Supporting the Largest Electronic Health Record in the World: A Case Report on Optimizing Informatics Infrastructure at the Military Treatment Facility

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Background

MHS Genesis (MHSG) is the electronic health record (EHR) for the Military Health System (MHS). It is the largest single health record in the world, coordinating care for almost 10 million beneficiaries both in and outside the continental United States. MHSG incorporates not only inpatient, outpatient, ancillary and dental services with business and human resources, but also consolidates the care provided at outside treatment facilities related to the military's unique mission. As military healthcare becomes more automated, efficient and data-driven, the need for a defined clinical/health informatics infrastructure has expanded.

Madigan Army Medical Center (MAMC) is the Army's second-largest medical treatment facility, and a teaching and research platform. This military treatment facility (MTF) accommodates more than 300 inpatients, is a leader in readiness and deployment medicine, and is a designated Level II trauma center. The MAMC Clinical Informatics (CI) department's workforce architecture is designed to promote medical education, clinical, business, and innovation solutions for the MTF and the affiliated power projection platforms it supports.

Objectives

1. Describe CI requirements at the larger MTF in support of MHSG
2. Discuss the impact of varied CI workforce structures on innovation, stakeholder efficiency and satisfaction
3. Develop recommendations that inform CI infrastructure design and policy

Planning/Research Methods

A limited literature review and evaluation of the MAMC CI workforce infrastructure compared to two similarly sized MTF informatics departments was performed. This framed the critical components we believe are required for optimal alignment with EHR optimization, and MTF and MHS missions. We highlight the unique organizational design at MAMC Clinical Informatics that has contributed to its success in creating enterprise-level solutions and establishing the only American College of Graduate Medical Education (ACGME) accredited Clinical Informatics fellowship in the military.

