014 there were no appreciable differences identified with performance in comparison to the Essential Business Functions (EBFs).	
6	18	1.5	N/A	Paragraph 5, Lines 3 - 7 – recommend changing to read: …adopted VistA/CPRS or CHCS/AHLTA for both the East and West Campus. JAL FHCC could have then utilized one network and removed performance issues and environmental complexity associated with multiple network and Active Directory domains administered by separate groups. JAL FHCC also would have been able to forego Joint Patient Registration, Orders Portability, and Medical Single Sign-On with Context Management investments. However, the DoD and VA would have had to invest in updates to VistA/CPRS or CHCS/AHLTA to enable the system to meet all of DoD and DoN or VA requirements.	Amended. The recommended language has been utilized.

11.10 Comments from VA-led JAL FHCC IM/IT Development Team (VA OIT) Representatives (Provided for the Summary of Evaluation Findings Section Submitted Prior to Report Version 1.0)

Please note, that in addition to the comments below, general comments were received stating that VA OIT representatives did not concur with the majority of PE's Summary of Evaluation Findings

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
1	1.4.2	S	Request clarification on the following sentence: "In terms of optimal integration and consolidation, the demonstration has not shown evidence of efficient or cost effective operations on a consistent basis." Was a determination of scope of effectiveness a piece of the VHA evaluation? Please identify how it was determined; what are the references or data that lead to this conclusion?	No change made. PE's primary evaluation objective was to assess the effectiveness of the JIF-funded IM/IT components. PE's findings are based on review of documentation, interviews with SMEs, interviews with JAL FHCC personnel, site visits, and direct observations. Data is presented throughout the Summary and supporting Report to substantiate PE's findings.

11.11 Comments from JAL FHCC IM/IT Support Leadership (DoD Representative) (Provided for the Summary of Evaluation Findings Section Submitted Prior to Report Version 1.0)

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
1	Summary comments	S	1. Need to define what we are calling success. Can't measure success or know we are successful until we have it defined. Especially for discussions related to latency. 2. Need to ensure that though some areas are felt as inefficiency is it a inefficiency unique to FHCC and integration or are they similar challenges at other facilities. Possibly highlight the comparison or similarities 3. Need to show the progressive picture/timelines to be reflective of bad – better - complete/good	Specific comments are addressed below.

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
2	1.3.2	C	IM/IT-driven latency and personnel's difficulty measuring tool – need to clarify what metrics are used for latency, what is the definition of latency to include acceptable time frames. Though referenced under Benefit 2 a statement like this draws attention and needs a clear metric which comment is referred to and then discussed later.	No change made. The need for transaction time success criteria is noted in the Benefit 1 section of the supporting Report, specifically on page . Quantitative data regarding transaction times was not made available to the PE team. Findings were based on interviews and direct observations.
3	1.4	S	Third bullet. Recommend stating that the first couple years were consistent improvements, but over the last year we have moved to a point of acceptable sustainment on many of the capabilities. (I am sure you could say it better). Key is to capture that we are now focusing not so much on IM/IT for the FHCC but big problems are more integration as a whole (non-IT).	No change made. PE's findings regarding the operational state of each JIF-funded IM/IT capability is summarized in section 1.4.3 with additional details in the supporting Report.
4	1.4.2	S (Mr. Holt, Mr. Wilborn, CDR Poulin)	Request clarification on the following sentence: "In terms of optimal integration and consolidation, the demonstration has not shown evidence of efficient or cost effective operations on a consistent basis." Was a determination of scope of effectiveness a piece of the VHA evaluation? Please identify how it was determined; what are the references or data that lead to this conclusion?	No change made. PE's primary evaluation objective was to assess the effectiveness of the JIF-funded IM/IT components. PE's findings are based on review of documentation, interviews with SMEs, interviews with JAL FHCC personnel, site visits, and direct observations. Data is presented throughout the Summary and supporting Report to substantiate PE's findings.
5	1.4.2	S	Figure 2 – Unclear why Medical Readiness is listed? This is an overall function that incorporates information from different areas to include clinical and ancillary documentation. Recommend you add a paragraph or statement that explains what pieces of medical readiness are not integrated. Although a considered a specific DoD function; need to clarify how these separate clinical areas support Medical Readiness.	Amended. Medical Readiness was removed from the graphic.
6	1.4.2	S	Last sentence – not sure which IM/IT common services model you are referencing. Possible list or reference	No change made. The IM/IT common services model is referring to the overall

