FINAL REPORT 2015

Strategy Drives Function and Form

Pursuing a World-Class System for Health

Independent Review Panel on
Military Medical Construction Standards

September 30, 2015

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
HEALTH AFFAIRS
7700 ARLINGTON BOULEVARD, SUITE 5101
FALLS CHURCH, VA 22042-5101

Independent Review Panel on Military Medical Construction Standards

MEMORANDUM FOR SECRETARY OF DEFENSE

SUBJECT: Final Report of the Independent Review Panel on Military Medical Construction Standards

I, the Chairperson of the Independent Review Panel on Military Medical Construction Standards, on behalf of the Panel and pursuant to our charter, hereby submit our final report's findings and offer our recommendations.

A. Ray Pentecost III, DrPH,
FAIA, FACHA, LEED AP
Chairperson

TABLE OF CONTENTS

List of Figures & Tables v

Independent Review Panel on Military Medical Construction Standards vii

Executive Summary ES 1

Charge to the Panel ES 1
Methods and Approach ES 2
Overarching Observations ES 2
Summary of Four Strategic Areas ES 4
Conclusion ES 6
Executive Summary References ES 7

1.0 Introduction 1

1.1 Military Health System Complexity 2
1.2 Military Medical Construction Legislation, Reports, and Studies Related to Facility Standards 4
1.3 Charge to the Independent Review Panel on Military Medical Construction Standards 6
1.4 Overarching Methodology/Approach 7
1.5 How to Read the Report 8
Section References 9

2.0 Develop and Implement a Military Health System Strategic Plan 11

2.1 Transformation of the Military Health System Is Underway 11
2.2 The Military Health System Has a Strategic Goal to Become a Highly Reliable Integrated Delivery System 16
2.3 Facility Utilization Affects Department of Defense Health Care Costs 17
2.4 Cultural Change and a Commitment to Innovation Are Required to Realize the Military Health System's Quadruple Aim 28

2.5 Successful Integrated Delivery Systems Effectively Distribute Human Capital, Consistent with Readiness Requirements and Integrated Delivery System Strategy 31

Section References 35

3.0 Continue to Create an Integrated Delivery System in the National Capital Region 39

3.1 The National Capital Region Should Be Defined More Broadly in its Comprehensive Master Plan 41

3.2 The Walter Reed National Military Medical Center Addition Alteration Project Should Proceed 44

3.3 Complete the National Capital Region's Comprehensive Master Plan to Help Realize Its Goal of Becoming an Integrated Delivery System of Care 47

Section References 49

4.0 Effectively Integrate Technology into Operations and Medical Facilities 51

4.1. Technology Innovations Are Transforming Care Delivery Processes and Enabling Integrated Care 51

4.2. Facilities and Technology Require Further Integration in the Military Health System 54

Section References 56

5.0 Implement a Systematic Evidence-Based Design Evaluation Process 59

5.1. Evidence-Based Design Interventions and Supporting Rationale Should Be Documented by the Military Health System 59

5.2. The Military Health System Should Evaluate the Impact of Evidence-Based Design Interventions on Key Health Care Outcomes 62

5.3. Institutionalizing Evidence-Based Design Is Needed to Maximize Return on Investment 68

Section References 70

6.0 Summary and Conclusions 73

Conclusion 74

Section References 80

Appendix A. Guiding Principles 81

Appendix B. Annual Progress Report Executive Summary 85

Charge to the Independent Review Panel on Military Medical Construction Standards 86

About the Report 87

Findings and Recommendations 88

Conclusion 95

Appendix References 95

Appendix C. Summary of Panel's Response to Five Charges 96

Appendix D. Crosswalk of Annual Progress Report Findings and Recommendations to Final Report Sections, and Military Health System Review: Final Report to the Secretary of Defense 98

Appendix E. Department of Defense Medical Military Construction Policy, Standards Criteria, and Guidelines 100

Department of Defense Medical Space Planning Criteria for Health Facilities 102

Unified Facilities Criteria 102

Military Standard 1691 Master Equipment List 103

Military Health System Templates 103

World-Class Toolkit and Checklist 103

Health Care Requirements Analysis 104

Capital Investment Decision Model 104

Appendix References 105

Appendix F. Enhanced Multi-Service Market Facility List 107

Appendix References 111

Appendix G. Workload and Utilization Data 112

Appendix References 117

Appendix H. Standards Development Process and Framework 118

Current Department of Defense Standards Development Process 118

Department of Defense Standards Benchmarked Against Industry Standards 119

Current Department of Defense Partners in Standards Development 121

Meaningful Standards in a Rapidly Evolving Health Care Environment 121

Standards Development Philosophy and Impact 122

Appendix References 125

Appendix I. Integrated Delivery System Literature Review 127

Appendix References 134

Appendix J. Military Health System Organizational Structure 136

Appendix References 136

Appendix K. Ike Skelton National Defense Authorization Act for Fiscal Year 2011, Section 2852 137

Appendix L. What is a World-Class Medical Facility? 142

Appendix M. Terms of Reference 153

Appendix N. Meetings and Presentations 155

Appendix O. List of Acronyms 163

Appendix P. Panel Member Biographies 167

Appendix Q. Support Staff 174

Report References 175

LIST OF FIGURES & TABLES

Tables

Table 1.	Average Weekly Workload in Direct Care and Purchased Care as a Percent of Total	3
Table 2.	Defense Health Budget Distribution, Fiscal Years 2012-2015	19
Table 3.	Inpatient and Ambulatory Costs in Six Inpatient Facilities Visited by the Panel, Fiscal Year 2014	20
Table 4.	Facility Ambulatory Costs in Five National Capital Region Medical Directorate Outpatient Facilities and Two Facilities Briefed to the Panel, Fiscal Year 2014	21
Table 5.	Military Health System Performance Dashboard	22
Table 6.	Facility Workload in Six Facilities Visited by the Panel, Fiscal Year 2014	24
Table 7.	Facility Workload in Four National Capital Region Medical Directorate Outpatient Facilities and Two Facilities Briefed to the Panel, Fiscal Year 2014	25
Table 8.	Crosswalk to Requirements in Section 2714A of the 2010 National Defense Authorization Act	40
Table 9.	Facilities in the National Capital Region Medical Directorate	43
Table 10.	Military Health System Action Plan for Access, Quality of Care, and Patient Safety Targeted Outcomes for Improvement and Evidence-Based Design Features	60
Table 11.	Results of Question 9: How Often Was the Area Around Your Room Quiet at Night?	66
Table 12.	Final Report Findings and Recommendations	76
Table 13.	Military Treatment Facilities by Enhanced Multi-Service Market	109
Table 14.	Facility Workload in Six Facilities Visited by the Panel, Fiscal Year 2014	113
Table 15.	Facility Workload in Six Facilities Visited by Panel, Fiscal Year 2014	113
Table 16.	Facility Workload in Four National Capital Region Medical Directorate Outpatient Facilities and Two Facilities Briefed to the Panel, Fiscal Year 2014	114

Table 17. Facility Inpatient Costs in Six Facilities Visited by the Panel, Fiscal Year 2014 115

Table 18. Facility Ambulatory Costs in Six Facilities Visited by the Panel, Fiscal Year 2014 116

Table 19. Facility Ambulatory Costs in Five National Capital Region Medical Directorate Outpatient Facilities and Two Facilities Briefed to the Panel 117

Table 20. Definitions of Integrated and Organized Health Care Delivery Systems 131

Figures

Figure 1. The Quadruple Aim 1

Figure 2. Relevant Legislative Actions, Reports, and Studies (2005-2015) 6

Figure 3. Walter Reed National Military Medical Center Facility Condition Index 45

Figure 4. Information Technology and Lower Cost Health Care Alternatives 53

Figure 5. The Evidence-Based Design Model 63

Figure 6. Interventions That Help to Reduce Noise 65

Figure 7. Institutionalizing Evidence-Based Design 68

Figure 8. Defense Health Agency Planning and Programming Process 100

Figure 9. Capital Investment Decision Model 105

Figure 10. eMSM and Single Service Market Geographic Distribution 108

Figure 11. Impact of Design Standards 123

Figure 12. Six Attributes of an Ideal Health Care Delivery System 129

Figure 13. A Checklist for High-Value Health Care 129

INDEPENDENT REVIEW PANEL ON MILITARY MEDICAL CONSTRUCTION STANDARDS

A. Ray Pentecost III, DrPH, FAIA, FACHA, LEED AP
Professor of Practice, College of Architecture, Texas Tech University (TTU)
Professor of Practice, Department of Public Health, TTU Health Sciences Center
Panel Chairperson

Mark Erath, CPA, CGMA, CTS-MC, FACHE, FHFMA
Healthcare Executive; Former Chief Financial Officer of Parkland Health and Hospital System and Geisinger Medical Center; Retired Healthcare Partner, PricewaterhouseCoopers, LLP

Anjali Joseph, PhD, EDAC
Associate Professor and Endowed Chair of Architecture and Health Design and Research
Clemson University

William Paul Kearns, III, MBA, CPA, CHE, LFACHE, FHFMA
Colonel (Retired), U.S. Air Force
Senior Executive Service (Retired), Veterans Health Administration

Christine Malcolm, MBA
West Coast Leader, Managing Director, Healthcare
Navigant Consulting, Inc.

Eileen Malone, RN, MSN, MS, EDAC
Colonel (Retired), U.S. Army
Senior Partner, Mercury Healthcare Consulting, LLC

Donald Orndoff, AIA, MS
Captain (Retired), U.S. Navy
Senior Vice President, National Facilities Services
Kaiser Permanente

William Rowley, MD
Rear Admiral (Retired), U.S. Navy
Independent Consultant

Joseph G. Sprague, FAIA, FACHA, FHFI
Principal and Senior Vice President/Director of Health Facilities
HKS, Inc.

Philip E. Tobey, FAIA, FACHA
Senior Vice President
SmithGroupJJR

EXECUTIVE SUMMARY

The Department of Defense's (DoD's) Military Health System (MHS) finds itself in promising, but challenging, times. The MHS is making significant progress toward improving the quality, access, and safety of the health care it provides to DoD beneficiaries, while also maintaining military medical readiness, improving health, and lowering costs. It is also moving toward greater integration of health care delivery across the Army, Navy, Air Force, and the Defense Health Agency (DHA). Recent efforts include the establishment of the DHA and its shared services, forming six enhanced Multi-Service Markets (eMSMs), pursuing an enterprise-wide approach to modernizing and optimizing the MHS, identifying strategies for achieving high reliability, developing plans to recapture workload and increase productivity in support of readiness requirements, and emphasizing the importance of creating world-class medical facilities.

It is important to note that the definition of a world-class facility extends far beyond the physical aspects, or form, of a facility. It also includes the comprehensive functions and all the other ways and means by which care is delivered to best meet the needs of stakeholders. The functions of a health system are often far more critical to fulfilling world-class goals than the form of its facilities. Thus, the Independent Review Panel on Military Medical Construction Standards' (Panel's) focus was equally, if not more so, on the comprehensive functions of the MHS as on the form of its facilities. ***Because form should always follow function, and function should be shaped by strategy, the impacts of the multiple significant changes in the MHS environment described above have the potential to redefine world-class health care facility requirements and supporting standards.*** In turn, facilities built or reconfigured based on evidence-based design principles and best practices can enable the MHS to achieve its Quadruple Aim of increased readiness, better care, better health, and lower cost while providing safe, high quality, and accessible health care, and are integral components in the transformation of health care delivery in the MHS.

Charge to the Panel

Section 2852 of the Ike Skelton National Defense Authorization Act for Fiscal Year 2011 required the establishment of a panel whose objectives and scope of activities include the provision of advice and recommendations regarding a construction standard for military medical centers to provide a single standard of care. The Panel was charged to:

A. Review the unified construction standards to determine their consistency with industry practices and benchmarks for world-class medical construction;

B. Review ongoing DoD construction programs to ensure medical construction standards are uniformly applied across applicable military medical centers;

C. Assess DoD's approach to planning and programming facility improvements;

D. Assess whether the *Comprehensive Master Plan for the National Capital Region Medical* (hereafter the *Comprehensive Master Plan)* is adequate to fulfill statutory requirements; and

E. Make recommendations regarding any adjustments of the *Comprehensive Master Plan* that are needed to ensure the provision of world class military medical centers and delivery system in the National Capital Region.[1]

Methods and Approach

The Panel approached its charges using the following key frameworks:

- The *world-class medical facility* definition, which was developed as part of the work of the National Capital Region Base Realignment and Closure Health Systems Advisory Subcommittee of the Defense Health Board in May 2009, shaped the Panel's analysis, advice, and recommendations. The definition includes 18 conditions in 6 domains that must be met for a medical facility to be considered world-class: (1) Basic Infrastructure; (2) Leadership and Culture; (3) Processes of Care; (4) Performance; (5) Knowledge Management; and (6) Community and Social Responsibility.
- Seven Guiding Principles, created and adopted by the Panel, established the foundation for its work, reflected the Panel's core beliefs, and provided a lens through which the Panel established goals and developed recommendations.
- The components of the MHS Quadruple Aim—increased readiness, better care, better health, and lower cost—guided the Panel's inquiries.

The Panel also established Terms of Reference to guide its work. During its tenure, the Panel convened on numerous occasions in person and via teleconference and webcast. It received briefings from subject matter experts in facility design, construction, and repair standards; engaged in discussions with DHA and DoD leaders and national leaders of health care organizations and groups; toured multiple military treatment facilities; and reviewed relevant reports and presentation files. In the course of its work, the Panel reviewed the *Military Health System Review: Final Report to the Secretary of Defense*[2] and was briefed on the work of the MHS High Reliability Organization Task Force. Many of the Panel's final findings and recommendations link to strategic objectives and recommendations in this report, emphasizing the need for cultural change, system-wide accountability, and reductions in duplication of effort.

An initial report was delivered June 5, 2014. The Panel's first and only annual progress report, delivered February 1, 2015, included detailed findings and recommendations for the five specific congressional charges cited above. This is the Panel's final report, providing 13 findings and recommendations for consideration by DoD and MHS leadership. Section 6.0 includes a table of all of the detailed findings and recommendations found in this report. Appendix C displays the recommendations from the February 2015 progress report and this report as they relate to the Panel's charges.

Overarching Observations

The Panel offers the following overarching observations.

- As the MHS evolves into a modern integrated system that reliably delivers value by improving health and readiness outcomes and rivals other high reliability, top performing health care systems, it must continue to adapt to environmental, scientific, and technological changes; align itself with industry and evidence-based design best practices; and continue to innovate to provide safe, high quality, accessible, and affordable health care.
- The Panel recognizes the MHS is adapting to multiple cultural changes: the shift from volume to value;[3] the focus on health status rather than acute health care;[4] the effect of virtual care and information technology on care delivery processes; and the MHS's evolution toward greater integration in its delivery systems. Successful cultural changes are paramount to the creation of an integrated delivery system. Research shows that while managing integration and collaboration is difficult, "it is the differences in values and cultures that are the most difficult barriers to integration."[5(p.83)]
- In general, the MHS currently lacks the processes and procedures to methodically evaluate the planning assumptions and decisions that underpin all major investments across the facility lifecycle, to include population and workload assumptions, design and operational decisions, and the impact of facility investments on the achievement of the Quadruple Aim. For example, the planning and programming assumptions for several recently completed hospitals have changed because of DoD troop drawdown decisions that will result in fewer eligible beneficiaries, affecting the efficiency with which these new hospitals will operate. The civilian sector rarely faces such a challenge. In addition, the civilian sector continually evaluates facility requirements and when designing new facilities includes space that can be easily renovated for expansion or, during operations, prunes or mothballs excess capacity to avoid unnecessary sunk costs. This approach is rare in the Department.
- The design and operation of health care facilities literally shapes most patient care experiences and the care provided. Yet, in spite of this fact, there is little understanding and appreciation in the MHS,

outside of those members assigned to the facility teams, of the role that the building and its design plays in the achievement of targeted health care outcomes associated with the Quadruple Aim. The Panel believes this must change for the MHS to achieve the status of a world-class system of health. The rest of the MHS must build on the progressive work of the DHA and Services facility teams' use of evidence-based design science in the design and construction of medical facilities during the past 15 years by transforming the culture, reengineering clinical and administrative practices, and integrating infrastructure investments, to include technology, in order to achieve strategic goals. As Sir Winston Churchill remarked in 1943, "We shape our buildings and afterwards our buildings shape us."[6]

Summary of Four Strategic Areas

In this report, the Panel provides findings and recommendations in four major strategic areas, as summarized below.

1. Develop and implement a MHS strategic plan that drives market-specific strategies and business/operations to effectively utilize available medical facility capacity and capability.

The MHS's goal is to become an integrated health system using a federated model. However, the Panel has found that while federated models are quick to implement, they are slow to achieve strategic goals. Thus, the Panel recommends that the MHS finalize and implement its strategic plan and continuously monitor and evaluate progress to drive transformation and unity of effort. This plan should incorporate facility design, operations, and maintenance activities, as they represent key variables in the provision of safe and reliable care.

The Panel also found that care provided in the MHS direct care component is significantly more expensive than care purchased in the marketplace. Underutilization of facilities in the direct care environment appears to contribute to this cost imbalance. The Panel makes detailed recommendations about the need for facility utilization and cost-related metrics to drive decisions about facility asset utilization and resources. Further, the Panel recommends that DoD continue to refine, implement, and execute clinical and business plans using an integrated approach to optimize infrastructure and better align resources, including facility investments, with enterprise-wide strategic goals.

Because the separate cultures of the Services and the DHA challenge efforts to achieve strategic direction and accountability, the Panel recommends that DoD develop uniform standards, processes, and metrics across the Services and the DHA to achieve shared strategic goals. Cultural differences can also challenge innovation in health care delivery. Although there are pockets of innovation in the MHS, it lacks a comprehensive, enterprise-wide, integrated approach to innovation to fully realize the Quadruple Aim.

Finally, the need for a "Medically Ready Force and a Ready Medical Force" is unique to DoD. Military Treatment Facilities (MTFs) serve as important medical readiness platforms, where combat care teams train to develop and maintain the necessary skills to support the full range of military missions around the world. Optimized training depends on effective distribution of staff, graduate medical education programs, and other military training programs to those locations with the required patient volume and case mix complexity to achieve increased readiness. All of these variables underpin facility planning and programming assumptions to achieve patient access, quality, and efficiency goals associated with successful integrated delivery systems.

2. Continue to create an integrated delivery system in the National Capital Region.

The National Capital Region (NCR) is one of six geographic markets called eMSMs (see Appendix F). The Services retain the command, control, and budgetary authority for all MTFs in the other five eMSMs and the remaining MTFs located outside those markets. The NCR Medical Directorate includes command and control and single budgetary authority for 2 hospitals and 5 clinics, as well as enhanced authority for the additional 12 MTFs in the NCR eMSM, for which the Services retain command, control and budgetary authority. Although this organizational structure represents a first step in the NCR's journey to become an integrated delivery system, the Panel recommends that the DHA reevaluate the need to assign operational control over the remaining outpatient clinics as stated in the 2010 NCR *Comprehensive Master Plan*. In the meantime, the Panel also recommends providing efficient and effective mechanisms for appropriately shifting money, personnel, and other resources among military treatment facilities in the NCR controlled by the Services and emphasizes the need to continuously evaluate the success of the current federated NCR model in achieving the Quadruple Aim and other strategic objectives.

The Panel also notes that the NCR has yet to achieve the full potential of an integrated system of health care delivery with world-class medical facilities, as required by the *Comprehensive Master Plan*, and makes recommendations aimed at achieving that goal. Further, the Panel recommends that the Walter Reed National Military Medical Center Addition Alteration Project be completed to fulfill the *Comprehensive Master Plan* recommendations regarding world-class facilities and to replace critical infrastructure.

3. Effectively integrate technology into MHS operations and medical facilities.

Emerging technology platforms and reengineered clinical and administrative work processes affect facility planning criteria, investment decisions, and facility asset utilization. Previously, major MHS facility and information management/ information technology (IM/IT) planning and investment decisions were not fully integrated. Thus, the Panel recommends integration of IM/IT and facility funding, policies, standards, and outcome measurements, including non-facility-based care alternatives, to inform facility planning and programming standards and criteria to maximize returns on investments in these areas.

4. Implement a systematic evidence-based design evaluation process.

Although the MHS is an industry leader in its use of evidence-based design to inform the planning and programming, construction, and maintenance of facilities, the Panel found variability in the selection of evidence-based design features. The Panel recommends the systematic capture and documentation of the rationale for all design decisions, including research findings that explain and justify significant variation in design strategies. The lack of accompanying documented rationale contributes to a general lack of understanding by staff and leaders about the important role the facility plays in quality care delivery and patient experience. Moreover, the MHS has yet to evaluate how evidence-based design features are affecting health care outcomes in recently constructed facilities. The Panel recommends evidence-based design features be addressed as a component of performance improvement initiatives to determine which design features are actually achieving the desired outcomes and which features are not successful, and adjusting the facility standards and criteria accordingly. Finally, DoD should institutionalize evidence-based design to maximize return on investment by sharing decision-making processes that underpin facility design. All of this information must be consistently communicated to current and future generations of health care workers to enable their understanding and use of the environment to help achieve strategic goals.

Conclusion

The recommendations contained in this report are designed to provide the Department with opportunities for enterprise-wide improvements that can be used to drive systematic, positive change and achieve the MHS's Quadruple Aim—increased readiness, better health, better care, and lower cost. The imperative for this new direction seems clear: Change in health care is happening at an unprecedented pace and on a scale that touches every aspect of the health care industry. Current legislative mandates have prioritized the quality of care over the volume of care provided, with renewed focus on affordable services that result in healthy individuals and communities.[3] Health care technology advances provide new virtual or non-facility-based options for care delivery, challenging the strategic planning process that represents the first step in determining health care facility requirements and standards. As a result, facility and IM/IT infrastructure investments and standards should be determined, executed, and evaluated together. Changes in health care also require MHS leaders to think outside the traditional facilities-based platform to establish an accountable, highly reliable, integrated health care delivery system. The MHS is on an ambitious quest to become such a system; a strategy that should drive the function and then the subsequent form of its facilities.

Executive Summary References

1. 111th Congress 2nd Session. Ike Skelton National Defense Authorization Act for Fiscal Year 2011. Pub. L. No. 111-383. 2011.
2. U.S. Department of Defense. *Military Health System Review: Final Report to the Secretary of Defense.* August 29, 2014.
3. U.S. Department of Health & Human Services. Read the Law. [Webpage]. http://www.hhs.gov/healthcare/rights/law/. Accessed April 15, 2015.
4. Horoho PD. Statement by Lieutenant General Patricia D. Horoho, The Surgeon General, United States Army, Before the Senate Committee on Appropriations Subcommittee on Defense. 2014.
5. Axelsson R, Axelsson SB. Integration and collaboration in public health: A conceptual framework. *Int J Health Plann Mgmt.* 2006;21:75-88.
6. The Churchill Centre. Quotations and Stories. [Webpage]. http://www.winstonchurchill.org/resources/quotations/famous-quotations-and-stories. Accessed July 6, 2015.

INTRODUCTION

1.0

"The foundation for improving performance in the MHS [Military Health System] rests on combining the concepts of an integrated health care system with those of high reliability organizations. The MHS must continue to mature as an integrated health system, improving alignment among the Services and between the direct care and purchased care components, and placing particular emphasis on improving transparency related to access, quality of care, and patient safety."[2(p.8)]

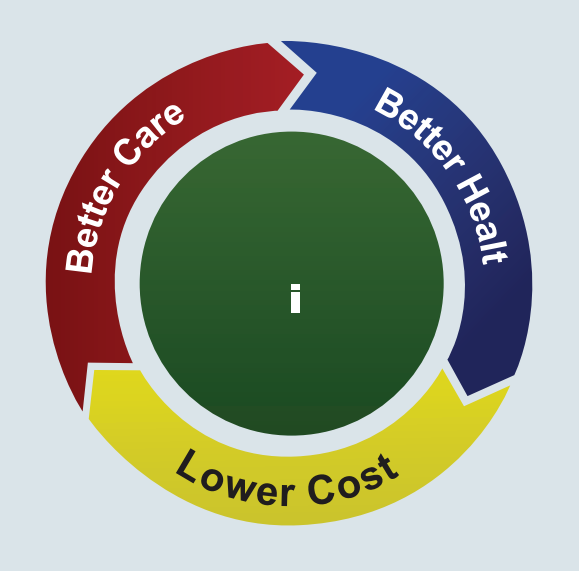
Military Health System Review:
Final Report to the Secretary of Defense
2014

For almost two centuries, Service members have received health care in hospitals and clinics built and operated by the Department of Defense (DoD).[7-9] The Department makes a concerted effort to keep all facilities up to date and within industry standards; however, while many of these facilities are state of the art, a portion of the inventory is outdated and does not always reflect changes occurring in the evolving health care environment.[10] As transformation occurs across the civilian and military health care sectors, in conjunction with DoD's extensive self-examination of its health care system, there is an opportunity to further align facility investments with MHS's broader strategic vision and business plan execution.

Because form should always follow function,[11] and function is determined by strategy, the impacts of these significant changes have the potential to redefine world-class health care facility requirements and supporting standards.

It is critical to note that "the fundamental mission of the MHS, providing medical support to military operations, is different from that of any other health system in the United States."[2(p.18)] This means that, in addition to considering the Triple Aim goals faced by all civilian health care systems—"better health, better care, lower cost"[12]—the MHS is addressing a fourth aim, "increased readiness," which requires additional complex strategies and tactics to achieve success (Figure 1).

Figure 1. The Quadruple Aim[13,14]



From U.S. Department of Defense, 2014.

1.1 Military Health System Complexity

"Our continued strength and relevance will be achieved by our sustained focus on readiness, greater integration within our system and with external partners, moving from healthcare to health, and an enduring commitment to quality and safety."[14(p.12)]

Dr. Jonathan Woodson
Assistant Secretary of Defense for Health Affairs
2013

The Military Health System is comprised of separate and distinct cultures and organizational structures.

As one of the largest health systems in the United States,[2] the MHS is very complex, in part because of its unique mission, culture, and organizational structure. The operational components of the MHS consists of the Medical Departments of the Army, Navy (which supports the Marine Corps), and Air Force, and the newly formed Defense Health Agency (DHA), each of which have unique missions, cultures, and organizational structures, as well as separate policies and procedures, personnel and financial systems, installations, and medical services.[15,16] Today, the MHS is comprised of these separate and distinct cultures and organizational structures, with "each Service and the Defense Health Agency controlling and operating its own medical centers, hospitals, and clinics worldwide."[2(p.2)] Each Services' medical command or medical service is led by its respective Surgeon General.[13] (See Appendix J for an illustration of MHS Organizational Structure.)[17] Governance of the MHS is also complex. Overall, the MHS is a:

> …federated health care system with responsibility for the delivery of safe, high-quality care shared among the Office of the Assistant Secretary of Defense for Health Affairs (ASD(HA)), the Military Departments (Services), and the Defense Health Agency (DHA). This governance structure follows from DoD's overall organizational structure, with the MHS nested within the Department…the ASD(HA) reports to the Under Secretary of Defense for Personnel and Readiness (USD[P&R]), who in turn reports to the Secretary of Defense.[2(p.24)]

Established October 1, 2013, the DHA is "responsible for driving greater integration of clinical and business processes across the MHS, implementing shared services with common measurement of outcomes, enabling rapid adoption of proven practices, helping reduce unwanted variation, and improving the coordination of care across time and treatment venues."[17] The DHA is also a Combat Support Agency that meets the needs of the combatant commanders by ensuring that "Service members are medically ready to perform their mission, and [DoD's] military medical personnel are ready to perform their mission."[17]

Prior to October 1992, the role of the ASD(HA) in the MHS was primarily one of setting broad medical policies and procedures for the three Surgeons General, who were directly responsible to their Service and to their Service Secretary. At that time, the Surgeons General had complete control of the medical personnel, funding, and facilities of their Service.[18] In October 1992, separate medical funding of the Army, Navy, and Air Force was removed from the control of the

three Services and consolidated into a single Defense Health Program (DHP) appropriation under the direct control of the ASD(HA). However, funding for military medical personnel remained under the direction and control of each Service and its Surgeon General, along with separate medical personnel systems, policies, procedures, medical facilities, organizational structures, and cultures.[18]

In 2005, the DoD Base Closure and Realignment Commission (BRAC) directed: (1) the closure and realignment of the Walter Reed Army Medical Center (WRAMC) with the National Naval Medical Center (NNMC) to create the new Walter Reed National Military Medical Center (WRNMMC) in Bethesda, Maryland; (2) the closure of inpatient care at Malcolm Grow Medical Center at Andrews Air Force Base, Maryland; and (3) the expansion and replacement of the community hospital at Fort Belvoir, Virginia.[19] The 2010 National Defense Authorization Act (NDAA) then required a comprehensive master plan for the National Capital Region, following the creation of the Joint Task Force National Capital Region Medical (JTF CapMed) as the organizational entity with control over the new WRNMMC and the new Fort Belvoir Community Hospital (FBCH).[20,21] Three years later in 2013, the National Capital Region Medical Directorate, a directorate of the new DHA, replaced the JTF CapMed as the organizational entity controlling WRNMMC and FBCH, which are now staffed with medical personnel from more than one Service.[22,23]

Across the MHS, the full continuum of health care services is provided to 9.6 million beneficiaries, some of whom are deployed to battlefields or austere operational environments around the world, as well as to all eligible beneficiaries cared for in fixed military treatment facilities (MTFs), in private sector facilities, and in tertiary military medical centers in the United States and overseas.[2] In Fiscal Year (FY) 2013, 84.9 percent of eligible beneficiaries utilized the MHS, which includes services provided in the direct care component, as well as contracted purchased care services made available in the civilian marketplace.[2] Table 1 depicts a sample of key services provided during an average week in the direct and purchased care components, based on FY 2013 data.

In Fiscal Year 2013, 84.9 percent of 9.6 million eligible beneficiaries utilized the Military Health System's direct and purchased care components.

Table 1. Average Weekly Workload in Direct Care and Purchased Care as a Percent of Total[2]

Service	Direct Care	Percent of Total[a]	Purchased Care	Percent of Total[a]	Total
Inpatient Admissions	5,000	**25%**	15,000	**75%**	20,000
Outpatient Visits	834,000	**44%**	1,042,000	**56%**	1,876,000
Births	943	**41%**	1,345	**59%**	2,288
Prescriptions Filled	926,554	**37%**	1,240,000-Retail Pharmacies 363,000-Home Delivery	**63%**	2,529,554
Behavioral Health Outpatient Services	61,000	**18%**	282,000	**82%**	343,000
Emergency Room Visits	28,000	**16%**	149,000	**84%**	177,000

[a]Calculated by authors using data from the U.S. Department of Defense.
Adapted from U.S. Department of Defense, 2014.

The direct care component employs approximately 86,000 military personnel and 60,400 civilians across 56 hospitals, 361 ambulatory care clinics, and 249 dental clinics.[2] The integration of direct care services with purchased care through TRICARE contracts is a profoundly complex challenge and opportunity for the MHS as it struggles to organize these separate care delivery modalities into an integrated system of care.

The Military Health System (MHS) is driven by different fiscal realities than the civilian market. MHS health care funding is complex, with some funding under the direct control of the Assistant Secretary of Defense (Health Affairs), while military personnel salaries remain under the direction and control of the Services.

In addition to its unique readiness mission to ensure that the Force is medically ready at all times and that health care personnel are ready to support the mission, the MHS is driven by different fiscal realities than the civilian market and therefore has different incentives. It "does not operate on a traditional reimbursement system as found in the civilian sector, and is subject to congressional authorization and appropriation processes that direct its activities and use of resources."[2(p.11)] In addition, the ASD(HA) controls "all funding for the DoD MHS, including operations and maintenance; procurement; and research, development, test, and evaluation in the single Defense Health Program (DHP) appropriations account, but keeps funds for medical facility military construction in a separate single appropriations account."[24(p.2)] The only funds not controlled by the ASD(HA) are military medical personnel salaries, which are controlled by the three Services. These fiscal conditions create a level of complexity not faced in the civilian health care sector.

1.2 Military Medical Construction Legislation, Reports, and Studies Related to Facility Standards

A plethora of key legislative actions, as well as relevant reports and studies, have had a transformative effect on the delivery of care within the Department over the past decade and laid the foundation for the establishment of the Panel (Figure 2).

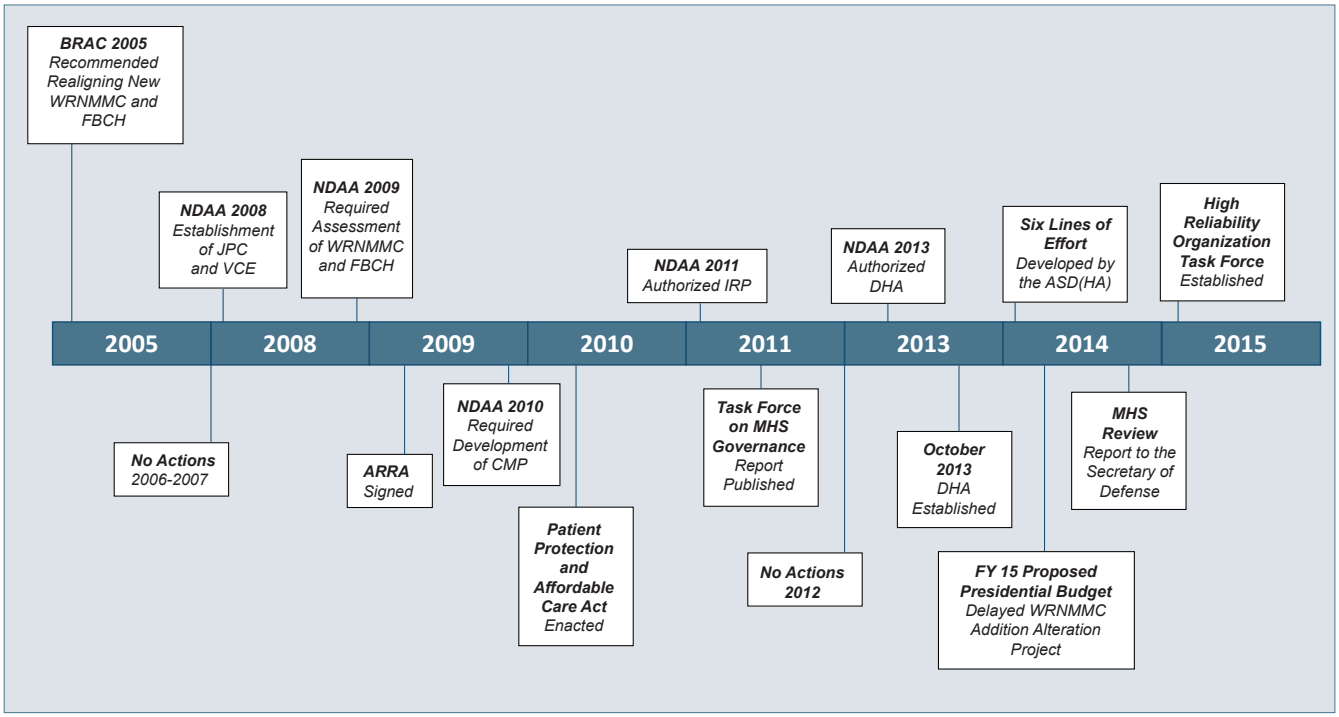
These legislative actions, reports, and studies include:

- As mentioned above, realigning WRAMC with the NNMC, Bethesda, Maryland, and relocating all non-tertiary patient care functions for beneficiaries located in Virginia to the new FBCH at Fort Belvoir, Virginia.[19]
- The NDAA for FY 2008, Section 722, called for the establishment and maintenance of a Joint Pathology Center (JPC) that would serve "as the reference center in pathology for the Federal Government," and Section 1632, which called for the establishment of a vision center of excellence (VCE) in the prevention, diagnosis, mitigation, treatment, and rehabilitation of military eye injuries.[25]
- The Duncan Hunter NDAA for FY 2009, Section 2721, recommended that beneficiaries living in the NCR deserve to be treated in world-class facilities.[26]
- The American Recovery and Reinvestment Act (ARRA) of 2009 established three primary goals: (1) to create new jobs and save existing ones; (2) to spur economic activity; and (3) to invest in long-

term growth and foster levels of accountability and transparency in government spending.[27]

- The NDAA for FY 2010, Section 2714, required development and implementation of a comprehensive master plan that provides sufficient world-class military medical facilities and an integrated system of health care delivery for the NCR.[20]
- The Patient Protection and Affordable Care Act of 2010 aims to: (1) increase access to health care insurance using a variety of programs and incentives; (2) increase prevention and wellness provisions; and (3) improve health care quality, system performance, and efficiency.[3]
- The Ike Skelton NDAA for FY 2011, Section 2852, required establishment of: (1) a unified construction standard for military construction and repairs for military medical centers that provides a single standard of care and (2) the Independent Review Panel on Military Medical Construction Standards (Panel).[1]
- The 2011 Task Force on Military Health System Governance evaluated the MHS and multi-service health care markets' long-term governance structure.[28]
- The NDAA for FY 2013, Section 731, authorized the DHA, established in October, 2013, to accomplish the MHS Quadruple Aim of increased readiness, better health, better care, and lower cost.[29]
- The Six Lines of Effort for the Military Health System developed six strategic lines of effort to position the MHS to be stronger and more flexible in providing care.[30]
- The proposed FY 2015 Budget delayed the WRNMMC Addition Alteration project until FY 2017.[31]
- The 2014 *Military Health System Review: Final Report to the Secretary of Defense* provided a comprehensive review of patient access, patient safety, and quality of care across the MHS.[2]
- The 2015 High Reliability Organization Task Force was established as a result of the *Military Health System Review: Final Report to the Secretary of Defense* to evaluate how the MHS can become a high reliability organization.

Figure 2. Relevant Legislative Actions, Reports, and Studies (2005-2015)



Additional information on these legislative actions, reports, and studies can be found in the Panel's annual progress report at: http://www.facadatabase.gov/committee/reportdocuments.aspx?flr=15915&cid=2450.

1.3 Charge to the Independent Review Panel on Military Medical Construction Standards

Section 2852 of the Ike Skelton NDAA for FY 2011 required the establishment of a panel whose objectives and scope of activities include the provision of advice and recommendations regarding a construction standard for military medical centers to provide a single standard of care. Specifically, the Panel's charges include:

> (A) Reviewing the unified construction standards established pursuant to subsection (a) to determine the standards [*sic*] consistency with industry practices and benchmarks for world class medical construction;
>
> (B) Reviewing ongoing construction programs within the Department of Defense to ensure medical construction standards are uniformly applied across applicable military medical centers;
>
> (C) Assessing the approach of the Department of Defense approach [*sic*] to planning and programming facility improvements with specific emphasis on –
>
> > (i) Facility selection criteria and proportional assessment system; and

(ii) Facility programming responsibilities between the Assistant Secretary of Defense for Health Affairs and the Secretaries of the military departments [*sic*];

(D) Assessing whether the *Comprehensive Master Plan for the National Capital Region Medical*, dated April 2010, is adequate to fulfill statutory requirements, as required by section 2714 of the Military Construction Authorization Act for Fiscal Year 2010 (division B of Public Law 111-84; 123 Stat. 2656), to ensure that the facilities and organizational structure described in the plan result in world class military medical centers in the National Capital Region; and

(E) Making recommendations regarding any adjustments of the master plan referred to in subparagraph (D) that are needed to ensure the provision of world class military medical centers and delivery system in the National Capital Region.[1]

The Panel was charged with providing an initial report to the Secretary of Defense not later than 120 days after its first meeting, as well as an annual report on the Panel's findings and recommendations each February 1 thereafter until the termination of the Panel.[1] The Panel began its work on February 6, 2014, and submitted its initial report June 5, 2014;[32] the first and only annual progress report was submitted February 1, 2015.[33] (See Appendix K to read the entire Section 2852 of the Ike Skelton NDAA for FY 2011). This is the Panel's final report to the Secretary of Defense.

A summary of background information that led to the establishment of the Panel can be found in the Panel's annual progress report at: http://www.facadatabase.gov/committee/reportdocuments.aspx?flr=15915&cid=2450

1.4 Overarching Methodology/Approach

The Panel approached each of the five requirements outlined in the FY 2011 NDAA using three key frameworks:

- The *world-class medical facility* definition, which was developed as part of the work of the NCR BRAC Health Systems Advisory Subcommittee of the Defense Health Board in May 2009, influenced the Panel's analysis, advice, and recommendations (see Appendix L). The definition of a world-class medical facility includes 18 conditions in the following 6 domains that must be met for it to be considered world-class:

    1. Basic Infrastructure
    2. Leadership and Culture
    3. Processes of Care
    4. Performance
    5. Knowledge Management
    6. Community and Social Responsibility

The definition of a world-class medical facility extends far beyond the physical aspects of a facility.

It is important to note that the definition of a world-class facility extends far beyond the physical aspects, or form, of a facility. It also includes the comprehensive functions and all the other ways and means by which care is delivered to best meet the needs of stakeholders. The functions of a health system are often far more critical to fulfilling world-class goals than the form of its facilities. Form follows function.[11] Thus, the Panel's focus was equally, if not more so, on the comprehensive functions of the MHS and the strategies that drive those functions, as precursors to facility form.

- Seven Guiding Principles, created and adopted by the Panel, established the foundation for its work, reflected the Panel's core beliefs, and provided a lens through which the Panel established goals and developed recommendations (see Appendix A).
- The components of the MHS Quadruple Aim—increased readiness, better care, better health, and lower cost—guided the Panel's inquiry (see Figure 2).

The Panel also established Terms of Reference, which can be found in Appendix M, to guide its work. During its tenure, the Panel convened on numerous occasions in person and via teleconference and webcast. It received briefings from subject matter experts in facility design, construction, and repair standards; engaged in discussions with DHA and DoD leaders and national leaders of health care organizations and groups; toured multiple MTFs; and reviewed relevant reports and presentation files. A complete list of meetings, presentations, and MTFs visited is included in Appendix N.

1.5 How to Read the Report

The Panel views this final report as an opportunity to crystallize its findings and recommendations from its annual progress report (see Appendix B for the annual progress report's executive summary, which includes its findings and recommendations) with added focus on:

- The second part of Charge C, assessing facility programming responsibilities among the ASD(HA) and the Service Secretaries; and
- Charges D and E, assessing and making recommendations regarding the *Comprehensive Master Plan*.

The Panel answered all five of its charges completely. The final report is complementary to and builds on the annual progress report, which primarily focused on Charges A, B, and the first part of Charge C. Additional focus was given to Charges D and E, which address the adequacy and need for adjustment of the National Capital Region's *Comprehensive Master Plan for the National Capital Region Medical*. Table 12 in Section 6.0 summarizes by topic how the final report recommendations address each of five charges to the Panel. Appendix C summarizes how both the final and annual progress report's recommendations align with the Panel's five charges.

In this final report, the Panel highlights four key, overarching strategic areas for the Secretary of Defense:

1) The critical role of strategy and market-specific business/operations plan execution in effectively utilizing available medical facility capacity and capability (Section 2.0);
2) How implementing an integrated delivery system affects facility requirements and utilization in the NCR (Section 3.0);
3) The relationship between technology and facility investments (Section 4.0); and
4) The relationship between evidence-based design solutions and health care outcomes (Section 5.0).

The report concludes in Section 6.0, followed by supporting appendices.

Section References

1. 111th Congress 2nd Session. Ike Skelton National Defense Authorization Act for Fiscal Year 2011. Pub. L. No. 111-383. 2011.
2. U.S. Department of Defense. *Military Health System Review: Final Report to the Secretary of Defense.* August 29, 2014.
3. U.S. Department of Health & Human Services. Read the Law. [Webpage]. http://www.hhs.gov/healthcare/rights/law/. Accessed April 15, 2015.
7. Lund JV. *Military Pay, Benefits and Retirement.* Nova Publishers; 2004.
8. U.S. Department of Defense. Fort McNair History. [Webpage]. http://www.jbmhh.army.mil/web/jbmhh/AboutJBMHH/FortMcNairHistory.html. Accessed May 22, 2015.
9. U.S. Department of Defense. Naval Medical Center Portsmouth. [Webpage]. http://www.med.navy.mil/sites/NMCP2/Pages/Default.aspx. Accessed May 22, 2015.
10. Serbu J. 2016 budget aims to "arrest" deterioration in military facilities. *Federal News Radio.* March 4, 2015.
11. Sullivan LH. The tall office building artistically considered. *Lippincott's Magazine.* 1896.
12. Whittington J, Nolan K, Lewis N, Torres T. Pursuing the triple aim: The first seven years. *Milbank Q.* 2015;93(2):263-300.
13. U.S. Department of Defense. *Evaluation of the TRICARE Program: Access, Cost, and Quality - Fiscal Year 2014 Report to Congress.* February 25, 2014.

14. Woodson J. Institute of Medicine: Moving to a More Integrated Health System. 2013.
15. U.S. Department of Defense. About the Department of Defense. [Webpage]. http://www.defense.gov/about/.
16. 112th Congress. Title 10, United States Code. Washington, DC: U.S. Government Printing Office; 2011.
17. Defense Health Agency. [Webpage]. http://www.health.mil/About-MHS/Defense-Health-Agency. Accessed April 15, 2014.
18. Dahl PE. *The Impact of the Establishment of the Defense Health Program Appropriation on the Planning, Programming, and Budgeting System within the Department of Defense,* Naval Postgraduate School; 1993.
19. Defense Base Closure and Realignment Commission. *2005 Defense Base Closure and Realignment Commission Report.* 2005.
20. 111th Congress. National Defense Authorization Act for Fiscal Year 2010. Pub. L. No. 111-84. 2009.
21. England G. Establishing Authority for Joint Task Force - National Capital Region/Medical (JTF CapMed) and JTF CapMed Transition Team (Unclassified). 2007.
22. Carter AB. Planning for Reform of the Governance of the Military Health System. 2012.
23. Carter AB. Implementation of Military Health System Governance Reform. 2013.
24. U.S. Department of Defense. Department of Defense Directive Number 5136.01. 2013.
25. 110th Congress. National Defense Authorization Act for Fiscal Year 2008. Pub. L. No. 110-181. 2008.
26. 110th Congress. Duncan Hunter National Defense Authorization Act for Fiscal Year 2009. Pub. L. No. 110-417. 2008.
27. 111th Congress. American Recovery and Reinvestment Act of 2009. Pub. L. No. 111-5. 2009.
28. Task Force on Military Health System Governance. *Department of Defense Task Force on Military Health System Governance Final Report.* September 29, 2011.
29. 112th Congress. National Defense Authorization Act for Fiscal Year 2013. Pub. L. No. 112-239. 2013.
30. Woodson J, Robb D. Prepared Statement Of The Honorable Jonathan Woodson, M.D., Assistant Secretary of Defense (Health Affairs), and Lieutenant General (Dr) Douglas Robb, Director, Defense Health Agency Before the House Armed Services Committee Subcommittee on Military Personnel. 2014.
31. U.S. Department of Defense. Presidential Budget 2015 Defense Health Agency Future Years Defense Plan. 2014.
32. Independent Review Panel on Military Medical Construction Standards. [Webpage]. 2014; https://database.faca.gov/committee/historyreportdocuments.aspx?flr=15308&cid=2450&fy=2014.
33. Independent Review Panel on Military Medical Construction Standards. [Webpage]. 2015; http://facadatabase.gov/committee/reportdocuments.aspx?flr=15915&cid=2450.

DEVELOP AND IMPLEMENT A MILITARY HEALTH SYSTEM STRATEGIC PLAN

2.0

"To achieve the diverse health care goals of the United States, health care value must increase. The capacity to create value through innovation is facilitated by an integrated delivery system focused on creating value, measuring innovation returns, and receiving market rewards."[34(p.1235)]

Ronald Paulus, Karen Davis, and Glenn Steele
Authors of "Continuous Innovation in Health Care:
Implications of The Geisinger Experience"
2008

To achieve the goal of becoming a highly reliable integrated delivery system (IDS) (see Appendix I for a discussion of the IDS literature), the Military Health System (MHS) will need to further integrate the separate cultures of the Defense Health Agency (DHA) and the Services and strive to achieve the Quadruple Aim with a focus on lowering costs and increasing value. Effectively distributing human capital resources and graduate medical education (GME) programs and managing the portfolio of fixed medical facilities and available purchased care options to reduce excess facility capacity will contribute to these goals.

2.1 Transformation of the Military Health System Is Underway

One of the most visible responses to the Patient Protection and Affordable Care Act's shift in the government financing of care from volume to value is the creation of larger health care systems in the civilian sector using a variety of integration models. The Federal Government has fostered integration by encouraging "payment incentives to drive integrated care delivery;"[35(p.279),36] shifting momentum "toward Accountable Care Organizations (ACOs) for traditional Medicare beneficiaries . . . which raises the stakes for all providers and IDSs;"[36(p.42)] and providing incentives for widespread use of electronic health records. Integration also has been encouraged through the prevalence of pay-for-reporting and pay-for-performance programs.

Recent literature has attempted to define and describe the attributes of an IDS and other forms of integration, drawing similarities and highlighting the differences among them (see Appendix I for more information about IDSs). The most often noted advantages of integration include heightened care coordination, reduced duplication, and improved ability to finance the required investments in important

The civilian health care industry has re-embraced the concept of integration as a driver of world-class performance.

information technology and capabilities required to respond to the shift in the underlying health economy. Regardless of whether termed an integrated delivery network or system, a clinically integrated network or ACO, the civilian health care industry has re-embraced the concept of integration as a driver of world-class performance.[36,37]

Further, initial research has indicated that ACOs can lead to considerable savings.[38] IDSs "share with ACOs many of the same organizational features, foremost among them being high levels of organizational and clinical service integration," [39] which can be tailored to each organization's market, patient base, capabilities and context.[39,40]

The rationale for increased integration within the U.S. health care industry is succinctly stated below:

> Our healthcare system is fragmented, with a misalignment of incentives, or lack of coordination, that spawns inefficient allocation of resources. Fragmentation adversely impacts quality, cost, and outcomes. Eliminating waste from unnecessary, unsafe care is crucial for improving quality and reducing costs—and making the system financially sustainable. Many believe this can be achieved through greater integration of healthcare delivery, more specifically via integrated delivery systems (IDSs).[41(p.S284)]

There are multiple IDS models, including "an integrated delivery system with its own hospitals and other providers and/or a multispecialty physician group practice and a health plan."[42(p.4)] The benefit of this model is that "the insurance function provides flexibility, aligned incentives, and expertise in organizing to deliver high-value care."[42(p.4)] These models can either be "closed," like Kaiser Permanente, which only serves patients who are members of its plan, or "open," which serve patients both within and outside its health plans. Examples of "open" IDSs include Geisinger Health System (Pennsylvania), HealthPartners (Minnesota), Intermountain Healthcare (Utah), and New York City Health and Hospitals Corporation.[34,42] The MHS's direct care component most closely resembles a closed system.

"Efforts at greater integration don't begin and end with just internal jointness. Shaping this joint force will also depend on our ability to seek out and expand our strategic partnerships with other federal agencies, with academia and with private sector partners."[43]

Dr. Jonathan Woodson
Assistant Secretary of Defense for Health Affairs
2015

Secretary of Defense Ashton Carter has outlined his three top priorities: (1) help the President make national security decisions and implement those decisions; (2) ensure the strength and health of today's fighting force; and (3) build the Department and Joint Force of the future by embracing change.[43] The second priority is directly related to the MHS's Quadruple Aim, and "efforts at greater

integration don't begin and end with just internal jointness. Shaping this joint force will also depend on our ability to seek out and expand our strategic partnerships with other federal agencies, with academia and with private sector partners."[43] The MHS has recognized the need to transition wherever possible from solely Service-centric management of health care to an IDS model.[44]

As described in Section 1.0 and Section 3.1, DoD's 2010 *Comprehensive Master Plan* was a first step toward developing and implementing a world-class, integrated health care delivery system in the National Capital Region (NCR).[45] Although there have been significant changes to care delivery methods, the MHS governance structure, and MHS enterprise-wide strategic goals since 2010, the MHS is clearly at the beginning of its journey to become an IDS. Integration is a theme of DoD's 2014 *Military Health System Review: Final Report to the Secretary of Defense*[2] and the work of Department of Defense's (DoD's) High Reliability Organization Task Force.