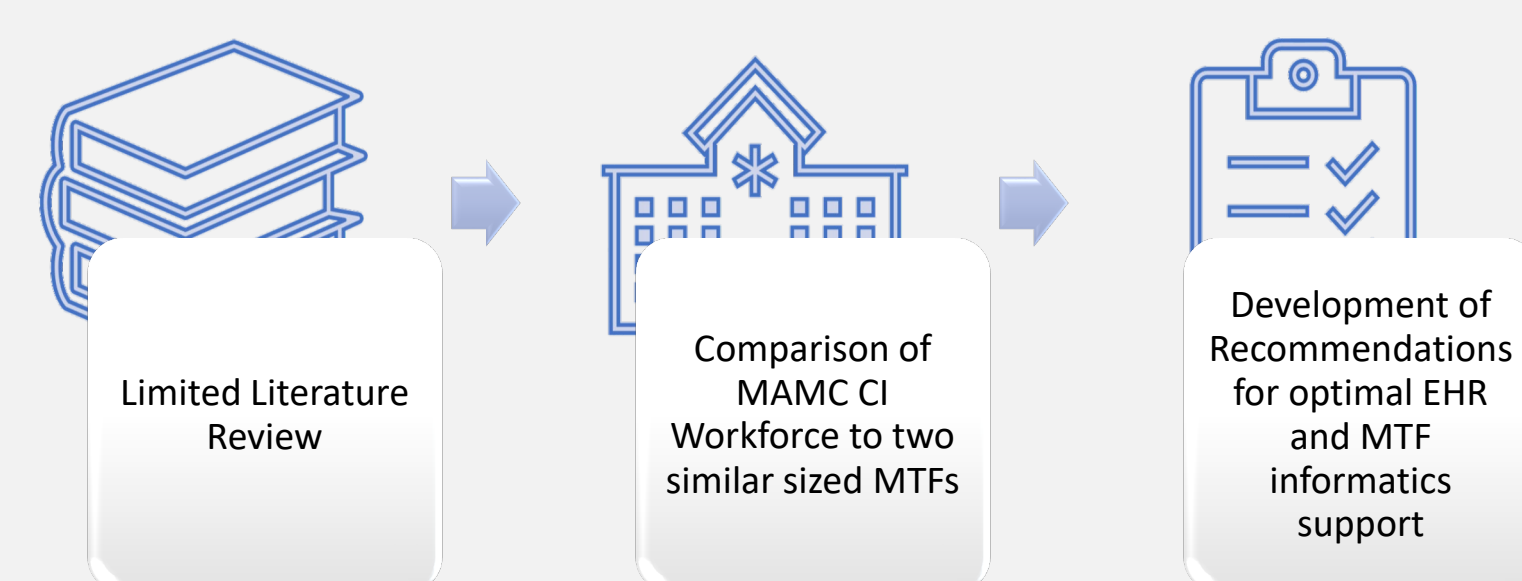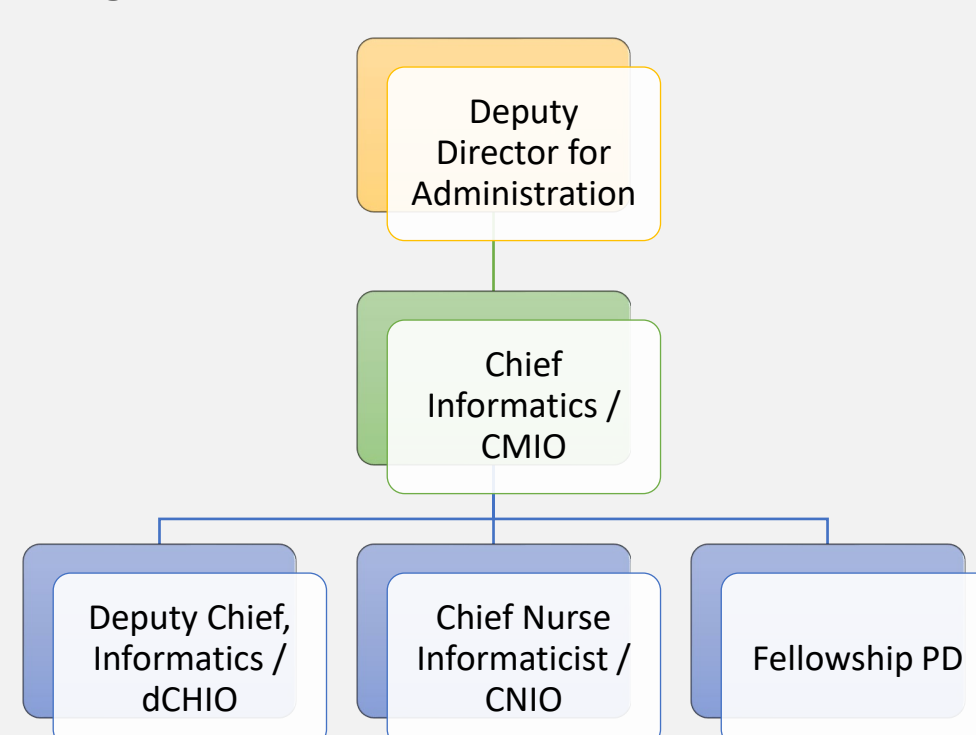Figure 1. Planning, Research and Implementation Methods

Figure 2. MAMC CI Leadership Structure

Results

We found that MAMC CI's leadership structure, operating teams and curated functional areas have led to efficient MTF and EHR support.

Organizational Structure and Functional Areas

Since 2003, the department has been physician-led by the Chief Medical Information Officer (CMIO). The Chief Nursing Information Officer (CNIO) and Deputy Chief Health Information Officer (dCHIO) manage 35 professionals operating in four teams that use analytic tools to optimize MHSG inputs and outputs, allowing maximum provider/patient interactions, assuring clinical quality, patient safety, and standardized business processes. The CI Fellowship Program Director (PD) works closely with the CNIO and dCHIO to allow the physician and non-physician fellows maximum engagement with CI department functions.