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
			where to find the challenges mentioned.	IM/IT model selected for JAL FHCC. It was first presented as a common services model in a *DoD-VA Health Care Sharing Incentive Fund Initiative Proposal* submitted by the Director of the VA's Office of Information Technology's (OIT's) Joint Solutions Division and the Program Manager for the DoD's Defense Health Information Management System. This *Proposal* was the required submission to obtain JIF funds.
7	1.4.3	C	1st sentence – not sure if the "entirely due to lack of adherence to procedures" is accurate. Though it does occur, the process now has been going well. The challenges with JPRS should state working with two different patient identity systems (DEERS and MVI) causing challenges with ensuring patients have all appropriate information, no identity management issues, and host systems are up. Recommend updating this statement.	Amended changed "almost entirely" to "largely."
8	1.4.3.2	C	Recommend updating this paragraph with latest information. Also what was the total number and roles of those surveyed? Reference 11 cited doesn't provide any comments(s)pertaining to the incompatibility referenced with Citrix and AVHE. Please identify the page where it cites that AVHE and instability. Is reference 10 and 11 crossed?	Amended. Footnote numbering has been corrected.
9	1.4.3.3	C	Paragraph 2 – Latency. Again please define and what is acceptable latency? Everyone views differently. Not sure I agree with this statement.	No change made. The need for transaction time success criteria is noted in the Benefit 1 section of the supporting Report, specifically on page 64. Quantitative data regarding transaction times was not made available to the PE team. Findings were based on interviews and direct

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
				observations.
10	1.4.4.1	S	Paragraph 2 – Difficult to follow; please refer to above comment.	Amended. Language was added to Section 1.4.4.1 noting that care providers who serve DoD patients but are based on VA workstations believe that the ability to toggle between EHRs and view a DoD patient's complete CHCS/AHLTA record for reference purposes is superior to utilizing Remote Data Viewer (RDV) solutions.
11	1.4.4.2	C	Paragraph 1 – needs to reviewed and corrected. Data was looked at incorrectly as it is seconds vice minutes. This is why acceptable latency needs to be accessed. Possible comparison of transaction times that occur between other HMOs in the civilian world. Need a baseline to measure	Amended. Any reference to previously provided interagency transaction times has been removed. PE has stated that, according to the lead VA Program Manager for the DoD/VA IM/IT Development Team, average interagency transaction times at JAL FHCC are two (2) minutes. The VA Program Manager also noted, however, that interagency transaction times can exceed five (5) hours. Interviews with JAL FHCC personnel indicate that lengthy interagency transaction times are a near daily occurrence during peak facility hours Information regarding average interagency transaction times were provided by the lead VA Program Manager for the DoD/VA IM/IT Development Team during the October FHCC Advisory Board meeting. The need for transaction time success criteria is noted in the Benefit 1 section of the supporting Report, specifically on page 64. Quantitative data regarding transaction times was not made available to PE. Findings were based on interviews and direct observations.

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
12	1.4.5.1	C	Consults paragraph – incorrect. Patient follow-up consults do flow to AHLTA and information is in the notes section.	No change made. Follow-up consults will transport from VistA/CPRS to CHCS/AHLTA – if the follow-up consult was initiated by a consult order in CHCS/AHLTA. The paragraph is referring to follow-up visits scheduled by the consulting provider (and not initiated by another consult order).
13	1.4.5.1	S	Last paragraph – recommend somehow commenting that information is found via BHIE or JANUS(JLV) as well, but this was a practiced that was adopted out of personal preference. Education is constantly being given. This is viewing from the two sources is used at other facilities as well.	Amended. Information regarding Remote Data Viewers (RDVs) was added to section 1.4.5.1.
14	1.4.5.2	C	Last paragraph – correct transaction time in document.	Amended. Any reference to previously provided interagency transaction times has been removed.
15	1.4.5.2	C	First paragraph – recommend validating the comment to manual entry of results as there is the ORP retry function. Also need to also identify that unrelated to latency to other reasons the orders aren't there is because patient not correlated.	Amended. Language was changed from "all" inefficiencies to "the majority" of inefficiencies."
16	1.4.5.3	S	SharePoint is accessible via VA Citrix which was the agreed upon solution prior to Oct 2010 for East Campus to access VA non-clinical resources. It is also presented app from AVHE providing them an easier way to access since the VA Citrix solution wasn't a single step to access.	No change made. Findings are based on document reviews, interviews, and direct observations.
17	1.5	C	Why are we talking solutions and making recommendations without a technical assessment/review to the audience that will receive this? Alternative model – recommend adding the example include adopt of CHCS/AHLTA as another alternative. Assessment to determine the security requirements	Amended. A footnote was added stating that CHCS/AHLTA could also be a viable alternative. The example given states that "One alternative IM/IT model for future joint DoD/VA facilities is to adopt one of the agency's EHRs and enhance that EHR to