"We must not only focus on creating world-class facilities, but also on how the Military Health System's choices and strategic direction enable success and empower individuals to work toward the shared vision of a world-class system of care."[46]

Lieutenant General Thomas Travis
Former Air Force Surgeon General
2014

Ideally, the MHS's goal is to become a fully integrated health system focused on the Quadruple Aim of increased readiness, better care, better health, and lower cost. The system includes the combat and deployed health care in fixed military treatment facilities (MTFs), which includes large tertiary care medical centers, medium and small hospitals, and ambulatory care clinics located in the United States and overseas; and comprehensive private sector care contracts for areas without fixed facilities. The fixed MTFs are essentially owned and operated by the Army, Navy, and Air Force Medical Departments, except that 7 of the 19 medical facilities in the NCR are owned and operated by the newly created DHA, established in October 2013 (see Section 3.1). As a support agency of the Joint Staff, the DHA is intended to facilitate interdependence and interoperability within the MHS, as well as provide single information technology solutions, planning and programming for medical facility construction, and appropriate resource management. The DHA also supports governance efforts with data analysis.[2]

In the Panel's opinion, one of the most impressive achievements of MHS leaders has been the stated commitment to:

- Complete transparency;
- Common safety and quality metrics and performance measures;
- Open and honest consideration of the facts as they become known; and
- Employment of the best thinking of military health care and the private sector to achieve the Quadruple Aim.[2]

The Military Health System continues to lack an enterprise-wide strategic plan to drive transformation and unity of effort.

However, the Panel notes that the MHS continues to lack an enterprise-wide strategic plan to drive transformation and unity of effort and provide a framework to support regional planning from a market perspective. After careful evaluation of the feasibility of a unified medical command or similar organizational structure, the MHS has chosen a federated organizational model, in part to preserve the unique identity of the separate medical cultures of the Army, Navy, and Air Force. This federated model includes six enhanced Multi-Service Markets (eMSMs), which are the NCR; Tidewater, Virginia; San Antonio, Texas; Colorado Springs, Colorado; Puget Sound, Washington; and Oahu, Hawaii (see Appendix F for a further description). The MTFs located outside these six geographic areas are owned and operated by the MTFs parent Service. As noted above, the DHA owns and operates 7 of the 19 medical facilities in the NCR. The remaining 12 medical facilities in the NCR and the facilities in the other five eMSMs are under the ownership and control of the MTFs' parent Service. This federated model of six eMSMs represents the MHS's first step towards integrating its health system.

Federated models require greater focus and attention on developing and implementing standardized performance metrics and senior leader accountability.

The term Multi-Service Market (MSM) refers to a health care market that is served by multiple Services and their subordinate MTFs. Enhanced refers to enhanced authorities granted to the military officer assigned to the role of Market Manager. In a federated model, some decisions are centralized by a small core team, while other decisions are decentralized to empowered individual units.[47] The MHS federated organizational model relies more on collaboration and cooperation than on ownership and control, which is found in more integrated models, to achieve its objectives of performance and accountability. This federated model requires greater focus and attention on developing and implementing standardized performance metrics and requiring senior leader accountability for achieving those metrics at every level of the organization, from the most senior executives to the manager of each clinical service in each MTF. It is interesting to note that the NCR contains a mix of two organizational models. The DHA portion of the NCR relies on ownership and control, and a higher degree of integration, while the non-DHA portion of the NCR relies more on collaboration and cooperation to achieve the Quadruple Aim (see Section 3.1 for a detailed discussion of the NCR's evolution as an IDS). In its collective experience in the private sector, the Panel has found that federated models are quicker to implement, but slower to achieve strategic goals.

The Panel has found that federated models are quicker to implement, but slower to achieve strategic goals, because they rely on collaboration and cooperation, rather than ownership and control, which is found in more integrated models.

IDSs carefully plan their services and facilities in response to the demonstrated need of their patient populations and with careful thought given to caring for the right patient in the right setting at the right time.[48] The Panel was informed of the eMSMs' efforts to complete market-specific facilities strategies that are based on rigorous and standardized business plans, which will be presented to MHS governance. This is an important first step to matching facility supply, demand, and location of care and delivering efficient, reliable, and effective care. This market-based approach is a significant improvement in the MHS's core process of facilities development and provides the opportunity to deliver a clearly articulated purpose, scope, role, and process for each facility that can align all parties.

Responding to abrupt market changes because of DoD and Service decisions that result in dramatic beneficiary population changes is a unique challenge for the MHS as it plans, programs, and constructs new or modified MTFs. These changes can occur even while new medical construction is in progress, as was recently seen in the case of the new hospital project at Fort Riley, Kansas. As part of the military drawdown, it was announced in 2014 that personnel at Fort Riley could be reduced by up to 16,000 soldiers and Army-employed civilians.[49] That reduction in force, coupled with a consequent decrease in family members who are beneficiaries, dramatically reduces the demand for health care services, which was originally used to program the facility. Likewise, in July 2015, the Army detailed additional troop reductions at Fort Benning and Fort Bliss where new hospitals are scheduled to open soon.[50] The potential for this happening in the future will continue as military force structure decisions continue to reshape and relocate military personnel and their families.

Responding to abrupt market changes due to Department of Defense and Service decisions, such as a military drawdown, is a unique challenge for the Military Health System as it plans, programs, and constructs new or modified military treatment facilities.

Finding 1: The Military Health System's goal is to become an integrated military health system using a federated model. Given its collective private sector experience, the Panel has found that federated models are quick to implement, but slow to achieve strategic objectives, such as the Quadruple Aim—increased readiness, better care, better health, and lower cost. The federated model relies more on cooperation and collaboration than on ownership and control, which is found in more fully integrated models, to achieve its objectives of performance and accountability. This requires greater focus and attention on developing and implementing standardized performance metrics and requiring leader accountability for achieving those metrics at every level of the organization, from the most senior executive to the manager of each clinical service in every hospital and ambulatory clinic.

Recommendation 1: As part of its transformation to become an integrated health system using the federated model, the Military Health System should:

A. Within the next 12 months, finalize and implement a strategic/enterprise-wide plan to drive transformation and unity of effort to realize the Quadruple Aim at every level of the Military Health System organization.

B. On a quarterly basis, aggressively monitor progress and accountability in achieving these goals and, based on these results, adjust business plans and operational decisions, current facility utilization, and future facility requirements as needed to achieve the Quadruple Aim.

C. Align health care capital investments with the strategic/enterprise-wide plan being developed by the Military Health System.

2.2 The Military Health System Has a Strategic Goal to Become a Highly Reliable Integrated Delivery System

"We will not be satisfied until we have zero preventable harm."[51]

Lieutenant General Patricia Horoho
U.S. Army Surgeon General
2015

The MHS aspires to become a high reliability organization (HRO),[2] like many of its civilian counterparts,[52,53] an approach encouraged by The Joint Commission.[54] HROs aim for zero incidence of preventable harm. Research has shown that hospital-acquired conditions significantly contribute to patient harm and death.[55,56] Driven by financial incentives of the Patient Protection and Affordable Care Act to decrease hospital-acquired conditions, health care organizations are using the HRO approach, which is based on the use of human factors engineering as a tool to understand and analyze contributing safety-related variables, including the built environment.[53,57] "Human factors engineering is the study of human capabilities, limitations, and behaviors and the integration of that knowledge into the systems we design for them with the goals of enhancing safety, performance and the general well-being of the operators of the system."[58]

Commitment to becoming a high reliability organization "requires embedding the aim of high reliability into the vision and mission statements of health care organizations, setting measurable goals, and monitoring their achievement."[52(p.564)]

Mark Chassin and Jerod Loeb
Authors of "The Ongoing Quality Improvement Journey: Next Stop, High Reliability"
2011

Although the processes of making safety, reliability, and excellent patient experiences may vary, they all share a few common elements, including: enhanced integration for an organization aspiring to high reliability, leadership commitment to change, a culture of safety, and a system of robust process improvement.[53] Commitment to becoming an HRO "requires embedding the aim of high reliability into the vision and mission statements of health care organizations, setting measurable goals, and monitoring their achievement."[52(p.564)] Integration is one means for achieving these goals, as "it is difficult to imagine a hospital getting close to high reliability if quality is merely one of many competing priorities."[53(p.476)]

Standardization of facility design can lead to improved safety and key outcomes. Evaluation of the impact of design decisions is equally important.

A commitment to being a highly reliable IDS that delivers on the Quadruple Aim depends on many variables to support safe and reliable care, including facility design, operations, and maintenance, and therefore has significant facilities implications. It is the Panel's view that standardization of facility design represents an important tool for aspiring HROs such as the MHS. It can lead to improved safety and other key outcomes and may be important in facilitating the ability of military medical personnel to provide care at any MTF to which they are assigned.

Equally important is the evaluation of the impact of design decisions on key health care outcome measures and returns on investment (see Section 5.0).

However, the MHS has failed to implement mandatory reporting of contributing environmental factors in the current MHS Patient Safety Reporting Tool, which is not consistent with the characteristics and methods of HROs that are preoccupied with avoiding failure. The MHS Patient Safety Reporting Tool could serve as an important data source in the evaluation of environmental variables related to patient harm and near-miss episodes of care.

The Military Health System (MHS) has failed to implement mandatory reporting of contributing environmental factors in the current MHS Patient Safety Reporting Tool.

Finding 2: The Military Health System aspires to become a high reliability organization, which depends on many variables to support safe and reliable care, including facility design, operations, and maintenance. However, the Military Health System has failed to implement mandatory reporting of contributing environmental factors in the current Military Health System Patient Safety Reporting Tool, which is not consistent with the characteristics and methods of high reliability organizations.

Recommendation 2: The Military Health System should:

A. Incorporate facility design, operations, and maintenance activities into its efforts to become a high reliability organization, as they represent key, but often unconsidered, variables in the provision of safe and reliable care.

B. Require the mandatory reporting of contributing environmental factors as a component of the Military Health System Patient Safety Reporting Tool.

C. Include contributing environmental factors data as a component of routine performance improvement activities at military treatment facilities for a systems-wide perspective to improve facility standards and criteria.

D. Continuously evaluate how facility design, operations, and maintenance activities help the Military Health System become a high reliability organization.

2.3 Facility Utilization Affects Department of Defense Health Care Costs

One goal of the MHS Quadruple Aim is to lower cost by creating "value by focusing on quality, eliminating waste, and reducing unwarranted variation"[13(p.2)] and considering "the total cost of care over time, not just the cost of an individual health care activity."[13(p.2)] In the civilian sector, an organization's bottom line is a significant driver of change. In the MHS, readiness and associated mission requirements most actively drive its changes.

In 2014 the U.S. Congressional Budget Office stated that: "…the cost of providing that care has increased rapidly as a share of the defense budget over the past decade, outpacing growth in the economy, growth in per capita health care spending in the United States, and growth in funding for DoD's base budget."[59(p.1)] Specifically, "between 2000 and 2012, funding for military health care increased by 130 percent, over and above the effects of overall inflation in the economy. In 2000, funding for health care accounted for about 6 percent of DoD's base budget; by 2012, that share had reached nearly 10 percent."[59(p.1)] The Panel is concerned about the sustainability of this level of growth in the portion of the DoD budget consumed by health care. Table 2 shows the major components of the defense health budget between 2012 and 2015. During this period, the medical budget remained at approximately 10 percent of the total DoD budget and spending on medical facility maintenance and related facility costs ranged between 4 percent and just under 7 percent of the total medical budget.

The Panel was not able to compare MHS facility expenses with a comparable civilian health care system's expenses because of differences in structure, complexity, and accounting practices. The Panel noted that the MHS has made significant progress delineating and streamlining military construction (MILCON) planning and programming responsibilities by creating DHA's Facilities Division, a shared service, in 2013. This DHA component manages the life cycle of facility investments and 90 percent of the DHA Facilities Division's construction projects have been completed within budget, which is an enviable and substantial achievement.[60]

Table 2. Defense Health Budget Distribution, Fiscal Years 2012-2015[61-74]

Funding ($ Values In Billions)	2012 (Actual)	2013 (Actual)	2014 (Actual)	2015 (Estimated)
Eligibles[a]	**9,661,562**	**9,590,893**	**9,534,479**	**9,229,952**
Operations and Maintenance (O&M)[b]	$30.44	$29.29	$30.22	$30.31
TRICARE for Life Accrual Payments[c]	$10.85	$8.30	$7.44	$7.02
Unified Medical Personnel[d]	$8.15	$8.17	$8.39	$8.45
Research Development Test and Evaluation[b]	$1.27	$1.02	$1.71	$1.73
Military Construction (MILCON)[e]	$1.13	$0.91	$1.16	$0.49
Procurement[b]	$0.63	$0.34	$0.71	$0.31
Total MHS Expenditures[h]	**$52.46**	**$48.02**	**$49.62**	**$48.32**
Total DoD Expenditures[f]	$530.40	$495.50	$496.00	$495.60
MHS Expenditures as a Percent of DoD[g]	**9.89%**	**9.69%**	**10.00%**	**9.75%**
Facility Maintenance, Sustainment, & Restoration (Subset of O&M)[e]	$1.91	$1.89	$2.17	$1.50
MILCON (From Above)[f]	$1.13	$0.91	$1.16	$0.49
Total Facility Expenditures	**$3.04**	**$2.80**	**$3.33**	**$1.99**
Total Facility Expenditures as a Percent of MHS[g]	**5.80%**	**5.80%**	**6.70%**	**4.10%**

[a]Data source is Defense Health Program Budget Estimates – Exhibit PB-11B, Medical Workload and Productivity Data FY 2014-2016
[b]Data source is Defense Health Program Budget Estimates – Exhibit PBA-19, Appropriation Highlights FY 2014-2016.
[c]Data source is DoD Comptroller Financial Summary Tables FY 2014-2016.
[d]Data source is the Defense Health Program President's Budget for FY 2014-2016.
[e]Data source is MHS Funding Summary provided by DHA Facilities Division.
[f]Data source is DoD FY 2015 Budget Request; total DoD expenditures exclude Overseas Contingency Operations.
[g]Calculated by authors using DoD data.
[h]All numbers are rounded to the nearest hundredth.
Adapted from U.S. Department of Defense, 2013-2016, and DHA Facilities Division, 2014.

Data show that inpatient health care provided in the direct care component is more expensive than care purchased in the market at five of the six military treatment facilities the Panel visited.

The Panel then moved from a global budget view to the calculated average costs by inpatient admission and product line for direct and purchased care as shown in Table 3 and Table 4. These data show that inpatient health care provided in the direct care component is more expensive than care purchased in the market (see Appendix G for workload and utilization data) at five of the six MTFs the Panel visited. Specifically, the data show that the calculated average cost of inpatient care provided per relative value product in the direct care component ranged from between 11 percent to approximately 120 percent more expensive than the care provided in the purchased care component (Table 3). Ambulatory care was also more expensive in the direct care component than care purchased in the market at all six inpatient MTFs the Panel visited, the two outpatient facilities the Panel was briefed on (Fort Drum and 779th Medical Group), and five outpatient facilities in the National Capital Region Medical Directorate (NCR MD). Ambulatory cost per relative value unit in the direct care component ranged from between 4 percent to approximately 177 percent more expensive than the purchased care component (Tables 3 and 4).[75]

Table 3. Inpatient and Ambulatory Costs in Six Inpatient Facilities Visited by the Panel, Fiscal Year 2014[75]

Military Treatment Facility	Inpatient Care			Ambulatory Care		
	Inpatient Direct Care (Cost/RWP)	Inpatient Purchased Care (Cost/RWP)	Ratio of Direct Care Costs to Purchased Care Costs (Cost/RWP) [a, b]	Ambulatory Direct Care (Cost/RVU)	Ambulatory Purchased Care (Paid/RVU)[c]	Ratio of Direct Care Costs to Purchased Care Costs (Cost/RWP) [a, b]
Fort Belvoir Community Hospital	$21,891	$9,776	**2.24**	$171	$68	**2.51**
Walter Reed National Military Medical Center	$21,077	$12,106	**1.74**	$218	$79	**2.77**
Carl R. Darnall Army Medical Center	$11,410	$7,865	**1.45**	$97	$65	**1.50**
San Antonio Military Medical Center	$14,155	$8,788	**1.61**	$133	$85	**1.56**
Naval Hospital Camp Pendleton	$13,273	$11,957	**1.11**	$101	$61	**1.65**
Naval Medical Center San Diego	$11,657	$12,437	**0.94**	$117	$64	**1.82**

[a]Calculated by authors using data; ratio should be read as X:1.
[b]Headquarters, training activities (i.e. training commands), recruiting activities (recruiting commands), and research and development activities are not included in direct care costs; only overhead associated with a particular command is spread over inpatient and outpatient care. Purchased care costs include a 13 percent increase for overhead burdening.
[c]Data source is Management Analysis and Reporting Tool (M2) Non-Institutional (using "ambulatory" defined by enhanced Multi-Service Market workgroup, but excludes those claims indicating "Other Health Insurance" and includes drug costs). Includes all beneficiaries. Site based on Provider Catchment Area.
RVU = Relative Value Unit; RWP = Relative Weighted Product.
Adapted from DHA Decision Support Division via sources listed above, 2015.

Table 4. Facility Ambulatory Costs in Five National Capital Region Medical Directorate Outpatient Facilities and Two Facilities Briefed to the Panel, Fiscal Year 2014[75]

Ambulatory Facility	Ambulatory Direct Care (Cost/RVU)	Ambulatory Purchased Care (Paid/ RVU)[c]	Ratio of Direct Care Cost to Purchased Care Cost (Cost/RWP)[a]
579th Medical Group - Joint Base Anacostia-Bolling	$93	$98	**.95**
Naval Health Clinic Annapolis	$86	$83	**1.04**
Naval Health Clinic Quantico	$102	$61	**1.67**
Army Health Clinic Guthrie - Fort Drum	$73	$55	**1.32**
779th Medical Group - Joint Base Andrews Naval Air Facility[b]	$163	$60	**2.71**
Kimbrough Ambulatory Care Center - Fort Meade[b]	$108	$72	**1.50**
59th Medical Wing - Wilford Hall Ambulatory Surgery Center - Joint Base San Antonio-Lackland[b]	$124	$77	**1.62**

[a]Calculated by authors using data; ratio should be read as X:1.
[b]Although these three facilities also provide ambulatory surgery, encounters for ambulatory surgery are not included in the total costs per RVU. Headquarters, training activities (i.e., training commands), recruiting activities (recruiting commands), and research and development activities are not included in direct care costs; only overhead associated with a particular command is spread over inpatient and outpatient care. Purchased care costs include a 13 percent increase for overhead burdening.
[c]Data source is Management Analysis and Reporting Tool (M2) Non-Institutional (using "ambulatory" defined by enhanced Multi-Service Market workgroup, but excludes those claims indicating "Other Health Insurance" and includes drug costs). Includes all beneficiaries. Site based on Provider Requirement Integrated Specialty Model (PRISM) Area (includes all the children of the Parent Defense Medical Information System ID).
RVU = Relative Value Unit; RWP = Relative Weighted Product.
Adapted from DHA Decision Support Division via sources listed above, 2015.

In the experience of the Panel, there are specific areas in which facilities contribute to increased costs, such as a facility that contains too much physical capacity (see Section 2.5), a facility that is not staffed consistent with the original project plan, or a facility that has experienced decreases in projected demand once it is finally occupied. There are other notable linkages between facility project scope and its relationship to cost, quality, and other measures of performance. In order to understand how facility investments contribute to costs, valid and reliable measures are required.

Table 5. Military Health System Performance Dashboard[76]

Quadruple Aim	Performance Metric
Increased Readiness	Individual Medical Readiness
	To Be Determined
Better Health	To Be Determined
	Healthcare Effectiveness Data and Information Set (HEDIS) Cancer Screening Index
Better Care	Risk Adjusted Mortality (All Cases)
	Inpatient: Recommend Hospital (Satisfaction)
	Overall Satisfaction w/Healthcare (Outpatient)
	Healthcare-Associated Infection - Central Line-Associated Bloodstream Infection
	Patient Safety Indicator 5 - Foreign Body Retention (Per Year)
	National Surgical Quality Improvement Program (30 Day) All Case Morbidity Index
	Catheter-Associated Urinary Tract Infections
	Wrong Site Surgery
	HEDIS Diabetes Index
	HEDIS Appropriate Care Index (Low Back Pain, Pharyngitis, Upper Respiratory Infection)
	National Perinatal Information Center (NPIC) Post-Partum Hemorrhage
	NPIC Vaginal Deliveries w/Coded Shoulder Dystocia Linked to a Newborn ≥ 2500 grams w/ Birth Trauma
	HEDIS (30-Day) Mental Health Follow-Up
	HEDIS All Cause Readmission
	ORYX® Transition of Care Index (Asthma, Venous Thromboembolism, Inpatient Psych)
	Agency for Healthcare Research & Quality Prevention Quality Indicator Index
	Primary Care Manager (PCM) Continuity
	PCM Empanelment
	Primary Care Leakage
	Average Number of Days to Third Next Available Future Appointment (Primary Care)
	Average Number of Days to Third Next Available 24 Hour Appointment (Primary Care)
	Percent of Direct Care Enrollees in Secure Messaging
	Satisfaction with Getting Care When Needed (Service Surveys)
Lower Cost	Per Member Per Month Costs
	Total Purchased Care Cost
	Private Sector Care Cost per Prime Enrollee
	Operating Room Utilization
	Total Enrollment
	Pharmacy Percent Retail Spend
	Productivity Targets

Adapted from U.S. Department of Defense, 2015.

The MHS has adopted key performance metrics and a common measurement system mapped to all four goals of the Quadruple Aim. These performance metrics were developed as a result of the *Military Health System: Final Report to the Secretary of Defense* and are illustrated in Table 5. None of these 30 measures consider facility utilization beyond the operating room as a tool to improve stewardship and lower costs. The DHA Decision Support Division and DHA Facilities Division maintain a comprehensive facilities database, as well as MILCON-specific data that include a great deal of additional information, including bed capacity and number of rooms by type. Addressing direct facility measures at the MHS level, like asset utilization, could help to balance supply and demand in the direct care component, especially during this period when the IDS is being created. Facility resource measures should be developed and added to the MHS Performance Management System to include, at a minimum, facility asset utilization (inpatient beds and outpatient exam rooms) as a reflection of workload data and occupancy rates to better understand how better facility utilization can improve resource stewardship.

Planning and programming for recent military construction investments have not resulted in full facility asset utilization. All Military Treatment Facilities visited by the Panel had less than a 60 percent occupancy rate for inpatient medical surgical care.

Despite DoD's ongoing transformation, the planning and programming for recent MILCON investments have not resulted in full facility asset utilization (see Appendix G for workload and utilization data). For example, all facilities visited by the Panel were operating at a staffed occupancy rate of less than 60 percent in Fiscal Year (FY) 2014.[75] These low occupancy rates are not common in the commercial sector, except in older hospitals with semi-private rooms. It is widely recognized that fewer beds will be needed because of advances in care that can be appropriately delivered outside of an inpatient hospital setting. What is worth noting, however, is that other IDSs carefully forecast demand and bed need so their hospitals can operate at much higher occupancy rates, rates that have been reflected in the DoD Space Planning Criteria since 2013.

In late spring 2015, the Panel received MTF Portfolio reports from the DHA Decision Support Division and DHA Facilities Division. The Panel was keenly interested in these metrics, because they can be analyzed to measure progress and provide leaders with critical information to inform decision making. They also produce hard data that provide insights as to whether the Panel's observations of excess facility capacity during site visits were borne out by workload and occupancy data. The Panel conducted a high-level analysis of this information, which appears in Appendix G. These reports highlight some of the areas that deserve additional investigation by senior leaders. Generally, the linkages between facilities and key metrics are of interest in determining whether the MHS is, indeed, world class. The data show that there are significant cost differences between the direct and purchased care components.

Table 6 and Table 7 provide a summary of facility workload for the six inpatient facilities visited by the Panel, the two outpatient facilities briefed to the Panel, and five outpatient facilities in the NCR MD. According to the DoD Space Planning Criteria, medical-surgical inpatient rooms should operate at 80 percent annual occupancy,[77] a rate much higher than all MTFs visited by the Panel, most of which hovered around 50 to 55 percent in FY 2014.[77] Additionally, the MHS's standard

Two primary reasons contribute to a significant portion of underutilization of facilities: (1) unrealized recapture of inpatient care from the network coupled with troop movements and end-strength decreases; and (2) the use of old ambulatory care standards based on staffing rather than workload.

for outpatient exam rooms is 2,304 annual encounters per non-GME physician.[77] The average encounter per exam room in each location is significantly below the Panel's experience of private care systems that target a minimum of 10 encounters per exam room per day. In the Panel's opinion, two primary factors contribute to a significant portion of the underutilization of facilities built over the past decade and analyzed in Table 6 and Table 7: (1) unrealized recapture of inpatient care from the network coupled with troop movements and end-strength decreases; and (2) the use of old ambulatory care standards based on staffing rather than workload to program the new facilities, which DoD updated in 2013 to reflect industry standards. In addition, when the newest facilities were built, the MILCON process was complex, lengthy, and not optimally aligned with an IDS approach. The MHS has not realized infrastructure optimization for the most recently built facilities visited by the Panel. This situation will only add costs to the system across the entire life cycle of the buildings if the situation remains unchanged.

Table 6. Facility Workload in Six Facilities Visited by the Panel, Fiscal Year 2014[75]

Military Treatment Facility	FY 2015 Projected Staffed Beds[a,b,d]	Staffed Occupancy Rate without Newborn[a]	Exam Rooms[c]	Average Encounters Per Day[e]	Average Encounters Per Exam Room Per Day[a]
Fort Belvoir Community Hospital	121	**50%**	533	2,385	**4.5**
Walter Reed National Military Medical Center	306	**55%**	888	4,220	**4.8**
Carl R. Darnall Army Medical Center	79	**54%**	395	2,221	**5.6**
San Antonio Military Medical Center	425	**56%**	408	3,391	**8.3**
Naval Hospital Camp Pendleton	42	**53%**	301	1,704	**5.7**
Naval Medical Center San Diego	272	**46%**	582	2,785	**4.8**
Civilian Standard	N/A	N/A	N/A	N/A	**10.0**

[a]Calculated by authors using data.
[b]All data are for FY 2014, except for FY 2015 projected staffed beds. The staffed occupancy rate is calculated using FY 2015 projected staffed beds, and FY 2014 workload data. It is important to note that the number of staffed beds may change regularly.
[c]The number of exam rooms includes those outpatient clinics found within the hospital, not freestanding primary care centers that belong to the hospitals. Data source is DHA Facilities Division.
[d]Data source is enhanced Multi-Service Market Business Plans, Army Office of the Surgeon General Decision Support, and Navy Bureau of Medicine and Surgery.
[e]Data source is Management Analysis and Reporting Tool (M2) Comprehensive Ambulatory/Professional Encounter Record (CAPER). Only "B" Medical Expense and Performance Reporting System (MEPRS). Emergency Room and Immediate Care omitted; Monday-Friday only.
N/A = Not Available.
Adapted from DHA Decision Support Division via sources listed above, 2015.

Table 7. Facility Workload in Four National Capital Region Medical Directorate Outpatient Facilities and Two Facilities Briefed to the Panel, Fiscal Year 2014[75]

Ambulatory Facility	Exam Rooms[a]	Average Encounters Per Day[b]	Average Encounters Per Exam Room Per Day[c]
Naval Health Clinic Annapolis	71	272	**3.8**
Naval Health Clinic Quantico	95	510	**5.4**
Army Health Clinic Guthrie - Fort Drum	143	1,334	**9.3**
779th Medical Group - Joint Base Andrews Naval Air Facility	224	903	**4.0**
Kimbrough Ambulatory Care Center - Fort Meade	277	1,759	**6.4**
59th Medical Wing - Wilford Hall Ambulatory Surgery Center - Joint Base San Antonio-Lackland	652	2,902	**4.5**
Civilian Standard	N/A	N/A	**10.0**

[a]Data source is DHA Facilities Division.
[b]Data source is Management Analysis and Reporting Tool (M2) Comprehensive Ambulatory/Professional Encounter Record (CAPER). Only "B" Medical Expense and Performance Reporting System (MEPRS). Emergency Room and Immediate Care omitted; Monday-Friday only.
[c]Calculated by authors using data.
N/A = Not Available.
Adapted from DHA Decision Support Division via sources listed above, 2015.

A more integrated approach to delivery system strategy and planning, such as is described in Section 2.1, could also ameliorate operational issues; create an environment that enables right-sizing of the system; streamline and improve facility activities, reporting, and investments; and decrease duplication of efforts and investments that increase health care costs. The DHA Facilities Division recently has engineered a process that evaluates potential facility investments and executes them in a more integrated fashion. This process includes a new demand signal approach designed to identify and prioritize future facility investments so facility investments are aligned with MHS strategy. Additionally, the DHA has established an eMSM visioning process, which is an integrated market approach to facility planning.

Revised TRICARE contracts could also improve resource utilization, by incentivizing contractors to keep MTFs operating at full capacity, where appropriate, an outcome that would positively contribute to readiness goals and improve overall outcomes. Recognizing that the volume of procedures a health professional provides is linked to patient safety, three top academic medical centers—Dartmouth-Hitchcock Medical Center, Johns Hopkins Medicine, and the University of Michigan—plan to ban hospitals from performing certain surgical procedures unless the hospital and its health professionals exceed minimum-volume standards.[78-80] Additionally, *U.S. News & World Report* recently began publishing a new set of ratings, finding that patients receiving procedures at lower-volume hospitals had a higher risk of death or complications.[80] The Centers for Medicare & Medicaid Services also has begun posting procedural volume data for Medicare beneficiaries.[80]

Although there are business plans in place to recapture a large amount of care from the private sector, perhaps these goals are more aspirational than realistic.

Although there are business plans in place to recapture a large amount of that care from the private sector, perhaps these goals are more aspirational than realistic, given past experience, and a lack of incentives for patients, especially those who are Medicare eligible, to return to the direct care component.[81-86] Internal incentives found in the civilian sector, such as rewards for success and penalties for failure, should also be applied. Particular focus should be given to successful care recapture from the private sector, since it underpins the planning and ultimate utilization of facility assets. Business planning and workload assumptions used to program a new facility should be compared with realized workload, two years after occupancy, for each major MILCON project. Insights gained from this analysis could be used to further refine planning and programing standards.

The Military Health System must urgently develop systems and a culture of accountability to control and reduce costs.

The continuation of the current cost imbalance may threaten the future viability of the MHS and its medical readiness mission. Targeted and focused cultural and structural changes are needed to correct this cost imbalance. The imbalance relates to the MHS's need to stimulate progress through culture, systems, practice, and incentives that embed innovation into strategies and daily behaviors of leaders and staff. Accordingly, the MHS must urgently develop systems and a culture of accountability to control and then reduce costs. The Panel is not persuaded that the current strategy of recapturing purchased care will improve the situation. Instead, efficiencies must be created by strategically channeling services in the direct care component to achieve the Quadruple Aim. Viability and success in the health care sphere today must reflect a well-defined strategy, fueled by a culture of innovation (see Section 2.4) that demands accountability using measures found in world-class health care organizations, given that readiness is essential to national security. The Panel believes that one of the best ways to address the cost imbalance is to transition toward a true IDS, not a federated model, and that effective management of facilities is an important part of addressing these cost imbalances.

The Panel believes one of the best ways to address the cost imbalance is to transition toward a true integrated delivery system, not a federated model.

Finding 3: Care provided in the direct care component is significantly more expensive than care purchased in the marketplace. Underutilization of facilities in the direct care environment appears to contribute to this cost imbalance. For example, operations and maintenance of facilities that are idle have inherent costs and are part of the cost burden. Sustaining this level of cost inefficiency will be a challenge as pressures increase on the DoD budget.

Recommendation 3: Without compromising essential Quadruple Aim objectives, the Military Health System should:

A. Rapidly transition away from the current federated model towards a true integrated delivery system, with its related ownership and control characteristics, as a means to address cost imbalances. Should the Military Health System decide to retain the current federated model with its cooperation and collaboration characteristics, then more aggressive actions will be required by senior leaders to address cost imbalances at every level across the Military Health System.

B. Establish comprehensive facility utilization metrics as a component of the Military Health System Performance Management System. Recognizing that lower cost is one of the Quadruple Aims, senior leaders should set specific cost improvement standards, and related metrics, for the Military Health System enterprise-wide and develop a strategy of targeted specific actions to meet the standards within two years.

C. Examine how facility underutilization and other potential sources of imbalances in the allocation of care delivered among the direct care and purchased care components contribute to cost efficiency and inefficiency, mindful that essential Quadruple Aim objectives must be achieved beyond just cost economy.

D. Maximize facility resource utilization and optimal allocation of care delivery activities among the direct care and purchased care components for holistic achievement of objectives (economic and otherwise) as key components of integrated delivery system planning and execution.

E. Manage the care delivery portfolio with greater agility to better coordinate resources, settings, and methods for delivering care and consolidate, modify, or close facilities to reduce excess facility capacity and uneconomic cost burdens, where appropriate.

Finding 4: Recent military construction investments were based on prior and unrealized planning assumptions and business plans that have resulted in state-of-the-art, but overbuilt and underutilized, facilities. These underutilized facilities contribute to increased direct care costs and undermine the Military Health System's Quadruple Aim goal of lower cost. Although the newly created Defense Health Agency includes a shared services medical facilities component, the planning and programming process for constructing medical facilities is still a lengthy one, which requires updating workload and demand assumptions that drive the ultimate size and scope of new or modified medical facilities to realize a better return on investment.

Recommendation 4: The Military Health System should rigorously refine future-oriented clinical and business plans that drive medical facility investments and execute and evaluate these plans using an integrated delivery system approach to more effectively align resources with enterprise-wide strategic goals and objectives.

2.4 Cultural Change and a Commitment to Innovation Are Required to Realize the Military Health System's Quadruple Aim

Cultural transformation is required for the Military Health System to become a world-class integrated delivery system.

Cultural transformation is required for the MHS to become a world-class IDS. In the Panel's opinion, the separate cultures of the Services and the DHA undermine the achievement of a unified strategic direction and effort, and enterprise-wide accountability. Many believe that DoD's complex mission, organizational structure, and Service allegiance makes the creation of a shared culture a daunting, if not impossible, challenge (see Appendix J for an MHS organizational chart and Section 1.1 for a description of the MHS's complexity). However, during the wars of the past two decades, when enhanced integration was mission essential and driven by a shared culture, military medicine excelled in its use of innovative team-based casualty care processes, enabled by medical advances, technology, communications and transportation organization to achieve the lowest battlefield mortality rates ever seen.[87] This same urgency and passion for success must be harnessed in a unified culture to transform peace time health care operations and achieve the Quadruple Aim.

In the Panel's opinion, transforming the MHS culture represents the most important and challenging task facing current and future leaders. In the current federated environment, maintaining separate cultures undermines investment decisions and often results in resource redundancies and lack of system-wide accountability. As a result, it appears that leaders often focus on the successful achievement of short-term initiatives to the detriment of the successful execution of long-term goals. A culture that enables innovation to achieve and maintain strategic health care outcomes is critical, especially as it relates to realizing the underpinning strategic and business planning assumptions associated with the creation of health care facility projects. In addition, all leaders should understand how civilian health care, itself in the midst of enormous transformation, operates in partnership with the direct care system, in order to achieve the targets of better health, enhanced readiness, better care, and lower costs. Steps toward transforming an organization's culture include establishing a sense of urgency, forming empowered teams, and creating a shared vision.[88] Recent efforts, such as the *Military Health System Review: Final Report to the Secretary of Defense* and formation of the High Reliability Organization Task Force, reflect DoD leaders' desire for a shared vision to improve the MHS its quest to become an HRO.

Although there are pockets of innovation, the Military Health System lacks a comprehensive, enterprise-wide, and integrated approach to innovation.

Innovation competency provides a fundamental tool to fuel the MHS's transformation so that the organization avoids using yesterday's solutions for tomorrow's problems. Although there are pockets of innovation, the MHS lacks a comprehensive, enterprise-wide, and integrated approach to innovation essential to fully realizing the Quadruple Aim. Principal Deputy Assistant Secretary of Defense for Health Affairs Dr. Karen Guice recently reminded and challenged the MHS team to use the same spirit of innovation that drove so many improvements during the past 15 years of war:

> …that we are all capable of reinventing a tool or process to serve a new purpose, as well as creating something entirely new all on its own. This

> cycle of constant improvement and reinvention is always possible, even in the face of fiscal constraints and organizational change. Innovation is imperative to our success as a system and it is something to which we can all contribute.[89]

Although innovation is embedded in the history of military medicine, "overseas and here at home, the times demand even greater attention to and reward of the innovators in our midst. We have an urgent obligation to improve how we deliver health services in peacetime as well. The most important and effective innovations are those that occur closest to the delivery of care—at our hospitals and clinics."[90(p.0)]

The MHS defines innovation in four ways:

1. Process improvement, which involves "improving the efficiency and/or effectiveness of processes through incremental, localized changes;"[90(p.3)]
2. Leading practice, which involves "adopting proven solutions from within and outside of the MHS that update and/or expand existing work streams or services;"[90(p.3)]
3. Transformative innovation, which includes "new fundamentally redesigned work streams or services that deliver expanded value propositions;"[90(p.3)] and
4. Disruptive innovation, which includes "ground-breaking changes that disrupt current behavior, render existing approach and delivery mechanisms obsolete, and that change the value proposition."[90(p.3)]

Many world-class health care organizations utilize their own innovation centers and programs to help achieve successful transformation.

Many world-class health care organizations utilize their own innovation centers and programs to help achieve successful transformation, such as Kaiser Permanente's Garfield Innovation Center, the MedStar Institute for Innovation, and the Mayo Clinic Center for Innovation.[91-93] For example, according to a Kaiser Permanente representative, work at the Garfield Innovation Center includes building new inpatient rooms to assess how technologies affect workflow and service; conducting simulations to understand how mobile technologies used in temporary spaces impact efficiency, quality, and member experience; and determining best practices for hand hygiene.[91-93] The MHS has had a dedicated innovation program for over six years, which includes a Chief Innovation Officer charged with "identifying funding sources for innovative ideas; altering existing policies that inhibit innovation; broadening the avenues for innovators to bring promising new ideas to the attention of MHS senior leaders; and reducing the time and effort it takes to move ideas from the point of origination to the larger MHS."[90(p.13)] The Chief of Innovation reports to the Office of the Assistant Secretary of Defense for Health Affair's Office of Strategy Management and focuses on military medicine-related innovation and the development of infrastructure to support innovation within the DHA that is aligned with MHS strategy. The Panel was informed that the Services have also invested in innovation cells. Although there are pockets of innovation, the MHS lacks a comprehensive, enterprise-wide, and integrated approach to innovation essential to fully realizing the Quadruple Aim.

A robust, tri-Service staffed innovation program could serve as a catalyst to stimulate experimentation with new delivery processes.

In the Panel's opinion, a robust, tri-Service staffed innovation program could serve as a catalyst to stimulate experimentation with new delivery processes in line with the MHS's vision and strategy, which "must reflect a health care organization's fundamental purpose: what it is trying to achieve and for whom."[94(p.1682)] To address these aims, "one goal must become paramount: improving value for patients."[94(p.1682)] An enterprise-wide, interdisciplinary innovation program would develop essential new care processes; assist in the transition to increased virtual care; create leadership, management, strategies, policies, and personnel optimization; drive standardization across the MHS and the eMSMs; and enable the cultural changes required to improve quality, control costs, optimize readiness, and make a transition into an effective IDS. An innovation program is particularly relevant and important as the enterprise shifts to an integrated system of care delivery, which requires new leadership expertise, processes, and culture changes to realize seamless, cost-effective, high-quality care, especially in complex eMSMs. Best practices should be replicated across the eMSMs for consistency as personnel move among MTFs. Part of the innovation agenda should include standardized research across MTFs to examine the impact of building design and related factors on health care outcomes (see Section 5.2), which would then inform facility standards and criteria.

The Facility Innovation and Research Model could provide a promising structure and framework for conducting standardized research.

The MHS's current Facility Innovation and Research Model (FIRM) could provide a promising structure and framework for conducting standardized research across MTFs to examine the impact of design and related factors on health care outcomes, as a component of an enterprise-wide innovation program. The FIRM report outlines features such as a detailed structure, processes to include forms and templates, and methodologies for individuals and teams at MTFs interested in conducting EBD research.[95] Some of the initial study templates shared with the Panel were focused on facility-only outcomes, reflecting the lack of engagement and endorsement by clinical leaders who understand the critical role that human factors play in the built environment, which can affect health care outcomes. Subsuming FIRM as a component of an innovation program would allow clinicians, policy makers, and facility leaders to collaborate on health care delivery innovations and corresponding facility innovations. Further, facility-based research efforts, including translational research for combat casualty care facilities and equipment and data collected via the Patient Safety Reporting Tool, could be embedded in the MHS's strategic performance improvement activities.

Cultural transformation driven by innovation competency must occur for the MHS to become a world-class health care system. The MHS has already identified ways in which innovation brings value to the organization. These approaches need to be fully reflected in the MHS strategic plan, the results of which should describe a coordinated innovation effort across the MHS with specific cultural transformation goals, a number of which can be found in the world-class medical facility definition domain of Leadership and Culture (see Appendix L). Leaders must empower a culture of innovation and learn to actively use this critical tool to transform the culture in order to realize the Quadruple Aim.

Finding 5: Cultural transformation is required for the Military Health System to become a world-class integrated delivery system. The separate cultures of the Services and the Defense Health Agency challenge efforts to achieve strategic direction, enterprise-wide accountability, and unity of effort. In the current environment, investment decisions, duplication of resources, and efforts to maintain separate cultures and organizational structures remain a daunting leadership challenge. Innovation competency provides a fundamental tool to fuel the Military Health System transformation so that the organization avoids using yesterday's solutions for tomorrow's problems. Although there are pockets of innovation, the Military Health System lacks a comprehensive, enterprise-wide, and integrated approach to innovation essential to fully realizing the Quadruple Aim.

Recommendation 5: The Military Health System should:

A. Invest in a comprehensive, enterprise-wide, and integrated commitment to a culture that promotes and values innovation at every level of the organization. This will require consistent senior leader engagement to eliminate the "status quo" mentality, implement a culture that values and honors innovation, and create an environment that encourages continuous learning and improvement. Leaders must assume responsibility for adopting a structured approach to innovation.

B. Establish a robust tri-Service innovation program to fuel transformation by developing and testing uniform standards, processes, and measures for implementation across the Services and the Defense Health Agency to achieve shared strategic goals, recognizing this requirement is particularly critical in times of senior leader turnover. While honoring the importance of Service-specific traditions, leaders must adopt an enterprise-wide, targeted focus on key performance metrics, empower a culture of innovation, and learn to actively use this critical tool to realize the Quadruple Aim and a world-class health care system.

2.5 Successful Integrated Delivery Systems Effectively Distribute Human Capital, Consistent with Readiness Requirements and Integrated Delivery System Strategy

A successful IDS includes effective human capital distribution to optimally align staff and workload requirements. The distribution of human capital is a priority in the civilian sector in order to maximize profits and return on investment because it enables an organization to "execute its business strategy, by ensuring that the right people are in the right place at the right time and at the 'right' cost."[48(p.363)] Because personnel account for 92 percent of the life cycle costs of a building,[96] effective human capital distribution is key to controlling costs. Frequent changes

A successful integrated delivery system includes effective human capital distribution to optimally align staff and patient workload with available facility capacity.

in health care personnel requirements, distribution, and availability confound facility planning and programming standards and criteria. Further,

> . . . an organization as complex as a multihospital system must put in place structures and processes to guide the required work, the expertise to carry it out, the leadership to oversee and support the engaged experts, and, finally, mechanisms for ensuring accountability at all levels. Each of these components must work together for an organization to successfully navigate through to the future.[48(p.371)]

The way in which human capital distribution currently occurs within the Military Health System is not consistent with a successful integrated delivery system approach.

In the Panel's opinion, the way in which human capital distribution currently occurs within the MHS is not consistent with a successful IDS approach.[37] The Panel observed that, even when a federated IDS approach was used to analyze population demand for care and identify consequent personnel requirements, which were then used to size the new Fort Belvoir Community Hospital, provider staff were not assigned from Walter Reed National Military Medical Center, resulting in underutilization this state-of-the-art facility, an issue presently being addressed by the NCR MD (see Section 2.3 and Section 3.1).[81]

"We will provide the platforms to sustain our expertise by putting our personnel in locations where they are best positioned to sustain their clinical skills. . . Maintaining the inpatient medical facilities that can no longer sustain active and complex clinical practices is not simply inefficient; it also undermines our readiness mission."[97]

Dr. Jonathan Woodson
Assistant Secretary of Defense for Health Affairs
2015

One factor that contributes to eMSM staffing challenges is that each Service has its own manpower determination and human capital distribution regulations, policies, and procedures. However, the Panel learned that the Medical Deputy Action Group, comprised of the Services Deputy Surgeons General, is examining the attributes of creating a medical tri-Service human capital distribution plan. The plan could assist in the development of more accurate facility planning and programming standards. In addition, currently there is no process by which the manpower planning assumptions used to program space in a new facility are ever evaluated after building occupancy and ensuing health care operations. Successful facility planning and programming ultimately depends on the assignment of planned medical staff and GME programs to achieve the readiness, patient access, quality, cost, and efficiency goals associated with effective IDSs.

Military treatment facilities serve as readiness platforms to support the full range of military operations around the world.

The requirement for a "Medically Ready Force and a Ready Medical Force" is unique to DoD. MTFs serve as important medical readiness platforms, where teams train using the skills necessary to support the full range of military operations around the world. Optimized training depends on the continuous maintenance of wartime-related clinical skills through the daily practice of comprehensive and challenging medical care by all military medical professionals, including corpsmen and medics, in busy medical centers.

In addition, staff and GME program distribution and the placement of other military medical training programs to locations with the required patient volume and case mix complexity are critical for team-based combat care skills development and sustainment.

Appropriate allocation of staffing based on workload is important so providers and other team members are able to maintain their skills, facility capacity is used, and most importantly, the MTF team is able to maintain and improve the health status and clinical outcomes of the population it serves. The Military Compensation and Retirement Modernization Commission Report recommended "Service members receive the best possible combat casualty care by creating a joint readiness command, new standards for essential medical capabilities, and innovative tools to attract readiness-related medical cases to military hospitals."[98(p.57)]

Human capital distribution associated with MHS GME programs represents an important subset of staffing requirements. During the past decade of wars, care moved from the direct care system to the purchased care market. This was especially true in the largest eMSMs with medical centers, such as the NCR, where much of the wartime-related specialty care was provided and in which there was both an increased demand in the direct care system and a corresponding loss of market share to network providers.[45] Retirees and their family members were particularly affected in these locations, which is now problematic for GME program training requirements dependent on the case-mix complexity found with older patients, especially given that there are fewer war-related casualties, essential to support GME training. The Military Compensation and Retirement Modernization Commission stated in its January 2015 report, "The military medical force requires access to the desired volume and mix of complex medical cases and trauma to maintain medical force readiness."[98(p.73)] Each GME training program has requirements for a volume and variety of encounters that residents experience during their training.[99,100]

Comments made during briefings the Panel received during its visits to MTFs suggested there may be an insufficient diversity of challenging clinical cases to adequately support GME programs and maintain clinical wartime readiness skills for the health care team. The Panel believes staffing, workload, and GME appear to be best supported by maximizing the volume of care at the largest medical centers and community hospitals in communities serving a large beneficiary population. In the Panel's opinion, there appears to be a few high-capacity MTFs in large catchment areas that can be properly resourced to support GME and maintain staff skills, but this may require shifting medical personnel assets from other locations where there are alternatives for beneficiary care in the market place. The MHS may find value in conducting an enterprise-wide GME specific modernization study to address the quantity and type of cases needed to maintain health professional skills, including medics and corpsmen, while considering the best locations for the provision of GME, given population demand and existing facility assets. Then, case mix volume and complexity requirements established by the Accreditation Council for Graduate Medical Education should be included as a component of the planning standards for each service line included in a facility project, as appropriate to its mission.

The Military Health System may find value in conducting an enterprise-wide graduate medical education (GME) specific modernization study to address the quantity and type of cases needed to develop and maintain health professional and combat care skills given population demand and existing facility assets.

In summary, the MHS, like many other newly reorganized systems, is just beginning its efforts to standardize, set common aims, and create world-class IDSs in each of its markets. One important aspect of world-class care systems is the distribution of precious human resources in support of strategic aims. Human capital planning and distribution, based on population health requirements, represents a key component of all facility project planning and programming in order to support readiness goals and achieve full facility asset utilization. The MHS has the opportunity to develop an enterprise-wide human capital distribution plan to better support its Quadruple Aims.

Finding 6: Military treatment facilities serve as important medical readiness platforms, where teams train using the skills necessary to support the full range of military operations around the world. Comments made during briefings the Panel received during visits to military treatment facilities suggested there may be an insufficient diversity of challenging clinical cases to adequately support graduate medical education programs and maintain clinical wartime readiness skills for the health care team. In addition, the Panel learned that for at least one new hospital, the planned personnel distribution that was used to size the facility did not occur, resulting in significant underutilization of this state-of-the art facility.

Recommendation 6: Successful facility planning and programming ultimately depends on assignment of planned medical staff and graduate medical education programs. Therefore, in order to achieve its strategic goals the Military Health System should:

A. Create a medical tri-Service human capital distribution plan that includes graduate medical education and other military medical training programs to support team-based combat casualty care training.

B. Effectively utilize available medical facility capacity, where appropriate.

C. Evaluate manpower planning and distribution assumptions used in each project's space programming and then use the results to inform future facility planning and programming standards and criteria so the Military Health System can avoid constructing facility capacity that is in excess of projected demands, which is not consistent with achievement of the Quadruple Aim.

Section References

2. U.S. Department of Defense. *Military Health System Review: Final Report to the Secretary of Defense.* August 29, 2014.
13. U.S. Department of Defense. *Evaluation of the TRICARE Program: Access, Cost, and Quality - Fiscal Year 2014 Report to Congress.* February 25, 2014.
34. Paulus R, Davis K, Steele G. Continuous innovation in health care: Implications of the Geisinger experience. *Health Aff. (Millwood).* 2008;27(5):1235-1245.
35. Korda H, Eldridge GN. How can we bend the cost surve? Payment incentives and integrated care delivery: Levers for health system reform and cost containment. *Inquiry.* 2011;48:277-287.
36. Medical Group Management Association. *Integrate or disintegrate: Integrated delivery systems a re-emerging trend.* 2010.
37. Burns LR, Pauly MV. Accountable care organizations may have difficulty avoiding the failures of integrated delivery networks of the 1990s. *Health Aff. (Millwood).* 2012;31(11):2407-2416.
38. Blumenthal D, Nuzum MAR. The Affordable Care Act at 5 years. *N. Engl. J. Med.* June 18 2015;372:2451-2458.
39. Hwang W, Chang J, LaClair M, Paz H. Effects of integrated delivery system on cost and quality. *Am. J. Manag. Care.* May 10 2013;19(5):e175-e184.
40. Kreindler S, Larson B, Wu F, et al. Interpretations of integration in early accountable care organizations. *Milbank Q.* 2012;90(3):457-483.
41. Enthoven A. Integrated delivery systems: The cure for fragmentation. *Am. J. Manag. Care.* Dec 2009;15(10 Suppl).
42. McCarthy D, Mueller K. *Organizing for Higher Performance: Case Studies of Organized Delivery Systems.* The Commonwealth Fund; 2009.
43. Woodson J. SECDEF Top Priorities. 2015.
44. Dinneen M. Linking MHS Strategy to the Work of the Independent Review Panel - Some Ideas for Consideration. 2014.
45. U.S. Department of Defense. *Comprehensive Master Plan for the National Capital Region Medical.* 2010.
46. Barr L. Quote for IRP Annual Report. 2014.
47. Deloitte. Federated Model. [Webpage]. https://www.bersin.com/Lexicon/Details.aspx?id=12837.
48. Datz D, Hallberg C, Harris K, Harrison L, Samples P. Strategic workforce planning for a multihospital, integrated delivery system. *Nurs Admin Q.* 2012;36(4):362-371.
49. Stephenson R, Llopis-Jepsen C. Army assesses potentially dramatic cuts at Fort Riley. *The Topeka Capital-Journal.* June 26, 2014.
50. Tan M. Army lays out plan to cut 40,000 soldiers. *ArmyTimes.* July 10, 2015.
51. Wolf RW. Becoming a High Reliability Organization: Army Medicine Foundation for Patient Safety. January 14, 2015.
52. Chassin MR, Loeb JM. The ongoing quality improvement journey: Next stop, high reliability. *Health Aff. (Millwood).* 2011;30(4):559-568.