Figure 3. MAMC CI Operating Teams

- Clinical Workflow Analysts
- Clinical Systems Trainers
- Applied Informatics Team
- Issue Resolutions / Account Professionals

Figure 4. MAMC CI Required Functional Areas

- Electronic health record support and standardization
- Operational medical readiness
- MTF Operations
- Medical Education and Research
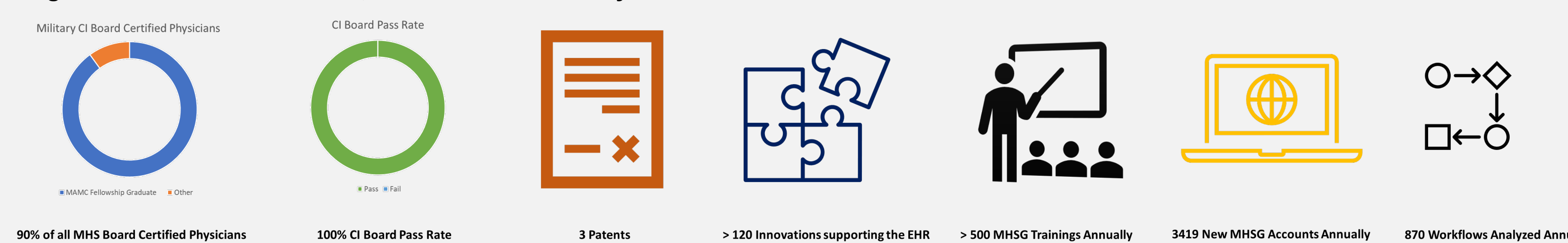- Innovation
- Consultation
- Virtual Health

Critical Components and Performance Indicators

MAMC CI has the most mature, established organizational structure and governance process. The Operating Teams support seven Functional Areas with demonstrable successes. Unlike other MTFs where disparate groups support informatics domains of practice, MAMC deploys dedicated CI sub-teams embedded within clinical departments. The Applied Informatics Operating Team, comprising computer/data scientists and system administrators, design solutions spanning the entire functional footprint, and engage in strategic collaborations.

Table 1. Comparison of Critical Workforce Components at Larger MTFs

	Department Leadership Structure	Dedicated Staffing	Assigned Data/Computer Scientist	Strategic Collaborations
MAMC CI	Stable	Yes	Yes	Yes
Other MTF 1 CI	Dynamic	No	No	No
Other MTF 2 CI	Dynamic	No	No	No

Figure 5. MAMC CI Innovation, Contributions and Key Performance Indicators

Military CI Board Certified Physicians — 90% of all MHS Board Certified Physicians

CI Board Pass Rate — 100% CI Board Pass Rate

3 Patents

> 120 Innovations supporting the EHR

> 500 MHSG Trainings Annually

3419 New MHSG Accounts Annually

870 Workflows Analyzed Annually

Discussion

There is a paucity of guidelines for optimal CI workforce organization in the literature. Descriptions of workforce structures in both civilian and military healthcare facilities vary widely, with organizational size and legacy practices playing contributing roles. While different models may be successful, we believe MAMC CI has developed unique processes supporting MHSG workflow efficiencies, end-user training, data analytics, business intelligence, extracting accurate quality measures, and improving medical readiness. MTFs of similar size and complexity could benefit from the following recommendations:

Table 2. Recommendations to Streamline MHSG and MTF Support

Recommendation	Description
R1.	Definitive leadership structure to include a CMIO, CNIO, steering and data governance committees
R2.	Strategic collaboration with key industry and military partners
R3.	Embedded functional teams that support efficient EHR use, business intelligence, data quality and analytics
R4	Research, Innovation & Education

Conclusion

Our case report describes the functional areas and key teams that best support MHSG at a large MTF. We identified that a stable department leadership structure and dedicated staffing that includes data science and strategic collaborations positively impact efficiencies, innovation, and stakeholder satisfaction. We developed initial recommendations that other MTFs may reference in CI infrastructure design.

Related Literature

1. Desai, S., Mostaghimi, A., & Nambudiri, V. E. (2020). Clinical informatics subspecialists: characterizing a novel evolving workforce. Journal of the American Medical Informatics Association : JAMIA, 27(11), 1711–1715. https://doi.org/10.1093/jamia/ocaa173
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3. Stephenson, L., Reddy, R., Schoenbaum, A., Pandita, D., Evans, J., De Los Santos, R., & Lee, D. (2024). The invaluable role of Clinical Informatics. Himss.org. https://www.himss.org/sites/hde/files/media/file/2024/04/18/wp_value-of-clinical-informatics-1.pdf