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
			imposed by both agencies would need to be considered and based off the findings utilize higher standards. This paragraphs example should either be rewritten or removed.	meet the needs of the other agency." Adopting VistA/CPRS was provided as one example. Adopting CHCS/AHLTA is the second example. The presented alternative notes that further analysis would be required.
18	1.5	S	Last paragraph is unclear what you are saying. There are also other challenges as well unrelated to EHR with single network requiring access to different agencies higher authorities (example: many big Navy sites - Navy EKM, Navy Legal, etc.)	No change made. The final paragraph and accompanying graphic are intended to depict agency-level policy challenges that extend beyond IM/IT.
19	1.5	S(CDR Poulin)	Figure 5 and last paragraph – is this hampering IM/IT capabilities or confusing facility integration as many things can be modified locally to the higher standard and making the rules/policies between applications the same.	No change made. Based on interviews, observations, and document reviews, there are several agency-level policy constraints that cannot be addressed at the local level.

11.12 Comments from JAL FHCC IM/IT Support Leadership (VA Representative, Provided for the Summary of Evaluation Findings Section Submitted Prior to Report Version 1.0)

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
1	1.3.2	S	Appropriate resources to Explore IM/IT solutions and infrastructure for…..	No change made. Section 1.3.3 notes that business cases should be developed to determine if additional IM/IT investment is needed.
2	1.4.5.2	C	The advantage of having access to both DoD and VA medical record is more efficient comparing to independent operations. CAPT Acosta used to reference his experience when he was at Tripler which is less efficient than at the FHCC.	Amended. Language was added to Section 1.4.4.1 noting that care providers who serve DoD patients but are based on VA workstations believe that the ability to toggle between EHRs and view a DoD patient's complete CHCS/AHLTA record for reference

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
				purposes is superior to utilizing Remote Data Viewer (RDV) solutions.

11.13 Comments from JAL FHCC Clinical Leadership (DoD Representative, Provided for the Summary of Evaluation Findings Section Submitted Prior to Report Version 1.0)

The JAL FHCC Clinical Leadership DoD Representative did not utilize the comment matrix format, but instead provided the following statement:

> I think this document [(PE's Summary of Evaluation Findings)] captures most of what is occurring here. I sincerely hope it is highlighted amongst all the pages that the data sharing is not robust and the IT systems present a huge barrier for Primary Care. When functionality fails, it has an immediate impact on patient centered data that is reported to Agency leadership.
>
> When "Big Navy" or "Big Army" or whoever changes operating systems it eventually affects the FHCC in a much harder way. For example, the DoD HEDIS [(Healthcare Effectiveness Data and Information Set)] metrics that were shown [(at the FHCC Advisory Board meeting)]….. it was not highlighted that when the Army changed the Carepoint system from a legacy system to something called a G6, they did not include "va.gov" in the contact so we, the FHCC, could not pull HEDIS data, patient outliers for approx. six months while BUMED worked with whoever to get va.gov access to the site. Once we were granted access we then learned that a CAAC card was required as opposed to the previous PIV – this simple change for DoD significantly affected the FHCC but it is not known until an afterthought.
>
> Cross over failure is still existent and is a huge threat to imperfect data pulls.
>
> Thank you for allowing me to read the document. There is a lot of information in there [(the Summary of Evaluation Findings)], I hope they [(DoD and VA leadership)] dissect every aspect of it when making future decisions. The FHCC would be a lot easier if we all went to one system.