53. Chassin MR, Loeb JM. High-reliability health care: Getting there from here. *Milbank Q.* 2013;91(3):459-490.
54. The Joint Commission. High Reliability Resource Center. [Webpage]. http://www.jointcommission.org/highreliability.aspx.
55. Institute of Medicine Committee on Quality of Health Care in America. *To Err is Human: Building A Safer Health System.* Washington, D.C.: Institute of Medicine; 2000.
56. James JT. A new, evidence-based estimate of patient harms associated with hospital care. *Journal of Patient Safety.* 2013;9(3):122-128.
57. Weick KE, Sutcliffe KM. *Managing the Unexpected: Resilient Performance in an Age of Uncertainty.* San Francisco, CA: Jossey-Bass; 2007.
58. Koonce JM. Predictive validity of flight simulation as a function of simulator motion. *Hum. Factors.* 1979;21:215-223.
59. U.S. Congressional Budget Office. *Approaches to Reducing Federal Spending on Military Health Care: Actual and Projected Costs for Military Health Care as a Share of DoD's Base Budget, 2000 to 2028.* January 2014.
60. Becker J, Wooldridge S. Senior Military Medical Advisory Committee: FY 2017 MCAA Review and Scope Validation in Support of NCR Business Performance Plan. 2015.
61. DHA Facilities Division, DHA RM. Five Year Summary of DoD MHS Funding. 2014.
62. U.S. Department of Defense Office of the Undersecretary of Defense (Comptroller)/Chief Financial Officer. United States Department of Defense Fiscal Year 2015 Budget Request Overview. 2014.
63. U.S. Department of Defense. Financial Summary Tables: Department of Defense Budget for Fiscal Year 2014. 2013.
64. U.S. Department of Defense. Financial Summary Tables: Department of Defense Budget for Fiscal Year 2016. 2015.
65. U.S. Department of Defense. Financial Summary Tables: Department of Defense Budget for Fiscal Year 2015. 2014.
66. U.S. Department of Defense. Defense Health Program Fiscal Year (FY) 2016 Budget Estimates: Exhibit PBA-19, Appropriation Highlights.
67. U.S. Department of Defense. Defense Health Program Fiscal Year (FY) 2015 Budget Estimates: Exhibit PBA-19, Appropriation Highlights.
68. U.S. Department of Defense. Defense Health Program Fiscal Year (FY) 2014 Budget Estimates: Exhibit PBA-19, Appropriation Highlights.
69. U.S. Department of Defense. DHP FY 2015 PB Controls.
70. U.S. Department of Defense. DHP FY 2016 PB Controls.
71. U.S. Department of Defense. DHP FY 2014 PB Controls.
72. U.S. Department of Defense. Defense Health Program Fiscal Year (FY) 2014 Budget Estimates: Exhibit PB-11B, Medical Workload and Productivity Data.
73. U.S. Department of Defense. Defense Health Program Fiscal Year (FY) 2015 Budget Estimates: Exhibit PB-11B, Medical Workload and Productivity Data.

74. U.S. Department of Defense. Defense Health Program Fiscal Year (FY) 2016 Budget Estimates: Exhibit PB-11B, Medical Workload and Productivity Data.
75. MTF Portfolios. Defense Health Agency Decision Support Division; 2015.
76. U.S. Department of Defense. MHS Performance Dashboard. 2015.
77. U.S. Department of Defense. Military Health System (MHS): DoD Space Planning Criteria for Health Facilities. [Webpage]. http://www.wbdg.org/ccb/browse_cat.php?o=29&c=261.
78. Sternberg S. Hospitals Move to Limit Low-Volume Surgeries. *U.S. News & World Report.* 2015.
79. Sternberg S, Doughtery G. Risks are High at Low-Volume Hospitals. *U.S. News & World Report.* 2015.
80. Clark C. Welcome Back, Volume - the Original Quality Measure. *HealthLeaders Media.* May 21, 2015.
81. U.S. Department of Defense. National Capital Region: FY15-FY19 eMSM Business Performance Plan. 2014.
82. U.S. Department of Defense. San Antonio: FY15-FY19 eMSM Business Performance Plan. 2014.
83. U.S. Department of Defense. Tidewater Military Health System: FY15-FY19 eMSM Business Performance Plan. 2014.
84. U.S. Department of Defense. Colorado Springs: FY15-FY19 eMSM Business Performance Plan. 2014.
85. U.S. Department of Defense. Puget Sound: FY15-FY19 eMSM Business Performance Plan. 2014.
86. U.S. Department of Defense. Hawaii: FY15-FY19 eMSM Business Performance Plan. 2014.
87. Pearl R. Rethinking Rural Hospitals With Lessons From The Battlefield. [Webpage]. 2015; http://www.forbes.com/sites/robertpearl/2015/01/22/rethinking-rural-hospitals/.
88. Kotter JP. Leading Change: Why Transformation Efforts Fail. *Harvard Business Review.* 2007.
89. Guice K. Health Innovation - the Key to Survival. [Webpage]. 2015; http://health.mil/News/Articles/2015/07/01/Health-Innovation-Innovation-the-Key-to-Survival. Accessed July 6, 2015.
90. U.S. Department of Defense. Military Health System Innovation Report: Strengthening Our Culture of Innovation. 2013.
91. Mayo Clinic. Center for Innovation. [Webpage]. http://www.mayo.edu/center-for-innovation/. Accessed July 10, 2015.
92. Kaiser Permanente. Garfield Innovation Center. [Webpage]. https://xnet.kp.org/innovationcenter/index.html. Accessed July 10, 2015.
93. MedStar Institute for Innovation. Catalyze Innovation that Advances Health. [Webpage]. http://mi2.medstarhealth.org/. Accessed July 10, 2015.
94. Porter ME, Lee TH. Why strategy matters now. *N. Engl. J. Med.* April 30, 2015;372(18):1681-1684.
95. HKS Inc., Wingler & Sharp. *MHS FIRM: Facilities Innovation and Research Model.* December 31, 2013.

96. Ihnen J. Leed: Added Cost or Sound Investment? [Webpage]. 2007; https://www.lorman.com/resources/leed-added-cost-or-sound-investment--15399. Accessed April 1, 2015.
97. Woodson J. Spanning the Globe: The Military Health System at Home and Deployed in 2015. 2015.
98. Military Compensation and Retirement Modernization Commission. *Final Report of the Military Compensation and Retirement Modernization Commission*. January 29, 2015.
99. Accreditation Council for Graduate Medical Education. Common Program Requirements. [Webpage]. http://www.acgme.org/acgmeweb/tabid/429/ProgramandInstitutionalAccreditation/CommonProgramRequirements.aspx.
100. Accreditation Council for Graduate Medical Education. Case Log Statistical Reports. [Webpage]. http://www.acgme.org/acgmeweb/tabid/274/DataCollectionSystems/ResidentCaseLogSystem/CaseLogsStatisticalReports.aspx.

Continue to Create an Integrated Delivery System in the National Capital Region

3.0

"Jointness is critical to how we operate and directly impacts readiness and value… Working together jointly leverages the synergy of creating efficiencies, removing redundancies and allowing greater transparency; which in turn elevates the care we provide."[101]

Vice Admiral Matthew L. Nathan
Navy Surgeon General
2015

The 2005 Base Closure and Realignment Commission (BRAC) included a number of stipulations, two of which are relevant here: (1) not changing the total inpatient bed capacity in the National Capital Region (NCR) after closing the former Walter Reed Army Medical Center, Washington, D.C.; and (2) discontinuing the inpatient services at Malcolm Grow Medical Center at Joint Base Andrews, Maryland. Following the 2005 BRAC, Section 2721 of the Fiscal Year (FY) 2009 National Defense Authorization Act (NDAA) recommended that beneficiaries living in the NCR deserve to be treated in world-class medical facilities. It also established the NCR BRAC Health Systems Advisory Subcommittee of the Defense Health Board to recommend whether the design plans for Walter Reed National Military Medical Center (WRNMMC) and Fort Belvoir Community Hospital (FBCH) would achieve the goal of providing world-class medical facilities.[102] The Subcommittee's 2009 report issued five primary recommendations:

A. Further planning for the new WRNMMC and FBCH, as well as development of the NCR [integrated delivery system], should be guided by the definition of *world-class medical facility* [developed by the Subcommittee].

B. One official should be empowered with singular organizational and budgetary authority and staffed appropriately to manage and lead the health care integration efforts and operations in the NCR. This should be accomplished as quickly as possible, and this official's authority should extend over all DoD healthcare facilities and resources that impact healthcare operations within the NCR …

C. Deficiencies in the current plans for the WRNMMC should be corrected, and the funding needed to correct these [deficiencies] should be identified as soon as possible. . .

D. A plan to assess the outcomes, benefits, and return on investment, among other things, of the design processes used for the new WRNMMC and FBCH, as well as the benefits of incorporating [evidence-based design] principles in these facilities, should be developed, funded, and implemented.

E. New construction should proceed as currently planned, assuming that the needed master plans are developed in a timely manner.[102(p.18-19)]

Additionally, the NCR BRAC Health Systems Advisory Subcommittee defined the term *world-class medical facility*, which consists of 6 domains and 18 conditions that a facility must meet to be considered world class. The full definition of a world-class medical facility can be found in Appendix L.

Subsequently, Section 2714 of the FY 2010 NDAA required that a comprehensive master plan be developed and implemented that provides "sufficient world class military medical facilities and an integrated system of health care delivery for the National Capital Region (NCR)."[20] This plan, the *Comprehensive Master Plan for the National Capital Region Medical* and its supplement, *Supplement to the Comprehensive Master Plan for the National Capital Region Medical: Schedule for Completion of Requirements and Updated Cost Estimates*, were published in April 2010 and August 2010, respectively.

The Panel was charged to assess whether the *Comprehensive Master Plan* was adequate to fulfill the statutory requirements detailed in Table 8.[20]

Table 8. Crosswalk to Requirements in Section 2714A of the 2010 National Defense Authorization Act

Section 2714A Requirements		Panel Assessment of Comprehensive Master Plan[a]
1	A) Addresses the unique needs of members of the Armed Forces and retired members of the Armed Forces and their families;	The *Comprehensive Master Plan* describes this in Section 3.1.
	B) Addresses the care, management, and transition of seriously ill and injured members of the Armed Forces and their families;	The *Comprehensive Master Plan* describes this in Section 3.2.
	C) Addresses the missions of the branch or branches of the Armed Forces Served;	The *Comprehensive Master Plan* describes this in Section 3.3.
	D) Addresses performance expectations for the future integrated health care delivery system, including – i) information management and information technology support; and ii) expansion of support services;	The *Comprehensive Master Plan* describes this for the limited facilities addressed in the *Comprehensive Master Plan*, WRNMMC and FBCH, in Section 4.1.
2	Delineates the process for the development of budgets, prioritization of requirements, and the allocation of funds;	The *Comprehensive Master Plan* addresses this in Section 5.0 for the limited facilities addressed in the *Comprehensive Master Plan*, WRNMMC and FBCH.
3	Delineates budget and operational authority to provide and operate world class military medical facilities in the National Capital Region;	The *Comprehensive Master Plan* addresses this in Section 5.0 for the limited facilities addressed in the *Comprehensive Master Plan*, WRNMMC and FBCH.
4	Incorporates all ancillary and support facilities at the National Naval Medical Center, Bethesda, Maryland, including education and research facilities as well as centers of excellence, transportation, and parking structures required to provide a full range of adequate care and services for members of the Armed Forces and their families;	The *Comprehensive Master Plan* describes this in Section 6.1.

	Section 2714A Requirements	Panel Assessment of Comprehensive Master Plan[a]
5	Incorporates a facilities needs assessment, including an assessment of standards for patient rooms, and provides a program to meet the facility requirements;	The *Comprehensive Master Plan* addresses this in Section 6.2 for the limited facilities addressed in the *Comprehensive Master Plan*, WRNMMC and FBCH.
6	Specifies the personnel authorizations and personnel systems required to provide and operate a world class military medical facility;	The *Comprehensive Master Plan* addresses this in Section 7.0 for the limited facilities addressed in the *Comprehensive Master Plan*, WRNMMC and FBCH.
7	Can be used as a basis to develop similar master plans for other military medical facilities of the Department of Defense;	The *Comprehensive Master Plan* accomplishes this in Section 8.0 to create a facility/campus master plan, but not to deliver an integrated system of health care delivery.
8	Includes a community development plan that incorporates multiple options to alleviate traffic congestion related to the expansion of the National Naval Medical Center and Fort Belvoir Community Hospital, including a review of options— (A) to expand adjacent highways; (B) improvements to nearby intersections; (C) on-facility site queuing; and (D) multimodal expansion that could include expanded support for buses and subways.	The *Comprehensive Master Plan* describes this in Section 9.0.

[a]*Sections listed in the second column refer to sections in the Comprehensive Master Plan.*

3.1 The National Capital Region Should Be Defined More Broadly in its Comprehensive Master Plan

The *Comprehensive Master Plan* and its supplement reflect the Department of Defense's (DoD's) vision for an integrated delivery system (IDS) and world-class facilities in the NCR. The *Comprehensive Master Plan* states:

> An IDS is a term that describes the relationships of different healthcare delivery elements, usually in private sector organizations. Previously in the NCR, the Army, Navy, and Air Force governed and operated MTFs [Military Treatment Facilities] that were tightly coupled vertically to individual Services. They could be described as overlapping enterprises, but not as operating an inter-Service system.
>
> The dense multi-Service military healthcare market in the NCR provided the Department with the unique opportunity to achieve an inter-Service system that is integrated from the patient perspective as well as the inter-service perspective. In addition, the Department's establishment of [Joint Task Force National Capital Region Medical (JTF CAPMED)] to oversee, manage, and direct all healthcare delivery by military medical units within the NCR [joint operating area (JOA)] allows for a single chief executive to manage the budgets, workforce, facilities, and other resources in the NCR IDS. This governance structure will achieve a synergy among military healthcare delivery systems that will be able to achieve better

patient outcomes. This capability in the region is further enhanced by the additional budgetary and organizational authorities the Department has provided to the Commander of the JTF.[45(p.13)]

In response to a NCR BRAC Health Systems Advisory Subcommittee's recommendation related to "singular organizational and budgetary authority" [102(p.18)] and to allow for more efficient operations and effective execution of BRAC, the *Comprehensive Master Plan* assigned operational control of Walter Reed Army Medical Center, National Naval Medical Center (NNMC), and DeWitt Army Community Hospital to the Commander of the JTF CapMed, who also would maintain authority over the new WRNMMC and FBCH.[45] Previously, JTF CapMed had tactical control for these three facilities, along with 28 others, while the Services maintained operational control.[45] DoD also instituted a tri-Service merger and established WRNMMC and FBCH as joint hospitals with joint manning in order to effectively staff the two MTFs. However, "singular organizational and budgetary authority" for "all DoD healthcare facilities and resources that impact healthcare operations within the NCR" was not accomplished, as was recommended by the NCR BRAC Health Systems Advisory Subcommittee.[102(p.18)]

Singular organizational and budgetary authority for DoD health care facilities and resources that affect health care operations in the National Capital Region was not accomplished.

Further, the *Comprehensive Master Plan* did not create an integrated system of health care delivery for all facilities in the NCR, as it was directed to, according to the definition codified in 10 U.S. Code § 2674(f)(2), which describes the NCR as "the geographic area located within the boundaries of the District of Columbia; Montgomery and Prince Georges Counties in the State of Maryland; Arlington, Fairfax, Loudoun, and Prince William Counties and the City of Alexandria in the Commonwealth of Virginia; and all cities and other units of government within the geographic areas of such District, Counties, and City."[103]

The Comprehensive Master Plan for the National Capital Region Medical did not create an integrated system of health care delivery for all facilities in the National Capital Region according to the definition codified in 10 U.S. Code § 2674(f)(2).

Since the *Comprehensive Master Plan* report and its supplement were published in 2010, the Military Health System (MHS) has been restructured, resulting in the creation in 2013 of the National Capital Region Medical Directorate (NCR MD) under the authority, direction, and control of the Defense Health Agency (DHA). The DHA Director, "Exercises authority, direction and control, through the NCR Directorate, over the WRNMMC and FBCH, and their subordinate clinics."[104(p.2)]

The NCR MD includes command and control (or ownership and control) for WRNMMC and FBCH and 5 of the primary care and ambulatory care facilities found in the 40-mile geographic region that surrounds the Nation's capital,[81] as summarized in Table 9. The NCR MD also has enhanced authority (or cooperation and collaboration) for the remaining 12 facilities, which includes the authority to manage the allocation of the budget for the market, direct the adoption of common clinical and business functions for the market, optimize readiness to deploy medically ready forces and ready medical forces, and direct the movement of workload and workforce between or among the military treatment facilities (MTFs).[23] (See Appendix F for more information about enhanced Multi-Service Markets [eMSMs].) The Services maintain command and control and budgetary authority for these 12 facilities.

Table 9. Facilities in the National Capital Region Medical Directorate [23,81]

Service/Directorate	Facility Name[a]	Type	Authority[b]
NCR MD	Walter Reed National Military Medical Center	Hospital	Direct & Control
NCR MD	DiLorenzo TRICARE Health Clinic	Clinic	Direct & Control
NCR MD	Branch Medical Clinic (BMC) Carderock	Clinic	Direct & Control
NCR MD	National Intrepid Center of Excellence	Clinic	Direct & Control
NCR MD	Fort Belvoir Community Hospital	Hospital	Direct & Control
NCR MD	Fairfax Health Center	Clinic	Direct & Control
NCR MD	Dumfries Health Center	Clinic	Direct & Control
U.S. Army	Kimbrough Ambulatory Care Center	Clinic	Enhanced
U.S. Army	Fort McNair Army Health Clinic (AHC)	Clinic	Enhanced
U.S. Army	Andrew Rader AHC	Clinic	Enhanced
U.S. Navy	Naval Health Clinic (NHC) Annapolis	Clinic	Enhanced
U.S. Navy	Naval Branch Health Clinic (NBHC) Bancroft Hall	Clinic	Enhanced
U.S. Navy	NHC Quantico	Clinic	Enhanced
U.S. Navy	NBHC Washington Navy Yard	Clinic	Enhanced
U.S. Navy	BMC Officer Candidate School Brown Field	Clinic	Enhanced
U.S. Navy	NBHC The Basic School	Clinic	Enhanced
U.S. Navy	NBHC Andrews Air Force Base	Clinic	Enhanced
U.S. Air Force	Malcolm Grow Medical Clinics and Surgery Center (779th Medical Group)	Clinic	Enhanced
U.S. Air Force	Joint Base Anacostia-Bolling Clinic (579th Medical Group)	Clinic	Enhanced

[a]eMSM authorities as stated in the Deputy Secretary of Defense Memorandum subject: Implementation of MHS Governance Reform, dated 11 Mar 2013.
[b]The table lists facilities in the NCR MD. The DHA has command and control over facilities listed as "direct & control," as they are part of the NCR MD. The NCR MD has eMSM authority for the other facilities shown, which are managed by their Service. Adapted from Carter, AB, 2013 and U.S. Department of Defense, 2014.

The Comprehensive Master Plan for the National Capital Region represents a first step in the Military Health System's journey to become an integrated delivery system using two separate and distinct organizational models.

The *Comprehensive Master Plan* proposed comprehensive requirements for integrated health care delivery, but it did not describe an eMSM operating as a true IDS with single command and control and budgetary authority for all facilities in the eMSM.[45] Instead, it represents a first step in the MHS's journey to become an IDS using two separate and distinct organizational models, a fully integrated model for 7 of 19 facilities and a federated model for the remaining 12 facilities. The other five eMSMs use a federated IDS model.

The *Comprehensive Master Plan* states, "the delivery of integrated healthcare requires a strong regional rather than facility perspective that must be both effective and able to identify efficiencies for the benefit of this population."[45(p.13)] Although JTF CapMed was assigned operational control of Walter Reed Army Medical Center, NNMC, and DeWitt Army Community Hospital, the *Comprehensive Master Plan*

Now is the time to evaluate assigning operational control of the remaining 12 facilities to the National Capital Region Medical Directorate.

states, "The Department will continue to evaluate the need to assign [operation control] over the remaining outpatient clinics in the JOA (Attachment 2, JTF CAPMED September 2007 Establishment Document) to achieve an integrated delivery system in the NCR."[45(p.84)] In the Panel's opinion, it is now time to evaluate assigning operational control of the remaining 12 facilities to the NCR MD to reflect the refined goal of creating an IDS in the broader NCR and to achieve the Quadruple Aim.

Finding 7: The National Capital Region uses two separate and distinct organizational models for managing care in the National Capital Region: first, a fully integrated model (ownership and control) under the Defense Health Agency (DHA) with command, control, and sole budgetary authority for 2 hospitals and 5 clinics; and second, an enhanced authority model (cooperation and collaboration) under the three Services that retain their command, control, and separate budget authority for 12 additional military treatment facilities. The National Capital Region is one of six enhanced Multi-Service Markets in the Military Health System. The other five enhanced Multi-Service Markets continue to use a federated organizational model. The Defense Health Agency led portion of the National Capital Region represents a first step in the MHS's journey to become a fully integrated delivery system.

Recommendation 7: The Military Health System should:

A. Implement efficient and effective mechanisms for appropriately shifting money, personnel, and other resources among military treatment facilities to optimize direct care and purchased care services, while reducing costs within their regions to achieve the Quadruple Aim.

B. Create a successful world-class integrated delivery system for Department of Defense beneficiaries for the portion of the National Capital Region and the other five enhanced Multi-Service Markets that currently use the federated model, which relies on cooperation and collaboration rather than ownership and control.

C. Continuously evaluate the results of the current National Capital Region enhanced Multi-Service Market model and the other five enhanced Multi-Service Markets to determine which are the most successful in achieving the Quadruple Aim and other strategic objectives.

The Comprehensive Master Plan for the National Capital Region Medical resulted in seven construction projects, all but one of which are underway or have been completed.[60]

3.2 The Walter Reed National Military Medical Center Addition Alteration Project Should Proceed

The *Comprehensive Master Plan* resulted in seven construction projects, all but one of which are underway or have been completed.[60] The WRNMMC Addition Alteration Project (MCAA) represents the last remaining major new construction required to support WRNMMC as outlined in the 2010 NDAA. To support previously established planning requirements, in 2009 DoD conducted an in-

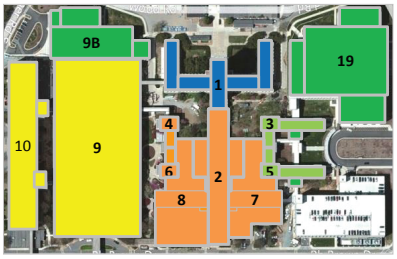
depth analysis of the NCR to determine the reliant population, estimate workload demand, understand market dynamics, and project future care demand. The planning and programming analysis relied on available data, as well as on a comprehensive survey of hospital infrastructure requirements that needed to be replaced or upgraded.

The Medical Center Addition Alteration project must be completed to fulfill recommendations regarding world-class facilities in the National Capital Region and to replace 70-year-old critical infrastructure that comprises the central clinical core.

Failing WRNMMC infrastructure is the primary driver for the MCAA project, the need for which was revalidated every six months during the past five years using a newly refined Facility Condition Index Assessment. The MCAA project is necessary to replace several 70-year-old legacy, non-historic buildings comprising the medical center's central clinical core, which includes 15 clinical services. Overall, 90 percent of the project is needed to replace WRNMMC's failing infrastructure and 10 percent is renovation-related. All the buildings in the MCAA, which are represented in yellow and orange in Figure 3, are considered inadequate based on the most recent Facility Condition Index (see Figure 3).[60]

Figure 3. Walter Reed National Military Medical Center Facility Condition Index[60]

Existing Building Map



Facility Condition Ratings Category I Direct Patient Care Facilities		
Bldg. #	Facility Condition Rating	Q Band
7	Inadequate	Q4
8	Inadequate	Q3
9	Inadequate	Q3
10	Inadequate	Q3

Building #	Year Constructed	Included in MCAA?	Comment
1	1941	No	Historic facility
2	1941	Yes	Demolished in MCAA
3	1943	No	Renovated during BRAC
4	1941	Yes	Demolished in MCAA
5	1943	No	Renovated during BRAC
6	1942	Yes	Demolished in MCAA
7	1963	Yes	Demolished in MCAA
8	1961	Yes	Demolished in MCAA
9	1980	Yes	Partial renovation in MCAA
9B	2011	No	Constructed during BRAC
10	1980	Yes	Partial renovation in MCAA
19	2011	No	Constructed during BRAC

From Becker, J., 2015.

New and remodeled clinical spaces will account for 57 percent of the size of the military construction (MILCON) project.[105] These spaces include the conversion of all hospital double occupancy rooms to single-patient rooms, while reducing the required BRAC medical-surgical beds by 44 to reflect an updated market demand analysis, and construction of a new women's health center, a neonatal intensive care unit, an ambulatory surgery center, and units for vision care, psychiatry and addiction services.

The other 43 percent of the project includes 16 percent for medical education services and a simulation center and 27 percent for public and patient amenities and supporting activities.

The MCAA project was originally scheduled to begin in FY 2015; however, it was deferred to FY 2017 in the Presidential Budget 2015 Defense Health Agency Future Years Defense Plan[31] so that requirements could be revalidated. The clinical missions contained in the 2010 *Comprehensive Master Plan* are based on FY 2008 data, which do not reflect current demand.[45,105] The Panel was told that after the 2010 *Comprehensive Master Plan* was completed a 2012 market analysis was conducted that showed the NCR was over bedded. Another analysis in 2013, which factored in declining Overseas Contingency Workload, led to a planned reduction in the total number of beds of 44 in the current project. Subsequently, the Panel was informed that the NCR MD revalidated the workload used to program the facility and documented this in its most recent approved business plans, which the Panel did not review.

Accordingly, in May 2015, the Senior Military Medical Action Council (SMMAC) approved the MCAA funding, redesign, and construction and agreed that the project should proceed in an expeditious manner to improve the infrastructure at WRNMMC. The SMMAC is chaired by the Assistant Secretary of Defense for Health Affairs and includes the Principal Deputy Assistant Secretary of Defense (Health Affairs), the Service Surgeons General, the DHA Director, and the Joint Staff Surgeon. Even though current workload is not what was forecasted when the MCAA was originally planned and programmed, the Panel learned that MHS senior leaders support the NCR MD's plans to more fully develop its integrated system of care and recapture purchased care resulting in increased workload and resource utilization to achieve the MCAA project's proposed scope for the included clinical missions. The MCAA must be completed to fulfill the *Comprehensive Master Plan*'s recommendations regarding world-class facilities in the NCR and to replace critical infrastructure. However, successful business plan execution is essential to fully utilize this major capital investment.

Successful business plan execution is essential to fully utilize this major capital investment.

Now that the MCAA has been endorsed by the SMMAC, the NCR MD should focus its attention on creating a more integrated system of care throughout the NCR.

Finding 8: The National Capital Region Medical Directorate and the Senior Military Medical Action Council have approved the Walter Reed National Military Medical Center Addition Alteration Project, as required to replace critical infrastructure and to complete the *Comprehensive Master Plan for the National Capital Region Medical*'s recommendations regarding creating world-class medical facilities in the National Capital Region.

Recommendation 8: The Military Health System should expeditiously complete the Walter Reed National Military Medical Center Addition Alteration Project to fulfill one of the *Comprehensive Master Plan for the National Capital Region Medical*'s recommendations regarding world-class facilities in the National Capital Region and to replace critical infrastructure.

3.3 Complete the National Capital Region's Comprehensive Master Plan to Help Realize Its Goal of Becoming an Integrated Delivery System of Care

The Comprehensive Master Plan for the National Capital Region Medical only partially fulfills Section 2741A statutory requirements, focusing just on Walter Reed National Military Medical Center and Fort Belvoir Community Hospital, rather than for all health care facilities in the National Capital Region.

As stated above, Section 2714(a) of the 2010 NDAA required DoD to develop and implement a *Comprehensive Master Plan* to provide sufficient world-class military medical facilities and an integrated system of health care delivery in the NCR. The Panel was tasked to assess whether the *Comprehensive Master Plan* is adequate to fulfill these statutory requirements, and, if required, make recommendations for any needed adjustments to the *Comprehensive Master Plan* to ensure their accomplishment.[20]

Overall, the Panel's assessment is that the *Comprehensive Master Plan* partially fulfills statutory requirements (see Table 8). Although it addresses each of Section 2714A requirements, it does so only for WRNMMC and FBCH, rather than for all health care facilities in the NCR. Additionally, although it created a facility/campus master plan that could be used as a model, the plan is not adequate to deliver an integrated system of health care delivery in the market.

Although the Comprehensive Master Plan provides facility and campus master plan that could be used as a model, the plan is not adequate to support the creation of an integrated system of health care.

The definition of a world-class medical facility includes six domains, and only a portion of one domain pertains to physical buildings. The other domains encompass staff, systems, processes, and performance criteria for achieving world-class health care. A trend in the civilian sector is a move to an IDS model to provide all health and health care, including direct and possibly purchased care, for enrolled beneficiaries within a defined region with high-quality outcomes within a fixed capitated budget. Examples include the Mayo Clinic, Geisinger Health System, and Kaiser Permanente. These complex and sophisticated systems require effort and commitment to develop.

One of the specifications in Section 2714(a) asked whether the *Comprehensive Master Plan* "can be used as a basis to develop similar master plans for other military medical facilities of the Department of Defense."[20] To meet the intent of Congress, the Panel spent time studying the degree of integration, processes,

utilization, and outcomes of the NCR MD and comparing them to those in other eMSMs and single Service markets. All the facilities visited by the Panel were challenged to fully utilize capacity (see Table 6 and Section 2.3), and direct care outpatient and inpatient costs are significantly higher than purchased care costs (see Table 3 and Section 2.3). In the NCR, workload was 50 to 60 percent of capacity (see Table 6).

The National Capital Region Medical Directorate (NCR MD) could serve as a test bed for innovation and a pilot project to evaluate the viability and challenges of single command and control and budgetary authority of all military treatment facilities in the NCR.

Given that the NCR MD is a DHA directorate, it could serve as a test bed for many essential innovations, including being a pilot to evaluate the viability and challenges of single command and control and budgetary authority of all MTFs, which must then be monitored at the senior leadership level to receive the proper necessary stewardship, commitment, and visibility. Identifying eMSM organizational elements and best practices that result in achieving the Quadruple Aim should be standardized across the MHS. In the Panel's opinion, NCR leaders will need help from the DHA and other experts to design and implement an effective system and processes to create a robust IDS that could be used as a prototype for other eMSMs.

Finding 9: The National Capital Region has yet to achieve the full potential of an integrated system of health care delivery with world-class medical facilities, as required by the *Comprehensive Master Plan for the National Capital Region Medical*, as workload is 50 to 60 percent of capacity and direct care outpatient and inpatient costs are significantly higher than purchased care costs.

Recommendation 9: Senior leaders of the Military Health System should:

A. Focus attention on creating a highly reliable integrated system of care for both the direct care and purchased care components throughout the entire National Capital Region to realize strategic and business plan targets that underpin the Walter Reed National Military Medical Center Addition Alteration Project investment and to achieve the Quadruple Aim.

B. Evaluate the results of the National Capital Region model compared to other enhanced Multi-Service Markets and make the appropriate modifications to create a robust integrated delivery system with a high level of standardization and uniformity across the Military Health System to achieve the Quadruple Aim.

Section References

20. 111th Congress. National Defense Authorization Act for Fiscal Year 2010. Pub. L. No. 111-84. 2009.
23. Carter AB. Implementation of Military Health System Governance Reform. 2013.
31. U.S. Department of Defense. Presidential Budget 2015 Defense Health Agency Future Years Defense Plan. 2014.
45. U.S. Department of Defense. *Comprehensive Master Plan for the National Capital Region Medical.* 2010.
60. Becker J, Wooldridge S. Senior Military Medical Advisory Committee: FY 2017 MCAA Review and Scope Validation in Support of NCR Business Performance Plan. 2015.
81. U.S. Department of Defense. National Capital Region: FY15-FY19 eMSM Business Performance Plan. 2014.
101. Nathan ML. Navy Medicine: Stepping Up to the Challenge. 2015.
102. National Capital Region Base Realignment and Closure Health Systems Advisory Subcommittee of the Defense Health Board. *Achieving World Class - An Independent Review of the Design Plans for the Walter Reed National Military Medical Center and the Fort Belvoir Community Hospital.* May 2009.
103. 10 U.S. Code § 2674(f)(2).
104. U.S. Department of Defense. Department of Defense Directive Number 5136.13. 2013.
105. U.S. Department of Defense. *Supplement to the Comprehensive Master Plan for the National Capital Region Medical: Schedule for Completion of Requirements and Updated Cost Estimates.* 2010.

Effectively Integrate Technology into Operations and Medical Facilities

4.0

"A 'visit' no longer requires that a patient physically see their provider in person. All of our enrollees now have the option of receiving care from their primary care provider through multiple means – in-person visits, secure messaging, telephone consults, nurse advice line, behavioral health visits within the medical home, or clinical pharmacist consultations. All providers should educate their patients on the various options our patients have to access high-quality care they need when they need it."[106]

Jonathan Woodson
Assistant Secretary of Defense for Health Affairs

Lieutenant General Patricia Horoho
Surgeon General, U.S. Army

Vice Admiral Matthew Nathan
Surgeon General, U.S. Navy

Lieutenant General Mark Ediger
Surgeon General, U.S. Air Force

Lieutenant General Douglas Robb
Director, Defense Health Agency
2015

Information management/information technology (IM/IT) requirements increasingly serve as the backbone for health care delivery, representing a key component of facility life cycle activity. Fully integrated IM/IT represents an essential element of successful integrated delivery system (IDS),[37] since so many new care delivery models and services, especially non-facility-based care, are increasingly enabled by IT. Improved outcomes for patients and staff require greater understanding about the objects, including technology and IM/IT enabled equipment, that should be ideally integrated with care delivery processes in a facility designed to maximize their safe and efficient use.

Information management/ information technology requirements increasingly serve as the backbone for health care delivery.

4.1 Technology Innovations Are Transforming Care Delivery Processes and Enabling Integrated Care

Integrated service delivery can be described as "the organization and management of health services so that people get the care they need, when they need it, in ways that are user-friendly, achieve the desired results and provide value for money."[39,107(p.1)] Key attributes of an IDS include the dedication of enough resources to promote evidence-based medicine, including use of health IT, and the maintenance of comprehensive longitudinal electronic medical records and electronic health records (EHRs) that are accessible and shared by all providers.[41]

Technology innovations, such as new diagnostic and treatment equipment, virtual care options, the implementation and use of EHRs, and other digital systems

(e.g., imaging) influence care delivery processes and enable more user-friendly, integrated care. Further, since care delivery continues to shift from the hospital into the community and home via smart-phone technology and other wireless applications, the need for certain components of facility-based care is reduced.[108] Telehealth and telemedicine have "the potential to substantially expand access to high-quality health care, overcoming not only geographic but also socioeconomic barriers to care."[109(p.1684)] Similarly, the rapid move toward virtual care will define and dominate care services for the foreseeable future. The ongoing transformation of health care brought forth by technology has been "likened to a new industrial revolution" and "is creating both enormous opportunities and structural challenges," to include impacts on human capital and consequent facility requirements.[110(p.10)] An example of rapid technological advances is the Johnson & Johnson Sedasys anesthesiology machine, which has the possibility to transform health care by reducing the need for anesthesiologists to be physically present during anesthesia delivery.[111]

The rapid move toward virtual care will define and dominate care services for the foreseeable future.

Many organizations are embracing virtual care, such as Kaiser Permanente Northern California (KPNC), whose members can communicate with their primary care physician or specialist via secure e-mail messages. In addition to allowing patients to ask providers questions, patients can submit images and forms. In many cases, this allows physicians to resolve an issue without the need for an office visit.[112] Since 2008, the number of virtual visits provided in KPNC has increased from 4.1 million to an estimated 10.5 million, while the number of traditional office visits has remained relatively stable. Importantly, these Internet, mobile, and video interactions with patients cost less per visit than office visits.[112] However, there is concern that health care costs may increase if telemedicine leads to more encounters overall.[109]

UnitedHealthcare recently announced it will reimburse for virtual visits through such services as Doctor on Demand, AmWell, and NowClinic to "enable consumers, especially people who live in rural areas of the country, to access quality, cost-effective health care, whether at home or on the go."[114] Currently, some telehealth services are reimbursable through Medicare, but interest is growing to expand reimbursement for telehealth and remote patient monitoring services.[115,116,117] Telemedicine has the potential to reduce health care costs for providers, patients, and payers, as well as improve access and quality.[109,113]

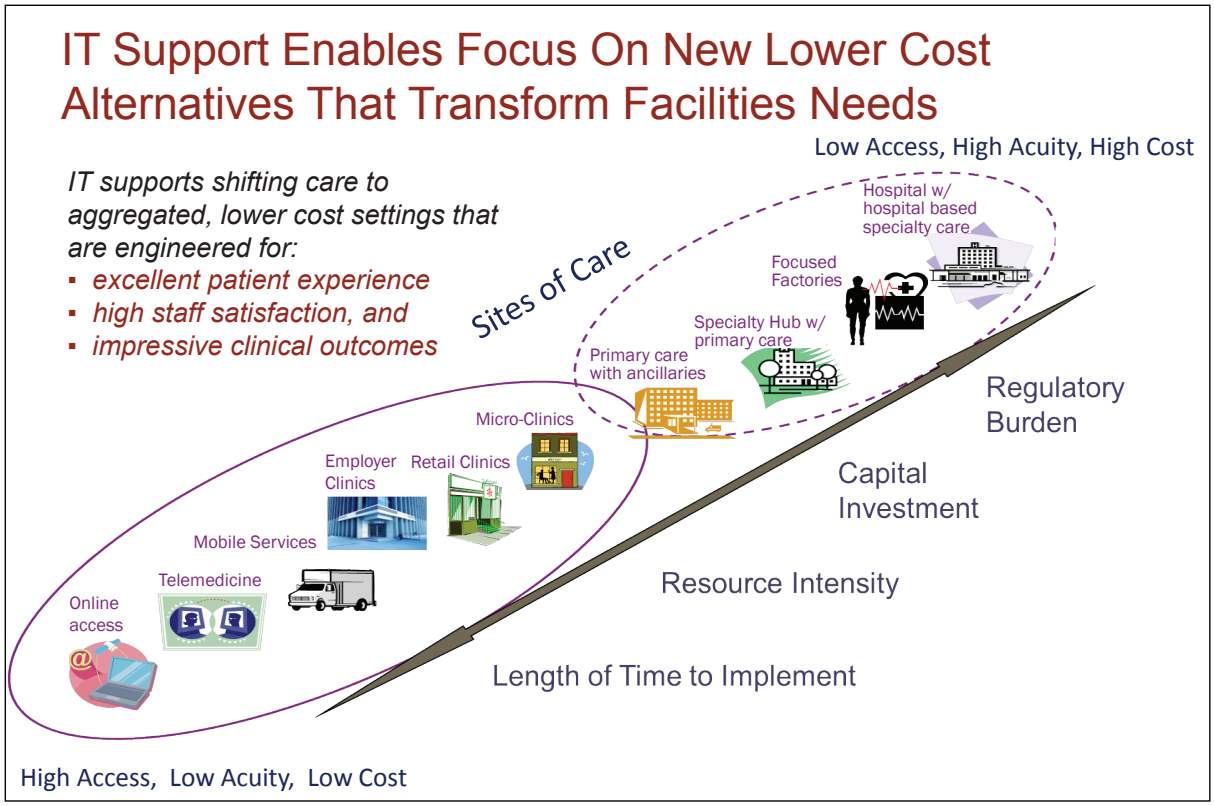
Telemedicine has the potential to reduce health care costs for providers, patients, and payers, as well as improve access and quality.[109,113]

In one briefing, a Kaiser Permanente representative indicated to the Panel that Kaiser Permanente is actively implementing IM/IT applications system-wide that could dramatically transform practice patterns and enhance the provision of care by installing high-speed wireless Internet, video conferencing capabilities, and team rooms that encourage a collegial and collaborative atmosphere. These technological changes, which affect building design and delivery of care, allow for tailored health education in waiting areas, text messaging to patients when the provider is available to see them, and multiple provider visits during one patient encounter. By increasing the use of social technology, this organization is creating "touch points" that are available 24 hours a day, 7 days a week, and reduce face-to-face interaction between patients and providers. The organization

believes implementation of this technology will allow systems to be more flexible in response to surges and reductions in demand, whereas buildings are much less easily adapted. Harnessing technology removes space and time limitations, ultimately allowing for increased amounts of care to be provided virtually.

Figure 4 illustrates the relationship between IT services and various care delivery alternatives, which ultimately affect facility requirements. Solutions that can limit access tend to yield higher costs and treat higher acuity patients, whereas solutions that increase access to care yield lower costs and are more appropriate for lower acuity patients. These lower cost solutions frequently require less regulatory burden, smaller capital investments, fewer resources, and shorter implementation times.

Figure 4. Information Technology and Lower Cost Health Care Alternatives[118]



Adapted from Malcolm, C., 2014.

Additionally, the Centers for Medicare & Medicaid Services' incentive payments for the *meaningful use* of EHRs have accelerated the adoption of EHRs and related capabilities in the United States, consequent to enactment of the Health Information Technology for Economic and Clinical Health Act of 2009, which requires providers to have "increased connectivity in order to receive higher levels of reimbursement."[112(p.256),119] Though adoption of EHRs does not guarantee increased quality and safety of care, systems like Kaiser Permanente and Geisinger that "made substantial investments and changes in the design of their care delivery that went far beyond the use of health information technology" have realized

Health care is becoming more value-oriented, and "accountable care organizations and other integrated health care providers will increasingly rely on technology to improve efficiency"[109(p.1685)] and quantify other performance metrics.

Jeremy Kahn, Author of "Virtual Visits - Confronting the Challenges of Telemedicine"
2015

substantial improvements in care.[119(p.856)] Health care is becoming more value-oriented, and "accountable care organizations and other integrated health care providers will increasingly rely on technology to improve efficiency"[109(p.1685)] and quantify other performance metrics.

4.2 Facilities and Technology Require Further Integration in the Military Health System

Virtual care delivery is fundamentally altering the planning and programming of health care facilities.

Technology advances that facilitate virtual care delivery are fundamentally altering the planning and programming of health care facilities. Telemedicine was developed and has been used within the Department of Defense (DoD) for more than 20 years to provide care services to beneficiaries in remote locations, including theaters of war.[120] The Panel's review of the current Space Planning Criteria found that the Military Health System (MHS) does provide one telehealth examination room for specialty medical and behavioral health clinics, as well as general and specialty surgical clinics. This space can be used to manage health care remotely, including online communication with health care providers, remote monitoring of vital signs, and video or online doctor visits. Depending on the clinic's concept of operations, the space can include video camera capability.[77] This represents a much more limited investment strategy than the telemedicine infrastructure being included in Kaiser Permanente's exam rooms; an investment worth monitoring.

It is not clear how the Military Health System is planning for and adapting to significant shifts in health care delivery modalities.

The *Military Health System Review: Final Report to the Secretary of Defense* discussed two non-facility access solutions, Secure Messaging and the Nurse Advice Line, which already have shown significant and growing use. Further, "patient satisfaction with [secure messaging] is 97 percent and more than 86 percent of SM satisfaction survey respondents agreed that using [secure messaging] interaction allowed them to avoid an unnecessary trip to the clinic, emergency department, or urgent care facility,"[2(p.53)] all of which have the potential to decrease the facility footprint. However, it was not clear to the Panel how the MHS is planning for and adapting to significant shifts in health care delivery modalities, moving from a facility-based model toward a seamless, more virtually-based, IDS model using available communications and technology devices.[2]

It is also not clear to the Panel how the use of telemedicine and subsequent provision of virtual care has affected the workload associated with facility-based services in a military treatment facility (MTF). For example, the Panel observed there is little indication that new virtual care alternatives, such as telehealth, secure messaging systems, and nurse advice lines, have influenced the size and cost of the facilities being built in the MHS. In the Panel's opinion, DoD focuses primarily on architectural elements in the development of its construction standards without fully incorporating the impacts of technology integration and use on concepts of operation, space requirements, design, construction and operations, and maintenance activities. To the Panel's knowledge, standards have not yet been created to reflect an integrated physical environment and technology infrastructure.

Overall, facilities and IM/IT policies, standards, and outcome measurements require greater integration to maximize return on facility and IT investments and enhance the provision of non-facility-based care alternatives by integrating the planning and design of both the building and technology to enable the safe and effective use of IT-based systems and equipment. Human factors engineering approaches could be studied to more effectively integrate technology into operations and facility design to better achieve desired outcomes. One area of collaboration is the MHS's recent EHR acquisition, which has required consensus to standardize clinical and administrative work processes.[121] These processes provide the fundamental framework for facility concepts of operation, which are an important component of facility design standards and criteria. The Panel was told that individuals from the Defense Health Agency (DHA) Facilities Division have been engaged in this work. The Panel strongly agrees that this collaboration continues now that the $4.3 billion EHR modernization contract has been signed, which may ultimately cost just under $9 billion over the next 18 years.[122]

Facility and information management/information technology policies, standards, and outcome measurements require greater integration to maximize return on investment to enhance non-facility-based care alternatives.

Another area of collaboration is the establishment of the Facilities, Logistics, Health Information Technology Collaboration Group by the DHA Facilities Division and IM/IT leaders to increase collaboration among the relevant communities supporting the MHS. The goals of the group include increasing synergy among the communities; reducing duplication and conflicting efforts; achieving standardization to the extent practicable or feasible; reducing the training burden as people move across facilities; and increasing interoperability,[123] all of which will surely affect how many and what kinds of health care facilities will be needed.

Finding 10: Emerging technology platforms and reengineered clinical and administrative work processes affect facility planning criteria, investment decisions, and facility asset utilization. Previously, major Military Health System facility and information management/technology planning and investment decisions were not fully integrated.

Recommendation 10: The Military Health System should integrate information management/technology and facility funding, policies, standards, and outcome measurements, including non-facility-based care alternatives, to inform facility planning and programming standards and criteria to maximize returns on information technology and facility investments.

Section References

2. U.S. Department of Defense. *Military Health System Review: Final Report to the Secretary of Defense.* August 29, 2014.
37. Burns LR, Pauly MV. Accountable care organizations may have difficulty avoiding the failures of integrated delivery networks of the 1990s. *Health Aff. (Millwood).* 2012;31(11):2407-2416.
39. Hwang W, Chang J, LaClair M, Paz H. Effects of integrated delivery system on cost and quality. *Am. J. Manag. Care.* May 10 2013;19(5):e175-e184.
41. Enthoven A. Integrated delivery systems: The cure for fragmentation. *Am. J. Manag. Care.* Dec 2009;15(10 Suppl).
77. U.S. Department of Defense. Military Health System (MHS): DoD Space Planning Criteria for Health Facilities. [Webpage]. http://www.wbdg.org/ccb/browse_cat.php?o=29&c=261.
106. Woodson J, Horoho P, Nathan M, Ediger M, Robb D. Improving Access to Care. 2015.
107. Waddington C, Egger D. Integrated Health Services - What and Why? In: World Health Organization Working Group on Service Delivery, ed. *Technical Brief No. 1*: World Health Organization; 2008.
108. Tahir D. Kaiser virtual-visits growth shows the technology's potential. *Modern Healthcare.* 2014.
109. Kahn JM. Virtual visits - confronting the challenges of telemedicine. *N. Engl. J. Med.* April 30, 2015;372(18):1684-1685.
110. The Goldman Sachs Group Inc. Goldman Sachs 2014 Annual Report: Four Trends Shaping Markets and Economies. 2015.
111. Frankel T. Sedation device could replace doctors. *The Washington Post.* May 12, 2015: A1, A12.
112. Pearl R. Kaiser Permanente Northern California: Current experiences with internet, mobile, and video technologies. *Health Aff. (Millwood).* 2014;33(2):251-257.
113. Jayanthi A. Pediatric telemedicine consults save $4,600 per use, study finds. [Webpage]. 2015; http://www.beckershospitalreview.com/healthcare-information-technology/pediatric-telemedicine-consults-save-4-600-per-use-study-finds.html. Accessed June 15, 2015.

114. Pai A. UnitedHealthcare now covers Doctor on Demand, American Well video visits too. [Webpage]. 2015; http://mobihealthnews.com/43052/unitedhealthcare-now-covers-doctor-on-demand-american-well-video-visits-too/.
115. Williams M. Telehealth Reimbursement Gets New Focus Via the Senate. [Webpage]. 2015; http://www.bsminfo.com/doc/telehealth-reimbursement-gets-new-focus-via-senate-0001.
116. Ravindranath M. The Next Step in Health IT? Virtual Doctors Visits. [Webpage]. 2015; http://www.nextgov.com/health/2015/04/next-step-health-it-virtual-doctors-visits/110821/.
117. Ruoff A. Telehealth Industry Feels Some Love. [Webpage]. 2015; http://www.bna.com/telehealth-industry-feels-b17179925503/.
118. Malcolm C, Navigant Consulting. IT Support Enables Focus on New Lower Cost Alternatives That Transform Facilities Needs. 2014.
119. Classen DC, Bates DW. Finding the meaning in meaningful use. *N. Engl. J. Med.* 2011; 365 (9):855-858
120. Joseph SC. Telemedicine in the Military Health Services System. [Webpage]. 1996; http://www.defense.gov/Speeches/Speech.aspx?SpeechID=978. Accessed June 15, 2015.
121. Wolford-Connors A. Process Design Planning. 2015.
122. Garamone J. DoD Awards Contract for Electronic Health Records. *DoD News, Defense Media Activity.* July 29, 2015.
123. Berchtold. Draft Charter. 2014.

Implement a Systematic Evidence-Based Design Evaluation Process

5.0

"A growing body of research has demonstrated that the built environment can positively influence health outcomes, patient safety, and long-term operating efficiencies to include reduction in staff injuries, reduction in nosocomial infection rates, patient falls and reductions in length of hospital stay. Incorporating the results of this research along with changes in concepts of operations into the design of some of our most significant facilities will allow the Military Health System and the patients entrusted to our care to reap substantial health and system wide benefits for many years to come."[124]

Memorandum from William Winkenwerder
Former Assistant Secretary of Defense for Health Affairs
2007

Since the publication of this Memorandum, the Military Health System (MHS) has become an industry leader in the application of evidence-based design (EBD). However, further evaluation of the effect of EBD on key health outcomes is required to inform the standards used in the planning and programming of future facilities. Additionally, EBD concepts should be institutionalized across the MHS to maximize return on investment.

5.1 Evidence-Based Design Interventions and Supporting Rationale Should Be Documented by the Military Health System

Evidence-based design is a "process of basing decisions about the built environment on credible research to achieve the best possible outcomes."[125]

The Center for Health Design
2008

A growing body of research reveals that the design and maintenance of a health care facility shapes a range of safety and quality outcomes that are high priorities for health care organizations, as seen in the MHS's Quadruple Aim. D. Kirk Hamilton originally described EBD in 2003 as "a deliberate attempt to base design decisions on the best available research evidence" to result in "improvements in the organization's clinical outcomes, economic performance, productivity, customer satisfaction, and cultural measures."[126] The Center for Health Design now defines EBD as a "process of basing decisions about the built environment on credible research to achieve the best possible outcomes,"[125] such as patient and staff safety, patient experience, access to care, the delivery of care, staff effectiveness, quality of care, health care costs, and staff satisfaction. Highly regarded health care organizations, such as those in the top tier of *U.S. News and World Report* ratings, nearly always work to incorporate the latest EBD features, such as single-patient rooms, the inclusion of family zones, and natural lighting,[127-129] in addition to reflecting the characteristics of an integrated delivery system (IDS).[130]

Table 10 provides a list of some of the types of EBD features that could affect health outcomes targeted in the *Military Health System Review: Final Report to the Secretary of Defense*.

Table 10. Military Health System Action Plan for Access, Quality of Care, and Patient Safety Targeted Outcomes for Improvement and Evidence-Based Design Features[2]

Targeted Outcomes for Improvement	Evidence-Based Feature
Healthcare-Associated Infections (Central Line Associated Blood Stream Infections, Catheter-Associated Urinary Tract Infections, Ventilator-Associated Pneumonia)	• Single inpatient rooms • Sink and alcohol gel placement and design • Material finishes to enable cleaning of high-touch surfaces • Heating and air conditioning systems that include high-efficiency particulate air filters; ultra-violet gamma irradiation
Obstetrical Patient Satisfaction	Patient- and family-centered care designed rooms
Waiting Time	Positive distractions, such as art work and views of nature; small, moveable seating areas
Readmission Rates	Family zone space in the patient room to enable family presence as part of the care team to enable home transitions

Incorporation of EBD has become increasingly important since Patient Protection and Affordable Care Act-driven health care reform is targeting patient experience and hospital acquired conditions through three pay-for-performance programs. The Centers for Medicare & Medicaid Services (CMS) has established a goal that 50 percent of reimbursement will be based on value by 2018.[131] The Health Care Transformation Task Force, whose members include 6 of the nation's top 15 health systems and 4 of the top 25 health insurers, challenged other providers in January 2015 to join its commitment to put 75 percent of their business into value-based arrangements that focus on the Triple Aim of better health, better care, and lower costs by 2020.[132]

The Military Health System facility community is an industry leader in its use of innovative evidence-based design strategies.

The Panel discovered that, in many ways, the MHS facility community is an industry leader in its use of innovative EBD strategies and development of supporting tools and resources over the past decade to inform a $11.4 billion military construction (MILCON) investment portfolio.[133] It adopted EBD as the framework for its health care projects beginning with the 2007 report, *Evidence-Based Design: Application in the MHS*.[134] An EBD checklist was developed in 2008 to evaluate various design iterations for the Walter Reed National Military Medical Center (WRNMMC) and Fort Belvoir Community Hospital (FBCH) projects and to provide feedback to the project team.[135] This checklist was further developed and formalized as the World-Class Toolkit and Checklist, which uses EBD as its theoretical framework and is now required for the design and planning of all new MILCON projects as reflected in Section 2-3.4.7 of the Unified Facilities Criteria (see Appendix E for more information on the MHS's defined policies, standards criteria, and guidelines for effective facility life-cycle management).[136] The World-Class Toolkit represents one of the most carefully constructed set of design and construction resources in the field and should be a source of pride for the Defense Health Agency (DHA).

Now the time has come to understand the impact of EBD used in the portfolio of new MHS facilities, which includes 27 new hospitals or hospitals that have received additions/alterations, 4 ambulatory surgery centers, 43 medical clinics, and 12 dental clinics,[133] since many are completed and have been operational for a few years. The Panel found that some EBD features were used in a variable fashion across some of the recent medical MILCON projects. For example, during site visits to FBCH and Naval Hospital Camp Pendleton, the Panel observed that single patient medical-surgical bedrooms were designed differently. The patient bathrooms at FBCH were on the outside wall of the patient bedroom, while NHCP's bathrooms were on the inside wall. Both approaches have advantages and disadvantages, but it was not clear to the Panel which approach met the original intended design principle or how the choice affected targeted outcomes. In another example, WRNMMC and FBCH both had single patient bedrooms with ceiling mounted patient lifts. However, one design included lifts and a track to carry patients into the bathroom, whereas the other design would only bring the patient to the bathroom door. Again, it is not clear which design met the intended principle or how these different results affect care delivery processes and health care outcomes.

The time has come to understand the impact of newly created, evidence-based designed Military Health System facilities on targeted health care outcomes.

Evidence-based features were used in a variable fashion across some of the recent medical military construction projects.

Although the MHS has included the EBD features found in Table 10 and many more for recently constructed military treatment facilities (MTFs), it is unclear whether observed variability in the application of EBD features arises from: (1) thoughtful review of previous projects and their application to different project contexts; (2) variation in the interpretation of EBD strategies, without due consideration of research or lessons learned or; (3) variance in the project decision-making processes. The lack of accompanying documented rationale to explain design decision variability contributes to the general lack of understanding by staff and leaders about the reasons and science that underpin each variable design choice.

The lack of accompanying documented rationale to explain design decision variability contributes to the general lack of understanding by staff and leaders about the reasons and science that underpin each variable design choice.

The MHS could benefit from implementing a process to capture the rationale for all design decisions, including those research findings that explain and justify significant variation in design strategies. This information must then be consistently and continuously communicated to current and future generations of health care workers across each phase of the facility's life cycle to enable them to first understand and then realize the full benefit of these major capital investments. Efforts to evaluate the impact of different design decisions on key health care outcomes will enable the subsequent refinement of the Department of Defense (DoD) standards and criteria and clinician understanding about the role the environment plays in shaping care delivery and the patient experience, as explained in the next section.

Finding 11: The Military Health System is commended as a health care industry leader in its use of evidence-based design to inform the planning and programming, construction, and maintenance of facilities. However, the Panel found variability in the selection of evidence-based design features for recently constructed facilities without accompanying documented rationale for the differing design decisions. The Panel also found that the purpose and use of the design features are not always consistently and continuously communicated to the end users to enable them to understand and benefit from these investments.

Recommendation 11: The Military Health System should:

A. Systematically document the rationale for all design decisions, including the research findings that explain and justify significant variation in design strategies.

B. Consistently and continuously communicate the existence and purpose of these design features to the end users so they and their patients can benefit from these investments.

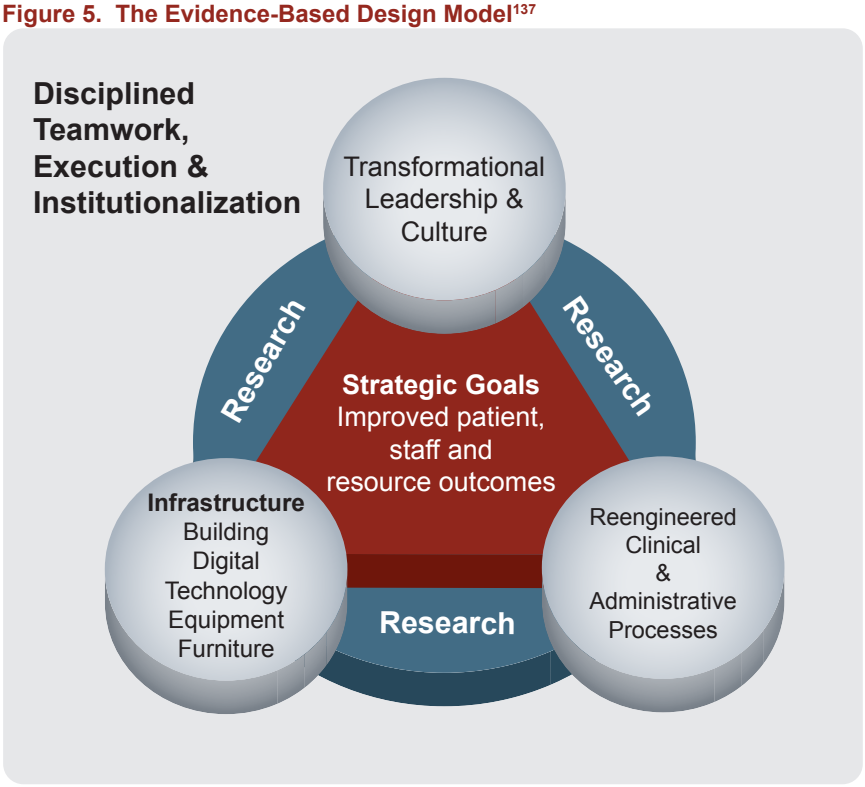
5.2 The Military Health System Should Evaluate the Impact of Evidence-Based Design Interventions on Key Health Care Outcomes

As an aspiring high reliability organization (HRO), it is now time for the MHS to systematically evaluate the impacts of design decisions on targeted outcomes, such as measuring the impact of EBD strategies on patient and staff safety, health care outcomes, care delivery processes, and financial measures, to inform facility standards and criteria. This evaluation and research will be challenging because EBD is an emerging research field that frequently produces and relies on multifactorial, correlational results.

Evidence-based design is not a set of prescriptive design strategies but rather a process to identify innovative solutions that facilitate the best possible outcomes.

EBD is not meant to be a set of prescriptive design strategies. Rather, it is a process by which published and emerging research is continuously evaluated in the context of project goals, technology, and clinical and administrative processes to identify innovative solutions and to facilitate the best possible outcomes (see Figure 5). Infrastructure is just one part of this model that includes transformative leadership and reengineered clinical and administrative processes that together will result in improved patient, staff, and resource outcomes.[137] Further, EBD is a continuous looped cycle in which lessons learned from implemented projects inform future projects.

Figure 5. The Evidence-Based Design Model[137]



Adapted from Malone, E.

As such, an EBD process by its very definition supports deliberate variation among projects. Lessons learned from a finished project, along with evolving new research findings, would likely lead to changes and modifications in the standards and criteria that inform the design of future projects. This sort of variation is healthy and can both be driven by and support innovation (see Appendix H for more information about design standards development). On the other hand, there may be some EBD features that deserve standardization across the MHS because of their demonstrated impact on safety or other outcomes, as explained in Section 4.3 of the Panel's annual progress report. Regardless, as just discussed, it is important to document the reason for a design decision as described in Section 5.1 and evaluate its effectiveness as a tool to enable clinical and administrative processes that produce the desired outcomes.

The MHS is perfectly poised to begin this inquiry, especially important since the recent *Military Health System Review: Final Report to the Secretary of Defense* does not mention facility design, construction, and maintenance as tools to help resolve a number of targeted outcomes (see Table 10).[2] It is the Panel's view that there appears to be little understanding and appreciation, outside of the facilities community, of the role the facility and its design play in the achievement of targeted health care outcomes.

Facility variables should be included in routine performance improvement activities at the military treatment facility level and then aggregated for analysis by the Defense Health Agency for a systems-wide perspective that could be used to improve facility standards and criteria.

Facility variables should be included in routine performance improvement activities at the MTF level and then aggregated for analysis by DHA for a system-wide perspective that could be used to improve facility standards and criteria. These activities should not be limited to just a facilities-focused evaluation of EBD. For example, the MHS Patient Safety Reporting Tool does not include mandatory reporting of contributing environmental variables that may have contributed to patient harm or near-miss episodes of care. This lack of reporting means there is no systematic way this information is collected (see Section 2.2). This level of scrutiny is critical for HROs, which are preoccupied with preventing and eliminating failure.

Successful routine performance improvement activities engage all domains illustrated in Figure 5: transformational leadership and culture, reengineered clinical and administrative processes, and infrastructure. In order to succeed, performance improvement efforts should involve members from the facilities community, clinicians, and other involved stakeholders. An example is provided to explain how the MHS might evaluate the impact of design decisions on the improvement of patient experience. The TRICARE Inpatient Satisfaction Survey (TRISS) includes questions from the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, developed by the Agency for Healthcare Research and Quality and CMS, which is used nationwide to evaluate inpatient experience, the results of which are tied to hospital reimbursement.[138] There are eight care dimensions measured by the survey, including the environment of care, which includes two targets; the cleanliness of the patient's room and bathroom; and how quiet the area around the patient's room was at night. Using noise reduction as an example and the EBD framework depicted in Figure 5, an integrated bundle of solutions is depicted in Figure 6, all of which together help to reduce noise that interferes with patient rest and sleep, increases staff stress, and serves as an error-provoking condition.

Figure 6. Interventions That Help to Reduce Noise

HCAHPS Survey, Question #9:

How often was the area around your room quiet at night?

Goal: Decrease noise to enable patient sleep and rest (decrease staff stress)

Infrastructure	Culture	Process Reengineering
Building • Single patient rooms • Use of sound absorbing materials • Design to separate noisy entities (ice machine)	**Identify Desired End-State** • Identify current state: decibel level, HCHAP score, & staff satisfaction re: noise • Establish sense of urgency • Identify target goals	**Staff Interventions** • Nighttime care guidelines • Quiet voices • Resupply and equipment movement
Technology • Hands-free communication • Beepers on vibrate • No overhead paging	**Develop Noise Reduction Campaign Plan** • Set the stage using research and best practices • Clarify values, vision	**Patient Interventions** • Rights • Earplugs • Television and radio headphones
Equipment • Fix squeaks • Decrease equipment volumes–link to hands-free devices	**Measure and Reward Progress** • Celebrate successes • Find and tell the best stories	**Visitor Interventions** • Orientation to noise reduction • Cell phone use

Adapted from Malone, E., 2011.

The results from this established, valid, and reliable question in Figure 6 and Table 11 could be compared pre- and post-occupancy, providing important feedback about the overarching success associated with a bundle of interventions used to reduce noise. The Panel examined pre- and post-occupancy results for the question "How often was the area around your room quiet at night?" for a few of the new hospital projects that are now operational (see Table 11).

Table 11. Results of Question 9: How Often Was the Area Around Your Room Quiet at Night?[138-140]

Category	Data Period	Fort Belvoir Community Hospital	Walter Reed National Military Medical Center	San Antonio Military Medical Center	Naval Hospital Camp Pendleton	Centers for Medicare & Medicaid Services Benchmark
Quietness of Hospital Environment	April 2011-March 2012	65%	56%	60%	57%	59%
	Calendar Year 2012	75%	59%	63%	60%	60%
	Fiscal Year (FY) 2013	79%	63%	66%	70%	61%
	FY 2014	83%	64%	65%	75%	61%

Adapted from U.S. Department of Defense, 2012-2015.

The new FBCH opened August 31, 2011. Its first results for Question 9 reflect five months of occupancy in the old facility and seven months in the new facility, from April 2011–March 2012, during which 65 percent of patients reported that the area around their room was always quiet. Compare this result with the findings for FY 2014 reflecting more than two years of operation in the new facility, during which 83 percent of the patients reported quietness at night, well above the CMS national benchmark of 61 percent in that year. It is also interesting to note that neither WRNMMC nor San Antonio Military Medical Center (SAMMC) saw as much improvement in their scores for this question: Is this because these addition alteration projects did not replace all of the inpatient rooms and so the survey reflects care provided in older and newer facilities? Naval Hospital Camp Pendleton is already demonstrating significant improvement on this metric in 2014, even though the data only reflect 9 months of occupancy in the new facility.

The question for the MHS is what interventions most contributed to these results? Given the Panel's interest in the DoD standards and criteria, what facility features most contributed to these scores among the following: single patient rooms, unit design layout to minimize noise-producing entities like ice machines or the use of decentralized nurses' stations, or the types of construction materials used to reduce sound reverberation and reduce noise creation. What clinical and process reengineering steps were taken to reduce noise created by staff, patients, and visitors? How did leaders establish a culture where patient rest and decreased staff stress were valued as a key component of world-class care delivery? Once the MHS has catalogued its various EBD features across all of the newly created hospitals (see Section 5.1), further comparisons will be possible where there was variation in design to determine which design features contribute most to noise reduction and therefore should be reflected in DoD standards and criteria.

Another important evaluation resource is the post-occupancy evaluation (POE), a tool used to evaluate the performance of a building's design, its operational flow, and maintainability. Evaluating these impacts is a critical part of the EBD process because POE results, identified lessons learned, and focused research studies provide critical evidence that should be used to additionally refine facility standards and criteria. Although not all civilian facilities conduct POEs, when a POE is conducted, the first evaluation typically is conducted between 12 and 18 months after a new facility has opened to capture staff, patient, and family first impressions of how the building helps or hinders care and the facility manager's assessment of the ease or difficulty of maintaining installed systems.[141] The Panel commends DoD's efforts to establish a valid and reliable POE framework that evaluates not just the building systems but also the impact of the design on health care outcomes, as seen in a project report with Clemson University.[142-144] The next step is to commit the resources necessary to conduct a standard POE for all major capital investments. In addition, although the Panel did not examine the development and use of combat casualty care facilities, lessons learned and consequent adjustments to facility standards and criteria are important to consider in the future development of these deployable facilities.

The post-occupancy evaluation represents another important tool that can be used to evaluate the performance of a building's design, its operational flow, and maintainability.

Finding 12: Although the Military Health System is a leader in its use of evidence-based design, it has yet to evaluate how evidence-based design features, especially those that relate to safety problems such as health care-associated infections, as well as patient experience, staff safety, environmental safety, and cost, impact health care outcomes in recently constructed facilities. It is the Panel's view that outside of the facility community there is little understanding and appreciation of the role that the facility and its design play in the achievement of targeted health care outcomes associated with the Quadruple Aim.

Recommendation 12: To evaluate the impact of evidence-based design intervention on key health care outcomes, the Military Health System should:

A. Integrate facility variables in routine military treatment facility level and enterprise-wide performance improvement activities by developing a process for collecting and measuring key evidence-based design-related outcome metrics.

B. Commit adequate resources to conduct a standardized post-occupancy evaluation for all major capital investments between one to two years after facility occupancy.

C. Provide needed adjustments and revisions to facility standards and criteria to better inform future design decisions, based on the results of these efforts.

5.3 Institutionalizing Evidence-Based Design Is Needed to Maximize Return on Investment

The evidence-based design process will yield optimum results in terms of improved health care outcomes when considered in conjunction with reengineered clinical processes and technology, in a culture that values innovation and transformation.

The EBD process will yield optimum results in terms of improved health care outcomes when considered in conjunction with reengineered clinical processes and technology, in a culture that values innovation and transformation. For EBD to be effective, the principles of EBD need to be institutionalized across the MHS as depicted in Figure 7. Special efforts are required so that major transformations permeate large organizations like the MHS. The Department's Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, and Facilities (DOTMLPF) process, which is used in the Joint Capabilities Integration Development System, reflects and quantifies the facilities solutions along with those dimensions that are needed when undertaking a major new initiative or acquisition.[145]

Figure 7. Institutionalizing Evidence-Based Design[137]

Military Formula DOTMLPF+	Civilian Translation
Doctrine	Review and update policies and procedures
Organization	Review and restructure the organization as needed
Training	Training integration and synchronization
Material/Data Quality/Marketing	• Life cycle approach • Data quality focused on the targeted healthcare outcomes using national measures • Integrate work with your Performance Improvement program • Tell your story using a variety of methods
Leader Development	Engage, educate and develop leaders at every level to transform culture and processes
Personnel Support	Hire the best. Find and reward your champions
Facilities	Life cycle approach ROI planning that results in realistic budgets

Adapted from Malone, E., 2010.

It is the Panel's view that the MHS lacks the enterprise-wide policies and procedures, staff education and training programs, leader development and personnel support, and process and data needed to fully maximize the use of EBD investments. The DHA Facilities Division has embraced EBD, but cultures and processes across the entire MHS need to change to fully realize its benefits.

As an example, there is no comprehensive MHS patient handling and movement program to take advantage of the ceiling mounted lifts included in patient rooms in recently constructed facilities to reduce injury to patients and staff. Panel members frequently observed during site visits that, even though EBD was used in the design and construction of the newly created facilities, the staff was unfamiliar with the reason for the design and its potential impact on quality care delivery and how the feature was designed to enable care processes. The research and decision-making process that underpins the facility design (see Section 5.1) should be shared with future generations of staff during training or orientation, so they understand how the facility design is intended to function with technology and care delivery processes to achieve optimum safety and quality outcomes. The MHS needs to institutionalize EBD to maximize its return on investment.

The Military Health System needs to institutionalize evidence-based design to maximize its return on investment.

Finding 13: Major initiatives or acquisitions, such as the use of evidence-based design, require special efforts so that their effective use permeates large organizations like the Military Health System. Although the Defense Health Agency Facilities Division has adopted evidence-based design, the Military Health System lacks the enterprise-wide policies and procedures, staff education and training programs, leader development and personnel support, and processes and data needed to fully realize its benefits and maximize the investment. An example includes lack of a Military Health System-wide, comprehensive patient handling and movement program to take advantage of the ceiling mounted lifts included in recently constructed facilities to help reduce injury to patients and staff.

Recommendation 13: The Military Health System should institutionalize the use of evidence-based design features through the evaluation and, as appropriate, the revision of applicable policies and procedures, staff education and training programs, leader development and personnel support, and processes and data so that evidence-based design features are used as intended to improve health care outcomes and maximize the return on investment.

Section References

2. U.S. Department of Defense. *Military Health System Review: Final Report to the Secretary of Defense.* August 29, 2014.
124. Winkenwerder W. QDR Roadmap and Evidence-Based Design. 2007.
125. The Center for Health Design. About Evidence-Based Design Accreditation and Certification (EDAC). 2008; https://www.healthdesign.org/edac/about.
126. Hamilton DK. The four levels of evidence-based practice. *Healthcare Design.* 2003.
127. The Center for Health Design. Pebble Project Facilities. [Webpage]. https://www.healthdesign.org/pebble/facilities.
128. Kimmelman M. In Redesigned Room, Hospital Patients May Feel Better Already. *The New York Times.* August 21, 2014.
129. Joseph A, Hamilton DK. The Pebble Projects: Coordinated evidence-based case studies. *Building Research & Information.* 2008;36(2):129-145.
130. Silvis JK. First Look: Cleveland Clinic Cancer Center. *Healthcare Design.* 2014.
131. Better, Smarter, Healthier: In historic announcement, HHS sets clear goals and timeline for shifting Medicare reimbursements from volume to value [press release]. 2015.
132. Health Care Transformation Task Force. About Us. [Webpage]. 2015; http://www.hcttf.org/aboutus/.
133. DHA Facilities Division. Data Response. 2014.
134. Malone E, Mann-Dooks JR, Strauss J. *Evidence-Based Design: Application in the MHS.* Falls Church, VA: Noblis, Inc.; August 1, 2007.
135. The Center for Health Design. *An Introduction to Evidence-Based Design: Exploring Healthcare Design.* Vol 2nd Edition, Volume 1. Concord, CA: The Center for Health Design; 2010.
136. U.S. Department of Defense. World-Class Toolkit. [Webpage]. https://facilities.health.mil/home/toolkit. Accessed April 17, 2014.
137. Malone E. Harnessing Transformative Changes to Maximize Technology and Facility Investments. Paper presented at: The Center for Health Design, Pebble Colloquium; April 26, 2010; Philadelphia, PA.
138. U.S. Department of Defense. TRICARE Inpatient Satisfaction Surveys (TRISS) - Purchased and Direct Care. [Webpage]. http://www.tricare.mil/hpae/surveys/survey_satis_detail.cfm?key=HPAE_SURVEY_SURVEYS_SATIS_8&cat=no.
139. U.S. Department of Defense Defense Health Cost Assessment and Program Evaluation (DHCAPE), Altarum Institute. *2013 TRICARE Inpatient Satisfaction Survey (TRISS) Report of Findings: Calendar Year 2012 Discharges.* 2013.
140. U.S. Department of Defense Defense Health Cost Assessment and Program Evaluation (DHCAPE), Altarum Institute. *2012 TRICARE Inpatient Satisfaction Survey (TRISS) Report of Findings: April 2011 - March 2012 Discharges.* October 8, 2012.
141. Shepley MM. *Health Facility Evaluation for Design Practictioners.* Myersville, MD: Asclepion Publishing; 2011.

142. Clemson University, NXT. *Pathway Towards the Development of a Post Occupancy Evaluation (POE) Program and Policy for the Military Health System: Final Report.* September 14, 2012.
143. Clemson University, NXT, Noblis. *Post Occupancy Evaluation Methodology and Tools Report for Military Health System: Final Report.* September 27, 2011.
144. Clemson University, NXT, Noblis. *Post Occupancy Evaluation Report for Military Health System: Bassett Army Community Hospital.* September 27, 2011.
145. U.S. Department of Defense. Chairman of the Joint Chiefs of Staff Instruction 3010.02D: Guidance for Development and Implementation of Joint Concepts. 2013.

SUMMARY AND CONCLUSIONS

6.0

Given its charge, the Panel's inquiry was framed by the definition of a world-class medical facility and its 6 domains and 18 conditions, as first described in 2009 by the National Capital Region Base Realignment and Closure Health Systems Advisory Board (see Appendix L). The domains include:

- Basic infrastructure
- Leadership and culture
- Processes of care
- Performance
- Knowledge management
- Community and social responsibility

The Panel discovered that, for the most part, members of the Defense Health Agency's (DHA's) Facilities Division were intimately knowledgeable about world-class medical facility requirements. However, when the Panel visited military treatment facilities (MTFs), the assigned hospital and clinic leaders and even DHA staff were not familiar with the definition of a world-class medical facility. When asked to brief the Panel on their MTF's processes and standards using the 6 domains and 18 conditions, MTF representatives found it to be worthwhile and rational framework, albeit occasionally redundant with Service and Military Health System (MHS) performance improvement initiatives.

The Panel mapped the world class medical facility domains and conditions with the recommendations of the 2014 *Military Health System Review: Final Report to the Secretary of Defense*[2] and the direction of the work of DoD's High Reliability Organization Task Force, and found that they were largely consistent. Some of the inconsistencies can be attributed to lack of full alignment with the military mission or changing standards. For example, the ways by which facilities can be leveraged to achieve readiness are not explicitly stated in the definition of a world-class medical facility. In addition, health care reform has reshaped many of the early performance improvement targets found in the definition of a world-class medical facility, specifically those that relate to health care-associated infections. Other value-related goals are also not completely reflected in the world-class medical facility definition.

On the other hand, the definition of a world-class medical facility is more fully descriptive with regard to culture, staff requirements, transparency, and patient and family engagement. Particular attention should be given to the leadership and culture characteristics found in the world-class domains, so important to fueling any MHS transformation. The Panel believes that the world-class medical facility definition must be updated to reflect a system of health, rather than its present focus on facility-centric health care delivery and reflected in the MHS Strategic Plan, now in development.

The MHS has the opportunity to capitalize and synergize all of these performance improvement targets by finalizing and implementing an enterprise-wide strategic plan to drive transformation and unity of effort. While the MHS has made great progress in improving access, safety, and quality, the Panel observed that the challenges associated with meeting its performance goals are both immediate and daunting. Although the current pace of change is faster than at any time in recent history within the MHS, it is still too slow and encumbered to meet today's and tomorrow's performance challenges. The creation of an integrated delivery system (IDS), which is a relatively new goal of the MHS, was set in motion decades ago in the civilian sector, where a number of successful organizations have created notable sophisticated health systems with better outcomes.

Viability and success in the health care sphere today must reflect a well-defined strategy, fueled by a culture of innovation that demands accountability using measures found in world-class health care organizations, given that readiness is most essential to national security.

Viability and success in the health care sphere today must reflect a well-defined strategy, fueled by a culture of innovation that demands accountability using measures found in world-class health care organizations, given that readiness is most essential to national security. Although the MHS is pursuing an IDS, the urgency seems missing to transform the peacetime system, along with a critical focus on incentives and systems and process reengineering to achieve the Quadruple Aim, including lower cost. In the Panel's opinion, this was particularly true in the National Capital Region (NCR), where the cost imbalance is most dramatic. In the course of its work, the Panel found newly completed facilities that were overbuilt and underutilized, the reasons for which deserve analysis. Last, given the significant resources associated with the planning, design, construction, and maintenance of health care facilities, attention must be focused on the better integration of technology as an alternative to facility-based care, as well as well as understanding how facility design and use can help to improve strategic health care outcomes.

Conclusion

The MHS has undergone significant transformation since Section 2852 of the Ike Skelton National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2011 required the establishment of the Independent Review Panel on Military Medical Construction Standards (Panel). In particular, the MHS experienced a tremendous organizational shift due to the creation of the DHA and its shared services. The Panel was established in February 2014 and spent the last 18 months gathering and absorbing information, speaking to MHS leaders and experts, and visiting seven MTFs, the sum of which has informed the Panel's findings and recommendations, which are detailed both in the Panel's annual progress report and final report. This final report reflects a refinement of the Panel's most important findings and recommendations from the annual progress report, with a particular focus on the critical role that strategy plays to inform the function for which form can then be designed and built.

Four major finding areas with recommendations are provided for the Secretary of Defense, the details of which are summarized in Table 12. The MHS should

1. Develop and implement a MHS strategic plan (Section 2.0);
2. Continue to create an integrated delivery system in the NCR (Section 3.0);
3. Effectively integrate technology into its operations and medical facilities (Section 4.0); and
4. Implement a systematic evidence-based design evaluation process (Section 5.0).

The Panel recognizes the journey the MHS has been on and the challenges it has faced in responding to environmental changes and in striving to achieve its goals. Importantly, the Panel has witnessed the MHS's attempts to improve, most notably through the *Military Health System Review: Final Report to the Secretary of Defense* and the High Reliability Organization Task Force, which have inspired and energized the Panel as it concurrently conducted its work. Importantly, the work of the DHA Facilities Division has been a positive force in the MHS, including integrating evidence-based design in the construction of medical facilities, creating the World-Class Checklist and Toolkit, and continuing to develop and maintain standards and criteria for the facility life cycle. The DHA Facilities Division and Services' facility organizations have created strong momentum, which future leaders should continue.

Importantly, the work of the DHA Facilities Division has been a positive force in the MHS, including integrating evidence-based design in the construction of medical facilities, creating the World-Class Checklist and Toolkit, and continuing to develop and maintain standards and criteria for the facility life cycle.

No doubt, there are additional efforts underway about which the Panel is unaware and which may address some of its concerns. Several recommendations in this report focus on necessary MHS-wide system enhancements and provide a framework for continuous performance improvement. Those results with facility impacts should be institutionalized through the refinement of DoD facility standards and criteria. Though the Panel has recommended areas for improvement (see Table 12 for a summary of the Panel's final findings and recommendations), it does so acknowledging the profound changes that have occurred over the past few years that will continue to transform the MHS culture.

Through the Panel's recommendations, the MHS has the opportunity to develop market-specific strategies and business/operations plans to identify IDS and facility requirements; continue to create an IDS in the NCR; more effectively integrate technology into its operations and medical facilities; and implement a systematic evidence-based design evaluation process. The MHS is on an ambitious quest to become a high-reliability IDS, a strategy that should drive the function and subsequent form of its facilities.

Table 12. Final Report Findings and Recommendations

The Independent Review Panel on Military Medical Construction Standards Final Report Findings and Recommendations	
Section 2.0: Develop and Implement a Military Health System Strategic Plan	
Finding 1: The Military Health System's goal is to become an integrated military health system using a federated model. Given its collective private sector experience, the Panel has found that federated models are quick to implement, but slow to achieve strategic objectives, such as the Quadruple Aim—increased readiness, better care, better health, and lower cost. The federated model relies more on cooperation and collaboration than on ownership and control, which is found in more fully integrated models, to achieve performance and accountability objectives. This requires greater focus and attention on developing and implementing standardized performance metrics and requiring leader accountability for achieving those metrics at every level of the organization, from the most senior executive to the manager of each clinical service in every hospital and ambulatory clinic.	**Recommendation 1:** As part of its transformation to become an integrated health system using the federated model, the Military Health System should: A. Within the next 12 months, finalize and implement a strategic/enterprise-wide plan to drive transformation and unity of effort to realize the Quadruple Aim at every level of the Military Health System organization. B. On a quarterly basis, aggressively monitor progress and accountability in achieving these goals and, based on these results, adjust business plans and operational decisions, current facility utilization, and future facility requirements as needed to achieve the Quadruple Aim. C. Align health care capital investments with the strategic/enterprise-wide plan being developed by the Military Health System.
Finding 2: The Military Health System aspires to become a high reliability organization, which depends on many variables to support safe and reliable care, including facility design, operations, and maintenance. However, the Military Health System has failed to implement mandatory reporting of contributing environmental factors in the current Military Health System Patient Safety Reporting Tool, which is not consistent with the characteristics and methods of high reliability organizations.	**Recommendation 2:** The Military Health System should: A. Incorporate facility design, operations, and maintenance activities into its efforts to become a high reliability organization, as they represent key, but often unconsidered, variables in the provision of safe and reliable care. B. Require the mandatory reporting of contributing environmental factors as a component of the Military Health System Patient Safety Reporting Tool. C. Include contributing environmental factors data as a component of routine performance improvement activities at military treatment facilities for a systems-wide perspective to improve facility standards and criteria. D. Continuously evaluate how facility design, operations, and maintenance activities help the Military Health System become a high reliability organization.
Finding 3: Care provided in the direct care component is significantly more expensive than care purchased in the marketplace. Underutilization of facilities in the direct care environment appears to contribute to this cost imbalance. For example, operations and maintenance of facilities that are idle have inherent costs and are part of the cost burden. Sustaining this level of cost inefficiency will be a challenge as pressures increase on the DoD budget.	**Recommendation 3:** Without compromising essential Quadruple Aim objectives, the Military Health System should: A. Rapidly transition away from the current federated model towards a true integrated delivery system, with its related ownership and control characteristics, as a means to address cost imbalances. Should the Military Health System decide to retain the current federated model with its cooperation and collaboration characteristics, then more aggressive actions will be required by senior leaders to address cost imbalances at every level across the Military Health System. B. Establish comprehensive facility utilization metrics as a component of the Military Health System Performance Management System. Recognizing that lower cost is one of the Quadruple Aims, senior leaders should set specific cost improvement standards, and related metrics, for the Military Health System enterprise-wide and develop a strategy of targeted specific actions to meet the standards within two years. C. Examine how facility underutilization and other potential sources of imbalances in the allocation of care delivered among the direct care and purchased care components contribute to cost efficiency and inefficiency, mindful that essential Quadruple Aim objectives must be achieved beyond just cost economy.

The Independent Review Panel on Military Medical Construction Standards Final Report Findings and Recommendations	
Finding 4: Recent military construction investments were based on prior and unrealized planning assumptions and business plans that have resulted in state-of-the-art, but overbuilt and underutilized, facilities. These underutilized facilities contribute to increased direct care costs and undermine the Military Health System's Quadruple Aim goal of lower cost. Although the newly created Defense Health Agency includes a shared services medical facilities component, the planning and programming process for constructing medical facilities is still a lengthy one, which requires updating workload and demand assumptions that drive the ultimate size and scope of new or modified medical facilities to realize a better return on investment.	D. Maximize facility resource utilization and optimal allocation of care delivery activities among the direct care and purchased care components for holistic achievement of objectives (economic and otherwise) as key components of integrated delivery system planning and execution. E. Manage the care delivery portfolio with greater agility to better coordinate resources, settings, and methods for delivering care and consolidate, modify, or close facilities to reduce excess facility capacity and uneconomic cost burdens, where appropriate. **Recommendation 4:** The Military Health System should rigorously refine future-oriented clinical and business plans that drive medical facility investments and execute and evaluate these plans using an integrated delivery system approach to more effectively align resources with enterprise-wide strategic goals and objectives.
Finding 5: Cultural transformation is required for the Military Health System to become a world-class integrated delivery system. The separate cultures of the Services and the Defense Health Agency challenge efforts to achieve strategic direction, enterprise-wide accountability, and unity of effort. In the current environment, investment decisions, duplication of resources, and efforts to maintain separate cultures and organizational structures remain a daunting leadership challenge. Innovation competency provides a fundamental tool to fuel the Military Health System transformation so that the organization avoids using yesterday's solutions for tomorrow's problems. Although there are pockets of innovation, the Military Health System lacks a comprehensive, enterprise-wide, and integrated approach to innovation essential to fully realizing the Quadruple Aim.	**Recommendation 5:** The Military Health System should: A. Invest in a comprehensive, enterprise-wide, and integrated commitment to a culture that promotes and values innovation at every level of the organization. This will require consistent senior leader engagement to eliminate the "status quo" mentality, implement a culture that values and honors innovation, and create an environment that encourages continuous learning and improvement. Leaders must assume responsibility for adopting a structured approach to innovation. B. Establish a robust tri-Service innovation program to fuel transformation by developing and testing uniform standards, processes, and measures for implementation across the Services and the Defense Health Agency to achieve shared strategic goals, recognizing this requirement is particularly critical in times of senior leader turnover. While honoring the importance of Service-specific traditions, leaders must adopt an enterprise-wide, targeted focus on key performance metrics, empower a culture of innovation, and learn to actively use this critical tool to realize the Quadruple Aim and a world-class health care system.
Finding 6: Military treatment facilities serve as important medical readiness platforms, where teams train using the skills necessary to support the full range of military operations around the world. Comments made during briefings the Panel received during visits to military treatment facilities suggested there may be an insufficient diversity of challenging clinical cases to adequately support graduate medical education programs and maintain clinical wartime readiness skills for the health care team. In addition, the Panel learned that for at least one new hospital, the planned personnel distribution that was used to size the facility did not occur, resulting in significant underutilization of this state-of-the art facility.	**Recommendation 6:** Successful facility planning and programming ultimately depends on assignment of planned medical staff and graduate medical education programs. Therefore, in order to achieve its strategic goals the Military Health System should: A. Create a medical tri-Service human capital distribution plan that includes graduate medical education and other military medical training programs to support team-based combat casualty care training. B. Effectively utilize available medical facility capacity, where appropriat C. Evaluate manpower planning and distribution assumptions used in each project's space programming and then use the results to inform future facility planning and programming standards and criteria so the Military Health System can avoid constructing facility capacity that is in excess of projected demands, which is not consistent with achievement of the Quadruple Aim.

The Independent Review Panel on Military Medical Construction Standards Final Report Findings and Recommendations	
Section 3.0: Continue to Create an Integrated Delivery System in the National Capital Region	
Finding 7: The National Capital Region uses two separate and distinct organizational models for managing care in the National Capital Region: first, a fully integrated model (ownership and control) under the Defense Health Agency (DHA) with command, control, and sole budgetary authority for 2 hospitals and 5 clinics; and second, an enhanced authority model (cooperation and collaboration) under the three Services that retain their command, control, and separate budget authority for 12 additional military treatment facilities. The National Capital Region is one of six enhanced Multi-Service Markets in the Military Health System. The other five enhanced Multi-Service Markets continue to use a federated organizational model. The Defense Health Agency led portion of the National Capital Region represents a first step in the MHS's journey to become a fully integrated delivery system.	**Recommendation 7:** The Military Health System should: A. Implement efficient and effective mechanisms for appropriately shifting money, personnel, and other resources among military treatment facilities to optimize direct care and purchased care services, while reducing costs within their regions to achieve the Quadruple Aim. B. Create a successful world-class integrated delivery system for Department of Defense beneficiaries for the portion of the National Capital Region and the other five enhanced Multi-Service Markets that currently use the federated model, which relies on cooperation and collaboration rather than ownership and control. C. Continuously evaluate the results of the current National Capital Region enhanced Multi-Service Market model and the other five enhanced Multi-Service Markets to determine which are the most successful in achieving the Quadruple Aim and other strategic objectives.
Finding 8: The National Capital Region Medical Directorate and the Senior Military Medical Action Council have approved the Walter Reed National Military Medical Center Addition Alteration Project, as required to replace critical infrastructure and to complete the *Comprehensive Master Plan for the National Capital Region Medical*'s recommendations regarding creating world-class medical facilities in the National Capital Region.	**Recommendation 8:** The Military Health System should expeditiously complete the Walter Reed National Military Medical Center Addition Alteration Project to fulfill one of the *Comprehensive Master Plan for the National Capital Region Medical*'s recommendations regarding world-class facilities in the National Capital Region and to replace critical infrastructure.
Finding 9: The National Capital Region has yet to achieve the full potential of an integrated system of health care delivery with world-class medical facilities, as required by the *Comprehensive Master Plan for the National Capital Region Medical*, as workload is 50 to 60 percent of capacity and direct care outpatient and inpatient costs are significantly higher than purchased care costs.	**Recommendation 9:** Senior leaders of the Military Health System should: A. Focus attention on creating a highly reliable integrated system of care for both the direct care and purchased care components throughout the entire National Capital Region to realize strategic and business plan targets that underpin the Walter Reed National Military Medical Center Addition/Alteration Project investment and to achieve the Quadruple Aim. B. Evaluate the results of the National Capital Region model compared to other enhanced Multi-Service Markets and make the appropriate modifications to create a robust integrated delivery system with a high level of standardization and uniformity across the Military Health System to achieve the Quadruple Aim.

The Independent Review Panel on Military Medical Construction Standards Final Report Findings and Recommendations	
Section 4.0: Effectively Integrate Technology into Operations and Medical Facilities	
Finding 10: Emerging technology platforms and reengineered clinical and administrative work processes affect facility planning criteria, investment decisions, and facility asset utilization. Previously, major Military Health System facility and information management/ technology planning and investment decisions were not fully integrated.	**Recommendation 10:** The Military Health System should integrate information management/technology and facility funding, policies, standards, and outcome measurements, including non-facility-based care alternatives, to inform facility planning and programming standards and criteria to maximize returns on information technology and facility investments.
Section 5.0: Implement a Systematic Evidence-Based Design Evaluation Process	
Finding 11: The Military Health System is commended as a health care industry leader in its use of evidence-based design to inform the planning and programming, construction, and maintenance of facilities. However, the Panel found variability in the selection of evidence-based design features for recently constructed facilities without accompanying documented rationale for the differing design decisions. The Panel also found that the purpose and use of the design features are not always consistently and continuously communicated to the end users to enable them to understand and benefit from these investments.	**Recommendation 11:** The Military Health System should: A. Systematically document the rationale for all design decisions, including the research findings that explain and justify significant variation in design strategies. B. Consistently and continuously communicate the existence and purpose of these design features to the end users so they and their patients can benefit from these investments.
Finding 12: Although the Military Health System is a leader in its use of evidence-based design, it has yet to evaluate how evidence-based design features, especially those that relate to safety problems such as health care-associated infections, as well as patient experience, staff safety, environmental safety, and cost, impact health care outcomes in recently constructed facilities. It is the Panel's view that outside of the facility community there is little understanding and appreciation of the role that the facility and its design play in the achievement of targeted health care outcomes associated with the Quadruple Aim.	**Recommendation 12:** To evaluate the impact of evidence-based design intervention on key health care outcomes, the Military Health System should: A. Integrate facility variables in routine military treatment facility level and enterprise-wide performance improvement activities by developing a process for collecting and measuring key evidence-based design-related outcome metrics. B. Commit adequate resources to conduct a standardized post-occupancy evaluation for all major capital investments between one to two years after facility occupancy. C. Provide needed adjustments and revisions to facility standards and criteria to better inform future design decisions, based on the results of these efforts.
Finding 13: Major initiatives or acquisitions, such as the use of evidence-based design, require special efforts so that their effective use permeates large organizations like the Military Health System. Although the Defense Health Agency Facilities Division has adopted evidence-based design, the Military Health System lacks the enterprise-wide policies and procedures, staff education and training programs, leader development and personnel support, and processes and data needed to fully realize its benefits and maximize the investment. An example includes lack of a Military Health System-wide, comprehensive patient handling and movement program to take advantage of the ceiling mounted lifts included in recently constructed facilities to help reduce injury to patients and staff.	**Recommendation 13:** The Military Health System should institutionalize the use of evidence-based design features through the evaluation and, as appropriate, the revision of applicable policies and procedures, staff education and training programs, leader development and personnel support, and processes and data so that evidence-based design features are used as intended to improve health care outcomes and maximize the return on investment.

Section References

2. U.S. Department of Defense. *Military Health System Review: Final Report to the Secretary of Defense.* August 29, 2014.

Appendix A. Guiding Principles

Across the continuum of health care delivery, facilities set the stage for every patient experience and all services provided. America's sons and daughters who defend our Nation deserve world-class facilities within which they receive world-class health care. Achieving this worthy goal requires focused leadership and an organizational culture that embraces both patient-centered principles along with evidence-based patient care processes and infrastructure investments. Collectively, these characteristics allow for quality patient, staff, and organizational outcomes. Health care professionals must be well trained and practiced in the latest advances in care delivery in all settings; information technology systems must seamlessly integrate daily operations to support timely and accurate delivery; and medical facilities must provide a sustainable and healing environment that does not contribute to patient or staff harm, but rather enhances the patient and family member experience and provides positive working conditions for the health care team. During the past 10 years, the Department of Defense (DoD) embarked on an ambitious program to improve its facility and technology infrastructure. It is now poised to evaluate the impact of these investments on desired outcomes, including its unique care delivery solution in the National Capital Region (NCR), and to encourage current military construction standards to be aligned with industry benchmarks.

Background Information: Several key legislative actions have had a transformative effect on the Department of Defense's ability to deliver care over the past decade. The 2005 Base Closure and Realignment Commission (BRAC) recommended realigning Walter Reed Army Medical Center with National Naval Medical Center, establishing it as the new Walter Reed National Military Medical Center in Bethesda, Maryland, providing all complex care for both the region and as a world-wide referral facility, and relocating all non-tertiary (primary and specialty) patient care functions to a new community hospital at Fort Belvoir, Virginia. Section 2721 of the Duncan Hunter National Defense Authorization Act (NDAA) for Fiscal Year 2009 recommended that beneficiary personnel living in the NCR deserve to be treated in world-class medical facilities. The Defense Health Board's (DHB's) NCR BRAC Health Systems Advisory Subcommittee (HSAS), in its 2009 report *Achieving World Class – An Independent Review of the Design Plans for the Walter Reed National Military Medical Center and the Fort Belvoir Community Hospital*, defined the operational characteristics of a world-class medical facility. Section 2721 (a) of the FY 2010 NDAA required a comprehensive master plan be developed and implemented to provide sufficient world-class military medical facilities and an integrated system of health care delivery for the NCR. Section 2852 (b) of the Ike Skelton NDAA for FY 2011 required that an independent advisory panel provide advice and recommendations regarding a construction standard for military medical centers to provide a single standard of care.

Context: The Military Health System (MHS) has faced multiple challenges over the past decade in providing medical care to its Service members and beneficiary population. These challenges included deploying a medically ready force fighting two wars, reorganizing governance functions, implementing enterprise-wide

common business processes, and creating shared services in a more integrated delivery system. Further complicating matters in an ever-changing health care landscape are new regulatory stipulations, technology advancements, security requirements constraints, budgetary pressures, and base realignment and closure requirements. With each challenge, the MHS leadership responded diligently, taking decisive actions to address opportunities and mitigate risks.

World-Class Medical Facilities: In 2009, the DHB NCR BRAC HSAS defined the characteristics of a world-class medical facility, which consists of six domains including: basic infrastructure, leadership and culture, processes of care, performance, knowledge management, and community and social responsibility. A world-class medical facility must meet the 18 conditions specified in the 6 domains, including the four conditions found within the basic infrastructure domain: (1) Attain and maintain all accreditations and certifications that satisfy licensure and other statutory and regulatory requirements; (2) Provide comprehensive and definitive acute health care services in an integrated and coordinated manner that meets patient needs from birth through end of life; (3) Maintain a high degree of facility readiness; and (4) Assure caregivers and other staff are prepared to perform competently and appropriately.

The design and physical structure of a medical facility can substantially affect the efficiency and effectiveness of the delivery of care. That is why it is critical that evidence-based design and construction principles must be applied and utilized in developing state-of-the-art treatment facilities. In order to achieve world-class recognition within its military treatment facilities (MTFs), leadership must pursue excellence in multi-dimensional domains that are constantly evolving. Once achieved, world-class status cannot be viewed as an end point, but rather as a continuing pursuit of ever-changing processes.

Overarching Principle: The members of the Panel are charged with providing independent advice and recommendations on the following five issues found in Section 2852 (b) of the Ike Skelton FY 2011 NDAA: (1) Review the unified military construction standards and comparing them with industry practices and benchmarks; (2) Review DoD ongoing construction programs to ensure that medical construction standards are being uniformly applied; (3) Assess DoD's planning and programming approach for facility improvements; (4) Assess the Comprehensive Master Plan; and (5) Make recommendations to the master plan in order to ensure the provision of world-class military medical centers and delivery system in the NCR.

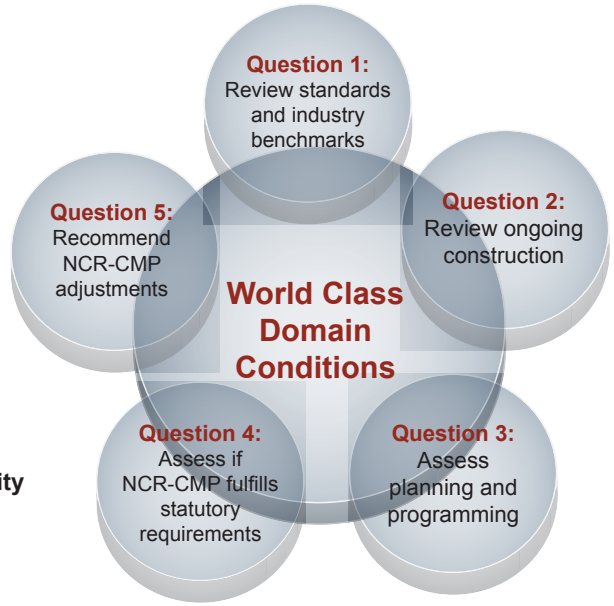
Panel members adopted the following definition of a world-class medical facility to guide their work:

> A *world-class medical facility* is one where the best of the art and science of medicine come together in a focused effort to meet the needs of the patient by providing the best in physical, mental, social and spiritual care. A *world-class medical facility* routinely performs at the theoretical limit of what is possible and consistently and predictably delivers superior healthcare value – i.e., high quality care and optimal treatment outcomes at a reasonable cost to the patient and society.[3(p.B-1)]

Building upon the work of the 2009 DHB Subcommittee, Panel members will use the world-class medical facility's 6 domains and 18 conditions as a framework to shape their analysis, advice, and recommendations in response to the five congressional issues, as depicted below.

World Class Domains:

1. **Basic Infrastructure**
2. **Leadership and Culture**
3. **Processes of Care**
4. **Performance**
5. **Knowledge Management**
6. **Community and Social Responsibility**



Guiding Principles: Panel members also adopted seven specific guiding principles. These principles require that the Panel's advice and recommendations, when taken as a whole, indicate:

1. World class is not viewed as an end point, but rather as a pursuit of multidimensional processes that constantly evolve over time.
2. Clinical care requires a systems-wide approach across the continuum of care for which excellence is measured using meaningful outcomes.
3. MHS strategic goals, including integration, virtualization, population health promotion, and personalization, will shape facility investments.
4. Striking a balance between innovation and affordability is required to optimize health care services and infrastructure investments.

5. The development and approval of facility, information management, and technology investments must be integrated using an evidence-based design framework in order to maximize the return on investment, as measured through the achievement of MHS strategic outcomes.
6. Best health care practices found in the federal, private, and international sectors will be shared.
7. The enterprise-wide improvements accomplished by the MHS over the past decade will be properly acknowledged.

The Panel has been charged with developing recommendations to ensure that the medical facilities serving the Services are world class in their design and construction. Its reports and recommendations are made with the intent and hope that the users of DoD facilities are provided with the best possible medical care in the world. However, as the health care design and construction industry is continually evolving, we cannot ensure, warrant, or guarantee world-class outcomes or that the recommendations provided by the Panel are perfect, will be implemented without error, or cannot be improved upon in the future.