PE did not amend the Summary of Evaluation Findings section. However, the Carepoint/HEDIS example provided was referenced in the Benefit 1 section of the Report, specifically on page 56.

11.14 Comments from JAL FHCC Clinical Leadership (VA Representative, Provided for the Summary of Evaluation Findings Section Submitted Prior to Report Version 1.0)

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
	Summary comment	S	Need to somehow add: When I speak to those in enterprise (other facilities) and I show them JLV and what we have - they want what we have ability to access the applications side by side with orders portability and not read only	Amended. Language was added to Section 1.4.4.1 noting that care providers who serve DoD patients but are based on VA workstations believe that the ability to toggle between EHRs and view a DoD patient's complete CHCS/AHLTA record for reference purposes is superior to utilizing Remote Data Viewer (RDV) solutions. The Benefit 1 section of the supporting Report also details the advantages of having full access to both EHRs.
2	1.1	S	Need to validate the total of $100,020,000 looks incorrect.	No change made. This amount was taken from a 2009 memorandum signed by the Co-Chairs of the Health Executive Committee (HEC) Financial management Work Group. Additional details regarding the cost of JAL FHCC IM/IT investments, including JIF-funded efforts are included in the Benefit 3 section of this report, specifically on page 93.
3	1.3.1	S	Comment related to Financial Reconciliation do not believe is true. Understanding that it is operational. Needs to be reevaluated.	No change made. The Financial Reconciliation model is in place; however, the IM/IT web tool was not operational when observed. Per follow-up interviews with JAL FHCC Health Care Business personnel, the web tool remains non-operational.
4	1.3.2	S	Disagree with statement that model is not efficiently enabling integrated operations and additional burden placed on personnel – Access to both legacy systems on a single desktop shortens the time to obtain clinical information for the patient allowing providers to immediately see care provided and documented	Amended. Language was added to Section 1.4.4.1 noting that care providers who serve DoD patients but are based on VA workstations believe that the ability to toggle between EHRs and view a DoD patient's complete CHCS/AHLTA record for reference

#	Section #	Comment Type (C=Critical / S=Substantive)	Comment	PE Team Response
			immediately without waiting days or weeks in the previous model where there was no ability to pull up the alternative legacy application. Need to reflect that though not perfect this level of burden is better than the alternative of having no ability to pull up each other's legacy system.	purposes is superior to utilizing Remote Data Viewer (RDV) solutions.
5	1.4.4.1	S	Main access barrier is not related to systems or policies but provider education and continuous turnover on the east campus	No change made. Information regarding end-user training is included in the Benefit 2 section of the supporting Report (beginning on page 68), and in the Benefit 6 section of the supporting Report (beginning on page 108).
6	1.4.4.1	S	Addressing comment related to needing to toggle to another system and additional workflow – This toggling actually decreases the need for written prescriptions/scripts which have proven and shown to be patient safety risk.	Amended. Language was added to Section 1.4.4.1 noting that care providers who serve DoD patients but are based on VA workstations believe that the ability to toggle between EHRs and view a DoD patient's complete CHCS/AHLTA record for reference purposes is superior to utilizing Remote Data Viewer (RDV) solutions.
7	1.4.5	S	Reference comment of incomplete patient records – The incomplete record is the same problem that DoD has and not unique to the integrated FHCC when they use Tricare or are seen at an institute. The FHCC providers have access to both legacy systems therefore facilitating access to data for informed decision making.	Amended. Section 1.4.5.1 was revised to clarify the unintended consequence of incomplete patient records.
8	1.4.5.2	S	Need to validate if it is 2 or 5 pharmacists that were hired.	No change made. Five pharmacists were noted in PE interviews and in the Institute of Medicine (IOM) 2012 *Evaluation of the Lovell Federal Health Care Center Merger: Findings, Conclusions, and Recommendations.*
9	1.5	Dr Maldonado	Joint Legacy Viewer (JLV) is not correct. We have JANUS (FHCC version)	Amended. The terminology was changed to the Janus Joint Legacy Viewer.

APPENDIX VOLUME

Please see the separate Appendix Volume document.