Appendix B. Annual Progress Report Executive Summary

The Department of Defense's (DoD's) Military Health System (MHS) has undergone significant transformation over the past decade as a result of myriad challenges and opportunities, which included supporting and deploying a medically ready force fighting two wars, reorganizing governance functions, implementing enterprise-wide common business processes, and creating shared services in a more integrated fashion. During this dynamic period, the MHS continued providing quality medical care to its Service members and beneficiary population. At the same time, the health care industry was being reimagined and reconfigured in response to health care reform legislation and advances in technology to achieve the national quality improvement goals of better care, healthy people and communities, and affordable care;[146] a journey that continues today. The impacts of these significant changes have the potential to redefine world-class health care facility requirements and supporting standards, since form should always follow function.

The general recommendations contained in this annual progress report are designed to provide the Department with opportunities for enterprise-wide improvements that can be used to drive systematic, positive change, and facility requirements, which should be based on strategic and business goals that reflect the MHS's recent transformation. The Independent Review Panel on Military Medical Construction Standards (Panel) recommends that the MHS update the 2010 *Comprehensive Master Plan* as quickly as possible to reflect current MHS strategy, business plans, and technological advances to help achieve strategic goals and targeted outcomes.

The Panel encourages the MHS to continue shaping its future with an emphasis on health; employ a strategic vision that reaches beyond world-class facilities; and focus on a world-class integrated delivery system (IDS).

The imperative for this new direction seems clear: change in health care is happening at an unprecedented pace and on a scale that touches every aspect of the health care industry. Current legislative mandates have prioritized the quality of care over the volume of care provided, with renewed focus on affordable services that result in healthy individuals and communities. Health care technology advances provide new virtual or non-facility based options for care delivery, disrupting the strategic planning that represents the first step in determining health care facility requirements and standards. As a result, facility and information management and technology infrastructure investments and standards should be determined, executed, and evaluated together. Changes in health care require leaders to think outside the traditional facilities-based platform to establish a high reliability IDS.

As the MHS evolves in its efforts to become an IDS that rivals other high reliability, top performing health care systems, it should continue to adapt to environmental, scientific, and technological changes; align itself with industry and evidence-based design best practices; and continue to focus on providing safe, high quality, accessible, and affordable patient care. The Panel commends the MHS for the progress it has made so far during its transformational journey. However, in its quest to become a top-tier health care system,[2] where average is unacceptable,[147] the DoD should also focus on the continuous improvement of its facility requirements and supporting standards, using better analytics to understand and improve the role that facilities play in the delivery of quality and affordable care.

Charge to the Independent Review Panel on Military Medical Construction Standards

Section 2852 of the Ike Skelton National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2011 required the establishment of an Independent Review Panel on Military Medical Construction Standards (Panel) whose objectives and scope of activities include the provision of advice and recommendations regarding a construction standard for military medical centers to provide a single standard of care. Specifically, the Panel's charges include:

(A) Reviewing the unified construction standards established pursuant to subsection (a) to determine the standards [*sic*] consistency with industry practices and benchmarks for world class medical construction;

(B) Reviewing ongoing construction programs within the Department of Defense to ensure medical construction standards are uniformly applied across applicable military medical centers;

(C) Assessing the approach of the Department of Defense approach [*sic*]

to planning and programming facility improvements with specific emphasis on –

(i) Facility selection criteria and proportional assessment system; and

(ii) Facility programming responsibilities between the Assistant Secretary of Defense for Health Affairs and the Secretaries of the military departments [*sic*];

(D) Assessing whether the *Comprehensive Master Plan for the National Capital Region Medical*, dated April 2010, is adequate to fulfill statutory requirements, as required by section 2714 of the Military Construction Authorization Act for Fiscal Year 2010 (division B of Public Law 111-84; 123 Stat. 2656), to ensure that the facilities and organizational structure described in the plan result in world class military medical centers in the National Capital Region; and

(E) Making recommendations regarding any adjustments of the master plan referred to in subparagraph (D) that are needed to ensure the provision of world class military medical centers and delivery system in the National Capital Region.[1]

The Panel was charged with providing to the Secretary of Defense, not later than 120 days after its first meeting, an initial report containing an assessment of the adequacy of DoD's plan to address the above items and the Panel's recommendations to improve the *Comprehensive Master Plan*.[1] The initial report was delivered on June 5, 2014 and can be found at the following link: https://database.faca.gov/committee/historyreportdocuments.aspx?flr=15308&cid=2450&fy=2014.

The Panel also was charged to provide an annual report on the Panel's findings and recommendations to address any identified deficiencies each February 1 until the termination of the Panel. This report is the first annual progress report of the Panel and provides an overview of the Panel's findings and recommendations based on its work to date.

About the Report

The annual progress report is organized in the context of a typical facility project life cycle. The facility life cycle begins with strategic planning and programming activities, followed by design, construction, commissioning, and on-going operational activities. Following this approach, the report addresses Charge C, Approach to Planning and Programming Facility Improvements, first, followed by Charge A, Consistency of Unified Construction Standards with Industry Practices and Benchmarks. Charges B, D, and E complete the report.

The Panel approached each of the five FY 2011 NDAA duties described above using the following three key frameworks:

- The *world-class medical facility* definition, which was developed as part of the work of the NCR Base Realignment and Closure Health Systems Advisory Subcommittee of the Defense Health Board in May 2009, shaped the Panel's analysis, advice, and recommendations. The definition includes 18 conditions in 6 domains that must be met for a medical facility to be considered world-class: (1) Basic Infrastructure; (2) Leadership and Culture; (3) Processes of Care; (4) Performance; (5) Knowledge Management; and (6) Community and Social Responsibility.
- Seven Guiding Principles, created and adopted by the Panel, established the foundation for its work, reflected the Panel's core beliefs, and provided a lens through which the Panel established goals and developed recommendations.
- The components of the MHS Quadruple Aim, increased readiness, better care, better health, and lower cost, guided the Panel's inquiries.

Findings and Recommendations

The MHS has made significant progress toward improving the quality, access, and safety of the health care it provides, while also maintaining military medical readiness, improving health, and lowering costs. These advances include establishing the Defense Health Agency (DHA) and its shared services, forming six enhanced Multi-Service Markets (eMSMs), pursuing an enterprise-wide approach to modernizing and optimizing the MHS, developing plans to recapture workload and increase productivity, and emphasizing the importance of creating world-class medical facilities. This progress has occurred in the face of a rapidly evolving health care industry and is the result of fundamental changes in thinking, dedicated leadership, and the continued integration of the Services. The work of the DHA Facilities Division has been a positive force in the MHS and includes integrating evidence-based design in the construction of medical facilities, creating the World-Class Checklist and Toolkit, and continuing to develop and maintain standards and criteria for the facility life cycle.

To address the five charges outlined in the NDAA, the Panel visited several military treatment facilities (MTFs) to understand the differences in creating world-class facilities under a variety of circumstances and during various phases of construction. Based on the information analyzed for this annual progress report, the Panel found that DoD's facility standards are consistent with the industry and in many ways lead the industry with their use of evidence-based design across the facility life cycle as a tool to help improve health care outcomes. The Department is to be commended for its extensive work in the pursuit of world-class facility criteria and goals and other major initiatives to optimize facility investments in support of the MHS Quadruple Aim. However, a number of MHS system enhancements remain to be realized, and then used, to further drive facility standards refinement. As the MHS strives to become a high reliability organization based on continuous performance improvement, it should analyze the impact of the environment, which shapes patient experiences and the care provided. This analysis should be used to refine facility standards and realize a maximum return on these investments. It appears certain practices, structures, and processes are barriers to an enterprise-

wide approach to facility planning and programming and contribute to a lack of understanding about the effect of certain design decisions on health outcomes. Future facility standards, requirements, and investments should be integrated with information management and technology infrastructure standards, requirements, and investments.

Although the MHS has made great strides, the Panel has observed the outcomes associated with previous decisions, policies, guidelines, and business models that are no longer supportive of current MHS goals and objectives. Since the creation of new facilities represents one of the largest, longest-lasting capital investments the MHS makes, the MHS should continue to evolve toward a world-class IDS to optimize its approach to planning and programming facility improvements, reduce underutilization, and maximize the use of its facility resources. Furthermore, due to the rapid evolution of health care models and technology during a time of dynamic health care reform and transformation, developing and maintaining up-to-date facility standards is particularly challenging, especially while also striving to achieve quality, safe, and affordable care. Future facility standards, requirements, and investments should be refined based on the routine evaluation of EBD features on targeted patient, staff, and resource outcomes, as an integral component of the MHS's and Services' performance improvement programs. Finally, as mentioned above, when the *Comprehensive Master Plan for the National Capital Region Medical* was published in 2010, it met the requirements to ensure that the facilities and organizational structure resulted in world-class medical centers, but now requires an update to reflect current and future MHS strategy, business plans, technology, and health care outcome goals. The Panel makes the following specific findings and recommendations based on information received to date, which will be further crystallized in the Final Report.

The Independent Review Panel on Military Medical Construction Standards Annual Progress Report Findings and Recommendations	
Charge C: Department of Defense Approach to Planning and Programming Facility Improvements	
Finding 1: Although the Military Health System (MHS) is evolving as a newly formed integrated delivery system (IDS), planning and programming for past military construction (MILCON) investments was often driven by Service strategies that did not always reflect the MHS's newly adopted IDS model and did not always result in full facility asset utilization. Specifically: a) Individual health care facilities, rather than an IDS model, were the framework for the 2009 definition of a world-class facility. b) The full continuum of care is not led by a single organization focused on serving the local population at the most appropriate site of care. c) Enhanced Multi-Service Markets (eMSMs) lack a single command and control structure with single budgetary authority for all military treatment facilities (MTFs) in their region, which complicates facility investment requirements and life-cycle management. d) eMSM MTFs do not always share administrative and support services, which would enable consolidation and reduce programming requirements.	**Recommendation 1:** The MHS should: a) Expand its IDS definition and framework to include a description of a high reliability care delivery organization that reflects direct and purchased care services, its core services, resource requirements, concepts of operation, and expected health care outcomes, which are then used to drive planning and programming facility requirements. Specifically, this IDS framework should: 1) Be developed by MHS clinical leaders and experts, rather than by facility design professionals. 2) Use single command, control, and budgetary authority to drive the facility requirements and planning processes by establishing a process for integrated facility life-cycle budget requirements with IDS fiscal accountability to better inform facility investment requirements. b) Expand and refine the current world-class medical facility definition and its supporting domains and conditions to be consistent with a world-class IDS structure and to promote broader strategic thinking, planning, and resource management.
Finding 2: The Panel observed that all seven of the MTFs they visited were not operating at full capacity. The DoD Space Planning Criteria for most of the primary and specialty clinics that require outpatient exam rooms were recently updated to reflect a model similar to that used in the private sector. The MTFs visited by the Panel were all programmed using the previous criteria, which may have overstated capacity requirements.	**Recommendation 2.1:** The MHS should continue to update DoD Space Planning Criteria to reflect current industry best practices. **Recommendation 2.2:** The MHS should establish asset utilization standards, based on enhanced Multi-Service Market (eMSM) business plans that use a medical tri-Service staffing distribution model, which are consistent with industry standards and applied in the planning process to reduce underutilized facility assets. **Recommendation 2.3:** The Defense Health Agency (DHA), together with the Services, should analyze low-volume service lines and adjust facility planning and programming criteria accordingly. **Recommendation 2.4:** The MHS should examine and refine facility planning and programming standards to reflect current thinking about the planned recapture of purchased care, in alignment with eMSM business plans.
Finding 3: Frequent changes in health care personnel requirements, distribution, and availability confound facility planning and programming standards and criteria.	**Recommendation 3:** The Services should develop a medical tri-Service human capital distribution plan to assist with development of more accurate facility planning and programming standards.

The Independent Review Panel on Military Medical Construction Standards Annual Progress Report Findings and Recommendations	
Finding 4: Graduate medical education (GME) program distribution represents an important facility planning and programming variable, as the maintenance of medical skills requires access to certain quantities and types of cases.	**Recommendation 4.1:** To realign and optimize MHS GME programs, the MHS should conduct an enterprise-wide GME-specific modernization study which addresses the quantity and type of cases needed to maintain health professional skills, including medics and corpsmen, while considering the best locations for the provision of GME given population demand and facility assets.
	Recommendation 4.2: The MHS should review the case mix volume and complexity requirements established by the Accreditation Council for Graduate Medical Education as a component of the planning standards for each service line included in a facility project.
Finding 5: MHS Centers of Excellence, such as the U.S. Institute for Surgical Research Burn Center, the Center for the Intrepid, and the National Intrepid Center of Excellence, are essential for readiness skills training.	**Recommendation 5:** The MHS should: a) Identify all centers of excellence essential to GME and readiness training as a variable in facility investment prioritization and asset utilization standards; and b) Consider a hub and spoke model using individual centers of excellence to help providers maintain their competencies.
Finding 6: The uneven and complex nature of past MILCON funding resulted in significant issues. For example: a) Base Realignment and Closure (BRAC) and MILCON facility funding restrictions and the complex MHS budget structure complicated efficient and effective planning and programming across the facility life cycle; and b) Phased funding hinders medical facility construction, resulting in potential issues with regard to operational resource requirements and project budget, schedule, and facility life-cycle maintenance.	**Recommendation 6.1:** The MHS should work with appropriate stakeholders associated with any future BRAC legislation that results in a more holistic, cost-efficient approach to planning, design, and construction.
	Recommendation 6.2: The MHS should: a) Request authority to use incremental funding from Congress whenever possible, consistent with best practices in the private sector; and b) Comprehensively manage projects, when phased funding is deemed necessary, to coordinate work between project phases to avoid unnecessary costs, schedule delays, and long-term facility life-cycle costs and issues.
Finding 7: DoD has made significant progress delineating and streamlining MILCON planning and programming responsibilities between DHA and the Services by creating DHA shared facility services.	**Recommendation 7:** The MHS should continue its work to streamline MHS MILCON planning and programming responsibilities using benchmark industry practices.
Finding 8: The MHS replaced the proportional assessment system with the Capital Investment Decision Model (CIDM), which continues to require refinement to help yield a high reliability IDS.	**Recommendation 8:** The MHS should continue to refine CIDM to better forecast demand. Specifically, the MHS should: a) Align the planning and prioritization of projects based on an IDS market strategy that supports MHS strategic goals; b) Base programming on forecasted utilization instead of staffing models, as reflected in the recently updated DoD Space Planning Criteria by DHA and the Services; and c) Examine and refine surge-capacity related standards.

The Independent Review Panel on Military Medical Construction Standards Annual Progress Report Findings and Recommendations	
Charge A: Consistency of Unified Construction Standards with Industry Practices and Benchmarks	
Finding 9: DoD standards are generally consistent with those found in industry. While seeking to embrace new industry-driven evidence-based design solutions, DoD faces the challenge of maintaining standards that respond to the rapidly evolving health care environment.	**Recommendation 9.1:** To respond to the rapidly evolving health care environment, DoD must continue to actively partner with key military and civilian stakeholders organizations and should: a) Continue developing formal partnerships with federal and industry organizations to streamline resources required to create and maintain standards; and b) Continue collaborating with the Department of Veterans Affairs and consider maintaining a single set of standards to reduce duplication of effort.
	Recommendation 9.2: The MHS should evaluate the use and effectiveness of flexibility tools found in the design and construction standards, such as use of interstitial building space and shelled-space to enable cost-effective facility modifications over the life cycle.
	Recommendation 9.3: The MHS should: a) Develop a collaborative process by engaging industry partners to expeditiously refine or create standards in response to major health care practice changes and challenges; and b) Identify and import the benefits of innovation, technology advances, and evidence-based research into DoD design and construction standards.
Finding 10: The MHS has embraced the world-class framework by using innovative evidence-based design (EBD) strategies to support standards development, but has not evaluated the impacts of these standards and design decisions on health care outcomes.	**Recommendation 10:** The MHS should evaluate the impact of innovative EBD solutions on key health care outcomes and financial measures, including affordability across the facility life cycle to refine standards and criteria.
Finding 11: Information management/information technology (IM/IT) provides the backbone for world-class care delivery, enabling the provision of non-facility based health care services. However, there is no indication that new virtual care alternatives have influenced the size of the facilities being built in the MHS. DoD facility and IM/IT standards and policy require greater integration in order to maximize investments.	**Recommendation 11.1:** The MHS should continue the work of the Facilities, Logistics, Information Technology Collaboration Group to integrate facility and IM/IT funding, policies, standards criteria, and outcome measurement, including identifying patient, staff, and resource measures to evaluate operational success.
	Recommendation 11.2: MHS clinicians, along with IM/IT and facility experts, should identify non-facility based care options within the continuum of care and then refine facility standards and criteria accordingly.
Finding 12: The current DoD Information Assurance Certification and Accreditation Process is an impediment to the full use of medical IM/IT systems and equipment capabilities, thus resulting in workaround processes for newly purchased systems and equipment needed to provide world-class health care services to beneficiaries and a poor return on investment.	**Recommendation 12:** DoD should review and improve current IM/IT security requirements for medical equipment and systems to allow full utilization of these expensive investments.

The Independent Review Panel on Military Medical Construction Standards Annual Progress Report Findings and Recommendations	
Charge B: Uniform Application of Medical Construction Standards in Ongoing Construction Programs	
Finding 13: The DoD employed a variety of new acquisition strategies during the past decade of construction in order to improve project outcomes.	**Recommendation 13:** With key stakeholders, the DHA should evaluate this past decade's project acquisition strategies, including the evidence and analysis underpinning acquisition and project decisions as they impact budget, scope, and schedule outcomes, to refine associated DoD construction standards and criteria as appropriate.
Finding 14: The current MILCON project cycle length is longer than that in the private sector.	**Recommendation 14:** The MHS should streamline and shorten the MILCON project life-cycle processes with key stakeholders.
Finding 15: Frequent reassignment of military personnel over the course of a facility project often results in a loss of understanding of original building design intent, the evidence and thinking that underpinned project decisions, and lessons learned about the application and refinement of medical construction standards.	**Recommendation 15:** DoD should consider the balance, duration, and transition planning of the civilian, military, and contractor personnel assigned to a project to enable leadership continuity, complete decision-supporting documentation, and identify lessons learned and outcomes that can be used to refine standards and criteria.
Finding 16: The Panel identified intended and unintended variability in the application of standards. Understanding the impacts of such variability on health care and project management measures is key to the future refinement of the standards and criteria.	**Recommendation 16:** DoD should analyze standards application variability for planning, programming, design, construction, and commissioning decisions to refine standards and criteria.
Finding 17: The MHS is to be commended for the development of the infrastructure domain of the world-class medical facility definition; however, most MTFs visited by the Panel were unaware of the definition of a world-class medical facility, and the tools were not consistently deployed.	**Recommendation 17:** For the infrastructure domain, DHA should: a) Refine the World-Class Checklist based on validity and reliability testing as a performance enhancement tool; b) Streamline the tool for practical use during project decision-making; c) Develop a process and budget to keep the World-Class Toolkit current; d) Develop and implement a process for capturing the rationale for all design decisions, new research findings, and MHS post occupancy evaluation (POE) findings to explain and justify significant variation from the World-Class Checklist strategies; and e) Disseminate and institutionalize the use of the definition of a world-class medical facility, as well as the World-Class Checklist and Toolkit, across the MHS.
Finding 18: DHA is underway with the creation of a valid and reliable POE framework to assess the impact of design decisions on building systems and health care outcomes.	**Recommendation 18.1:** DHA should commit adequate resources to conduct a standard POE within one to two years after facility occupancy for major capital investments.
	Recommendation 18.2: DHA should use POE results and lessons learned to inform project decision making and refinement of standards and criteria.

The Independent Review Panel on Military Medical Construction Standards Annual Progress Report Findings and Recommendations	
Finding 19: The MHS lacks enterprise-wide policies and procedures to maximize the use and systemic evaluation of EBD features as a tool to improve health care outcomes.	**Recommendation 19:** The MHS should: a) Create a database that profiles variance in EBD features across newly constructed MTFs; b) Develop a routine process to collect key EBD-related outcome metrics at the MHS and MTF level as a component of routine quality improvement initiatives; and c) Evaluate the impact of EBD features on health care outcomes and care delivery processes using nationally defined outcome metrics.
Finding 20: The MHS's Facility Innovation and Research Model (FIRM) provides a research-based approach for evaluating health care outcomes, which may help inform DoD facility design standards, but there is lack of awareness about FIRM beyond the DHA Facilities Division, with no clear MHS-driven research agenda identified to direct research efforts in the areas of facility design.	**Recommendation 20:** The MHS should: a) Develop a DHA FIRM research agenda that supports continuous evaluation and improvement of DHA design criteria; b) Require FIRM to actively engage with the MHS Innovation Center so clinical leaders, policy makers, and facility leaders collaborate in the development of a research agenda that is driven by health care delivery requirements and innovation and corresponding facility innovations; and c) Provide the necessary resources to support MHS facility research.
Charges D and E: Adequacy of and Adjustments to the Comprehensive Master Plan	
Finding 21: The 2010 *Comprehensive Master Plan* was a critical element in assessing and coordinating the complex processes associated with the completion of multiple major construction projects, as well as merging of staff and cultures to create Walter Reed National Military Medical Center (WRNMMC) and Fort Belvoir Community Hospital (FBCH). It has been very successful in achieving these original goals. However, with subsequent changes in care delivery and the MHS governance structure, the *Comprehensive Master Plan* now is insufficient to meet its mandate of creating world-class military medical facilities and an integrated system of health care delivery in the NCR. To realize the new MHS enterprise strategic goals, an updated *Comprehensive Master Plan* is necessary.	**Recommendation 21.1:** The MHS should update the 2010 *Comprehensive Master Plan* to reflect: a) Single authority and budgetary control for all MTFs in the region; b) Full distribution of graduate medical education (GME) assets between WRNMMC and FBCH, which served as an important planning variable for the new FBCH, in order to provide community-based specialty care in Northern Virginia and further GME medical training experiences; and c) A plan to achieve full facility and staff asset utilization within the NCR. **Recommendation 21.2:** The *Comprehensive Master Plan* should be updated to reflect the National Capital Region-Medical Directorate(NCR-MD) eMSM strategic and business plan goals, current facility asset utilization, and future facility requirements, with the goal of developing a new strategic plan to transform the entire NCR-MD into a model IDS and high reliability organization.

The Independent Review Panel on Military Medical Construction Standards Annual Progress Report Findings and Recommendations	
Finding 22: Walter Reed National Military Medical Center's Addition Alteration (MCAA) project requires revalidation and funding to realize world-class facility status.	**Recommendation 22:** DHA should: a) Revalidate the appropriate care capacity, infrastructure, and support functions included in the MCAA project based on recently updated DoD Space Planning Criteria, changing venues of care delivery, plans to recapture care, and GME training requirements that maximize existing facility assets; and b) Following revalidation, proceed in an expeditious manner to complete the creation of a world-class medical center at Walter Reed.

Conclusion

The MHS finds itself in promising but challenging times as a consequence of ongoing national health care reform, the establishment of DHA with its shared facility services, and the shift toward an IDS model with a market-based approach that uses common business planning processes, all of which profoundly affect facility requirements, standards, and criteria. The Panel was impressed with the commitment and dedication of MHS leaders to realize Quadruple Aim goals through collaboration among DHA and the Services. Several recommendations in this report focus on necessary MHS-wide system enhancements and provide a framework for continuous performance improvement, the results of which should be institutionalized through the refinement of DoD facility standards. Though the Panel has recommended areas for improvement, it also has observed profound changes over the past few years, which will continue to transform the culture and care delivery in the MHS to achieve increasingly world-class care.

This annual progress report represents a snapshot of the Panel's current findings and recommendations, which we realize is incomplete with respect to answering all five of the congressional charges and may be refined based on receipt of additional information to address some of the concerns we have noted. In the time that remains before the Panel concludes its work and submits its Final Report on September 30, 2015, the Panel will continue to refine its recommendations. The Panel also will examine DHA and Services structure, processes, and outcomes that shape MHS facility infrastructure programming requirements. Since facility investments represent a costly, capital commitment and are an important tool in MHS's quest to become a high reliability, world-class health care system, it is critical that form should always follow function.

Appendix References

1. 111th Congress 2nd Session. Ike Skelton National Defense Authorization Act for Fiscal Year 2011. Pub. L. No. 111-383. 2011.
2. U.S. Department of Defense. *Military Health System Review: Final Report to the Secretary of Defense.* August 29, 2014.

146. U.S. Department of Health & Human Services. *Report to Congress: National Strategy for Quality Improvement in Health Care.* 2011.
147. Kime P. 'We cannot accept average,' surgeons general say. *Military Times,* 2014.

Appendix C. Summary of Panel's Response to Five Charges

This appendix illustrates which annual progress report and final report recommendations address each of the Panel's five charges. For example, the Panel responded to Charge A via seven recommendations in the annual progress report (9.1, 9.2, 9.3, 10, 11.1, 11.2, and 12) and eight recommendations in the final report (2, 3, 5, 6, 10, 11, 12, and 13). See Table 12 for a list of all final report recommendations and Appendix B for a list of all annual progress report recommendations.

Congressional Charge	IRP Annual Progress Report Recommendations	IRP Final Report Recommendations
A	9.1 – Standards Collaboration 9.2 – Evaluation of Flexibility Tools 9.3 – Innovation and Evidence-Based Design Collaboration 10 – Evidence-Based Design Evaluation 11.1 – Information Management/ Information Technology and Facilities Integration 11.2 – Information Management/ Information Technology and Virtual Care Alternatives 12 – Information Management/Information Technology Security Constraints	2 – High Reliability Organizations and Facility Design 3 – Facility Utilization and Costs 5 – Cultural Change and Innovation 6 – Human Capital, Graduate Medical Education, & Readiness 10 – Integrate Information Management/ Information Technology and Facility Investments 11 – Document Evidence-Based Design Decisions and Supporting Rationale 12 – Evaluate Evidence-Based Design Impact on Health Care Outcomes 13 – Institutionalize the Use of Evidence-Based Design
B	13 – Acquisition Strategy Evaluation 14 – Military Construction Project Length 15 – Personnel Considerations 16 – Evaluation of Variability 17 – Infrastructure Domain Refinement 18.1 – Post Occupancy Evaluations 18.2 – Post Occupancy Evaluations 19 – Evidence Based Design Evaluation 20 – Military Health System Facility Innovation and Research Model	2 – High Reliability Organizations and Facility Design 10 – Integrate Information Management/ Information Technology and Facility Investments
C	1 – Integrated Delivery System Definition 2.1 – Space Planning Criteria Updates 2.2 – Asset Utilization Standards 2.3 – Low-Volume Service Line Analysis 2.4 – Planned Recapture of Care 3 – Medical Tri-Service Human Capital Distribution Plan 4.1 – Graduate Medical Education Modernization Study 4.2 – Case Mix Volume and Complexity Requirements 5 – Centers of Excellence 6.1 – Base Realignment and Closure Constraints 6.2 – Incremental and Phased Funding 7 – Programming and Planning Streamlining 8 – Capital Investment Decision Model Refinement	1 – Transformation of the Military Health System: Integrated Delivery System 3 – Facility Utilization and Costs 4 – Business Planning Assumptions and Utilization 5 –Cultural Change and Innovation 6 – Human Capital, Graduate Medical Education, & Readiness 10 – Integrate Information Management/ Information Technology and Facility Investments 11 – Document Evidence-Based Design Decisions and Supporting Rationale 12 – Evaluate Impact of Evidence-Based Design on Health Care Outcomes 13 – Institutionalize the Use of Evidence-Based Design

Congressional Charge	IRP Annual Progress Report Recommendations	IRP Final Report Recommendations
D/E	21.1 – Comprehensive Master Plan Updates 21.2 – Comprehensive Master Plan Updates 22 – Medical Center Addition Alteration Revalidation	7 – Broaden National Capital Region Definition 8 – Proceed with Medical Center Addition Alteration Project 9 – Complete the National Capital Region Comprehensive Master Plan

Appendix D. Crosswalk of Annual Progress Report Findings and Recommendations to Final Report Sections and Military Health System Review: Final Report to the Secretary of Defense

IRP Final Report Section	IRP Annual Progress Report Recommendation (See Appendix B)	Congressional Charge (See Appendix K)	MHS Review Recommendations
Section 2.0: Develop and Implement a Military Health System Strategic Plan	1 – Integrated Delivery System Definition	C	• I: Take Immediate Action to Improve Underperformance • II: Establish Clear Enterprise Performance Goals with Standardized Metrics and Hold the System Accountable for Improvement • III: Made Good Decisions by Relying on Accurate Data • IV: Show Information to Everyone – Patients, Providers, and Policy Makers • V: Drive the Necessary Change with MHS Governance • VI: Leverage Common Standards and Processes to Facilitate Improvement
	2.1 – Space Planning Criteria Updates	C	
	2.2 – Asset Utilization Standards	C	
	2.3 – Low-Volume Service Line Analysis	C	
	2.4 – Planned Recapture of Care	C	
	3 – Medical Tri-Service Human Capital Distribution Plan	C	
	4.1 – Graduate Medical Education Modernization Study	C	
	4.2 – Case Mix Volume and Complexity Requirements	C	
	5 – Centers of Excellence	C	
	6.1 – Base Closure and Realignment Constraints	C	
	6.2 – Incremental and Phased Funding	C	
	7 – Programming and Planning Streamlining	C	
	8 – Capital Investment Decision Model Refinement	C	
	13 – Acquisition Strategy Evaluation	B	
	14 – Military Construction Project Length	B	
	15 – Personnel Considerations	B	
	17 – Infrastructure Domain Refinement	B	
Section 3.0: Continue to Create an Integrated Delivery System in the National Capital Region	21.1 – Comprehensive Master Plan Updates	D/E	• III: Made Good Decisions by Relying on Accurate Data • V: Drive the Necessary Change with MHS Governance • VI: Leverage Common Standards and Processes to Facilitate Improvement
	21.2 – Comprehensive Master Plan Updates	D/E	
	22 – Medical Center Addition Alteration Revalidation	D/E	

IRP Final Report Section	IRP Annual Progress Report Recommendation (See Appendix B)	Congressional Charge (See Appendix K)	MHS Review Recommendations
Section 4.0: Effectively Integrate Technology into Operations and Medical Facilities	11.1 – Information Management/ Information Technology (IM/IT) and Facilities Integration	A	• I: Take Immediate Action to Improve Underperformance • V: Drive the Necessary Change with MHS Governance • VI: Leverage Common Standards and Processes to Facilitate Improvement
	11.2 – IM/IT and Virtual Care Alternatives	A	
	12 – IM/IT Security Constraints	A	
Section 5.0: Implement a Systematic Evidence-Based Design Evaluation Process	9.1 – Standards Collaboration	A	• II: Establish Clear Enterprise Performance Goals with Standardized Metrics and Hold the System Accountable for Improvement • III: Made Good Decisions by Relying on Accurate Data • IV: Show Information to Everyone – Patients, Providers, and Policy Makers • V: Drive the Necessary Change with MHS Governance • VI: Leverage Common Standards and Processes to Facilitate Improvement
	9.2 – Evaluation of Flexibility Tools	A	
	9.3 – Innovation and Evidence-Based Design (EBD) Collaboration	A	
	10 – EBD Evaluation	A	
	16 – Evaluation of Variability	B	
	18.1 – Post Occupancy Evaluations	B	
	18.2 – Post Occupancy Evaluations	B	
	19 – EBD Evaluation	B	
	20 – Military Health System Facility Innovation and Research Model	B	

Appendix E. Department of Defense Medical Military Construction Policy, Standards Criteria, and Guidelines

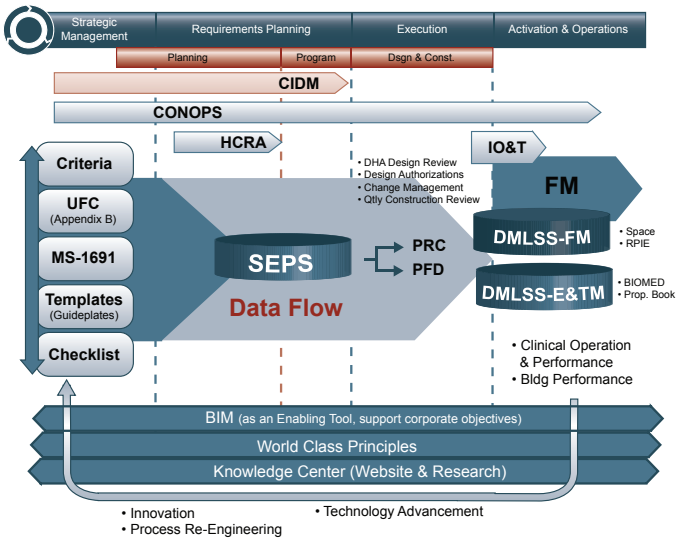
"Design guidelines are intended to provide designers and design decision makers with specific performance oriented tactical guidelines on how to achieve world-class and evidence- based design strategies, meet related objectives, and ultimately achieve MHS Guiding Principles through the design of the built environment."[148]

MHS Facilities Design Guidelines, Criteria, and Policy

The MHS has defined policies, standards criteria, and guidelines for effective facility life-cycle management in support of the MHS standard of care. These were established by the Office of the Secretary of Defense for Health Affairs Portfolio Planning and Management Division with the goal of "delivering world-class medical facilities that support a care experience that is patient- and family-centered, compassionate, convenient, equitable, safe and always of the highest quality."[149]

Figure 8 portrays the facility life-cycle process used for planning MHS facilities. This cycle shows four major phases: Strategic Management, Requirements Planning, Execution, and Activation and Operations. The process begins when the need for a capital investment is identified and continues through construction, operation, and, ultimately, decommissioning. The cycle repeats when another new requirement surfaces and lessons learned are incorporated.

Figure 8. Defense Health Agency Planning and Programming Process[150]



From Becker, J., 2014.

The process begins with strategic management decisions made by MHS senior leadership early in the planning process to determine if health care operations and the market it serves warrant a facility solution. The DHA uses the Capital Investment Decision Model (CIDM), a step-wise process to prioritize MILCON funding.[151] The left side of Figure 8 shows the five primary standards, criteria, guidelines, and references that provide the framework used to shape all medical MILCON projects.

Specifically, the DoD medical MILCON policy, standards, criteria, and guidelines define policies, standards criteria, and guidelines for effective facility life-cycle management, including:

- DoD Medical Space Planning Criteria for Health Facilities, which identifies authorized space based on specific planning criteria, including current and projected staffing, mission, and workload.[77,148]
- Unified Facilities Criteria, which provide programming, planning, design, and construction policies and procedures throughout the capital investment life cycle.[148,151]
- Military Standard (MILSTD) 1691 Master Equipment List, which provides a database of furnishings and equipment.[152]
- Military Health System Templates, which represent the recommended layout of equipment to support the function and flow of a space/room and reflect the net square feet of the space/room from the Space Planning Criteria chapter.[148,153]
- World-Class Toolkit and Checklist, which provide designers and design decision makers with specific performance-oriented tactical guidance on how to achieve world-class and evidence-based design strategies.[136]
- Health Care Requirements Analysis, which forecasts future requirements based on a range of considerations, including the size and demographics of the market population and demand/utilization of health care services by that population within and outside the MHS direct care system.[154,155]
- Capital Investment Decision Model, which prioritizes MILCON projects.[151,148]

The Medical Space Planning Criteria for Health Facilities, Unified Facilities Criteria (UFC) Appendix B, MILSTD 1691 Master Equipment List, MHS Templates, and the World-Class Checklist provide the strategy and identify required medical functions, room sizes, configurations, and contents.[151] Project requirements are processed through the Space and Equipment Planning System (SEPS) application to create the Project Room Contents (PRC) list and Program for Design (PFD) that can be used to identify more refined project costs. The Health Care Requirements Analysis (HCRA) process considers key input variables when determining what is required to plan and program a medical facility. The initial/preliminary phase is used to provide a level of detail necessary for enterprise level strategic decisions

regarding a given facility and current health care practices in the context of the requested project. The primary difference between the preliminary HCRA and the final HCRA is the level of detail required for each of the four components.[154,155]

As depicted in Figure 8, project execution begins after the CIDM process concludes. Design and construction activities occur as the gaining hospital staff begins to refine the Concept of Operations (CONOPS) in preparing for operational changes to maintain safe quality care while maximizing the capabilities of the new building. Initial outfitting and training (IO&T) planning, procurement, and transition activities also begin during execution and continue into the activation and operations stage.[151] This includes turnover of a substantially completed facility; activating building maintenance operations using DoD's Facility Management tool (DMLSS-FM); establishing a new property book and equipment maintenance schedule (DMLSS-E&TM); training the staff based on the refined CONOPS; and moving the health care operations from the existing areas to new facilities. Activation and operations also include establishing access, quality, and safety metrics designed to achieve the intended outcomes identified during the strategic planning process, along with any changes that have occurred in the health care industry. This life-cycle process should result in improved facility capabilities to provide better health care, as well as setting the stage for performance measurement, evaluation, and standards improvement for the next project.

The MHS has defined policies, standards criteria, and guidelines for effective facility life-cycle management in support of the MHS standard of care, which further described below.

Department of Defense Medical Space Planning Criteria for Health Facilities

The Office of the Secretary of Defense for Health Affairs Portfolio Planning and Management Division established the "DoD Medical Space Planning Criteria for Health Facilities," requirements that "define and provide specialized working environments within medical facilities according to departments and function areas within the departments" and "provide current guidance for the most efficient utilization of space to meet medical requirements." The primary purpose of this document is to identify how much space is authorized for a given medical function based on specific planning criteria, including current and projected staffing, mission, and workload. These criteria are regularly updated and recent care models, standards of care, and technology are considered during their development.[148,151]

Unified Facilities Criteria

UFC 4-510-01 provide mandatory programming, planning, design, and construction policies and procedures throughout the capital investment life cycle. UFC are used regardless of the source of funding and should be employed "in non-[Military Construction] MILCON sustainment, restoration or modernization projects, in facility additions or alteration projects or in operations maintenance (O&M) upgrade projects" in addition to being employed for MILCON.[151]

The UFC system is prescribed by MILSTD 3007, which provides planning, design, construction, sustainment, restoration, and modernization criteria, used by the Services, the Defense Agencies, and the DoD Field Activities in accordance with the Under Secretary of Defense for Acquisition, Technology, and Logistics Memorandum dated May 29, 2002. UFC 4-510-01 provides mandatory policies and procedures for programming, planning, design, and construction throughout the life cycle of MTFs, including medical and dental treatment facilities, medical training facilities, medical research facilities, and veterinary facilities in the MHS. Where necessary, the UFC refers to civilian codes and standards, such as the National Fire Protection Agency and the American Society of Heating, Refrigeration, and Air Conditioning Engineering.[151]

UFC were written to allow for the building of safe, functional, durable, and economical facilities that can be described as *world-class*. Additionally, construction is designed to be sustainable, life-cycle cost effective, and flexible.[151] The criteria are influenced by DoD and non-DoD standards, subject matter experts, and evidence-based research.

Military Standard 1691 Master Equipment List

MILSTD 1691 provides a database of furnishings and equipment typically found in a medical facility. Each item is referenced using a unique number (Joint Stock Number) that is linked to a furniture or equipment record. The database provides the planner, architect, engineer, and cost estimator with a functional description and size, weight, and utility requirements for each item. With the MILSTD 1691, the user is able to verify each item is appropriately planned (i.e., the item fits in the intended room and has the correct utilities to function appropriately). It also dictates which items are funded (built) into the construction contract for programming purposes.[156]

Military Health System Templates

The MHS Templates (formerly known as Design Guide Plates) describe how certain functional spaces/rooms should be designed and are intended to supplement the UFC 4-510-01. Each room template displays the geometry of a room and the positioning of furnishings and equipment. It also provides a list of every item in the room and the subsequent utility requirements for each. Armed with this information, the designer of record has a clear understanding of how each templated room is expected to be configured in order to reduce ambiguity during design and maximize standardization across the MHS during health care operations.[157]

World-Class Toolkit and Checklist

The World-Class Checklist (Checklist) is intended to "provide designers and design decision makers with specific performance oriented tactical guidance on how to achieve world-class and evidence-based design strategies, meet related objectives, and ultimately achieve MHS Guiding Principles through the design

of the built environment."[148] It is designed for use throughout the project's life cycle, beginning with the programming phase. The Checklist includes mandatory and recommended strategies, each with a supporting list of references. However, designers can explain and justify why they chose not to utilize a certain strategy.[151]

The Checklist provides strategies for all six domains of a world-class medical facility, but most of the effort to date has been on populating the Basic Infrastructure domain with strategies.

The Checklist is housed as part of the World-Class Toolkit which enables "planners, hospital staff, architects, engineers, agents, and facility managers to understand the meaning of world class and how it will affect their facilities and their operations" and helps "[them] to incorporate world-class strategies into [their] projects throughout their life cycles."[136] Although many features of the Toolkit are available to the public, including the World-Class Checklist, some areas of the website, such as the CIDM Tool, are restricted from the general public.

Health Care Requirements Analysis

The HCRA process considers key input variables when determining what is required to plan and program a medical facility. The process can be completed using DoD personnel or with contractor support. The new MHS HCRA process is conducted in two phases to highlight the most important potential projects quickly and focus efforts for further development. The Initial/Preliminary phase is used to provide a level of detail necessary for enterprise level strategic decisions regarding a given facility and current health care practices in the context of the requested project. Once a need has been validated, phase two begins and a Final/Detailed HCRA begins.[154,155]

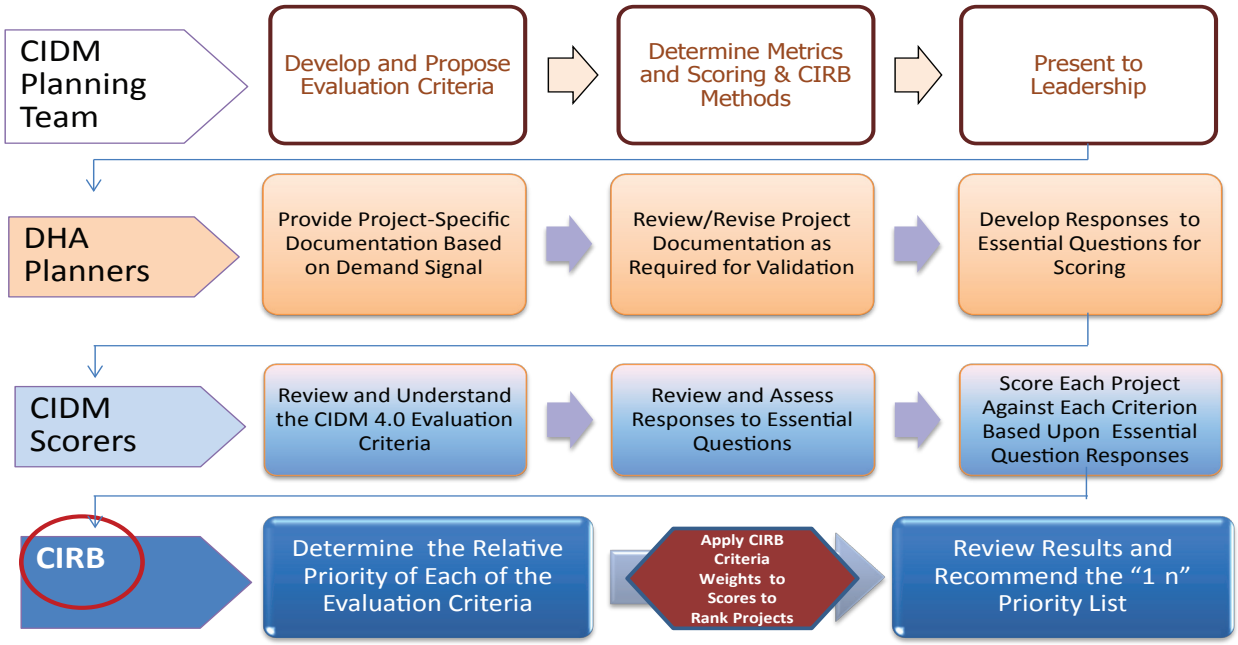
There are four components of the process. The primary difference between the preliminary HCRA and the final HCRA is the level of detail required for each of the four components. The first component of the process analyzes population supported including access to care, demographics, and availability of alternate sources of care (e.g., purchased care and Veterans Affairs). Next, the process considers the workload history of the existing facility, as well as a forecast based on the results of the population study. Workload analysis considers volumes of procedures, visits, and deliveries, as well as GME-provided care. The staffing analysis includes documenting the required skillsets and quantities necessary to support the workload previously identified as well as any staffing for military mandated programs, such as the Exceptional Family Member Program. Once the population, workload, and staffing requirements have been identified, space requirements are identified and the HCRA process is complete.[154,155]

Capital Investment Decision Model

Prior to the creation of DHA, the Services competed for resources via the proportional assessment system. In 2008, the MHS adopted the CIDM, which is now used to prioritize MILCON projects. CIDM standardizes the selection

process using multiple data points for each project based on an objective scoring methodology that results in a prioritized list of projects for funding and execution. DHA continues to refine the CIDM model and is currently underway with a 4.0 version that will include MHS leader input about key system priorities and enterprise-wide demand signals much earlier in the planning process to further reduce the time associated with this decision-making process. Figure 9 illustrates the CIDM process, as of June 2015.

Figure 9. Capital Investment Decision Model[158]



From Defense Health Agency Facilities Division, 2014.

Appendix References

77. U.S. Department of Defense. Military Health System (MHS): DoD Space Planning Criteria for Health Facilities. [Webpage]. http://www.wbdg.org/ccb/browse_cat.php?o=29&c=261.
136. U.S. Department of Defense. World-Class Toolkit. [Webpage]. https://facilities.health.mil/home/toolkit. Accessed April 17, 2014.
148. U.S. Department of Defense. MHS Facilities Design Guidelines, Criteria & Policy. [Webpage]. https://facilities.health.mil/home/Criteria. Accessed April 17, 2014.
149. U.S. Department of Defense. World-Class Facilities. [Webpage]. https://facilities.health.mil/home/. Accessed April 17, 2014.
150. Becker J. Facilities Overview for Independent Review Panel. 2014.
151. U.S. Department of Defense. Unified Facilities Criteria (UFC) - Design: Medical Military Facilities (UFC 4-510-01). 2012.
152. U.S. Department of Defense. Military Standard (MILSTD) 1691 Equipment. [Webpage]. https://facilities.health.mil/home/MILSTD1691.

Accessed January 6, 2014.
153. U.S. Department of Defense. Military Health System (MHS) Templates (formerly 'Guideplates'). [Webpage]. http://www.wbdg.org/ccb/browse_cat.php?o=64&c=260#8264.
154. McWhirt D. HCRA Process. 2014.
155. Boenecke C. Shared Service Annual Report Discussion. 2014.
156. U.S. Department of Defense. Military Standard 1691: Construction and Material Schedule for Military Medical, Dental, Veterinary and Medical Research Laboratories. 2011.
157. U.S. Department of Defense. Medical Military Facilities: Medical Templates. 2011.
158. Defense Health Agency Facilities Division. FY 2017 Medical MilCon Capital Investment Decision Model & Evaluation Criteria CIRB Orientation Read Ahead. 2014.

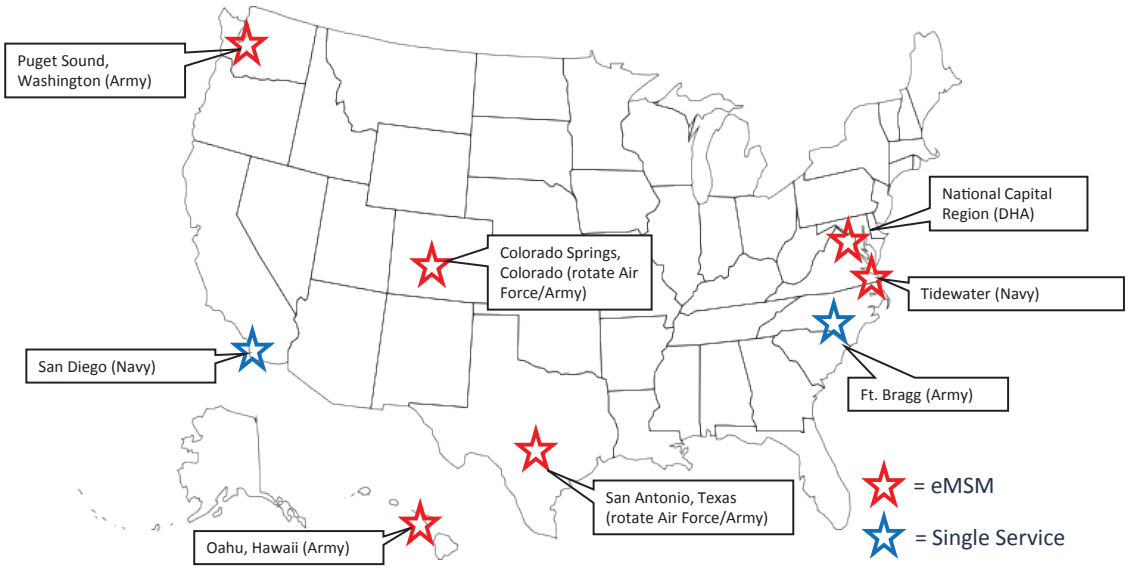
Appendix F. Enhanced Multi-Service Market Facility List

The Defense Health Agency (DHA) has taken the first step to create an integrated delivery system (IDS) through the implementation of enhanced Multi-Service Markets (eMSMs). The term Multi-Service Market (MSM) refers to a health care market that is served by multiple Services and their subordinate military treatment facilities (MTFs). Enhanced refers to enhanced authorities granted to the military officer assigned to the role of Market Manager. The March 11, 2013, Deputy Secretary of Defense Memorandum directs several actions, including the identification of the six eMSMs, as well as identifying the types of authority each market manager will have over medical military organizations operating in each market.[23,81-86]

The first level of authority was defined as enhanced management authority which includes the authority to manage the allocation of the budget for the market, direct the adoption of common clinical and business functions for the market, optimize readiness to deploy medically ready forces and ready medical forces, and direct the movement of workload and workforce between or among the MTFs. The second level of authority defined by the memorandum provides the authority to exercise authority, direction, and control over inpatient facilities and their subordinate clinics.[23] This appendix indicates which facilities are part of each eMSM and clarifies the level of authority over market facilities (Table 13).

There are six eMSMs, five of which are led by a single-Service and one managed by DHA, and two single-Service markets in San Diego, California, and at Fort Bragg, North Carolina (see Figure 10). However, Service leadership rotates every few years in each eMSM, and leadership has to rely on collaboration between DHA and among the Services.[23] The Panel learned in a briefing that eMSM leadership will have enhanced authority including responsibility for eMSM budgets,[159] although ultimate budgetary control still remains with the MTF's parent Service Surgeon General.

Figure 10. eMSM and Single Service Market Geographic Distribution[160]



From Robb, D., 2014.

Currently, the principal facilities that are included in the eMSM structure are hospitals and major campuses. However, ambulatory facilities, which frequently are the entryway to a health system, operate under the control of their sponsoring Service.[81-86] This results in a natural organizational barrier to being a world-class IDS. Though the Panel encountered multiple examples of voluntary collaboration between Services and the eMSM leadership, the MHS in these markets does not mirror what is found in a successful private-sector IDS, where the full continuum of care is led by a single organization focused on serving the local population at the most appropriate site of care.[41] However, the Panel was informed that, since 2014, eMSMs have been evaluated using the same metrics, which are updated quarterly and reviewed by the Medical Deputy Action Group. This has increased integration in these markets. However, eMSMs still lack a single command and control structure with single budgetary authority for all MTFs in their region, which complicates facility investment requirements and life cycle management. Another key difference between eMSMs and private or commercial IDSs is that shared administrative service structures appear to be somewhat underdeveloped, which could enable consolidation and reduce programming requirements. There is normally a tiered local regional strategy designed to achieve the most efficient support in facilities, laboratory, supply chain, dietary, finance, and other support services. Currently, each Service MTF manages most of its own support services. However, some of these support services, such as patient appointment and referral management could be consolidated as an eMSM function, such as was the case at the San Antonio Military Health System.

Therefore, there is a key structural limitation for eMSMs because the personnel structure, responsibilities, scope of command and control, and budgetary authority all vary from one location to another, and shared services are new and continuing to develop. A single command, control, and budgetary authority could drive

the facility requirements and planning processes by establishing a program for integrated facility life-cycle budget requirements with IDS fiscal accountability to inform facility investments. As affordability becomes a greater issue for the MHS, it is likely that this structure will need to quickly evolve.

Table 13. Military Treatment Facilities by Enhanced Multi-Service Market

Service/Directorate	Facility Name	Type	Authority	Enhanced Multi-Service Market (eMSM)
National Capital Region Medical Directorate (NCR MD)	Walter Reed National Military Medical Center	Hospital	Direct & Control	NCR MD
NCR MD	DiLorenzo TRICARE Health Clinic	Clinic	Direct & Control	NCR MD
NCR MD	Branch Medical Clinic (BMC) Carderock	Clinic	Direct & Control	NCR MD
NCR MD	National Intrepid Center of Excellence	Clinic	Direct & Control	NCR MD
NCR MD	Fort Belvoir Community Hospital	Hospital	Direct & Control	NCR MD
NCR MD	Fairfax Health Center	Clinic	Direct & Control	NCR MD
NCR MD	Dumfries Health Center	Clinic	Direct & Control	NCR MD
U.S. Army	Kimbrough Ambulatory Care Center	Clinic	Enhanced	NCR MD
U.S. Army	Fort McNair Army Health Clinic (AHC)	Clinic	Enhanced	NCR MD
U.S. Army	Andrew Rader AHC	Clinic	Enhanced	NCR MD
U.S. Navy	Naval Health Clinic (NHC) Annapolis	Clinic	Enhanced	NCR MD
U.S. Navy	Naval Branch Health Clinic (NBHC) Bancroft Hall	Clinic	Enhanced	NCR MD
U.S. Navy	NHC Quantico	Clinic	Enhanced	NCR MD
U.S. Navy	NBHC Washington Navy Yard	Clinic	Enhanced	NCR MD
U.S. Navy	BMC Officer Candidate School Brown Field	Clinic	Enhanced	NCR MD
U.S. Navy	NBHC The Basic School	Clinic	Enhanced	NCR MD
U.S. Navy	NBHC Andrews Air Force Base	Clinic	Enhanced	NCR MD

Service/Directorate	Facility Name	Type	Authority	Enhanced Multi-Service Market (eMSM)
U.S. Air Force	Malcolm Grow Medical Clinics and Surgery Center (779th Medical Group)	Clinic	Enhanced	NCR MD
U.S. Air Force	Joint Base Anacostia-Bolling Clinic (579th Medical Group)	Clinic	Enhanced	NCR MD
U.S. Army	San Antonio Military Medical Center	Hospital	Enhanced	San Antonio Military Health System (SAMHS)
U.S. Army	Taylor Burk Health Clinic	Clinic	Enhanced	SAMHS
U.S. Army	McWethy Troop Medical Clinic	Clinic	Enhanced	SAMHS
U.S. Army	Fort Sam Houston Primary Care Clinic	Clinic	Enhanced	SAMHS
U.S. Army	Schertz Medical Home	Clinic	Enhanced	SAMHS
U.S. Army	Center for the Intrepid	Clinic	Enhanced	SAMHS
U.S. Air Force	Wilford Hall Ambulatory Surgical Center	Clinic	Enhanced	SAMHS
U.S. Air Force	Randolph Air Force Base Clinic	Clinic	Enhanced	SAMHS
U.S. Air Force	Reid Clinic	Clinic	Enhanced	SAMHS
U.S. Air Force	North Central Federal Clinic	Clinic	Enhanced	SAMHS
U.S. Air Force	Langley Hospital	Hospital	Enhanced	Tidewater Military Health System (Tidewater)
U.S. Army	McDonald Army Health Center	Clinic	Enhanced	Tidewater
U.S. Army	Fort Eustis Troop Medical Clinic (TMC) 1	Clinic	Enhanced	Tidewater
U.S. Army	Fort Eustis TMC 2	Clinic	Enhanced	Tidewater
U.S. Army	Fort Story Health Clinic	Clinic	Enhanced	Tidewater
U.S. Navy	NMC Portsmouth	Hospital	Enhanced	Tidewater
U.S. Navy	NBHC Little Creek	Clinic	Enhanced	Tidewater
U.S. Navy	NBHC Norfolk Naval Shipyard	Clinic	Enhanced	Tidewater
U.S. Navy	NBHC Yorktown	Clinic	Enhanced	Tidewater
U.S. Navy	NBHC Dam Neck	Clinic	Enhanced	Tidewater
U.S. Navy	NBHC Oceana	Clinic	Enhanced	Tidewater
U.S. Navy	Sewells Point Branch Medical Clinic	Clinic	Enhanced	Tidewater
U.S. Navy	Northwest Branch Health Clinic	Clinic	Enhanced	Tidewater
U.S. Navy	TRICARE Prime Clinic Virginia Beach	Clinic	Enhanced	Tidewater
U.S. Navy	TRICARE Prime Clinic Chesapeake	Clinic	Enhanced	Tidewater
U.S. Army	Madigan Army Medical Center	Hospital	Enhanced	Puget Sound
U.S Navy	Naval Hospital Bremerton	Hospital	Enhanced	Puget Sound

Service/Directorate	Facility Name	Type	Authority	Enhanced Multi-Service Market (eMSM)
U.S. Navy	Naval Hospital Oak Harbor	Hospital	Enhanced	Puget Sound
U.S. Army	Tripler Army Medical Center	Hospital	Enhanced	Hawaii
U.S. Army	Schofield Barracks AHC	Clinic	Enhanced	Hawaii
U.S. Army	TMC 1 Schofield Barracks	Clinic	Enhanced	Hawaii
U.S. Army	Kahi Mohala Behavioral Health (Civilian)	ERSCIV	Enhanced	Hawaii
U.S. Army	Queen's Medical Center (Civilian)	ERSCIV	Enhanced	Hawaii
U.S. Army	Surgicare of Hawaii (Civilian)	ERSCIV	Enhanced	Hawaii
U.S. Army	Gamma Knife Center of the Pacific (Civilian)	ERSCIV	Enhanced	Hawaii
U.S. Army	Warrior Ohana Medical Home	Clinic	Enhanced	Hawaii
U.S. Air Force	Joint Base Pearl Harbor Hickam Clinic	Clinic	Enhanced	Hawaii
U.S. Navy	NHC Hawaii	Clinic	Enhanced	Hawaii
U.S. Navy	NBHC Naval Communication Area Master Station East Pacific	Clinic	Enhanced	Hawaii
U.S. Navy	BMC Marine Corps Air Station Kaneohe Bay	Clinic	Enhanced	Hawaii
U.S. Navy	NBHC Marine Corps Base Camp H.M. Smith	Clinic	Enhanced	Hawaii
U.S. Army	Evans Army Community Hospital	Hospital	Enhanced	Colorado Springs Military Health System (Colorado)
U.S. Air Force	U.S. Air Force Academy Clinic	Clinic	Enhanced	Colorado

Appendix References

23. Carter AB. Implementation of Military Health System Governance Reform. 2013.
41. Enthoven A. Integrated delivery systems: The cure for fragmentation. *Am. J. Manag. Care.* Dec 2009;15(10 Suppl).
81. U.S. Department of Defense. National Capital Region: FY15-FY19 eMSM Business Performance Plan. 2014.
82. U.S. Department of Defense. San Antonio: FY15-FY19 eMSM Business Performance Plan. 2014.
83. U.S. Department of Defense. Tidewater Military Health System: FY15-FY19 eMSM Business Performance Plan. 2014.
84. U.S. Department of Defense. Colorado Springs: FY15-FY19 eMSM Business Performance Plan. 2014.
85. U.S. Department of Defense. Puget Sound: FY15-FY19 eMSM Business Performance Plan. 2014.
86. U.S. Department of Defense. Hawaii: FY15-FY19 eMSM Business Performance Plan. 2014.
159. Keenan J. SAMHS eMSM Brief - IRP MilCon Delegation - Jul 14. 2014.
160. Robb DJ. Military Health System: HIT Transformation. 2014.

Appendix G. Workload and Utilization Data

The Panel analyzed workload, inpatient cost, and ambulatory care cost data, where appropriate, for the following facilities:

Six Inpatient Facilities Visited by the Panel

- Fort Belvoir Community Hospital
- Water Reed National Military Medical Center
- Carl R. Darnall Army Medical Center
- San Antonio Military Medical Center
- Naval Hospital Camp Pendleton
- Naval Medical Center San Diego

Five Outpatient Facilities in the National Capital Region and Two Outpatient Facilities Briefed to the Panel (Indicated by an Asterisk)

- 579th Medical Group – Joint Base Anacostia-Bolling
- Naval Health Clinic Annapolis
- Naval Health Clinic Quantico
- Army Health Clinic Guthrie – Fort Drum*
- 779th Medical Group – Joint Base Andrews Naval Air Facility
- Kimbrough Ambulatory Care Center – Fort Meade
- 59th Medical Wing – Wilford Hall Ambulatory Surgery Center – Joint Base San Antonio-Lackland*

Table 14. Facility Workload in Six Facilities Visited by the Panel, Fiscal Year 2014[75]

Beds and Occupancy Rates	Fort Belvoir Community Hospital	Walter Reed National Military Medical Center	Carl R. Darnall Army Medical Center	San Antonio Military Medical Center	Naval Hospital Camp Pendleton	Naval Medical Center San Diego
FY 2015 Projected Staffed Beds[a]	121	306	79	425	42	272
Average Daily Patient Load with Newborn	68.5	184.1	61.6	257	32.3	161.5
Average Daily Patient Load without Newborn	60.3	167.2	42.7	238.3	22.4	126.2
Staffed Occupancy Rate with Newborn[b]	57%	60%	78%	60%	77%	59%
Staffed Occupancy Rate without Newborn[b]	**50%**	**55%**	**54%**	**56%**	**53%**	**46%**

[a]Projected staffed beds are for FY 2015. It is important to note that the number of staffed beds may change regularly. Data source is enhanced Multi-Service Market Business Plans, Army Office of the Surgeon General Decision Support, and the Navy Bureau of Medicine and Surgery.
[b]Calculated by authors using data; staffed occupancy rate equals FY 2014 average daily patient load divided by FY 2015 projected staffed beds.
Adapted from DHA Decision Support Division via sources listed above, 2015.

Table 15. Facility Workload in Six Facilities Visited by the Panel, Fiscal Year 2014[75]

Military Treatment Facility	Exam Rooms[a]	Average Encounters Per Day[b]	Average Encounters Per Exam Room Per Day[c]
Fort Belvoir Community Hospital	533	2,385	**4.5**
Walter Reed National Military Medical Center	888	4,220	**4.8**
Carl R. Darnall Army Medical Center	395	2,221	**5.6**
San Antonio Military Medical Center	408	3,391	**8.3**
Naval Hospital Camp Pendleton	301	1,704	**5.7**
Naval Medical Center San Diego	582	2,785	**4.8**
Civilian Standard	N/A	N/A	**10.0**

[a]The number of exam rooms includes those outpatient clinics found within the hospital, not free-standing primary care centers that belong to the hospitals. Data source is DHA Facilities Division.
[b]Data source is Management Analysis and Reporting Tool (M2) Comprehensive Ambulatory/Professional Encounter Record (CAPER). Only "B" Medical Expense and Performance Reporting System (MEPRS). Emergency Room and Immediate Care omitted; Monday-Friday only.
[c]Calculated by authors using data; average encounters per exam room per day equals average encounters per day divided by the number of exam rooms.
N/A = Not Available.
Adapted from DHA Decision Support Division via sources listed above, 2015.

Table 16. Facility Workload in Four National Capital Region Medical Directorate Outpatient Facilities and Two Facilities Briefed to the Panel, Fiscal Year 2014[75]

Ambulatory Facility	Exam Rooms[a]	Average Encounters Per Day[b]	Average Encounters Per Exam Room Per Day[c]
Naval Health Clinic Annapolis	71	272	**3.8**
Naval Health Clinic Quantico	95	510	**5.4**
Army Health Clinic Guthrie - Fort Drum	143	1,334	**9.3**
779th Medical Group - Joint Base Andrews Naval Air Facility	224	903	**4.0**
Kimbrough Ambulatory Care Center - Fort Meade	277	1,759	**6.4**
59th Medical Wing - Wilford Hall Ambulatory Surgery Center - Joint Base San Antonio-Lackland	652	2,902	**4.5**
Civilian Standard	N/A	N/A	**10.0**

[a]Data source is DHA Facilities Division.
[b]Data source is Management Analysis and Reporting Tool (M2) Comprehensive Ambulatory/Professional Encounter Record (CAPER). Only "B" Medical Expense and Performance Reporting System (MEPRS). Emergency Room and Immediate Care omitted; Monday-Friday only.
[c]Calculated by authors using data; average encounters per exam room per day equals average encounters per day divided by the number of exam rooms.
N/A = Not Available.
Adapted from DHA Decision Support Division via sources listed above, 2015.

Table 17. Facility Inpatient Costs in Six Facilities Visited by the Panel, Fiscal Year 2014[75]

Work Performed	Product Line	Fort Belvoir Community Hospital	Walter Reed National Military Medical Center	Carl R. Darnall Army Medical Center	San Antonio Military Medical Center	Naval Hospital Camp Pendleton	Naval Medical Center San Diego
Inpatient Direct Care (Cost/Relative Weighted Product)	Medical	$20,053	$17,759	$7,342	$11,327	$9,114	$9,472
	Surgical	$15,502	$21,405	$9,979	$15,050	$13,651	$10,167
	Obstetrics	$24,177	$23,339	$13,848	$18,886	$15,614	$15,949
	Newborn	$20,259	$31,171	$12,676	$20,632	$17,748	$15,968
	Mental Health	$67,139	$30,979	$15,336	$19,790	$15,213	$16,592
	All Product Lines	**$21,891**	**$21,077**	**$11,410**	**$14,155**	**$13,273**	**$11,657**
Inpatient Purchased Care (Cost/Relative Weighted Product)	Medical	$9,217	$12,256	$7,700	$8,094	$11,467	$12,057
	Surgical	$9,375	$11,773	$7,764	$9,314	$12,661	$13,292
	Obstetrics	$10,781	$13,099	$8,220	$7,854	$10,416	$10,354
	Newborn	$12,322	$12,661	$8,777	N/A	$12,495	$12,756
	Mental Health	$12,223	$14,710	$6,398	$7,252	$10,604	$10,847
	All Product Lines	**$9,776**	**$12,106**	**$7,865**	**$8,788**	**$11,957**	**$12,437**
Ratio of Direct Care to Purchased Care[a,b]	Medical	2.18	1.45	0.95	1.40	0.79	0.79
	Surgical	1.65	1.82	1.29	1.62	1.08	0.76
	Obstetrics	2.24	1.78	1.68	2.40	1.50	1.54
	Newborn	1.64	2.46	1.44	N/A	1.42	1.25
	Mental Health	5.49	2.11	2.40	2.73	1.43	1.53
	All Product Lines	**2.24**	**1.74**	**1.45**	**1.61**	**1.11**	**0.94**

[a]Calculated by authors using data; ratio should be read as X:1 and is calculated by dividing the direct care costs by the purchased care costs.
[b]Headquarters, training activities (i.e. training commands), recruiting activities (recruiting commands), and research and development activities are not included in direct care costs; only overhead associated with a particular command is spread over inpatient and outpatient care. Purchased care costs include a 13 percent increase for overhead burdening.
N/A = Not Available.
Adapted from DHA Decision Support Division, 2015.

Table 18. Facility Ambulatory Costs in Six Facilities Visited by the Panel, Fiscal Year 2014[75]

Work Performed	Product Line	Fort Belvoir Community Hospital	Walter Reed National Military Medical Center	Carl R. Darnall Army Medical Center	San Antonio Military Medical Center	Naval Hospital Camp Pendleton	Naval Medical Center San Diego
Ambulatory Direct Care (Cost/Relative Value Unit)	Primary Care	$158	$190	$90	$106	$100	$98
	Obstetrics/ Gynecology	$133	$207	$80	$114	$99	$133
	Mental Health	$257	$220	$104	$89	$117	$111
	Other	$164	$226	$110	$149	$99	$128
	All Product Lines	**$171**	**$218**	**$97**	**$133**	**$101**	**$117**
Ambulatory Purchased Care (Paid/ Relative Value Unit)[c]	Primary Care	$62	$73	$69	$87	$65	$69
	Obstetrics/ Gynecology	$64	$72	$68	$77	$66	$67
	Mental Health	$81	$119	$61	$97	$52	$59
	Other	$70	$75	$64	$83	$61	$62
	All Product Lines	**$68**	**$79**	**$65**	**$85**	**$61**	**$64**
Ratio of Direct Care to Purchased Care[a,b]	Primary Care	2.53	2.62	1.30	1.22	1.54	1.43
	Obstetrics/ Gynecology	2.07	2.89	1.18	1.48	1.50	1.98
	Mental Health	3.18	1.85	1.71	0.92	2.27	1.88
	Other	2.34	3.03	1.71	1.80	1.62	2.06
	All Product Lines	**2.51**	**2.77**	**1.50**	**1.56**	**1.65**	**1.82**

[a]Calculated by authors using data; ratio should be read as X:1 and is calculated by dividing the direct care costs by the purchased care costs.
[b]Encounters from free-standing primary care centers that belong to the hospitals are included in these data; however, encounters for ambulatory surgery are not included in the total costs per RVU. Headquarters, training activities (i.e. training commands), recruiting activities (recruiting commands), and research and development activities are not included in direct care costs; only overhead associated with a particular command is spread over inpatient and outpatient care. Purchased care costs include a 13 percent increase for overhead burdening.
[c]Data source is Management Analysis and Reporting Tool (M2) Non-Institutional (using "ambulatory" defined by enhanced Multi-Service Market workgroup, but excludes those claims indicating "Other Health Insurance" and includes drug costs). Includes all beneficiaries. Site based on Provider Catchment Area.
Adapted from DHA Decision Support Division via sources listed above, 2015.

Table 19. Facility Ambulatory Costs in Five National Capital Region Medical Directorate Outpatient Facilities and Two Facilities Briefed to the Panel[75]

Work Performed	Product Line	579th Medical Group - Joint Base Anacostia-Bolling	Naval Health Clinic Annapolis	Naval Health Clinic Quantico	Army Health Clinic Guthrie - Fort Drum	779th Medical Group - Joint Base Andrews Naval Air Facility[a]	Kimbrough Ambulatory Care Center - Fort Meade[a]	59th Medical Wing - Wilford Hall Ambulatory Surgery Center - Joint Base San Antonio-Lackland[a]
Ambulatory Direct Care (Cost/ Relative Value Unit)	Primary Care	$112	$114	$154	$71	$137	$125	$137
	Obstetrics/ Gynecology	$24	N/A	N/A	$87	$247	$67	$91
	Mental Health	$121	$183	$122	$87	$115	$91	$124
	Other	$39	$56	$37	$64	$184	$89	$113
	All Product Lines	**$93**	**$86**	**$102**	**$73**	**$163**	**$108**	**$124**
Ambulatory Purchased Care (Paid/ Relative Value Unit)[d]	Primary Care	$85	$73	$59	$51	$58	$69	$78
	Obstetrics/ Gynecology	$107	$75	$61	$49	$66	$71	$69
	Mental Health	$120	$153	$60	$47	$41	$87	$83
	Other	$91	$79	$62	$58	$64	$72	$76
	All Product Lines	**$98**	**$83**	**$61**	**$55**	**$60**	**$72**	**$77**
Ratio of Direct Care to Purchased Care[b,c]	Primary Care	1.32	1.56	2.62	1.40	2.37	1.82	1.76
	Obstetrics/ Gynecology	0.22	N/A	N/A	1.77	3.73	0.94	1.32
	Mental Health	1.01	1.19	2.02	1.84	2.78	1.05	1.50
	Other	0.43	0.71	0.60	1.10	2.88	1.23	1.50
	All Product Lines	**0.95**	**1.04**	**1.67**	**1.32**	**2.71**	**1.50**	**1.62**

[a]Although these three facilities also provide ambulatory surgery, encounters for ambulatory surgery are not included in the total costs per RVU.
[b]Calculated by authors using data; ratio should be read as X:1 and is calculated by dividing the direct care costs by the purchased care costs.
[c]Headquarters, training activities (i.e. training commands), recruiting activities (recruiting commands), and research and development activities are not included in direct care costs; only overhead associated with a particular command is spread over inpatient and outpatient care. Purchased care costs include a 13 percent increase for overhead burdening.
[d]Data source is Management Analysis and Reporting Tool (M2) Non-Institutional (using "ambulatory" defined by enhanced Multi-Service Market workgroup, but excludes those claims indicating "Other Health Insurance" and includes drug costs). Includes all beneficiaries. Site based on Provider Requirement Integrated Specialty Model (PRISM) Area (includes all the children of the Parent Defense Medical Information System ID).
N/A = Not Available.
Adapted from DHA Decision Support Division via sourced listed above, 2015.

Appendix References

75. MTF Portfolios. Defense Health Agency Decision Support Division; 2015.

Appendix H. Standards Development Process and Framework

Current Department of Defense Standards Development Process

The *Oxford English Dictionary* defines a standard as "a definite level of excellence, attainment, wealth, or the like or a definite degree of any quality, viewed as a prescribed object of endeavor or as the measure of what is adequate for some purpose."[161]

The Department of Defense (DoD) has developed the Unified Facilities Criteria 4-510-1, a comprehensive set of guidance documents that enable design and construction professionals to create health care facilities that meet the needs of the operational mission within a prescribed budget. DoD standards are developed using and aligned with medical health care industry standards. Periodic review and feedback facilitates the maintenance of standards that are correct and adequate to meet the evolving DoD health care delivery model.

DoD is actively involved in key industry forums to review and improve design standards. For example, DoD participates with the Facility Guidelines Institute (FGI) as it refreshes its guidelines on a four-year cycle. DoD then references and requires conformance to FGI guidance as part of the DoD standards, which, the Panel learned in discussions with DoD facility leaders, have grown in size and complexity, are expensive to maintain, and require frequent refinement or review to reflect the dynamic health care environment.

DoD standards are broad and inclusive of all types of DoD health care facilities and recognize that construction can take place in both domestic and international locations. The challenge with any design and construction standard is how to rapidly adapt and improve as the health care delivery model changes driven by innovation in methods of care and the supporting technology.

According to the Panel's experience, most health care systems have developed a set of design and construction standards, which set targets on key variables, such as quantity (size), quality, functionality, and cost, to guide and inform the process of creating the built environment platform for care delivery. DoD is now working with the Construction Industry Institute and other large owner systems to develop medical facilities design and construction industry cost benchmarking. However, this effort is in its preliminary stages with limited comparable cost benchmark output.

Department of Defense Standards Benchmarked Against Industry Standards

In those instances where there are comparable standards, the Panel observed that DoD standards are generally consistent with industry practices and benchmarks. However, even within industry practices and benchmarks, construction standards vary in scope, as organizations are challenged to keep standards current given rapid changes to technology and care delivery paradigms, reconcile minimum standards with best practices, and determine how prescriptive standards can and should be while still encouraging innovation. Although DoD standards have been developed and are largely consistent with those found in industry, the challenge is in developing life-cycle facility standards that are appropriate for an enterprise-wide strategy. The FGI's *Guidelines for the Design and Construction of Hospitals and Outpatient Facilities* represent a consensus of health care industry thought leaders on fundamental requirements for design and construction of medical facilities,[162] and more than 40 States and 60 countries have adopted or reference the guidelines.[163] The guidelines are reviewed and updated on a four-year cycle,[164] which, until recently, appeared to be more frequent than the update cycles used by DoD.

Updating standards requires significant time and other resources and creates challenges in designing and building a medical facility that is both world-class and technologically current. Prior to 2012, updates to Space Planning Criteria chapters did not occur on a regular cycle; however, with the stand-up of the Defense Health Agency (DHA), there are now dedicated resources to sustain Space Planning Criteria chapters and space templates and to develop regular update schedules. Updates to Space Planning Criteria chapters began in early 2012; this effort was undertaken to align the chapters with current care models and technologies and to transition from a staffing-based to a workload-based planning metric. As of January 2015, 34 out of 36 total chapters have been updated; 13 chapters (10 clinical, 3 non-clinical) are used by DHA planners within the Space Equipment Planning System application and are available for public use on the World-Class Toolkit. The remaining 21 chapters will be available within Space Equipment Planning System and posted for public use on the Toolkit by early 2015. The two remaining chapters, Medical Mobilization and Chapel, will be updated in late 2015.[165]

The Space Template Board completed their review of 187 templates in 2014; 94 were deleted, and 19 new templates were developed, which equals 112 templates at end-state. Forty-three updated templates are currently posted on the Toolkit, and 39 additional templates will be posted in early 2015. All templates will be evaluated for relevancy and applicability on a project-by-project basis each time a project is completed and specific templates are referenced.[165] Some criteria are updated and published as individual sections or chapters, allowing frequent updates to sections as needed, while maintaining other sections that have not changed. Other references, such as the Unified Facilities Criteria (UFC), are updated in total each time. It is important to emphasize that the Space Planning Criteria chapters, the Templates, the Military Standard 1691, and the UFC Appendix B are integral elements of the DoD construction standards that do not stand alone, but

are interrelated and synchronized. The Panel commends the DHA on its recent, intensive efforts to update the standards and encourages the DHA to immediately post these updates on the "Military Health System: DoD Space Criteria for Medical Facilities" website.

Based on Panel experience, design and construction strategies to enable future flexibilities are frequently used during the creation of new health care facilities to accommodate new and changing missions over the lifetime of a facility, which for most major investments can be several decades. DoD has several standards in place to provide future flexibility, ranging from standards for rooms and individual clinics to an entire facility and its supporting campus. Examples of standards that enable future flexibility include:

- Select clinical and administrative rooms are sized the same to promote interchangeability between clinical and administrative uses;[77,153]
- Private offices are built with examination room utilities that are capped behind walls to simplify future conversions from office to examination space [77,153]
- Where clinically appropriate, modular systems furniture is used throughout a space to support configuration changes and relocations;[77]
- Radiology rooms are designed with a universal template that supports a wide variety of equipment and future re-configurations;[153] and
- Single patient rooms are designed with headwalls capable of supporting two patients in the event of a mass casualty event.[77,153]

In a larger facility, to the degree possible, individual clinics share the same room, waiting, and corridor layouts not only to simplify orientation for patients, but also to support clinic relocations and expansions. When supported by a business case, inpatient facilities may include interstitial building space (IBS) to facilitate facility maintenance and future modifications. Each design includes a campus master plan to accommodate lateral building expansion, as well as roofs and other building systems designed to allow for vertical growth.[151]

Some of the new projects at military treatment facilities (MTFs) the Panel visited include IBS, such as Carl R. Darnall Army Medical Center; others, such as Naval Hospital Camp Pendleton, do not. The justification associated with the decision to use IBS or other strategies was not clear to Panel members. While the private sector routinely uses shelled space as a means to provide space to accommodate future missions, this strategy is prohibited in DoD because Title 10 of the United States Code §2801, in part, defines a military construction project as work to produce a complete and usable facility.[166] Shelled space by its nature would be incomplete and unusable. At the time of this Annual Progress Report, the Panel had not had the opportunity to evaluate any Military Health System (MHS) studies on the efficacy and effectiveness associated with the use of flexibility strategies to accommodate new missions, technology changes, and routine maintenance and repair work as a means to explain the return on investment of these decisions.

Current Department of Defense Partners in Standards Development

The Panel found that DoD maintains extensive volumes of medical facility construction standards. Developing, maintaining, and updating these standards is a complex, labor-intensive, and time-consuming process, in which the Services and the DHA participate. The Department of Veterans Affairs (VA) also maintains its own set of standards, and, although the two Departments develop standards to meet unique medical mission requirements, there are potential areas of duplication and redundancy.

The VA/DoD Capital Asset Planning Committee, formally the Construction Planning Committee, was established in 2005 to provide a formalized structure to facilitate cooperation and collaboration in achieving an integrated approach to planning, design, construction (major and minor), leasing, and other real property related initiatives for medical facilities that are mutually beneficial to both Departments. The Committee provides the oversight necessary for collaborative opportunities for joint capital asset planning to explored, evaluated, and maximized to enhance service delivery.[167] DoD and the VA collaborate for some standards development, and similarly, both participate with FGI in developing their standards.

DHA's Facilities Division, formerly the TRICARE Management Activity's Portfolio, Planning and Management Division, has worked diligently to create active partnerships with other leading industry standards-creating organizations. However, the Panel wonders if these relationships could be further expanded in an effort to reduce potential duplication of effort in standards development and more fully synchronize standards development especially for those standards that must respond to rapidly changing care delivery models and technology advances in care.

Additionally, continuing current partnerships could promote greater consistency, alignment, and efficiency with industry practices. Because there is potential duplication of effort in standards development between these entities, there could be opportunities to synchronize standards development with federal and industry partners. The Panel believes this could provide DoD the opportunity to reduce investment in standards development and maintenance while still ensuring its standards are current.

Meaningful Standards in a Rapidly Evolving Health Care Environment

One of the main challenges to maintaining current standards is the rapid rate of change in health care technology and care delivery models against a backdrop of multi-year timelines associated with building a new facility. Emerging models of care, such as population-based planning, community-based medical home, integrated health care markets, pharmacy home delivery, virtual visits, focus on health and prevention rather than illness, and disease management all have the potential to significantly alter facility requirements. Consequently, these evolving

models of care can reshape industry practices and benchmarks, which then affect the MHS as it embraces these new models of care. For example, the patient-centered medical home concept is driving design considerations in ambulatory care to accommodate patient- and family-centered care, teamwork rooms, patient throughput, and enhanced use of the electronic health record.

Frequently health care delivery challenges emerge in which the physical environment may play a role. For example, in 2013, The Joint Commission published a Sentinel Alert about Medical Device Alarm Safety in Hospitals, describing the degree to which staff alarm fatigue contributes to patient harm. Alarms significantly contribute to noise and are both a patient irritant and create a known error-provoking environment.[168] One of The Joint Commission recommendations was for health care organizations to assess the degree to which acoustics in patient care areas allowed alarm signals to be audible. Ensuring that alarms can be heard requires a bundle of solutions, to include acoustic design standards, which includes how walls are designed to isolate sound and the use of materials to increase sound absorption and decrease sound reverberation.[162] FGI has already intensively focused on alarm fatigue by engaging nationwide experts who have researched and written white papers to inform its Guidelines standards.[169,170] Thus, this is work the MHS does not need to replicate.

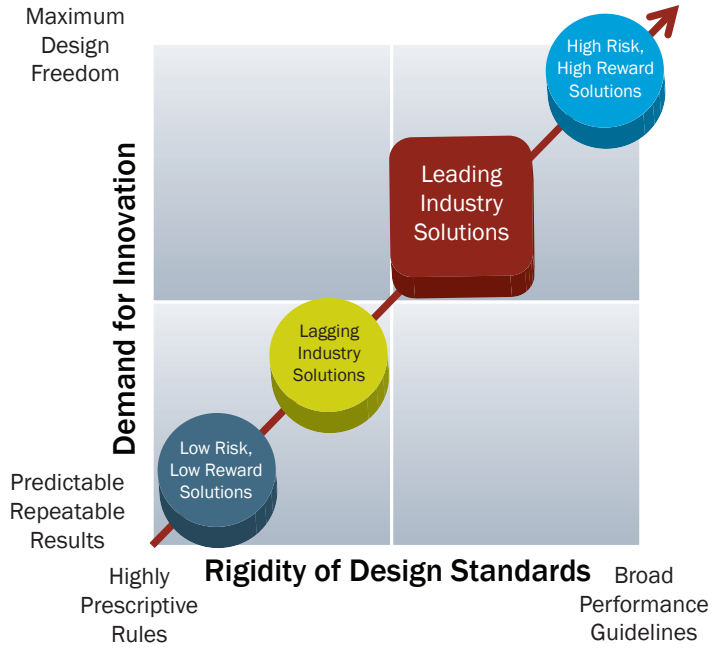
Staff fatigue is another error-provoking condition that results in patient harm as outlined in another The Joint Commission Sentinel Alert in 2011, in which it was recommended that organizations provide an integrated bundle of solutions to include a cool, dark, quiet, comfortable room to enable staff rest.[171] In addition, the recent Ebola epidemic has forced all health care organizations to reassess how they would identify, isolate, and care for such patients. This has profound facility implications, such as the need for patient isolation support; the use and maintenance of heating, ventilating and air conditioning systems; and the effective cleaning of surfaces, equipment and furniture.

Standards Development Philosophy and Impact

There is an ongoing debate in the national health care facility construction community about the philosophic framework that standards should reflect. The fundamental question is the degree to which standards should reflect proven methods over time versus altering standards to reflect emerging best practices and opportunities for innovation. This quandary occurs during a health care era that increasingly relies on evidence-based decision-making versus experiential practices, that is, "this is the way we've always done it."

Design standards should reflect the organization's desire and tolerance for change and variation. Figure 11 attempts to depict that there are potentially competing objectives.

Figure 11. Impact of Design Standards[172]



Adapted from Orndoff, D., 2014

The horizontal dimension of the figure illustrates that the owner organization's design and construction standards have a range of rigidity. On the extreme left is a highly prescriptive set of rules, limiting designer and constructor options in the delivery of a facility. On the extreme right is a broadly defined set of guidelines, allowing designers and builders maximum freedom to meet the owner's intent.

The vertical dimension of the chart illustrates that owner organizations have a range of demand for innovation. On the extreme bottom of the scale is a need for highly predictable, repeatable results. On the extreme top of the scale there is maximum design freedom to incorporate innovative, even experimental solutions to meet the owner's intent.

Organizations that operate in the lower left quadrant tend to value "standardization" to generate predictable, repeatable results (e.g., functionality, quality, cost, and schedule). This philosophic approach typically generates low-risk and high reliability solutions that result in minimum design variation and that generally avoid design failures. Organizations embracing this approach tend to lag behind the greater medical design and construction industry in terms of embracing innovative but unproven facilities solutions.

Organizations that operate in the upper right quadrant tend to value "creative solutions" to generate greater performance improvement (functionality, quality, cost, and schedule) over what would be anticipated by a more conservative standards driven approach. The innovation approach tolerates higher risk for potentially higher reward solutions. These organizations accept variation and occasional failure as an acceptable cost of business. Organizations embracing this approach tend to lead the greater medical design and construction industry in terms of embracing innovative facilities solutions. However, it is too early to tell if either approach is best associated with improved health care outcomes or more a cost-effective method over time.

The Panel's assessment is that DoD, as an "owner" design and construction organization, currently would be plotted near the middle of the chart. The Panel believes DoD values predictability, conformity, and reliability. However, over the past decade DoD has led the industry in embracing industry-driven, evidence-based design (EBD) solutions as evident in the World-Class Toolkit to shape the most current generation of MTFs. Just as is true in the private sector, as far as the Panel can ascertain, no evaluation of this innovative approach has been completed post occupancy to better understand the impact of these solutions on targeted health care outcomes or a formal return-on-investment analysis.

Since the creation of the MHS World-Class Toolkit, the MHS has completed a 90-day review of its health care system with regard to access, quality, and safety outcomes and has identified an aspirational goal to become a high reliability organization (HRO). Five principles are shared by HROs: preoccupation with failure, reluctance to simplify, sensitivity to operations, commitment to resilience, and deference to expertise.[57] Inherent in the HRO approach is the use of human factors engineering as a tool to understand and analyze contributing safety-related variables, including the built environment. "Human factors engineering is the study of human capabilities, limitations, and behaviors and the integration of that knowledge into the systems we design for them with the goals of enhancing safety, performance and the general well-being of the operators of the system."[58]

The HRO concept has been used widely in other high-risk industries, such as aviation, nuclear aircraft carrier operations, and wild-land firefighting to improve safety outcomes. The aviation community applied human factors engineering research in cockpit design to address human operator limitations and capabilities in order to achieve improved safety outcomes.[173] The Joint Commission has developed an HRO-based framework, which encourages health care organizations to commit to becoming HROs "to achieve and sustain the elusive goal of consistent excellence in safety and quality."[52(p.566)]

Standardization of facility design represents an important tool for aspiring HRO systems such as the MHS. It can lead to improved safety and other key outcomes and may be important in facilitating the ability of military medical personnel to provide care at any MTF to which they are assigned. However, the MHS has not yet fully considered the financial implications and long-term affordability issues that may emerge across a facility's cycle, especially issues related to the creation and operation of world-class facilities.

The Panel commends the MHS for leading the way with its definition of a world-class medical facility and development of the World-Class Toolkit, encouraging innovation during this last decade of construction. However, it must now evaluate the impact of these design decisions on key health care outcome measures and expected and realized returns on investment, in support of changing missions.

Appendix References

52. Chassin MR, Loeb JM. The ongoing quality improvement journey: Next stop, high reliability. *Health Aff. (Millwood).* 2011;30(4):559-568.
57. Weick KE, Sutcliffe KM. *Managing the Unexpected: Resilient Performance in an Age of Uncertainty.* San Francisco, CA: Jossey-Bass; 2007.
58. Koonce JM. Predictive validity of flight simulation as a function of simulator motion. *Hum. Factors.* 1979;21:215-223.
77. U.S. Department of Defense. Military Health System (MHS): DoD Space Planning Criteria for Health Facilities. [Webpage]. http://www.wbdg.org/ccb/browse_cat.php?o=29&c=261.
151. U.S. Department of Defense. Unified Facilities Criteria (UFC) - Design: Medical Military Facilities (UFC 4-510-01). 2012.
153. U.S. Department of Defense. Military Health System (MHS) Templates (formerly 'Guideplates'). [Webpage]. http://www.wbdg.org/ccb/browse_cat.php?o=64&c=260#8264.
161. The Oxford English Dictionary, Second Edition. *The Oxford English Dictionary, Second Edition.* Vol XVI. Oxford, England: Oxford University Press; 1989.
162. Facility Guidelines Institute. *Guidelines for Design and Construction of Hospitals and Outpatient Facilities.* Chicago, IL: American Society for Healthcare Engineering; 2014.
163. Boston Society of Architects/AIA. Healthcare Facilities Committee. [Webpage]. http://www.architects.org/programs-and-events/healthcare-facilities-committee-22.
164. New Health Care Facility Design Guidelines Address Patient Handling and Movement, Bariatric Accommodations, Cancer Treatment Facilities, Acoustics, and More [press release]. November 18, 2009.
165. DHA Facilities Division. IRP Response 26 Jan 2015 -finaljb. 2015.
166. 10 U.S. Code §2801. United States. 2010.
167. U.S. Department of Defense, U.S. Department of Veterans Affairs. Department of Veterans Affairs and Department of Defense Construction Planning Committee VA/DoD CPC. 2009.
168. The Joint Commission. Medical device alarm safety in hospitals. Vol 50: The Joint Commission; 2013.
169. Sykes D, Barach P, Belojevic G, et al. *Clinical Alarms & Fatalities Resulting from 'Alarm Fatigue' in Hospitals: Perspectives from Clinical Medicine, Acoustical Science, Signal Processing, Noise Control Engineering & Human Factors.* 2011.
170. Facility Guidelines Institute, Sykes DM. FGI Guidelines Update #15: Updated Acoustic Criteria Address Noise Issue. [Webpage]. 2014; http://fgiguidelines.org/pdfs/FGI_Update_AcousticCriteria_140929.pdf.

171. The Joint Commission. Health care worker fatigue and patient safety. Vol 48: The Joint Commission; 2011.
172. Orndoff D. Impact of Design Standards. 2014.
173. Aviation Knowledge. Cockpit Design and Human Factors. [Webpage]. http://aviationknowledge.wikidot.com/aviation:cockpit-design-and-human-factors. Accessed January 5, 2015.

Appendix I. Integrated Delivery System Literature Review

Although the term integrated delivery system (IDS) is widely used, there is no clear consensus on how it should best be defined.[39,174] Recent literature has attempted to define and describe the attributes of IDSs and similar terms, such as organized delivery systems, integrated and organized health care delivery, integration, integrated service delivery, and integrated and coordinated care, drawing similarities and highlighting the differences between the various terms. A list of definitions for these terms can be found at Table 20. Many of these terms are seemingly interchangeable because of ambiguity regarding two issues: the object of integration and the essential components of integration.[175] "Discussions of integrated health care often implicitly conflate delivery systems and delivery processes with their product: patient care. However, organizations, the processes they use to deliver care, and the care patients receive are all conceptually distinct objects to which the term *integration* can be applied."[175(p.113)] However, the distinction between integrated organizational structures and integrated care delivery processes seems clear, with some authors proposing a definition of integrated or coordinated care that "distinguishes it from integrated delivery organizations, acknowledging that integrated organizational structures and processes may fail to produce integrated patient care."[175(p.112)]

Health care research has described integration as having multiple components. Research originally described integration as having three components: clinical, physician-system, and functional administrative.[40,176,177] Functional administrative integration was described as "systemwide coordination of support functions and activities;" physician-system integration was described as "economic and social linkages between physicians and the system;" and clinical integration was described as "the extent to which patient care services are coordinated across people, functions, activities, processes, and operating units so as to maximize the value of services delivered."[40(p.458),178] Later research addressed four components of integration, including:

- Functional integration, which "seeks to coordinate key support functions and activities, such as financial and information management, strategic planning, and quality improvement."[175(p.114),178]
- Organizational integration, which "describes ownership, contractual arrangements, and alliances among health care institutions."[175(p.114),178]
- Professional integration, which "refers to formal collaboration among health care professionals, within and between institutions."[175(p.114),178]
- Clinical integration, which "describes organizational activities intended to coordinate patient care services across people, functions, activities, and operating units over time to maximize the value of services delivered to patients."[175(p.114),178]

The definition of integration may differ based on the role of an individual within the health care system. A patient might define integrated care as health care that is continuous and easy to navigate, whereas a health professional may define it

as the closely coordinated provision, management, financing, and evaluation of separate technical services and their management support systems.[107] Senior health managers and policymakers might define integration as something that "happens when decisions on policies, financing, regulation or delivery are not inappropriately compartmentalized."[107(p.5)]

Despite this variety, there are commonalities in how IDSs are described. Many definitions focus on increased communication and information sharing, as well as on an enhanced focus on the continuity of care to "coordinate patient care in a way that improves the patient experience and the quality of the care received."[39] Additionally, integration "hinge[s] on effective intergroup relationships."[40(p.458)] Health care research has suggested key attributes of successful integrated delivery systems,[41,179] including:

- Shared values and goals; committed leadership; and a culture that emphasizes safety, teamwork, continuous improvement, and accountability.
- Patient-centered care and a focus on population health.
- Coordination of care and information sharing across a continuum of health care services and settings, with all or most of the patient's care remaining within the system, "enabling maximum efficiency and coordination."[41(p. S286)]
- Financial incentives to provide high-quality, affordable care, with incentives to "avoid duplication and facilitate efficient deployment of resources…echoing the Institute of Medicine's call for continuous decreases in waste."[41(p. S286)]
- Evidence-based medicine and practices, including the use of health information technology, to minimize quality shortfalls.
- Comprehensive records, including electronic health records that are accessible, able to track patients across a continuum, and used to aggregate "data to enable systemwide evaluation, benchmarking, and improvement."[41(p. S286)]
- The ability to "right size" capacity, to include 1) retaining the number and types of physicians needed, so that enrolled patients have good access to primary care physicians and specialists, while still having the right number of "surgeons so that each one is fully busy [and] proficient;" and 2) adjusting "the facilities and equipment to the needs of the enrolled population."[41(p. S286)]
- Continuous innovation and learning to improve value.

Figure 12 describes six attributes of an ideal health care delivery system, while Figure 13 provides a checklist for high-value health care. McCarthy also identified overarching themes observed in well-known and successful IDSs, including value-driven leadership, interdisciplinary teamwork, integration, aligned incentives, mutual accountability, and transparency.[42]

Figure 12. Six Attributes of an Ideal Health Care Delivery System[42]

Exhibit 1. Six Attributes of an Ideal Health Care Delivery System

- ***Information Continuity*** Patients' clinically relevant information is available to all providers at the point of care and to patients through electronic health record (EHR) systems.
- ***Care Coordination and Transitions*** Patient care is coordinated among multiple providers, and transitions across care settings are actively managed.
- ***System Accountability*** There is clear accountability for the total care of patients. (We have grouped this attribute with care coordination, since one supports the other.)
- ***Peer Review and Teamwork for High-Value Care*** Providers (including nurses and other members of care teams) both within and across settings have accountability to each other, review each other's work, and collaborate to reliably deliver high-quality, high-value care.
- ***Continuous Innovation*** The system is continuously innovating and learning in order to improve the quality, value, and patients' experiences of health care delivery.
- ***Easy Access to Appropriate Care*** Patients have easy access to appropriate care and information at all hours, there are multiple points of entry to the system, and providers are culturally competent and responsive to patients' needs.

From McCarthy, 2009.

Figure 13. A Checklist for High-Value Health Care[180]

EXHIBIT 1

A Checklist For High-Value Health Care

Category	Item
Foundational elements	Governance priority—visible and determined leadership by CEO and board
	Culture of continuous improvement—commitment to ongoing, real-time learning
Infrastructure fundamentals	IT best practices—automated, reliable information to and from the point of care
	Evidence protocols—effective, efficient, and consistent care
	Resource use—optimized use of personnel, physical space, and other resources
Care delivery priorities	Integrated care—right care, right setting, right providers, right teamwork
	Shared decision making—patient-clinician collaboration on care plans
	Targeted services—tailored community and clinic interventions for resource-intensive patients
Reliability and feedback	Embedded safeguards—supports and prompts to reduce injury and infection
	Internal transparency—visible progress in performance, outcomes, and costs

SOURCE Cosgrove D, et al., *A CEO Checklist for High-Value Health Care* (Note 16 in text). **NOTE** IT is information technology.

From Cosgrove, 2013.

As illustrated above, while health care research has not agreed on a definition for an IDS, researchers agree on many key factors of successful health care organizations. The Military Health System's Quadruple Aim stems from the U.S. health care system's Triple Aim to improve the experience of care, improve the health of populations, and reduce per capita costs of health care.[181] Recognizing the importance of integration, Berwick describes that effective accomplishment of the Triple Aim requires "enrollment of an identified population, a commitment to universality for its members, and the existence of an organization (an "integrator") that accepts responsibility for all three aims for that population."[181(p.759)] Further, he describes the integrator's role as including five components: "partnership with individuals and families, redesign of primary care, population health management, financial management, and macro system integration."[181(p.759)]

Although an "integrator" can take on a form similar to Kaiser Permanente, which "has fully integrated financing and either full ownership of or exclusive relationships with delivery structures . . . and is able to use those structures to good advantage," Berwick believes that "other models can also take on a strong integrator role, even without unified financing or a single delivery system."[181(p.763)] He does state, however, that, "the important function of linking organizations across the continuum requires that the integrator be a single organization (not just a market dynamic) that can induce coordinative behavior among health service suppliers to work as a system for the defined population."[181(p.763)]

Integration can be difficult to achieve, but can be achieved either through a management hierarchy's top-down coordination of organizations or through market competition, which can lead to contractual relations between organizations.[5] A third option described in literature is the network mode of integration, which "means a more or less voluntary cooperation or collaboration" between organizations that are not part of a common hierarchy or Market.[5(p.79)] The article describes degrees of vertical and horizontal integration, including contracting, coordination, cooperation, and collaboration. It also explains that some methods are better depending on the degree of differentiation between entities in a system.[5]

Table 20. Definitions of Integrated and Organized Health Care Delivery Systems[5,39,41,42,107,175-179,182-195]

Sources	Definition
• Burns L, Muller R. Hospital-physician collaboration: Landscape of economic integration and impact on clinical integration. *Milbank Q.* 2008;86(3):375-434. • Enthoven A. Integrated delivery systems: The cure for fragmentation. *Am. J. Manag. Care.* Dec 2009;15(10 Suppl). • Washington State Hospital Association. Governing Board Orientation Manual. 2006:3-4.	An **integrated delivery system** is an organized, coordinated, and collaborative network that: (1) links various health care providers, via common ownership or contract, across 3 domains of integration— economic, noneconomic, and clinical—to provide a coordinated, vertical continuum of services to a particular patient population or community and (2) is accountable, both clinically and fiscally, for the clinical outcomes and health status of the population or community served, and has systems in place to manage and improve them.
• Enthoven A. Integrated delivery systems: The cure for fragmentation. *Am. J. Manag. Care.* Dec 2009;15(10 Suppl). • Maeda JLK, Lee KM, Horberg M. Comparative health systems tesearch among Kaiser Permanente and other integrated delivery systems: A systematic literature review. *Perm J.* 2014;18(3):66-77.	**Integrated delivery systems** are a model of health care involving an organized, coordinated, and collaborative network that brings together various physicians to deliver coordinated care and a continuum of services to a given patient population. Integrated delivery systems are clinically and fiscally accountable for the health status and outcomes for the population served, and they have systems to manage and to improve clinical outcomes.
• Hwang W, Chang J, LaClair M, Paz H. Effects of integrated delivery system on cost and quality. *Am. J. Manag. Care.* May 10 2013;19(5):e175-e184. • Margolis J. *The Healthcare Cure: How Sharing Information Can Make the System Work Better.* Amherst, NY: Prometheus Books; 2011.	An **integrated delivery system** is one or more hospitals along with physicians, diagnostic centers, and other components of the supply side of the supply chain strive to share information, minimize duplication, and make treatment decisions based upon the institutional best practices.
• Hwang W, Chang J, LaClair M, Paz H. Effects of integrated delivery system on cost and quality. *Am. J. Manag. Care.* May 10 2013;19(5):e175-e184. • Shortell S, Schmittdiel J, Wang M. An empirical assessment of high-performing medical groups: Results from a national study. Med. Care Res. Rev. 2005;62(4):407-434.	The definition of an **integrated delivery system** is not based on a system's size or structure, but rather on an organizational commitment to, and culture of, continuous quality improvement that is most closely linked to better performance as measured by clinical quality, patient satisfaction, organizational learning, and financial performance.

Sources	Definition
• Categorizing accountable care organizations: Moving toward patient-centered outcomes research that compares health care delivery systems. *Health Serv. Res.* 2014;49(6):1875-1882.* • Gillies R, Shortell S, Anderson D. Conceptualizing and measuring integration: Findings from the health systems integration study. *Hosp. Health Serv. Adm.* 1993;38(4):467-489. • Hwang W, Chang J, LaClair M, Paz H. Effects of integrated delivery system on cost and quality. *Am. J. Manag. Care.* May 10 2013;19(5):e175-e184. • McCarthy D, Mueller K. *Organizing for Higher Performance: Case Studies of Organized Delivery Systems.* The Commonwealth Fund; 2009. • Shortell SM, Wu FM, Lewis VA, Colla CH, Fisher ES. A taxonomy of accountable care organizations for policy and practice. *Health Serv. Res.* 2014;49(6):1883-1899. • Shortell S, Gillies R, Anderson D, Erickson K. *Remaking Health Care in America: Building Organized Delivery Systems.* San Francisco, CA: Jossey-Bass; 1996. • Shortell S, Gillies R, Anderson D. The new world of managed care: Creating organized delivery systems. *Health Aff. (Millwood).* 1994;13(5):46-64. • Shortell S, Casalino L, Fisher E. *Implementing Accountable Care Organizations.* May 2010. • Singer S, Burgers J, Friedberg M, Rosenthal M, Leape L, Schneider E. Defining and measuring integrated patient care: Promoting the next frontier in health care delivery. *Med. Care Res. Rev.* 2011;68(1):112-117.	An **integrated or organized delivery system** is a network of organizations that provides or arranges to provide a coordinated continuum of services to a defined population and is willing to be held clinically and fiscally accountable for the outcomes and health status of the population served.
• Hwang W, Chang J, LaClair M, Paz H. Effects of integrated delivery system on cost and quality. *Am. J. Manag. Care.* May 10 2013;19(5):e175-e184. • Waddington C, Egger D. Integrated Health Services - What and Why? In: World Health Organization Working Group on Service Delivery, ed. *Technical Brief No. 1*: World Health Organization; 2008.	**Integrated service delivery** is the organization and management of health services so that people get the care they need, when they need it, in ways that are user-friendly, achieve the desired results and provide value for money.
• Hwang W, Chang J, LaClair M, Paz H. Effects of integrated delivery system on cost and quality. *Am. J. Manag. Care.* May 10 2013;19(5):e175-e184. • *Jonas and Kovner's Health Care Delivery in the United States. 10th ed.* New York, NY: Springer Publishing Company; 2011.	**Organized health care delivery** occurs when care providers have established relationships and mechanisms for communicating and working to coordinate patient care across health conditions, services, and care settings over time.

Sources	Definition
• Coddington D, Moore K, Fischer E. *Integrated health care: Reorganizing the physician, hospital, and health plan relationship. 2nd ed.* Englewood, CO: Center for Research in Ambulatory Health Care Administration;1995. • Grone O, Garcia-Barbero M. Integrated care: A position paper of the WHO European office for integrated health care services. *Int. J. Integr. Care.* 2001. • Strandberg-Larsen M, Krasnik A. Measurement of integrated healthcare delivery: A systematic review of methods and future research directions. *Int. J. Integr. Care*. 2009.	**Integrated health care delivery** is either a) an organizational structure that primarily follows economic imperatives (e.g., that unites a financing group with all providers—from hospitals, clinics, and physicians to home care and long-term care facilities to pharmacies) or b) a way of organizing care delivery—by coordinating different activities to ensure harmonious functioning—ultimately to benefit the patients in terms of clinical outcome.
• Kodner D, Spreeuwenberg C. Integrated care: Meaning, logic, applications, and implications - A discussion paper. *Int. J. Integr. Care.* 2002;2(e12). • Singer S, Burgers J, Friedberg M, Rosenthal M, Leape L, Schneider E. Defining and measuring integrated patient care: Promoting the next frontier in health care delivery. *Med. Care Res. Rev.* 2011;68(1):112-117.	**Integration** is a coherent set of methods and models of the funding, administrative, organizational, service delivery, and clinical levels designed to create connectivity, alignment, and collaboration within and between the cure and care sectors.
• Axelsson R, Axelsson SB. Integration and collaboration in public health: A conceptual framework. *Int J Health Plann Mgmt.* 2006;21:75-88. • Lawrence P, Lorsch J. *Organization and Environment: Managing Differentiation and Integration.* Boston, MA: Harvard University Press; 1967. • Lawrence P, Lorsch J. *Organization and Environment: Managing Differentiation and Integration (Revised Edition).* Boston, MA: Harvard Business School Press; 1986. • Singer S, Burgers J, Friedberg M, Rosenthal M, Leape L, Schneider E. Defining and measuring integrated patient care: Promoting the next frontier in health care delivery. *Med. Care Res. Rev.* 2011;68(1):112-117.	**Integration** is the quality of the state of collaboration that exists among departments that are required to achieve unity of effort by the demands of the environment.

Regardless of how one defines integration, "much of the recent innovation in US health policy has been based upon a fundamental belief that a higher level of integration will yield a more efficient healthcare delivery system. An IDS presumably provides higher quality and more patient-centric care at lower costs."[39] In a review of peer-reviewed articles and 4 non–peer reviewed manuscripts, 20 studies "showed an association between increased integration in healthcare delivery and an increase in the quality of care."[39] Other evidence indicates that "IDSs can improve healthcare quality, improve outcomes, and reduce costs—especially for patients with complex needs—if properly implemented and coordinated."[41(p. S287)] For example, "IDSs are potentially formidable economic units. Coordinated organizations functioning under a cohesive strategy can achieve economies of scale and make efficient use of both capital and operating resources, enabling them to meet the same level of demand with less capacity than stand-alone facilities. Larger scale also promotes increased productivity, lower staffing requirements, and reduced operating and unit costs that can be passed on to consumers."[41(p. S288)]

There are, however, challenges to creating an IDS. The Panel believes that Berwick's observations and lessons learned regarding achievement of the Triple Aim are applicable to the MHS's goal of achieving the Quadruple Aim. Berwick stated, "the pain of the transition state – the disruption of institutions, forms, habits, beliefs, and income streams in the status quo – is what denies us, so far,

the enormous gains on components of the Triple Aim that integrated care could offer."[181(p.768)] Other challenges associated with creating an IDS include a lack of a shared social identity, which "is the wellspring of cooperation, mutual influence, and committed action in the service of group goals," and difficulties associated with intergroup collaboration, as "communication does not flow as easily across intergroup boundaries."[40(p.460)]

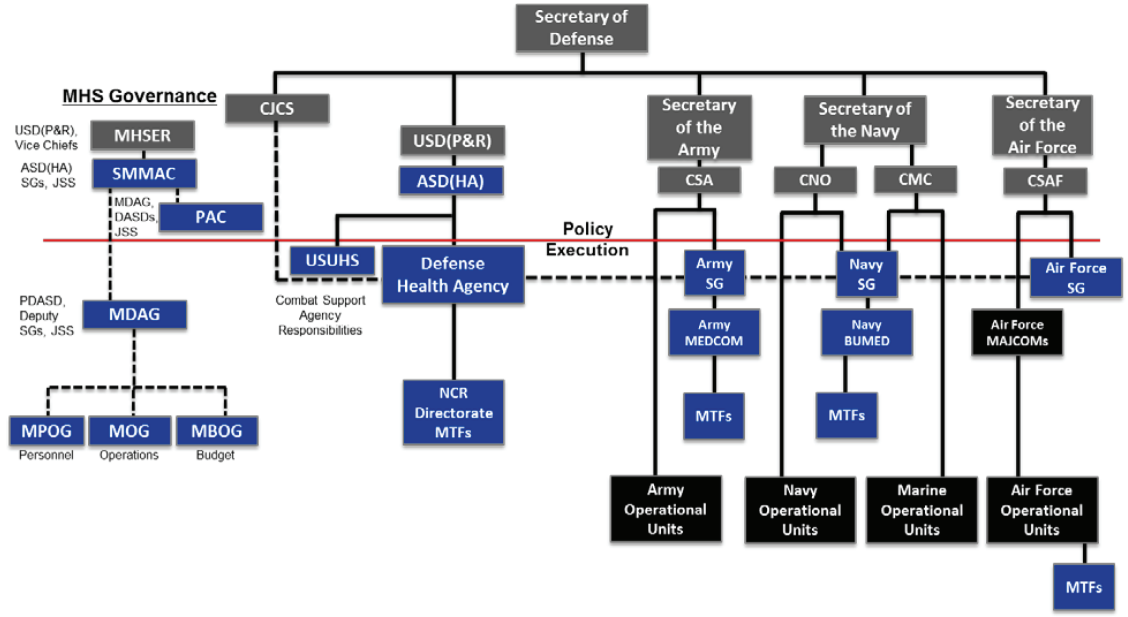
Appendix References

5. Axelsson R, Axelsson SB. Integration and collaboration in public health: A conceptual framework. *Int J Health Plann Mgmt.* 2006;21:75-88.
39. Hwang W, Chang J, LaClair M, Paz H. Effects of integrated delivery system on cost and quality. *Am. J. Manag. Care.* May 10 2013;19(5):e175-e184.
40. Kreindler S, Larson B, Wu F, et al. Interpretations of integration in early accountable care organizations. *Milbank Q.* 2012;90(3):457-483.
41. Enthoven A. Integrated delivery systems: The cure for fragmentation. *Am. J. Manag. Care.* Dec 2009;15(10 Suppl).
42. McCarthy D, Mueller K. *Organizing for Higher Performance: Case Studies of Organized Delivery Systems.* The Commonwealth Fund; 2009.
107. Waddington C, Egger D. Integrated Health Services - What and Why? In: World Health Organization Working Group on Service Delivery, ed. *Technical Brief No. 1*: World Health Organization; 2008.
174. Bodenheimer T. Coordinating care - a perilous journey through the health care system. *N. Engl. J. Med.* 2008;358(10):1064-1071.
175. Singer S, Burgers J, Friedberg M, Rosenthal M, Leape L, Schneider E. Defining and measuring integrated patient care: Promoting the next frontier in health care delivery. *Med. Care Res. Rev.* 2011;68(1):112-117.
176. Categorizing accountable care organizations: Moving toward patient-centered outcomes research that compares health care delivery systems. *Health Serv. Res.* 2014;49(6):1875-1882.
177. Gillies R, Shortell S, Anderson D. Conceptualizing and measuring integration: Findings from the health systems integration study. *Hosp. Health Serv. Adm.* 1993;38(4):467-489.
178. Shortell S, Gillies R, Anderson D, Erickson K. *Remaking Health Care in America: Building Organized Delivery Systems.* San Francisco, CA: Jossey-Bass; 1996.
179. Maeda JLK, Lee KM, Horberg M. Comparative health systems tesearch among Kaiser Permanente and other integrated delivery systems: A systematic literature review. *Perm J.* 2014;18(3):66-77.
180. Cosgrove DM, Fisher M, Gabow P, et al. Ten strategies to lower costs, improve quality, and engage patients: The view from leading health system CEOs. *Health Aff. (Millwood).* 2013;32(2):321-327.
181. Berwick D, Nolan T, Whittington J. The triple aim: Care, health, and cost. *Health Aff. (Millwood).* 2008;27(3):759-769.
182. Burns L, Muller R. Hospital-physician collaboration: Landscape of economic integration and impact on clinical integration. *Milbank Q.* 2008;86(3):375-434.
183. Washington State Hospital Association. Governing Board Orientation

Manual. 2006:3-4.
184. Lawrence P, Lorsch J. *Organization and Environment: Managing Differentiation and Integration.* Boston, MA: Harvard University Press; 1967.
185. Lawrence P, Lorsch J. *Organization and Environment: Managing Differentiation and Integration (Revised Edition).* Boston, MA: Harvard Business School Press; 1986.
186. Shortell SM, Wu FM, Lewis VA, Colla CH, Fisher ES. A taxonomy of accountable care organizations for policy and practice. *Health Serv. Res.* 2014;49(6):1883-1899.
187. Shortell S, Gillies R, Anderson D. The new world of managed care: Creating organized delivery systems. *Health Aff. (Millwood).* 1994;13(5):46-64.
188. Shortell S, Casalino L, Fisher E. *Implementing Accountable Care Organizations.* May 2010.
189. Coddington D, Moore K, Fischer E. *Integrated health care: Reorganizing the physician, hospital, and health plan relationship. 2nd ed.* Englewood, CO: Center for Research in Ambulatory Health Care Administration;1995.
190. Grone O, Garcia-Barbero M. Integrated care: A position paper of the WHO European office for integrated health care services. *Int. J. Integr. Care.* 2001.
191. Strandberg-Larsen M, Krasnik A. Measurement of integrated healthcare delivery: A systematic review of methods and future research directions. *Int. J. Integr. Care.* 2009.
192. Kodner D, Spreeuwenberg C. Integrated care: Meaning, logic, applications, and implications - A discussion paper. *Int. J. Integr. Care.* 2002;2(e12).
193. *Jonas and Kovner's Health Care Delivery in the United States. 10th ed.* New York, NY: Springer Publishing Company; 2011.
194. Margolis J. *The Healthcare Cure: How Sharing Information Can Make the System Work Better.* Amherst, NY: Prometheus Books; 2011.
195. Shortell S, Schmittdiel J, Wang M. An empirical assessment of high-performing medical groups: results from a national study. *Med. Care Res. Rev.* 2005;62(4):407-434.

Appendix J. Military Health System Organizational Structure

Figure 2.2 Organizational Structure of the Military Health System within the Department of Defense



LEGEND

C2 — Coordination & Assistance

ABBREVIATIONS

ASD(HA) – Assistant Secretary of Defense for Health Affairs
BUMED – US Navy Bureau of Medicine and Surgery
CJCS – Chairman of the Joint Chiefs of Staff
CMC – Commandant of the Marine Corps
CNO – Chief of Naval Operations
CSA – Chief of Staff, Army
CSAF – Chief of Staff, Air Force
DASD – Deputy Assistant Secretary of Defense
JSS – Joint Staff Surgeon
MAJCOM – Major Command, Air Force
MBOG –- Medical Business Operations Group
MDAG – Medical Deputies Action Group
MEDCOM – United States Army Medical Command
MHS – Military Health System
MHSER – Military Health System Executive Review
MOG – Medical Operations Group
MPOG – Manpower and Personnel Operations Group
MTF – Military Treatment Facility
NCR – National Capital Region
PAC – Policy Advisory Council
PDASD – Principal Deputy Assistant Secretary of Defense
SG – Surgeon General
SMMAC – Senior Military Medical Action Council
USD(P&R) – Under Secretary of Defense for Personnel and Readiness
USUHS – Uniformed Services University of the Health Sciences

Source: 2014 MHS Review Group, July 2014

From U.S. Department of Defense, 2014.[2]

Appendix References

2. U.S. Department of Defense. Military Health System Review: Final Report to the Secretary of Defense. August 29, 2014.

Appendix K. Ike Skelton National Defense Authorization Act for Fiscal Year 2011, Section 2852

SEC. 2852. REQUIREMENTS RELATED TO PROVIDING WORLD CLASS MILITARY MEDICAL CENTERS.

(a) UNIFIED CONSTRUCTION STANDARD FOR MILITARY CONSTRUCTION AND REPAIRS TO MILITARY MEDICAL CENTERS.—Not later than 180 days after the date of the enactment of this Act, the Secretary of Defense shall establish a unified construction standard for military construction and repairs for military medical centers that provides a single standard of care. This standard shall also include—

(1) size standards for operating rooms and patient recovery rooms; and

(2) such other construction standards that the Secretary considers necessary to support military medical centers.

(b) INDEPENDENT REVIEW PANEL.—

(1) ESTABLISHMENT; PURPOSE.—The Secretary of Defense shall establish an independent advisory panel for the purpose of—

(A) reviewing the unified construction standards established pursuant to subsection (a) to determine the standards consistency with industry practices and benchmarks for world class medical construction;

(B) reviewing ongoing construction programs within the Department of Defense to en-

sure medical construction standards are uniformly applied across applicable military medical centers;

(C) assessing the approach of the Department of Defense approach to planning and programming facility improvements with specific emphasis on—

(i) facility selection criteria and proportional assessment system; and

(ii) facility programming responsibilities between the Assistant Secretary of Defense for Health Affairs and the Secretaries of the military departments;

(D) assessing whether the Comprehensive Master Plan for the National Capital Region Medical, dated April 2010, is adequate to fulfill statutory requirements, as required by section 2714 of the Military Construction Authorization Act for Fiscal Year 2010 (division B of Public Law 111–84; 123 Stat. 2656), to ensure that the facilities and organizational structure described in the plan result in world class military medical centers in the National Capital Region; and

(E) making recommendations regarding any adjustments of the master plan referred to in subparagraph (D) that are needed to ensure the provision of world class military medical centers and delivery system in the National Capital Region.

(2) MEMBERS.—

(A) APPOINTMENTS BY SECRETARY.—The panel shall be composed of such members as determined by the Secretary of Defense, except that the Secretary shall include as members—

(i) medical facility design experts;

(ii) military healthcare professionals;

(iii) representatives of premier health care centers in the United States; and

(iv) former retired senior military officers with joint operational and budgetary experience.

(B) CONGRESSIONAL APPOINTMENTS.—The chairmen and ranking members of the Committees on the Armed Services of the Senate and House of Representatives may each designate one member of the panel.

(C) TERM.—Members of the panel may serve on the panel until the termination date specified in paragraph (7).

(D) COMPENSATION.—While performing duties on behalf of the panel, a member and any adviser referred to in paragraph (4) shall be reimbursed under Government travel regulations for necessary travel expenses.

(3) MEETINGS.—The panel shall meet not less than quarterly. The panel or its members may make other visits to military treatment centers and military headquarters in connection with the duties of the panel.

(4) STAFF AND ADVISORS.—The Secretary of Defense shall provide necessary administrative staff support to the panel. The panel may call in advisers for consultation.

(5) REPORTS.—

(A) INITIAL REPORT.—Not later than 120 days after the first meeting of the panel, the panel shall submit to the Secretary of Defense a written report containing—

(i) an assessment of the adequacy of the plan of the Department of Defense to address the items specified in subpara-

graphs (A) through (E) of paragraph (1) relating to the purposes of the panel; and

(ii) the recommendations of the panel to improve the plan.

(B) ADDITIONAL REPORTS.—Not later than February 1, 2011, and each February 1 thereafter until termination of the panel, the panel shall submit to the Secretary of Defense a report on the findings and recommendations of the panel to address any deficiencies identified by the panel.

(6) ASSESSMENT OF RECOMMENDATIONS.—Not later than 30 days after the date of the submission of each report under paragraph (5), the Secretary of Defense shall submit to the congressional defense committees a report including—

(A) a copy of the panel's assessment;

(B) an assessment by the Secretary of the findings and recommendations of the panel; and

(C) the plans of the Secretary for addressing such findings and recommendations.

(7) TERMINATION.—The panel shall terminate on September 30, 2015.

(c) DEFINITIONS.—In this section:

Appendix L. What is a World-Class Medical Facility?

Excerpted from Achieving World Class - An Independent Review of the Design Plans for the Walter Reed National Military Medical Center and the Fort Belvoir Community Hospital. National Capital Region Base Realignment and Closure Health Systems Advisory Subcommittee of the Defense Health Board. U.S. Department of Defense. May 2009. (Prepared in partial fulfillment of Section 2721, Public Law 110-417)

APPENDIX B

What Is a *World-class Medical Facility*?

> *As we men of medicine grow in learning we more justly appreciate our dependence on each other. The sum total of medical knowledge is now so great and wide spreading that it would be futile for any one man... to assume that he has even a working knowledge of any part of the whole... The best interest of the patient is the only interest to be considered, and in order that the sick may have the benefit of advancing knowledge, union of forces is necessary... It has become necessary to develop medicine as a cooperative science; the clinician, the specialist, and the laboratory workers uniting for the good of the patient, each assisting in elucidation of the problem at hand, and each dependent upon the other for support.*
>
> William J. Mayo, M.D.
> Commencement Address
> Rush Medical College, 1910

General Description

A *world-class medical facility* is one where the best of the art and science of medicine come together in a focused effort to meet the needs of the patient by providing the best in physical, mental, social and spiritual care.[1] A *world-class medical facility* routinely performs at the theoretical limit of what is possible and consistently and predictably delivers superior healthcare value – i.e., high quality-care and optimal treatment outcomes at a reasonable cost to the patient and society.

A medical facility achieves the distinction of being considered *world class* by doing many things in an exceptional manner, including applying evidence-based healthcare principles and practices, along with the latest advances in the biomedical, informatics and engineering sciences; using the most appropriate state of-the-art technologies in an easily accessible and safe healing environment; providing services with adequate numbers of well trained, competent and compassionate caregivers who are attuned to the patient's, and his or her family's culture, life experience and needs; providing care in the most condition appropriate setting with the aim of restoring patients to optimal health

[1] In most settings the term *healthcare facility* would be used instead of *medical facility*, but because the legislation requiring this report used the term *medical facility* that term is used here with the intent that it be viewed as being interchangeable with *healthcare facility*.

and functionality; and being led by skilled and pragmatic visionaries. The practices and processes of a *world-class medical facility* are models to emulate.

Many of the elements of a *world-class medical facility* can be objectively assessed and measured with existing methods, as reflected in the characteristics enumerated in the following section entitled Defining Characteristics; however, a *world-class medical facility* is more than the sum of its parts. Much of what distinguishes an institution, or facility, as being *world class* results from synergies between and among its parts and cannot be measured with currently available methods.

A *world-class medical facility* regularly goes above and beyond compliance with professional, accreditation and certification standards. It has a palpable commitment to excellence. A *world-class medical facility* has highly-skilled professionals working together with precision and passion as practiced teams within an environment of inquiry and discovery that creates an ambience that inspires trust and communicates confidence. A *world-class medical facility* constantly envisions what could be and goes beyond the best known medical practice to advance the frontiers of knowledge and pioneer improved processes of care so that the extraordinary becomes ordinary and the exceptional routine.

Defining Characteristics of a *World-class Medical Facility*

What is a Medical Facility?

In trying to define what it means to be a *world-class medical facility* it is understood that the physical structure, or facility per se, only provides the setting in which persons with health conditions are housed while doctors, nurses and myriad supporting personnel diagnose, administer treatment and provide other services needed to address health-related conditions and improve a person's health and functioning. While the facility does not diagnose, treat or provide any specific service, it is now well established that the design and construction of facilities can substantially affect the efficiency and effectiveness of making correct and timely diagnoses; the ease and accuracy of administering appropriate therapy; the attitude and morale of patients, visitors and healthcare workers; the culture of the organization and an environment that promotes the healing process.

In the following discussion, reference to *medical facility* is taken to mean the composite of the physical structure, the healthcare professionals who work there, the technology that they employ, and the processes and procedures used to accomplish their work, among other things.

Operational Characteristics of a World-class Medical Facility

To be considered world class, a medical facility must meet at least the 18 conditions in the 6 domains specified below.

I. Basic Infrastructure

The facility:

1. Has attained and maintains all accreditations and certifications that satisfy licensure and other statutory and regulatory requirements relating to the provision of the services offered at the facility.[2]

2. Provides comprehensive and definitive acute healthcare services in an integrated and coordinated manner that meets patient needs from birth (including the pre-term neonate) through the end of life, as demonstrated by, but not limited to:

a. providing services in all the specialty areas recognized by the American Board of Medical Specialties (ABMS), in so far as these specialties are reasonable and appropriate for the needs of the patient population and community served;

b. offering services in a preponderance of the subspecialty areas recognized by the ABMS; and

c. having clearly specified policies and procedures for referral and transfer of patients for highly specialized services that are generally centralized to a few locations, if such services are not provided at the facility.[3]

3. Has a high degree of facility readiness to provide high quality care as demonstrated by at least the following characteristics:

a. application of contemporary evidence-based knowledge and principles of design and construction and the utilization of state-of-the-art technology to, among other things:

1) create a healing environment and continuous healing relationships;

2) optimize the patient room environment and functionality for:

a) providing patient/family-centered care;

b) supporting the patient's and family's direct involvement in care delivery;

c) minimizing the need for patient movement; and

---

[2] For example, the Joint Commission, American Osteopathic Association (AOA) or Det Norske Veritas (DNV)accreditation; Accreditation Council for Graduate Medical Education (ACGME) postgraduate physician residency program accreditation; certifications by the American Association of Blood Banks, American College of Radiology, American College of Surgeons, College of American Pathologists, Nuclear Regulatory Commission, and the Food and Drug Administration's Division of Mammography Quality and Radiation Programs

[3] For example, definitive burn care, organ transplants, and spinal cord injury care and rehabilitation

d) allowing direct visual monitoring by caregivers.

3) facilitate effective communication between and among caregivers, patients and families;

4) support information management, as reflected by attaining at least stage 6 of the Healthcare Information and Management Systems Society (HIMSS) Electronic Medical Record Adoption Model;

5) minimize the occurrence of healthcare-related infections;

6) facilitate real time location tracking of patients and staff;

7) reduce patient and staff stress;

8) encourage retention of staff;

9) utilize unified communications;

10) support facility navigation and way-finding; and

11) achieve functional integration of component parts and processes into a coordinated
system;

b. assurance of equal access for all patients, families and staff to all clinical and routine nonclinical areas and activities throughout the interior and exterior areas of the facility by providing a physical barrier-free environment that exceeds minimum American with Disabilities Act(ADA) requirements;

c. development and regular testing of plans for continuity of operations during times of emergency or catastrophe due to epidemic, weather or other acts of nature, technological failure or terrorism, inter alia;

d. incorporation of significant flexibility and adaptability in the facility design and construction to accommodate changing practices and processes of care resulting from new knowledge, as well as optimization of surge capacity to accommodate the need to treat and manage unexpected large numbers of additional patients as might occur with an epidemic or disaster.

4. Assures that caregivers and other staff are prepared to perform competently and otherwise appropriately by, among other things:

a. promulgating policies for and standards of performance, conduct, and ethical behavior for all personnel, including job-specific and specialty-specific standards, as appropriate;

b. monitoring the performance of all employee's on a regular basis (at least annually) by direct observation of performance, formal testing, supervisor and peer review, patient feedback and/or other methods, as appropriate to the position;

c. providing feedback of monitoring results to the employee and, if relevant, concerned parties, together with counseling, mentoring and personal improvement or remediation programs, as needed;

d. promptly investigating all complaints or concerns voiced about the competence or safety of a caregiver's performance; and

e. carrying out whatever other actions are necessary to ensure that all caregivers and other staff are properly trained, equipped, fit and otherwise fully prepared to perform their assigned jobs.

II. Leadership and Culture

1. Provides executive leadership that is:

a. visionary and mission-focused;

b. experienced with demonstrated competence in the critical competencies identified by the National Center for Healthcare Leadership and the American College of Healthcare Executives (1);

c. stable over time; and

d. empowered with organizational and fiscal authority.

2. Organizes its governance structure and processes to, among other considerations:

a. ensure that the governing body is composed of appropriately knowledgeable and dedicated individuals who reflect and represent the interests of the organization and its stakeholders and who recognize the competencies required for excellent leaders;

b. facilitate effective communication with its medical staff and employee representatives;

c. assure that patient and patient family's views and perspectives about facility operations are known to facility management and the governing board; and

d. ensure that the governing board is actively involved in overseeing the operation of the institution, and especially in overseeing the quality and safety of care provided.

3. Manifests an organizational culture that:

a. continually strives for excellence, as demonstrated by, among other things:

1) the organization's mission, vision, core values, bylaws and strategic objectives;

2) the attainment of, or being in the process of attaining, the highest level of certification or designation for specialty services having generally recognized tiered levels of service;[4]

3) having been awarded "magnet status" by the American Nurses Credentialing Center (ANCC);

4) receipt of awards for excellence in organizational performance;[5]

5) establishment of multidisciplinary Centers of Excellence; and

6) the reputation and professional accomplishments of its staff;

b. seeks to be a high reliability organization by demonstrating, among other characteristics, proactive and relentless vigilance in

1) avoiding preventable patient harm, and

2) improving process effectiveness and efficiency;

c. actively encourages and rewards innovation;

d. promotes and supports teamwork, collaboration and partnerships, as demonstrated by, among other manifestations:

1) formally established collaborative relationships with other institutions and professional organizations;

2) routine utilization of one or more formal teamwork training methodologies for staff; and

3) recognition and awards for exceptional team performance and success;

e. creates a work environment that promotes employee satisfaction and well being by, among other things;

1) fostering an environment of civility and respect for patients and employees;

[4] For example, level 1 trauma center or comprehensive cancer center.

[5] For example, Malcolm Baldrige National Quality Award or state or regional quality awards.

2) reporting and addressing lateral violence;

3) supporting professional development; and

4) offering services such as child and elder care programs, telecommuting, flexible work schedules, and employee wellness and fitness programs;

f. is pro-active and non-punitive in identifying medical errors and recognizes medical errors and preventable adverse events as opportunities for process improvement, as demonstrated by, among other things:

1) utilization of a formal adverse event and near-miss reporting system;

2) routine application of clearly defined policies and procedures for root cause analysis and failure mode and effects analysis; and

3) establishment of formal processes of learning from the occurrence of adverse events;

g. recognizes the importance of culture, education, spiritual beliefs, life experience and health literacy on a person's response to injury or illness, their understanding and acceptance of diagnostic interventions and treatment, and in the healing process;

h. nurtures efforts to advance the frontiers of knowledge and to pioneer improved processes of care; and

i. understands that its responsibility does not stop at the hospital walls and recognizes the need to support, among other activities:

1) patient-focused care coordination, and

2) systematic examination of antecedents of hospitalization to reduce the need for such care.

III. Processes of Care

1. Organizes its services so that they are integrated and seamless between and among services in the facility and with home and community-based services.

2. Consistently applies contemporary evidence-based knowledge and principles and utilizes state-of-the-art technology in executing the following processes, among others:

a. diagnosis;

b. treatment;

c. documentation and records keeping;

d. medication management;

e. communication and care coordination;

f. knowledge management;

g. materiel management; and

h. business processes.

3. Routinely operationalizes evidence-based practices and processes in the delivery of care, including, but not limited to, those that:

a. implement the most recent set of "Safe Practices" endorsed by the National Quality Forum (2);

b. minimize the likelihood of the occurrence of the "never events" identified by the National Quality Forum (3);

c. implement the 6 aims and 10 "design rules" for healthcare in the 21st century espoused by the Institute of Medicine (4);

d. comply with the most recent National Patient Safety Goals and related specific expectations set by The Joint Commission (5);

e. are connected with known life-saving interventions such as evidence-based care for myocardial infarction, medication reconciliation and the ventilator bundle;

f. evaluate the quality of care provided to its sickest patients (i.e., those who die) by routinely utilizing the autopsy for quality assurance and education; and

g. utilize formal quality and process improvement methodologies as an integral element of all care processes.

4. Demonstrates transparency of processes by, among other manifestations:

a. routinely involving patients, patient families and employees in reviewing and determining the processes of care;

b. ensuring that patients are provided with complete information about their care that is appropriate to their level of healthcare literacy so that they can make informed decisions and fully participate in all decisions about their care;

c. responding openly, promptly and honestly when patients are injured by unanticipated adverse events or anticipated complications by:

1) informing the patient and/or the patient's designated representative, as appropriate, of what has happened and what will be done to remediate any injury and mitigate further injury;

2) investigating the cause(s) of the event and reporting the findings to the patient and/or the patient's designated representative, as appropriate;

3) providing emotional support for the patient as well as the caregivers involved in the adverse event; and

4) apologizing to the patient and his/her family and/or the patient's designated representative, as appropriate, when the institution or caregivers are responsible for the event; and

5) compensating the patient for costs associated with injury.

d. making publicly available performance data and de-identified results of root cause analyses.

IV. Performance

1. Complies with all relevant federal government performance reporting requirements;

2. Demonstrates superior performance (e.g., greater than the 90th percentile) against standardized industry metrics, including but not limited to those for:

a. clinical care;[6]

b. patient satisfaction and loyalty;[7]

c. employee satisfaction;

d. employee sick leave, absenteeism and retention;

e. work-related injuries and illnesses; and

f. stewardship of resources as reflected by expense control, operating efficiency and adequacy of revenue or appropriation to support sustained high level performance, among other considerations.

[6] For example, NQF endorsed performance measures for hospital and ambulatory care

[7] For example, NQF endorsed performance measures for patient satisfaction(H-CAPHS) or the American Consumer Satisfaction Index

V. Knowledge Management

1. Is regularly engaged in a full spectrum of scholarly activities, including, but not limited to:

a. providing graduate medical education and other health professional training;

b. conducting research, having its faculty and staff speak at scientific meetings and publish in peer-reviewed professional journals; and

c. utilizing a dedicated process to monitor, translate and apply research findings into clinical care, including a process for evaluating the results of new processes or pilot programs.

2. Has simulation laboratories for surgery, cardiac catheterization, endoscopy and emergency care, at a minimum.

VI. Community and Social Responsibility

1. Demonstrates a population health focus by routinely being involved in activities aimed at improving the community and constituency that it serves, as demonstrated by, but not limited to:

a. hosting or supporting health maintenance and disease early detection programs;

b. participating in local and regional disaster readiness programs; and

c. working with other organizations on community improvement projects.

2. Demonstrates environmental responsibility and sustainability in the facility design, construction and operation by, but not limited to:

a. having achieved Leadership in Energy and Environmental Design (LEED) certification;

b. embracing the recommendations contained in the latest edition of the *Green Guide for Healthcare*; and

c. disposing of potentially reusable medical devices with a Food and Drug Administration (FDA) cleared medical device reprocessor.

3. Demonstrates prudent use of resources by continually striving to reduce waste and inefficiencies.

The Spectrum of *World-class* Healthcare Facilities

A spectrum of healthcare facilities may seek to achieve world-class status, and the above defining characteristics may require modification when appropriate to a specific organization's mission. For example, a world-class community hospital may provide services in fewer specialties and subspecialties than a world-class academic medical center and may be engaged in relatively few scholarly activities, but would otherwise be expected to demonstrate the same characteristics. Likewise, a world-class military medical center must meet the requirements for being a world-class healthcare facility but also needs to ensure that it addresses the unique needs of active duty and retired military personnel, as well as the needs of the branch or branches of the Armed Forces served.

References

1. Dye, C.F., & Garman A.N. (2006). *Exceptional Leadership: 16 Critical Competencies for Healthcare Executives*. Chicago, IL. American College of Healthcare Executives.

2. National Quality Forum. (2009). *Safe Practices for Better Healthcare – 2009 Update: A Consensus Report*. Washington, D.C. National Quality Forum.

3. National Quality Forum. (2006). *Serious Reportable Events in Healthcare – 2005-2006 Update*. Washington, D.C. National Quality Forum.

4. Committee on Quality of Health Care in America, Institute of Medicine. (2001). *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC. National Academies Press.

5. The Joint Commission. (2009). *2009 National Patient Safety Goals.* Chicago, IL. http://www.jointcommission.org/PatientSafety/National PatientSafetyGoals/.

Appendix M. Terms of Reference

These terms of reference establish the objectives for the Panel to provide independent advice and recommendations to the Secretary of Defense regarding a construction standard for military medical centers to provide a single standard of care. They outline the scope of the Panel's examination as well as the methodology for responding to the Department of Defense's (DoD's) request.

Mission Statement: The Panel was established to fulfill the requirements of Section 2852 of the Ike Skelton National Defense Authorization Act (NDAA) for Fiscal Year 2011. The Panel will conduct a comprehensive assessment of requirements related to establishing world-class military medical centers/facilities, review DoD's unified construction standard for military construction and repairs to military medical centers/facilities, and assess the adequacy of the *Comprehensive Master Plan.*

Issue Statement: DoD established unified planning, design, and construction standards for military medical facilities in Unified Facilities Criteria 4-510-01, Design: Medical Military Facilities, November 1, 2012 and DoD Space Planning Criteria for Health Facilities. The Panel will review those standards to identify any deficiencies and will provide recommendations for improvement.

Objectives and Scope: The Panel will address the following in its reports:

1. Review the unified construction standards established pursuant to subsection (a) of the 2011 Ike Skelton NDAA to determine the standards' consistency with industry practices and benchmarks for world-class medical construction.
2. Review ongoing construction programs within DoD to ensure medical construction standards are uniformly applied across applicable military medical centers.
3. Assess the approach of the DoD to planning and programming facility improvements with specific emphasis on: facility selection criteria and proportional assessment system; and facility programming responsibilities between the Assistant Secretary of Defense for Health Affairs and the Secretaries of the Services.
4. Assess whether the *Comprehensive Master Plan*, dated April 2010, is adequate to fulfill statutory requirements as required by section 2714 of the Military Construction Authorization Act for FY 2010 (division B of Public Law 111-84; 123 Stat. 2656), to ensure that the facilities and organizational structure described in the plan result in world-class military medical centers in the National Capital Region (NCR).
5. Make recommendations regarding any adjustments of the *Comprehensive Master Plan*, dated April 2010, that are needed to ensure the provision of world-class military medical centers and delivery system in the NCR.

Methodology: The Panel members will receive briefings from subject matter experts (SMEs) in facility design and construction and repair standards, as well as from DoD leaders. The members will review the literature and available best practices and visit select federal and private health care facilities. Using this information, its Guiding Principles, as well as the information received from briefings, the Panel will deliberate the findings during which time members may propose recommendations and vote on those recommendations in an open public session.

Deliverables:

1. Not later than 120 days after the first meeting of the Panel, the Panel shall submit to the Secretary of Defense a written report containing:
    a. An assessment of the adequacy of the plan of DoD to address the items specified in the Objectives and Scope above relating to the purposes of the Panel.
    b. The recommendations of the Panel to improve the plan.
2. Not later than February 1, 2015, the Panel shall submit to the Secretary of Defense a report on the findings and recommendations of the Panel to address any deficiencies identified by the Panel.

The Panel shall terminate on September 30, 2015.

Membership: Up to 14 appointed members will comprise the Panel leading the primary investigation; members will consult SMEs as needed.

Support:

1. DHA will provide any necessary administrative, analytical/research, and logistical support to the Panel.
2. Funding for this review is included in the DHA operating budget.

Appendix N. Meetings and Presentations

Briefing Date/ Location	Presenter	Title/Organization	Briefing Title
February 6, 2014, at Defense Health Headquarters (DHHQ)	Col Douglas Rouse	Executive Secretary, Defense Health Board (DHB)	Administrative Requirements/ Paperwork
	Mr. Michael Krukar	Executive Secretary, Independent Review Panel on Military Medical Construction Standards (Panel)	Overview of Independent Review Panel Operations
	Ms. Camille Gaviola	Deputy Director, DHB/Panel	Travel Briefing
	Mr. John Becker	Director, Facilities Division, Defense Health Agency (DHA)	DHA Facilities Briefing: Shared Services, Unified Construction Standards, Planning and Programming, Ongoing Construction Program
	Dr. Kenneth Kizer	Director, Institute for Population Health Improvement, University of California Davis Health System; Chairman, Medsphere Systems	Achieving World Class: An Independent Review of the Design Plans for Walter Reed National Military Medical Center (WRNMMC) and Fort Belvoir Community Hospital (FBCH)
	Ms. Laurie Rafferty	Office of General Counsel, DHA	Ethics Briefing
	Mr. Jim Freeman II	Advisory Committee Management Officer, Office of the Secretary of Defense	Federal Advisory Committee Act Overview
	Mr. Allen Middleton	Defense Health Board & Panel Designated Federal Officer, Deputy Assistant Secretary of Defense (Health Budgets and Financial Policy)/Acting Deputy Director, DHA	Opening Remarks and Introductions
	Mr. John Bulick, Jr.	Health Care Facilities Planner, DHA	Overview of the NCR Comprehensive Master Plan: Integrated Delivery System, Infrastructure/Projects
	Mr. Scott Wardell	Director for Business Operations, National Capital Region (NCR) Medical Directorate	
February 7, 2014, at DHHQ – Panel Discussion			
February 19, 2014, Teleconference – Review of Guiding Principles, Terms of Reference, Benchmarking, and Panel Schedule			
March 3, 2014, Teleconference – Panel Discussion, Review of March 4 Schedule			

Briefing Date/ Location	Presenter	Title/Organization	Briefing Title
March 4, 2014, at WRNMMC	Mr. Jeff Getty	Senior Vice President, HDR Architecture, Inc.	*Comprehensive Master Plan*/ WRNMMC 35% Design
	Mr. Paul Heflin	Senior Vice President, HDR Architecture, Inc.	
	Mr. Julian Jones	Vice President and Senior Project Manager, HDR Architecture, Inc.	
	Ms. Joanne Krause	Director, Naval Facilities Engineering Command Headquarters Medical Facilities Design Office	
	RDML Raquel Bono	Director, NCR Medical Directorate	WRNMMC Leadership Discussion
	CAPT Sarah Martin	Chief of Staff, WRNMMC	
	Ms. Patricia Haley	Senior Associate, Booz/Allen/Hamilton	WRNMMC Site Visit/Facility Tour
	CDR Jeffrey McCoy	Chief, Facilities Management Department, WRNMMC	
	LCDR Roy Ranglin	DHA Project Site Officer	
March 14, 2014, Teleconference	Mr. John Becker	Director, Facilities Division, DHA	World–Class Toolkit Demonstration
	Mr. Clayton Boenecke	Chief, Portfolio Management, Facilities Division, DHA	
	Col Rex Langston	Chief, Portfolio/Planning, Facilities Division, DHA	
	Mr. Russell Manning	Acting Chief, Operations & Life Cycle, Integration Branch, Facilities Division, DHA	
April 2, 2014, at Hyatt House Hotel	Mr. Clayton Boenecke	Chief, Portfolio Management, Facilities Division, DHA	Capital Investment Decision Model
	Ms. Brenda McDermott	Health Facility Clinical Planner, Facilities Division, DHA	Criteria Benchmarking with Industry
	Dr. Michael Dinneen	Director, Office of Strategy Management, Office of the Assistant Secretary of Defense (Health Affairs)	DHA Office of Strategy Management
	Mr. John Becker	Director, Facilities Division, DHA	Facilities Update
	VADM (Ret) John Mateczun	Former Commander, Joint Task Force CapMed	History of the *Comprehensive Master Plan*
	Lt Gen Douglas Robb	Director, DHA	Military Health System Military Construction Independent Review Panel
	BG Jeffrey Clark	Director, WRNMMC	WRNMMC Leadership Discussion

Briefing Date/ Location	Presenter	Title/Organization	Briefing Title
April 3, 2014, at FBCH	COL Jonathan Allison	Director for Medicine, FBCH	FBCH Briefings/Leadership Discussion
	CDR Alex Bustamante	Assistant Chief of Staff, Executive Committee of the Medical Staff, FBCH	
	CDR David DeSantos	Deputy Director for Education and Training, FBCH	
	COL Sandy McNaughton	Deputy Director, Nursing, FBCH	
	LTC John Melvin	Acting Deputy Director, Training, FBCH	
	Dr. Richard Repeta	Director for Healthcare Operations and Strategic Planning, FBCH	
	CAPT Sterling Sherman	Chief of Staff, FBCH	
	CDR Stuart Shippey	Director for Surgery, FBCH	
	LCDR Michael Tiller	Deputy Director, Surgery, FBCH	
	CAPT Jennifer Vedral–Baron	Director, FBCH	
	LTC Wendi Waits	Director for Behavioral Health, FBCH	
	CSM Richard Watson	Senior Enlisted Leader, FBCH	
	Mr. John Zulick	Chief of Facilities, FBCH	FBCH Site Visit/Facility Tour
April 4, 2014, at DHHQ – Panel Discussion			
April 16, 2014, Teleconference	Mr. John Becker	Director, Facilities Division, DHA	Landstuhl Regional Medical Center Briefing
	Mr. Clayton Boenecke	Chief, Portfolio Management, Facilities Division, DHA	
	Mr. David Clark	Project Manager and Technical Expert, Landstuhl	
	COL Stephen Wooldridge	Deputy Director, Facilities Division, DHA	
April 30, 2014, Teleconference	Mr. Mark Hamilton	Budget and Program Analyst, Office of the Deputy Assistant Secretary of Defense (Health Budgets and Financial Policy)	MHS Modernization Study Process
May 14, 2014, Teleconference – Panel Discussion, Review Initial Report Draft & Meeting Schedule			
May 22, 2014, at WRNMMC	Panel Members		Initial Report Deliberation
	BG Jeffrey Clark	Director, WRNMMC	WRNMMC Command and World Class Domains
	Ms. Patricia Haley	Senior Associate, Booz/Allen/Hamilton	WRNMMC Site Visit/Facility Tour
	LCDR Roy Ranglin	Project Site Officer, DHA	
	Mr. Allen Middleton	DHB & Panel Designated Federal Officer, Deputy Assistant Secretary of Defense (Health Budgets and Financial Policy)/ Acting Deputy Director, DHA	DHA: Transforming Military Medicine
May 28, 2014, Teleconference – Panel Discussion, Review Initial Report Draft & Meeting Schedule			

Briefing Date/ Location	Presenter	Title/Organization	Briefing Title
June 11, 2014, Teleconference	COL Patrick Grady	Chief of Analytics, DHA	Enhanced Multi–Service Market Process Briefing
	Mr. Michael Datena	Patient Safety Analyst	Patient Safety Report Tool Demonstration
	Ms. Erin Lawler	Human Factors Engineer, DoD Patient Safety Analysis Center	
June 23, 2014, at DHHQ	Mr. Mark Goodge	Chief Technology Officer, Health Information Technology (IT) Directorate, DHA	IT Hospital of the Future
	Mr. Dale Woodin	Senior Executive Director, American Society for Healthcare Engineering	American Society for Healthcare Engineering Briefing
	Mr. Thomas Jung	Chief Executive Officer, Facility Guideline Institute (FGI)	Introduction and History of the FGI Guidelines
	Dr. Jonathan Woodson	Assistant Secretary of Defense for Health Affairs	Assistant Secretary of Defense for Health Affairs Vision and Strategy
	Dr. Francis McVeigh	Lead, Innovative Information Technology Scientific Domain, and Senior Clinical Consultant/tele–Traumatic Brain Injury Program Manager at Telemedicine and Advanced Technology Research Center	Telehealth Implications on Future Hospital Design
	CAPT Stephen Bree	British Liaison Officer (Deployment Health), U.S. Military Health System	Military Healthcare in the National Health System – Partners in Military Readiness
July 16, 2014, Teleconference – Panel Discussion, Review Meeting Schedule			
July 21, 2014, at San Antonio Military Medical Center (SAMMC)	MG Jimmie Keenan	Commanding General, Southern Region Medical Command; Market Manager, San Antonio Military Health System (SAMHS); Chief, Army Nurse Corps	SAMHS Market Brief/Q&A
	LTC Mark Swofford	Deputy Commander for Administration, SAMMC	SAMMC Leadership Brief/Discussion
	COL Kyle Campbell	Commander, Brooke Army Medical Center	SAMMC and Center for the Intrepid Site Tours
	COL Donald Gajewski	Director, Center for the Intrepid, SAMMC	
	Mr. Dewey Mitchell	Chief of Public Affairs, SAMMC	
	Mr. Robert Shields	Public Affairs Specialist, SAMMC	

Briefing Date/ Location	Presenter	Title/Organization	Briefing Title
July 22, 2014, at 59th Medical Wing/Wilford Hall Ambulatory Surgical Center (WHASC)	Maj Gen Bart Iddins	Commander, 59th Medical Wing	59th Medical Wing Mission Brief
	Maj Gen Bart Iddins	Commander, 59th Medical Wing	WHASC Site Tour
	Ms. Joann Pinto	Acting Director, Facilities Management, WHASC	
	Col John Andrus	Commander, 59th Medical Operations Group	59th Medical Wing Leadership Briefing
	Maj Janet Blachard	Chief of Business Innovation, 59th Medical Wing	
	Col Nancy Dezell	Vice Commander, 59th Medical Wing	
	Mr. Gary Forthman	Inspector General, 59th Medical Wing	
	Maj Gen Bart Iddins	Commander, 59th Medical Wing	
	CMSgt Maurice James, Sr.	Command Chief Master Sergeant, 59th Medical Wing	
	Lt Col Craig Keys	Chief, Financial Manager, 59th Medical Wing	
	Maj Candido Ramirez	Executive Officer, 59th Medical Wing	
	Lt Col Scot Spann	Chief, Health Facilities Division, Air Force Medical Support Agency /SG8F	
July 23, 2014, at Carl R. Darnall Army Medical Center (CRDAMC)	MAJ Eric Berard	Chief, Information Management, CRDAMC	CRDAMC Briefing/Leadership Discussion
	COL Patricia Darnauer	Commander, CRDAMC	
	Mr. Mark Morrissey	Provost Marshall, CRDAMC	
	Ms. Erika Provinsal	Project Manager, Health Facility Planning Agency, CRDAMC	
	MAJ Ira Waite	Transition Director, CRDAMC	
	LTC Michael Williams	Program Manager, Western Region Health Facility Planning Agency	
	COL Patricia Darnauer	Commander, CRDAMC	CRDAMC Site Tour
	Ms. Erika Provinsal	Project Manager, Health Facility Planning Agency, CRDAMC	
August 4, 2014, Teleconference	Mr. David Bowen	Chief Information Officer, Health IT Directorate, DHA	Discussion with Mr. David Bowen
August 18, 2014, at Naval Hospital Camp Pendleton (NHCP)	Dr. Benjamin Chu	Executive Vice President, Kaiser Foundation Hospitals and Health Plan; Group President, KP Southern California and Hawaii; President, KP Southern California	Trends in Health Care Discussion
	LT Clayton Beame	NHCP Facilities Management, Navy Medicine West	NHCP Site Tour
	LTJG Kezia Edmonson	Protocol Officer, NHCP	
	LCDR Jerry Brown, III	Senior Health Facility Planning Project Officer, Assistant Specialty Leader, Navy Medicine West	NHCP Briefing/Leadership Discussion
	CAPT Mark Kobelja	Commanding Officer, NHCP	
	Mr. Charles Miranda	Deputy Chief of Staff, Installations and Logistics, Navy Medicine West	

Briefing Date/ Location	Presenter	Title/Organization	Briefing Title
August 19, 2014, at Kaiser Permanente (KP) Central San Diego Hospital	Mr. Clayton Boenecke	Chief, Portfolio Management, Facilities Division, DHA	Design Standards Briefing and Roundtable Discussion: Department of Defense, Department of Veterans Affairs, FGI, Kaiser Permanente
	Mr. John Kouletsis	Vice President, Facilities Planning, Kaiser Foundation Health Plan	
	Ms. Eileen Malone	COL (Ret), U.S. Army; Senior Partner, Mercury Healthcare Consulting, LLC	
	Ms. Brenda McDermott	Clinical Lead, Criteria Working Group, Technical SME Section, Operations & Lifecycle Integration Branch, Facilities Division, DHA	
	Mr. Donald Myers	Director of Facilities Standards Service, U.S. Department of Veterans Affairs Office of Construction & Facilities Management, Office of Facilities Planning	
	Mr. Joseph Sprague	Principal and Senior Vice President; Director, Health Facilities, HKS, Inc.	
	COL Stephen Wooldridge	Deputy Director, Facilities Division, DHA	
	Mr. Scott Bell	National Executive Director, Kaiser Permanente	Kaiser Permanente San Diego Central Design Briefing and Tour
	Ms. Gandrup–Dupre	Vice President, Information Technology, Kaiser Permanente	
	Mr. Sunil Shah	Executive Director, Construction Acquisition, National Facility Services, Kaiser Permanente	
	Mr. Joseph Stasney	Project Director, National Facility Services Capital Investment Group, Kaiser Permanente	
August 20, 2014, at and Naval Medical Center San Diego (NMCSD)	RDML Bruce Gillingham	Commanding Officer, NMCSD	NMCSD Briefing/Leadership Discussion
	CAPT Lisa Mulligan	Deputy Commander, NMCSD	
	LCDR Kenneth Schwalbe	Facilities Department Head, NMCSD	NMCSD Site Tour
	LCDR Nathan Seaman	NMCSD	
September 18, 2014, Teleconference	COL Matthew Mattner	Commander, Fort Drum Medical Department Activity	Fort Drum Briefing

Briefing Date/ Location	Presenter	Title/Organization	Briefing Title
September 25, 2014, at DHHQ	Mr. John Becker	Director, Facilities, DHA	WRNMMC Addition Alteration Project
	Mr. Clayton Boenecke	Chief, Portfolio Management, Facilities Division, DHA	
	COL Stephen Wooldridge	Deputy Director, Facilities Division, DHA	
September 26, 2014, at DHHQ – Panel Discussion, Review Annual Progress Report Draft & Meeting Schedule			
October 17, 2014 Teleconference – Panel Discussion of MHS 90–Day Review, Review Draft Annual Progress Report, & Meeting Schedule			
November 12, 2014, at DHHQ	Ms. Phyllis Kaplan	Senior Health Facilities Architect, DHA	MHS Facilities Innovation and Research Model
	Dr. John Kugler	Chief, Clinical Support Division, DHA	MHS 90–Day Review
	Col Thomas Cantilina	Commander, 779th Medical Group	Malcolm Grow Medical Clinics and Surgery Center
	LT William Walders	Chief Information Officer, WRNMMC	WRNMMC IM/IT Brief
November 13, 2014, at DHHQ – Panel Discussion, Review Annual Progress Report Draft & Meeting Schedule			
November 25, 2014, Teleconference – Panel Discussion, Review Draft Annual Progress Report, & Meeting Schedule			
December 10, 2014, Teleconference – Panel Discussion, Review Draft Annual Progress Report, & Meeting Schedule			
December 17, 2014, Teleconference – Panel Discussion, Review Draft Annual Progress Report, & Meeting Schedule			
January 9, 2015, Teleconference – Panel Discussion, Review Draft Annual Progress Report, & Meeting Schedule			
January 14, 2015, at DHHQ – Public Deliberation of Annual Progress Report			
January 15, 2015, at DHHQ – Panel Discussion, Review Draft Annual Progress Report, & Meeting Schedule			
January 21, 2015, Teleconference – Panel Discussion, Review Draft Annual Progress Report, & Meeting Schedule			
January 26, 2015, Teleconference – Panel Discussion, Review Draft Annual Progress Report, & Meeting Schedule			
January 29, 2015, Teleconference – Panel Discussion, Review Draft Annual Progress Report, & Meeting Schedule			
February 24, 2015, at DHHQ	Mr. John Becker	Director, Facilities, DHA	Sustainment, Restoration, and Modernization Briefings and Defense Health Agency/Service Facility Roles and Responsibilities
	COL Michael Brennan	Commander, U.S. Army Health Facility Planning Agency	
	Dr. Russell Manning	Chief, Operations & Life Cycle Integration Branch, DHA Facilities Division	
	Mr. Paul McComb	Director of Facilities, M41, U.S. Navy Bureau of Medicine and Surgery	
	Lt Col Scot Spann	Chief, Capital Asset Management, DHA Facilities Division	
	COL Stephen Wooldridge	Deputy Director, Facilities Division, DHA	
	Col Paul Friedrichs	Vice Commander, Air Force Medical Operations Agency, Joint Base San Antonio & Chair, Military Health System High Reliability Organization Task Force	Military Health System Performance and Measurement
February 25, 2015, at DHHQ – Panel Discussion, Review Final Report Outline/Timeline			
March 18, 2015, at Home2Suites by Hilton San Antonio Downtown – Riverwalk – Panel Discussion, Review Final Report Timeline, & Develop Findings and Recommendations			

Briefing Date/ Location	Presenter	Title/Organization	Briefing Title
March 19, 2015, at Home2Suites by Hilton San Antonio Downtown – Riverwalk – Panel Discussion, Discussion with Dr. Michael Dinneen, & Review Final Report Outline			
April 8, 2015, Teleconference – Panel Discussion, Review Final Report Executive Summary, & Discussion with Col Paul Friedrichs and Dr. Michael Dinneen			
April 30, 2015, at DHHQ	Dr. Michael Dinneen	Director, Office of Strategy Management, Office of the Secretary of Defense (Health Affairs)	Military Health System Enterprise Plan for Improvement
	COL Stephen Wooldridge	Deputy Director, Facilities Division, DHA	Defense Health Agency Facilities Division Flexibility Studies
	Lt Col Amy Woosley	Chief, Capital Asset Optimization, DHA	
	Mr. John Becker	Director, Facilities, DHA	Medical Center Addition Alteration Discussion
	COL Stephen Wooldridge	Deputy Director, Facilities Division, DHA	
May 1, 2015, at DHHQ – Panel Discussion, Review Draft Final Report			
May 21, 2015, Teleconference –	Mr. John Becker	Director, Facilities, DHA	Medical Center Addition Alteration Project Briefing
	COL Stephen Wooldridge	Deputy Director, Facilities Division, DHA	
June 1, 2015, at DHHQ – Panel Discussion, Review Draft Final Report			
June 2, 2015, at DHHQ – Panel Discussion, Review Draft Final Report			
June 8, 2015, Teleconference – Panel Discussion, Review Draft Final Report, & Meeting Schedule			
June 24, 2015, Teleconference – Panel Discussion, Review Draft Final Report, & Meeting Schedule			
July 1, 2015, Teleconference – Panel Discussion, Review Draft Final Report, & Meeting Schedule			
July 8, 2015, Teleconference – Panel Discussion, Review Draft Final Report, & Meeting Schedule			
July 13, 2015, at DHHQ	Dr. Steve Steffensen	Chief of Innovation, Military Health System	Innovation Center Discussion
July 14, 2015, at DHHQ – Panel Discussion, Review Draft Final Report			
July 29, 2015, Teleconference – Panel Discussion, Review Draft Final Report, & Meeting Schedule			
August 5, 2015, Teleconference – Panel Discussion, Review Draft Final Report, & Meeting Schedule			
August 12, 2015, Teleconference – Panel Discussion, Review Draft Final Report, & Meeting Schedule			
August 19, 2015, Teleconference – Panel Discussion, Review Draft Final Report, & Meeting Schedule			
August 27, 2015, Teleconference – Panel Discussion, Review Draft Final Report, & Meeting Schedule			
September 10, 2015, at DHHQ – Media Briefing and Preparation for Public Deliberation			
September 11, 2015, at Fairview Park Marriott – Public Deliberation of Final Report			
September 21, 2015, Teleconference – Panel Discussion			

Appendix O. List of Acronyms

Acronym	Definition
ABMS	American Board of Medical Specialties
ACHA	American College of Healthcare Architects
ACO	Accountable Care Organization
ADA	Americans with Disabilities Act
AHC	Army Health Clinic
AIA	American Institute of Architects
ANCC	American Nurses Credentialing Center
ARRA	American Recovery and Reinvestment Act
ASD(HA)	Assistant Secretary of Defense for Health Affairs
BIM	Building Information Modeling
BMC	Branch Medical Clinic
BRAC	Base Realignment and Closure/Base Closure and Realignment
BRIK	Building Research Information Knowledgebase
BUMED	U.S. Navy Bureau of Medicine and Surgery
CFO	Chief Financial Officer
CGMA	Chartered Global Management Accountant
CIDM	Capital Investment Decision Model
CIRB	Capital Investment Review Board
CJCS	Chairman of the Joint Chiefs of Staff
CMC	Commandant of the Marine Corps
CMS	Centers for Medicare & Medicaid Services
CNO	Chief of Naval Operations
Comprehensive Master Plan	Comprehensive Master Plan for the National Capital Region Medical
CONOPS	Concept of Operations
CPA	Certified Public Accountant
CRDAMC	Carl R. Darnall Army Medical Center
CSA	Chief of Staff, Army
CSAF	Chief of Staff, Air Force
CTS-MC	Certified Technical Specialist-Managed Care
DASD	Deputy Assistant Secretary of Defense
DHA	Defense Health Agency
DHB	Defense Health Board
DHHQ	Defense Health Headquarters
DHP	Defense Health Program
DMLSS-E&TM	Defense Medical Logistics Standard Support – Equipment and Technology Management

Acronym	Definition
DMLSS-FM	Defense Medical Logistics Standard Support – Facility Management
DoD	Department of Defense
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, and Facilities
EBD	Evidence-Based Design
EHR	Electronic Health Record
eMSM	Enhanced Multi-Service Market
FACHA	Fellow of the American College of Healthcare Architects
FACHE	Fellow of the American College of Healthcare Executives
FAIA	Fellow of the American Institute of Architects
FBCH	Fort Belvoir Community Hospital
FDA	Food and Drug Administration
FGI	Facility Guidelines Institute
FHFI	Fellow in the Health Facility Institute
FHFMA	Fellow of the Healthcare Financial Management Association
FIRM	Facility Innovation and Research Model
FY	Fiscal Year
GME	Graduate Medical Education
HCAHPS	Hospital Consumer Assessment of Healthcare Providers and Systems
HCRA	Health Care Requirements Analysis
HEDIS	Healthcare Effectiveness Data and Information Set
HIMSS	Healthcare Information and Management Systems Society
HRO	High Reliability Organization
HSAS	Health Systems Advisory Subcommittee
IBS	Interstitial Building Space
IDS	Integrated Delivery System
IM	Information Management
IO&T	Initial Outfitting and Training
IRP	Independent Review Panel
IT	Information Technology
JPC	Joint Pathology Center
JSS	Joint Staff Surgeon
JTF CapMed	Joint Task Force National Capital Regional Medical
KP	Kaiser Permanente
KPNC	Kaiser Permanente Northern California

Acronym	Definition
LEED	Leadership in Energy and Environmental Design
LFACHE	Life Fellow of the American College of Healthcare Executives
MAJCOM	Major Command, Air Force
MBOG	Medical Business Operations Group
MCAA	Medical Center Addition Alteration
MDAG	Medical Deputies Action Group
MEDCOM	U.S. Army Medical Command
MHS	Military Health System
MHSER	Military Health System Executive Review
MILCON	Military Construction
MILSTD	Military Standard
MOG	Medical Operations Group
MPOG	Manpower and Personnel Operations Group
MSM	Multi-Service Market
MTF	Military Treatment Facility
NBHC	Naval Branch Health Clinic
NCR	National Capital Region
NCR MD	National Capital Region Medical Directorate
NDAA	National Defense Authorization Act
NFS	National Facilities Services
NHC	Naval Health Clinic
NHCP	Naval Hospital Camp Pendleton
NMCSD	Naval Medical Center San Diego
NNMC	National Naval Medical Center
NPIC	National Perinatal Information Center
O&M	Operations and Maintenance
OP	Other Procurement
OSD(HA)	Office of the Secretary of Defense for Health Affairs
PAC	Policy Advisory Council
Panel	Independent Review Panel on Military Medical Construction Standards
PCM	Primary Care Manager
PDASD	Principal Deputy Assistant Secretary of Defense
PFD	Program for Design
POE	Post-Occupancy Evaluation
ROI	Return on Investment
PRC	Project Room Contents
RVU	Relative Value Unit
RWP	Relative Weighted Product

Acronym	Definition
SAMHS	San Antonio Military Health System
SAMMC	San Antonio Military Medical Center
SEPS	Space and Equipment Planning System
SG	Surgeon General
SME	Subject Matter Expert
SMMAC	Senior Military Medical Action Council
TMC	Troop Medical Clinic
TRISS	TRICARE Inpatient Satisfaction Survey
UFC	Unified Facilities Criteria
USD(P&R)	Under Secretary of Defense for Personnel and Readiness
USUHS	Uniformed Services University of the Health Sciences
VA	Veterans Affairs
VCE	Vision Center of Excellence
VHA	Veterans Health Administration
WHASC	Wilford Hall Ambulatory Surgical Center
WRAMC	Walter Reed Army Medical Center
WRNMMC	Walter Reed National Military Medical Center

Appendix P. Panel Member Biographies

A. Ray Pentecost III, DrPH, FAIA, FACHA, LEED AP

Dr. Ray Pentecost III is the President of Design and Health, LLC in Norfolk, Virginia, as well as a Professor of Practice with appointments in both Biomedical Sciences and Architecture at Texas Tech University, in Lubbock, Texas. He is a licensed Architect, Board Certified in the health care architecture specialty, and a Fellow in both the American Institute of Architects (FAIA) as well as in the American College of Healthcare Architects (FACHA). He is a Leadership in Energy and Environmental Design Accredited Professional (LEED AP) and was formerly a Licensed Long Term Care Administrator.

Dr. Pentecost is the Immediate Past President of the International Academy for Design and Health based in Stockholm and a Past President of the American Institute of Architects (AIA) Academy of Architecture for Health. In 2012, Dr. Pentecost was named to Healthcare Design Magazine's list of The Most Influential People in Healthcare Design.

Dr. Pentecost currently serves as Chairman of the Board of Direction for the Building Research Information Knowledgebase (BRIK), an AIA/ National Institute of Building Sciences joint venture, building the world's premier online portal for building research information. BRIK went live on January 9, 2013. Dr. Pentecost also served as one of three co-chairs of the AIA's America's Design and Health Initiative, and currently serves as a member of the Design and Health Leadership Group for the AIA, which is focused on ways architecture can favorably impact the nation's health.

From 2008 to 2009, Dr. Pentecost served as a subject matter expert on the Achieving World Class study as a member of the Defense Health Board's National Capital Region Base Realignment and Closure Health Systems Advisory Subcommittee and helped assess whether the new Walter Reed National Military Medical Center and the new Fort Belvoir Community Hospital were being designed and constructed to be world-class medical facilities and, if not, what remedy was recommended.

Mark E. Erath, CPA, CGMA, CTS-MC, FACHE, FHFMA

Mr. Mark Erath currently serves as an independent health care consultant. He recently completed service as the Executive Vice President and Interim Chief Financial Officer of Parkland Health and Hospital System. Mr. Erath also served Geisinger Health System as Chief Financial Officer of Geisinger Medical Center, the flagship tertiary/quaternary care, teaching and research hospital platform, and led system-wide financial oversight for 10 clinical service lines.

A retired Partner with PricewaterhouseCoopers, Mr. Erath served diverse industry clients, concentrating on health care providers and payers, throughout his 30-year career as a consultant and auditor. His first job, beginning at age 13, was as a volunteer stationed in the Surgery Department at Hotel Dieu Hospital in New Orleans.

A former Board Member and Board Treasurer for the Foundation for Critical Care and a former faculty member for The Governance Institute, Mr. Erath earned his Bachelor of Science degree in Accounting from Louisiana State University in Baton Rouge. He is a licensed Certified Public Accountant (CPA), Chartered Global Management Accountant (CGMA), Certified Technical Specialist-Managed Care (CTS-MC), board certified in health care management as a Fellow of the American College of Healthcare Executives (FACHE), board certified in health care finance as a Fellow of the Healthcare Financial Management Association (FHFMA), and trained as a Lean Six Sigma Greenbelt. He also serves the nation as a Senior Examiner on the Board of Examiners of the Malcolm Baldrige National Quality Award program.

Anjali Joseph, PhD, EDAC

Dr. Anjali Joseph currently is an associate professor and endowed chair of Architecture and Health Design and Research at Clemson University, and formerly was the Vice President and Director of Research at the Center for Health Design, leading and coordinating research activities. Dr. Joseph's work focused on understanding the relationship between the health care built environment and health care outcomes, specifically focusing on tools and guidelines that support the implementation of built environment research in health care practice to result in improved outcomes for patients, staff, and families.

She leads a number of grant funded research projects at the center including "Developing and Disseminating a Safety Risk Assessment Toolkit for Integrating Safety in the Healthcare Facility Design Process," "Designing for Patient Safety: Developing methods to integrate patient safety concerns into the facility design process," and "Patient Room Interior Design Checklist and Evaluation Tool." Dr. Joseph also works closely with the center's member health care organization, the Pebble Partners, throughout their evidence-based health care facility design projects. Many of these studies incorporate aspects of patient safety, such as hospital acquired infections and medication errors. Dr. Joseph also is a regular speaker at national and international conferences, including the Architecture, Construction, and Capital Equipment Summit and Exposition, Conference for Safe and Sustainable Hospitals, and Environments for Aging in 2013.

William Paul Kearns III, MBA, CPA, CHE, LFACHE, FHFMA

Mr. Paul Kearns, a member of the Senior Executive Service, served as Chief Financial Officer (CFO) of the Veterans Health Administration (VHA) from November 17, 2006 until January 31, 2013. In this position, he served as the principal financial advisor to the Under Secretary for Health and was responsible for the management of VHA's $57 billion dollar budget system. This included budget formulation, justification, allocation, and execution processes; the financial management systems and assistance functions; and the managerial cost accounting decision support system. This financial system supports VHA's integrated health care delivery system for more than eight million enrolled veterans through 21 integrated networks of 153 medical centers and more than 828 outpatient clinics.

Mr. Kearns joined the Department of Veterans Affairs as VHA's Associate CFO for Resource Allocation and Analysis in February 2001. He was named Associate CFO for Resource Management in October 2003 and Deputy CFO in June 2004.

Mr. Kearns also served in senior health care financial management positions within the Office of the Secretary of Defense and the Department of the Air Force. While on the staff of the Assistant Secretary of Defense for Health Affairs, he was responsible for management of the Military Health System's $15 billion annual budget, including the allocation of resources to the medical departments of the Services and for oversight of budget execution within the three Services. His career experience includes more than 25 years as an active duty U.S. Air Force Medical Service Corps officer where he attained the rank of Colonel. During that period, he served in senior financial management positions ranging from the Air Force's largest medical center, to the Office of the Command Surgeon in Europe, the Office of the Surgeon General in Washington, D.C., and the Office of the Assistant Secretary for Health Affairs, DoD, in Washington, D.C. He is a certified public accountant (CPA) licensed in California, a life fellow of the American College of Healthcare Executive (LFACHE), and a fellow of the Healthcare Financial Management Association (FHFMA).

Christine Malcolm, MBA

Ms. Christine Malcolm is a Managing Director for Navigant Healthcare, based in San Francisco, California. Ms. Malcolm is a nationally recognized strategic health care leader with experience in leading transformational change in some of the leading health care systems, academic medical centers, and children's hospitals in the United States. She has a distinguished track record in the areas of health care leadership most important today, including network development, clinical transformation, accountable care organization development, physician integration and alignment, performance improvement, information technology, facilities, service line and clinical program development, funds flow, mergers and acquisitions, and strategy and growth.

Ms. Malcolm has been involved with a number of professional organizations over her career, including The Healthcare Executives Network (a network of 25 senior health care CEOs, academics and entrepreneurs), a number of societies of the American Hospital Association, and the Healthcare Strategy Institute. She also served on the Faculty of Rush University. While at Kaiser Permanente, she was influential in the green movement in health care including the formation of an alliance of 10 of the leading health systems in the United States, including Partners, Ascension, Catholic Healthcare West, University of California San Francisco, Kaiser Permanente, and the Center for Health Design, Healthcare Without Harm and Practice Green Health to encourage hospitals to achieve the triple objective of health care that is safe for patients, health care workers, and the environment. Ms. Malcolm also served on the board of the Hospital Energy Alliance of the Department of Energy and actively collaborated with the Centers for Disease Control and Prevention and other federal agencies interested in safer, more environmentally sensitive hospitals. She was also honored to be named a

leader in health care design, by Healthcare Design Magazine.

Often quoted, and an active speaker, Ms. Malcolm has presented research and facilitated planning retreats in more than 60 academic health centers, children's hospitals, and health systems. She has been published in numerous journals on a variety of topics, including market evolution, capital formation for health systems, and specialty contracting.

Eileen B. Malone, RN, MSN, MS, EDAC

Ms. Eileen Malone is the Senior Partner of Mercury Healthcare Consulting, LLC, which supports clients in their use of evidence-based design (EBD) solutions for health facility projects as a means to improve patient, staff, and resource outcomes. Mercury Healthcare's recent clients include the Military Health System in its effort to implement and institutionalize EBD in the creation and lifecycle maintenance of its health care facilities. Ms. Malone also is a volunteer consultant, having recently served as a board member of the Facility Guidelines Institute, as well as a member of their 2014 Healthcare Guideline Revision Committee, charged with reviewing and updating the *Guidelines for Design and Construction of Health Care Facilities*. From 2008-2014, Ms. Malone served as a member of The Center for Health Design's Research Coalition and as its Co-Chair from 2012-2014. She also participates as an advisory board member for several of The Center for Health Design's grants projects focused on patient safety and the built environment. Ms. Malone has delivered numerous national presentations and has authored a number of articles about evidence-based design, including study guides for individuals taking the Evidence-based Design Accreditation and Certification exam.

From 2005 to 2010, Ms. Malone served as the on-call Senior Principal in the Center for Science and Technology for Noblis in Falls Church, Virginia and later with Mercury Health Consulting, LLC, assisting with the MHS's planning and transformation of an integrated-health care delivery system serving 450,000 beneficiaries in the Washington, D.C., area.

Her career experience includes more than 26 years as an active duty Army Nurse Corps officer during which she served as the Army Medical Department Chief Information Officer, responsible for a worldwide IM/IT portfolio in excess of $500 million. Ms. Malone also served as the Senior Executive Medical Assistant to the Secretary of the Army's Business Transformation team, responsible for developing a prototype model of the Army Workload and Performance System for the medical community, Commander of DeWitt Community Hospital and Health Care Network at Fort Belvoir, Congressional Affairs Officer for Assistant Secretary of the Army for Manpower and Reserve Affairs, Quality Assurance Nurse, and in many clinical leadership positions, including numerous nurse practitioner assignments.

Don Orndoff, AIA, MS

Mr. Don Orndoff is Senior Vice President of National Facilities Services at Kaiser Permanente, one of America's leading health care providers and not-for-

profit health plans, with an annual operating revenue of more than $50 billion. Mr. Orndoff is accountable for Kaiser Permanente's 78-million-square-foot real estate portfolio, including more than 1,000 facilities with a replacement value of $32 billion. He oversees an annual capital program of $3 billion and an annual operating budget of $1.5 billion. Mr. Orndoff leads National Facilities Services (NFS), a national organization of nearly 3,000 people who provide products and services to support the complete facilities management life cycle. Organized into five collaborative business lines, NFS supports Kaiser Permanente's business strategies with facilities planning and design, construction acquisition, real estate acquisition, facilities operations, and clinical technology.

Mr. Orndoff oversees Kaiser Permanente's energy strategy, which focuses on reducing energy intensity and pursuing green power opportunities to reduce greenhouse gas emissions. He has committed to spending $331 million in 2014 with construction suppliers that are owned by minorities, women, and veterans to support Kaiser Permanente's continued commitment to diversity.

Prior to joining Kaiser Permanente in 2010, Mr. Orndoff served in the federal Senior Executive Service as director of the Department of Veterans Affairs (VA) Office of Construction and Facilities Management in Washington, D.C. Prior to his work with the VA, he served as a commissioned officer for more than 29 years in the Civil Engineer Corps of the U.S. Navy, retiring at the rank of Captain.

William R. Rowley, MD

Dr. William Rowley is currently the Senior Fellow at the Institute for Alternative Futures in Alexandria, Virginia. His career experience includes more than 28 years as an active duty Navy Officer, culminating his career as the Fleet Surgeon for the U.S. Atlantic Fleet, Command Surgeon for U.S. Joint Forces Command, and Medical Advisor for Allied Command Atlantic. Dr. Rowley held several other leadership positions in military health, including Commander of the Naval Medical Center Portsmouth and Lead Agent for the TRICARE Mid-Atlantic Region; Assistant Chief for Plans, Analysis, and Evaluation at the Navy Bureau of Medicine and Surgery (BUMED); and Deputy Assistant Chief for Health Care Operations of BUMED in Washington, D.C. He also served as an Associate Clinical Professor of Surgery at the Uniformed Services University of the Health Sciences for 25 years.

Dr. Rowley is Board Certified with the American Board of Surgery, with a Certification of Special Qualifications in General Vascular Surgery. He has authored chapters in the book *Decision Making in Vascular Surgery* and published articles on numerous health topics in peer-reviewed journals including Military Medicine.

Joseph G. Sprague, FAIA, FACHA, FHFI

For more than 40 years, Mr. Joseph Sprague has continued to promote design excellence within the health care industry for a multitude of project types including academic medical centers, cancer treatment facilities, specialty and

community hospitals, and medical teaching facilities. As a principal and director of health facilities at Harwood K. Smith, Inc. (HKS) Architects, an internationally recognized leader in health facilities design, Mr. Sprague serves as health facilities principal and technical advisor on numerous health care projects. He oversees project execution, while providing substantive input in the areas of functional and space planning, master planning, and facility design.

Prior to joining HKS, Mr. Sprague was director of design and construction at the American Hospital Association. Responsible for representing hospitals nationwide including managing state-of-the-art resources in both government and voluntary standard setting bodies, Mr. Sprague developed a high degree of understanding of the principles utilized in health facilities standards affecting design.

Widely published in national health care design magazines for his work contributions and a frequent lecturer in health facility planning, design and construction, Mr. Sprague is a Fellow in the American Institute of Architects (FAIA), a Fellow in the American College of Healthcare Architects (FACHA), and a Fellow in the Health Facility Institute (FHFI). He is past president of the AIA Academy of Architecture for Health and is chairman emeritus of the FGI "Guidelines for Design and Construction of Health Care Facilities," a nationally recognized standard. In addition, he is president emeritus of FGI and former president of the American College of Healthcare Architects.

Most recently, Mr. Sprague has received the Individual Distinction Award from the Symposium on Healthcare Design organization. The award recognizes an individual in the field of architecture who has displayed leadership and vision within their organizations or project teams, and has gone above and beyond to enhance the healing environment. He also received the Lifetime Achievement Award from the American College of Healthcare Architects (ACHA), the highest honor that the ACHA can bestow on an architect.

Philip E. Tobey, FAIA, FACHA

Mr. Philip Tobey is Senior Vice President and a national health care leader of SmithGroupJJR, one of the nation's largest architectural/engineering firms. He has more than 45 years of experience in health care planning and design for the country's leading academic medical centers and health care systems.

Mr. Tobey is a Fellow of the American Institute of Architects (FAIA) and Fellow and Founding Member of the American College of Healthcare Architects (FACHA). He is the recipient of the national 2012 Urbahn Medal for "eminent and notable contributions in the field of architecture" from the Society of American Military Engineers.

Widely recognized and highly regarded as one of the profession's leaders in health care architecture, Mr. Tobey has addressed many national and regional organizations concerning issues and trends that affect health care, including American Society of Hospital Executives, American Society of Hospital Engineers,

American Society of Military Engineers, and AIA Academy of Architecture for Health.

Much of Mr. Tobey's career has focused on health care for the Departments of Defense and Veterans Affairs. His planning experience includes master planning for all U.S. Army hospitals worldwide and planning for numerous U.S. Navy facilities and more than 20 VA hospitals. Recent projects of note include DoD Center for the Intrepid for Amputee Rehabilitation, DoD Intrepid Center for Traumatic Brain Injury, and a program of nine additional DoD Traumatic Brain Injury centers across the United States. In 2008, Mr. Tobey was appointed to the Defense Health Board's NCR BRAC HSAS that authored the study on Achieving World Class. The NDAA for FY 2010 subsequently codified the term world-class medical facility as it was defined in the 2009 report.

Prior to entering private practice, Mr. Tobey served as an officer with the U.S. Air Force Office of the Surgeon General with review responsibility for medical projects worldwide, and where for almost a year, he was on special assignment to the White House.

Appendix Q. Support Staff

Allen Middleton, SES
Deputy Director, Defense Health Agency/
Designated Federal Officer
(Until March 2015)

Christine Bader, MS, BSN, RN-BC
Executive Director and Designated Federal Officer (After March 2015), Defense Health Board and Independent Review Panel on Military Medical Construction Standards

Michael Krukar, MHA, FACHE
Executive Secretary, Independent Review Panel on Military Medical Construction Standards

Camille Gaviola, MBA
Deputy Director, Defense Health Board and Independent Review Panel on Military Medical Construction Standards

Troy Walker, MS
Health Facility Planner, VW International, Inc.

Lisa Austin, MSHA, MBA
Task Lead, Grant Thornton LLP

Sara Higgins, MPH
Analyst, Grant Thornton LLP

Ariel Markowitz-Shulman, MS
Analyst, Grant Thornton LLP

Kendal Brown, MBA
Management Analyst, Information Innovators Inc.

Margaret Welsh
Management Analyst, Grant Thornton LLP

Kathi E. Hanna, MS, PhD
Editor, Information Innovators Inc.

Jean Ward
Defense Health Board Staff Assistant

Report References

1. 111th Congress 2nd Session. Ike Skelton National Defense Authorization Act for Fiscal Year 2011. Pub. L. No. 111-383. 2011.
2. U.S. Department of Defense. *Military Health System Review: Final Report to the Secretary of Defense.* August 29, 2014.
3. U.S. Department of Health & Human Services. Read the Law. [Webpage]. http://www.hhs.gov/healthcare/rights/law/. Accessed April 15, 2015.
4. Horoho PD. Statement by Lieutenant General Patricia D. Horoho, The Surgeon General, United States Army, Before the Senate Committee on Appropriations Subcommittee on Defense. 2014.
5. Axelsson R, Axelsson SB. Integration and collaboration in public health: A conceptual framework. *Int J Health Plann Mgmt.* 2006;21:75-88.
6. The Churchill Centre. Quotations and Stories. [Webpage]. http://www.winstonchurchill.org/resources/quotations/famous-quotations-and-stories. Accessed July 6, 2015.
7. Lund JV. *Military Pay, Benefits and Retirement.* Nova Publishers; 2004.
8. U.S. Department of Defense. Fort McNair History. [Webpage]. http://www.jbmhh.army.mil/web/jbmhh/AboutJBMHH/FortMcNairHistory.html. Accessed May 22, 2015.
9. U.S. Department of Defense. Naval Medical Center Portsmouth. [Webpage]. http://www.med.navy.mil/sites/NMCP2/Pages/Default.aspx. Accessed May 22, 2015.
10. Serbu J. 2016 budget aims to "arrest" deterioration in military facilities. *Federal News Radio.* March 4, 2015.
11. Sullivan LH. The tall office building artistically considered. *Lippincott's Magazine.* 1896.
12. Whittington J, Nolan K, Lewis N, Torres T. Pursuing the triple aim: The first seven years. *Milbank Q.* 2015;93(2):263-300.
13. U.S. Department of Defense. *Evaluation of the TRICARE Program: Access, Cost, and Quality - Fiscal Year 2014 Report to Congress.* February 25, 2014.
14. Woodson J. Institute of Medicine: Moving to a More Integrated Health System. 2013.
15. U.S. Department of Defense. About the Department of Defense. [Webpage]. http://www.defense.gov/about/.
16. 112th Congress. Title 10, United States Code. Washington, DC: U.S. Government Printing Office; 2011.
17. Defense Health Agency. [Webpage]. http://www.health.mil/About-MHS/Defense-Health-Agency. Accessed April 15, 2014.
18. Dahl PE. *The Impact of the Establishment of the Defense Health Program Appropriation on the Planning, Programming, and Budgeting System within the Department of Defense*, Naval Postgraduate School; 1993.
19. Defense Base Closure and Realignment Commission. *2005 Defense Base Closure and Realignment Commission Report.* 2005.
20. 111th Congress. National Defense Authorization Act for Fiscal Year 2010. Pub. L. No. 111-84. 2009.
21. England G. Establishing Authority for Joint Task Force - National Capital Region/Medical (JTF CapMed) and JTF CapMed Transition Team

(Unclassified). 2007.
22. Carter AB. Planning for Reform of the Governance of the Military Health System. 2012.
23. Carter AB. Implementation of Military Health System Governance Reform. 2013.
24. U.S. Department of Defense. Department of Defense Directive Number 5136.01. 2013.
25. 110th Congress. National Defense Authorization Act for Fiscal Year 2008. Pub. L. No. 110-181. 2008.
26. 110th Congress. Duncan Hunter National Defense Authorization Act for Fiscal Year 2009. Pub. L. No. 110-417. 2008.
27. 111th Congress. American Recovery and Reinvestment Act of 2009. Pub. L. No. 111-5. 2009.
28. Task Force on Military Health System Governance. *Department of Defense Task Force on Military Health System Governance Final Report.* September 29, 2011.
29. 112th Congress. National Defense Authorization Act for Fiscal Year 2013. Pub. L. No. 112-239. 2013.
30. Woodson J, Robb D. Prepared Statement Of The Honorable Jonathan Woodson, M.D., Assistant Secretary of Defense (Health Affairs), and Lieutenant General (Dr) Douglas Robb, Director, Defense Health Agency Before the House Armed Services Committee Subcommittee on Military Personnel. 2014.
31. U.S. Department of Defense. Presidential Budget 2015 Defense Health Agency Future Years Defense Plan. 2014.
32. Independent Review Panel on Military Medical Construction Standards. [Webpage]. 2014; https://database.faca.gov/committee/historyreportdocuments.aspx?flr=15308&cid=2450&fy=2014.
33. Independent Review Panel on Military Medical Construction Standards. [Webpage]. 2015; http://facadatabase.gov/committee/reportdocuments.aspx?flr=15915&cid=2450.
34. Paulus R, Davis K, Steele G. Continuous innovation in health care: Implications of the Geisinger experience. *Health Aff. (Millwood).* 2008;27(5):1235-1245.
35. Korda H, Eldridge GN. How can we bend the cost surve? Payment incentives and integrated care delivery: Levers for health system reform and cost containment. *Inquiry.* 2011;48:277-287.
36. Medical Group Management Association. *Integrate or disintegrate: Integrated delivery systems a re-emerging trend.* 2010.
37. Burns LR, Pauly MV. Accountable care organizations may have difficulty avoiding the failures of integrated delivery networks of the 1990s. *Health Aff. (Millwood).* 2012;31(11):2407-2416.
38. Blumenthal D, Nuzum MAR. The Affordable Care Act at 5 years. *N. Engl. J. Med.* June 18 2015;372:2451-2458.
39. Hwang W, Chang J, LaClair M, Paz H. Effects of integrated delivery system on cost and quality. *Am. J. Manag. Care.* May 10 2013;19(5):e175-e184.
40. Kreindler S, Larson B, Wu F, et al. Interpretations of integration in early accountable care organizations. *Milbank Q.* 2012;90(3):457-483.

41. Enthoven A. Integrated delivery systems: The cure for fragmentation. *Am. J. Manag. Care.* Dec 2009;15(10 Suppl).
42. McCarthy D, Mueller K. *Organizing for Higher Performance: Case Studies of Organized Delivery Systems.* The Commonwealth Fund; 2009.
43. Woodson J. SECDEF Top Priorities. 2015.
44. Dinneen M. Linking MHS Strategy to the Work of the Independent Review Panel - Some Ideas for Consideration. 2014.
45. U.S. Department of Defense. *Comprehensive Master Plan for the National Capital Region Medical.* 2010.
46. Barr L. Quote for IRP Annual Report. 2014.
47. Deloitte. Federated Model. [Webpage]. https://www.bersin.com/Lexicon/Details.aspx?id=12837.
48. Datz D, Hallberg C, Harris K, Harrison L, Samples P. Strategic workforce planning for a multihospital, integrated delivery system. *Nurs Admin Q.* 2012;36(4):362-371.
49. Stephenson R, Llopis-Jepsen C. Army assesses potentially dramatic cuts at Fort Riley. *The Topeka Capital-Journal.* June 26, 2014.
50. Tan M. Army lays out plan to cut 40,000 soldiers. *ArmyTimes.* July 10, 2015.
51. Wolf RW. Becoming a High Reliability Organization: Army Medicine Foundation for Patient Safety. January 14, 2015.
52. Chassin MR, Loeb JM. The ongoing quality improvement journey: Next stop, high reliability. *Health Aff. (Millwood).* 2011;30(4):559-568.
53. Chassin MR, Loeb JM. High-reliability health care: Getting there from here. *Milbank Q.* 2013;91(3):459-490.
54. The Joint Commission. High Reliability Resource Center. [Webpage]. http://www.jointcommission.org/highreliability.aspx.
55. Institute of Medicine Committee on Quality of Health Care in America. *To Err is Human: Building A Safer Health System.* Washington, D.C.: Institute of Medicine; 2000.
56. James JT. A new, evidence-based estimate of patient harms associated with hospital care. *Journal of Patient Safety.* 2013;9(3):122-128.
57. Weick KE, Sutcliffe KM. *Managing the Unexpected: Resilient Performance in an Age of Uncertainty.* San Francisco, CA: Jossey-Bass; 2007.
58. Koonce JM. Predictive validity of flight simulation as a function of simulator motion. *Hum. Factors.* 1979;21:215-223.
59. U.S. Congressional Budget Office. *Approaches to Reducing Federal Spending on Military Health Care: Actual and Projected Costs for Military Health Care as a Share of DoD's Base Budget, 2000 to 2028.* January 2014.
60. Becker J, Wooldridge S. Senior Military Medical Advisory Committee: FY 2017 MCAA Review and Scope Validation in Support of NCR Business Performance Plan. 2015.
61. DHA Facilities Division, DHA RM. Five Year Summary of DoD MHS Funding. 2014.
62. U.S. Department of Defense Office of the Undersecretary of Defense (Comptroller)/Chief Financial Officer. United States Department of Defense Fiscal Year 2015 Budget Request Overview. 2014.
63. U.S. Department of Defense. Financial Summary Tables: Department of

Defense Budget for Fiscal Year 2014. 2013.
64. U.S. Department of Defense. Financial Summary Tables: Department of Defense Budget for Fiscal Year 2016. 2015.
65. U.S. Department of Defense. Financial Summary Tables: Department of Defense Budget for Fiscal Year 2015. 2014.
66. U.S. Department of Defense. Defense Health Program Fiscal Year (FY) 2016 Budget Estimates: Exhibit PBA-19, Appropriation Highlights.
67. U.S. Department of Defense. Defense Health Program Fiscal Year (FY) 2015 Budget Estimates: Exhibit PBA-19, Appropriation Highlights.
68. U.S. Department of Defense. Defense Health Program Fiscal Year (FY) 2014 Budget Estimates: Exhibit PBA-19, Appropriation Highlights.
69. U.S. Department of Defense. DHP FY 2015 PB Controls.
70. U.S. Department of Defense. DHP FY 2016 PB Controls.
71. U.S. Department of Defense. DHP FY 2014 PB Controls.
72. U.S. Department of Defense. Defense Health Program Fiscal Year (FY) 2014 Budget Estimates: Exhibit PB-11B, Medical Workload and Productivity Data.
73. U.S. Department of Defense. Defense Health Program Fiscal Year (FY) 2015 Budget Estimates: Exhibit PB-11B, Medical Workload and Productivity Data.
74. U.S. Department of Defense. Defense Health Program Fiscal Year (FY) 2016 Budget Estimates: Exhibit PB-11B, Medical Workload and Productivity Data.
75. MTF Portfolios. Defense Health Agency Decision Support Division; 2015.
76. U.S. Department of Defense. MHS Performance Dashboard. 2015.
77. U.S. Department of Defense. Military Health System (MHS): DoD Space Planning Criteria for Health Facilities. [Webpage]. http://www.wbdg.org/ccb/browse_cat.php?o=29&c=261.
78. Sternberg S. Hospitals Move to Limit Low-Volume Surgeries. *U.S. News & World Report.* 2015.
79. Sternberg S, Doughtery G. Risks are High at Low-Volume Hospitals. *U.S. News & World Report.* 2015.
80. Clark C. Welcome Back, Volume - the Original Quality Measure. *HealthLeaders Media.* May 21, 2015.
81. U.S. Department of Defense. National Capital Region: FY15-FY19 eMSM Business Performance Plan. 2014.
82. U.S. Department of Defense. San Antonio: FY15-FY19 eMSM Business Performance Plan. 2014.
83. U.S. Department of Defense. Tidewater Military Health System: FY15-FY19 eMSM Business Performance Plan. 2014.
84. U.S. Department of Defense. Colorado Springs: FY15-FY19 eMSM Business Performance Plan. 2014.
85. U.S. Department of Defense. Puget Sound: FY15-FY19 eMSM Business Performance Plan. 2014.
86. U.S. Department of Defense. Hawaii: FY15-FY19 eMSM Business Performance Plan. 2014.
87. Pearl R. Rethinking Rural Hospitals With Lessons From The Battlefield. [Webpage]. 2015; http://www.forbes.com/sites/robertpearl/2015/01/22/

rethinking-rural-hospitals/.
88. Kotter JP. Leading Change: Why Transformation Efforts Fail. *Harvard Business Review.* 2007.
89. Guice K. Health Innovation - the Key to Survival. [Webpage]. 2015; http://health.mil/News/Articles/2015/07/01/Health-Innovation-Innovation-the-Key-to-Survival. Accessed July 6, 2015.
90. U.S. Department of Defense. Military Health System Innovation Report: Strengthening Our Culture of Innovation. 2013.
91. Mayo Clinic. Center for Innovation. [Webpage]. http://www.mayo.edu/center-for-innovation/. Accessed July 10, 2015.
92. Kaiser Permanente. Garfield Innovation Center. [Webpage]. https://xnet.kp.org/innovationcenter/index.html. Accessed July 10, 2015.
93. MedStar Institute for Innovation. Catalyze Innovation that Advances Health. [Webpage]. http://mi2.medstarhealth.org/. Accessed July 10, 2015.
94. Porter ME, Lee TH. Why strategy matters now. *N. Engl. J. Med.* April 30, 2015;372(18):1681-1684.
95. HKS Inc., Wingler & Sharp. *MHS FIRM: Facilities Innovation and Research Model.* December 31, 2013.
96. Ihnen J. Leed: Added Cost or Sound Investment? [Webpage]. 2007; https://www.lorman.com/resources/leed-added-cost-or-sound-investment--15399. Accessed April 1, 2015.
97. Woodson J. Spanning the Globe: The Military Health System at Home and Deployed in 2015. 2015.
98. Military Compensation and Retirement Modernization Commission. *Final Report of the Military Compensation and Retirement Modernization Commission.* January 29, 2015.
99. Accreditation Council for Graduate Medical Education. Common Program Requirements. [Webpage]. http://www.acgme.org/acgmeweb/tabid/429/ProgramandInstitutionalAccreditation/CommonProgramRequirements.aspx.
100. Accreditation Council for Graduate Medical Education. Case Log Statistical Reports. [Webpage]. http://www.acgme.org/acgmeweb/tabid/274/DataCollectionSystems/ResidentCaseLogSystem/CaseLogsStatisticalReports.aspx.
101. Nathan ML. Navy Medicine: Stepping Up to the Challenge. 2015.
102. National Capital Region Base Realignment and Closure Health Systems Advisory Subcommittee of the Defense Health Board. *Achieving World Class - An Independent Review of the Design Plans for the Walter Reed National Military Medical Center and the Fort Belvoir Community Hospital.* May 2009.
103. 10 U.S. Code § 2674(f)(2).
104. U.S. Department of Defense. Department of Defense Directive Number 5136.13. 2013.
105. U.S. Department of Defense. *Supplement to the Comprehensive Master Plan for the National Capital Region Medical: Schedule for Completion of Requirements and Updated Cost Estimates.* 2010.
106. Woodson J, Horoho P, Nathan M, Ediger M, Robb D. Improving Access to

Care. 2015.
107. Waddington C, Egger D. Integrated Health Services - What and Why? In: World Health Organization Working Group on Service Delivery, ed. *Technical Brief No. 1*: World Health Organization; 2008.
108. Tahir D. Kaiser virtual-visits growth shows the technology's potential. *Modern Healthcare.* 2014.
109. Kahn JM. Virtual visits - confronting the challenges of telemedicine. *N. Engl. J. Med.* April 30, 2015;372(18):1684-1685.
110. The Goldman Sachs Group Inc. Goldman Sachs 2014 Annual Report: Four Trends Shaping Markets and Economies. 2015.
111. Frankel T. Sedation device could replace doctors. *The Washington Post.* May 12, 2015: A1, A12.
112. Pearl R. Kaiser Permanente Northern California: Current experiences with internet, mobile, and video technologies. *Health Aff. (Millwood).* 2014;33(2):251-257.
113. Jayanthi A. Pediatric telemedicine consults save $4,600 per use, study finds. [Webpage]. 2015; http://www.beckershospitalreview.com/healthcare-information-technology/pediatric-telemedicine-consults-save-4-600-per-use-study-finds.html. Accessed June 15, 2015.
114. Pai A. UnitedHealthcare now covers Doctor on Demand, American Well video visits too. [Webpage]. 2015; http://mobihealthnews.com/43052/unitedhealthcare-now-covers-doctor-on-demand-american-well-video-visits-too/.
115. Williams M. Telehealth Reimbursement Gets New Focus Via the Senate. [Webpage]. 2015; http://www.bsminfo.com/doc/telehealth-reimbursement-gets-new-focus-via-senate-0001.
116. Ravindranath M. The Next Step in Health IT? Virtual Doctors Visits. [Webpage]. 2015; http://www.nextgov.com/health/2015/04/next-step-health-it-virtual-doctors-visits/110821/.
117. Ruoff A. Telehealth Industry Feels Some Love. [Webpage]. 2015; http://www.bna.com/telehealth-industry-feels-b17179925503/.
118. Malcolm C, Navigant Consulting. IT Support Enables Focus on New Lower Cost Alternatives That Transform Facilities Needs. 2014.
119. Classen DC, Bates DW. Finding the meaning in meaningful use. *N. Engl. J. Med.* 2011; 365(9): 855-858.
120. Joseph SC. Telemedicine in the Military Health Services System. [Webpage]. 1996; http://www.defense.gov/Speeches/Speech.aspx?SpeechID=978. Accessed June 15, 2015.
121. Wolford-Connors A. Process Design Planning. 2015.
122. Garamone J. DoD Awards Contract for Electronic Health Records. *DoD News, Defense Media Activity.* July 29, 2015.
123. Berchtold. Draft Charter. 2014.
124. Winkenwerder W. QDR Roadmap and Evidence-Based Design. 2007.
125. The Center for Health Design. About Evidence-Based Design Accreditation and Certification (EDAC). 2008; https://www.healthdesign.org/edac/about.
126. Hamilton DK. The four levels of evidence-based practice. *Healthcare Design.* 2003.

127. The Center for Health Design. Pebble Project Facilities. [Webpage]. https://www.healthdesign.org/pebble/facilities.
128. Kimmelman M. In Redesigned Room, Hospital Patients May Feel Better Already. *The New York Times.* August 21, 2014.
129. Joseph A, Hamilton DK. The Pebble Projects: Coordinated evidence-based case studies. *Building Research & Information.* 2008;36(2):129-145.
130. Silvis JK. First Look: Cleveland Clinic Cancer Center. *Healthcare Design.* 2014.
131. Better, Smarter, Healthier: In historic announcement, HHS sets clear goals and timeline for shifting Medicare reimbursements from volume to value [press release]. 2015.
132. Health Care Transformation Task Force. About Us. [Webpage]. 2015; http://www.hcttf.org/aboutus/.
133. DHA Facilities Division. Data Response. 2014.
134. Malone E, Mann-Dooks JR, Strauss J. *Evidence-Based Design: Application in the MHS.* Falls Church, VA: Noblis, Inc.; August 1, 2007.
135. The Center for Health Design. *An Introduction to Evidence-Based Design: Exploring Healthcare Design.* Vol 2nd Edition, Volume 1. Concord, CA: The Center for Health Design; 2010.
136. U.S. Department of Defense. World-Class Toolkit. [Webpage]. https://facilities.health.mil/home/toolkit. Accessed April 17, 2014.
137. Malone E. Harnessing Transformative Changes to Maximize Technology and Facility Investments. Paper presented at: The Center for Health Design, Pebble Colloquium; April 26, 2010; Philadelphia, PA.
138. U.S. Department of Defense. TRICARE Inpatient Satisfaction Surveys (TRISS) - Purchased and Direct Care. [Webpage]. http://www.tricare.mil/hpae/surveys/survey_satis_detail.cfm?key=HPAE_SURVEY_SURVEYS_SATIS_8&cat=no.
139. U.S. Department of Defense Defense Health Cost Assessment and Program Evaluation (DHCAPE), Altarum Institute. *2013 TRICARE Inpatient Satisfaction Survey (TRISS) Report of Findings: Calendar Year 2012 Discharges.* 2013.
140. U.S. Department of Defense Defense Health Cost Assessment and Program Evaluation (DHCAPE), Altarum Institute. *2012 TRICARE Inpatient Satisfaction Survey (TRISS) Report of Findings: April 2011 - March 2012 Discharges.* October 8, 2012.
141. Shepley MM. *Health Facility Evaluation for Design Practictioners.* Myersville, MD: Asclepion Publishing; 2011.
142. Clemson University, NXT. *Pathway Towards the Development of a Post Occupancy Evaluation (POE) Program and Policy for the Military Health System: Final Report.* September 14, 2012.
143. Clemson University, NXT, Noblis. *Post Occupancy Evaluation Methodology and Tools Report for Military Health System: Final Report.* September 27, 2011.
144. Clemson University, NXT, Noblis. *Post Occupancy Evaluation Report for Military Health System: Bassett Army Community Hospital.* September 27, 2011.
145. U.S. Department of Defense. Chairman of the Joint Chiefs of Staff

Instruction 3010.02D: Guidance for Development and Implementation of Joint Concepts. 2013.
146. U.S. Department of Health & Human Services. *Report to Congress: National Strategy for Quality Improvement in Health Care.* 2011.
147. Kime P. 'We cannot accept average,' surgeons general say. *Military Times,* 2014.
148. U.S. Department of Defense. MHS Facilities Design Guidelines, Criteria & Policy. [Webpage]. https://facilities.health.mil/home/Criteria. Accessed April 17, 2014.
149. U.S. Department of Defense. World-Class Facilities. [Webpage]. https://facilities.health.mil/home/. Accessed April 17, 2014.
150. Becker J. Facilities Overview for Independent Review Panel. 2014.
151. U.S. Department of Defense. Unified Facilities Criteria (UFC) - Design: Medical Military Facilities (UFC 4-510-01). 2012.
152. U.S. Department of Defense. Military Standard (MILSTD) 1691 Equipment. [Webpage]. https://facilities.health.mil/home/MILSTD1691. Accessed January 6, 2014.
153. U.S. Department of Defense. Military Health System (MHS) Templates (formerly 'Guideplates'). [Webpage]. http://www.wbdg.org/ccb/browse_cat.php?o=64&c=260#8264.
154. McWhirt D. HCRA Process. 2014.
155. Boenecke C. Shared Service Annual Report Discussion. 2014.
156. U.S. Department of Defense. Military Standard 1691: Construction and Material Schedule for Military Medical, Dental, Veterinary and Medical Research Laboratories. 2011.
157. U.S. Department of Defense. Medical Military Facilities: Medical Templates. 2011.
158. Defense Health Agency Facilities Division. FY 2017 Medical MilCon Capital Investment Decision Model & Evaluation Criteria CIRB Orientation Read Ahead. 2014.
159. Keenan J. SAMHS eMSM Brief - IRP MilCon Delegation - Jul 14. 2014.
160. Robb DJ. Military Health System: HIT Transformation. 2014.
161. The Oxford English Dictionary, Second Edition. *The Oxford English Dictionary, Second Edition.* Vol XVI. Oxford, England: Oxford University Press; 1989.
162. Facility Guidelines Institute. *Guidelines for Design and Construction of Hospitals and Outpatient Facilities.* Chicago, IL: American Society for Healthcare Engineering; 2014.
163. Boston Society of Architects/AIA. Healthcare Facilities Committee. [Webpage]. http://www.architects.org/programs-and-events/healthcare-facilities-committee-22.
164. New Health Care Facility Design Guidelines Address Patient Handling and Movement, Bariatric Accommodations, Cancer Treatment Facilities, Acoustics, and More [press release]. November 18, 2009.
165. DHA Facilities Division. IRP Response 26 Jan 2015 -finaljb. 2015.
166. 10 U.S. Code §2801. United States. 2010.
167. U.S. Department of Defense, U.S. Department of Veterans Affairs. Department of Veterans Affairs and Department of Defense Construction

Planning Committee VA/DoD CPC. 2009.
168. The Joint Commission. Medical device alarm safety in hospitals. Vol 50: The Joint Commission; 2013.
169. Sykes D, Barach P, Belojevic G, et al. *Clinical Alarms & Fatalities Resulting from 'Alarm Fatigue' in Hospitals: Perspectives from Clinical Medicine, Acoustical Science, Signal Processing, Noise Control Engineering & Human Factors.* 2011.
170. Facility Guidelines Institute, Sykes DM. FGI Guidelines Update #15: Updated Acoustic Criteria Address Noise Issue. [Webpage]. 2014; http://fgiguidelines.org/pdfs/FGI_Update_AcousticCriteria_140929.pdf.
171. The Joint Commission. Health care worker fatigue and patient safety. Vol 48: The Joint Commission; 2011.
172. Orndoff D. Impact of Design Standards. 2014.
173. Aviation Knowledge. Cockpit Design and Human Factors. [Webpage]. http://aviationknowledge.wikidot.com/aviation:cockpit-design-and-human-factors. Accessed January 5, 2015.
174. Bodenheimer T. Coordinating care - a perilous journey through the health care system. *N. Engl. J. Med.* 2008;358(10):1064-1071.
175. Singer S, Burgers J, Friedberg M, Rosenthal M, Leape L, Schneider E. Defining and measuring integrated patient care: Promoting the next frontier in health care delivery. *Med. Care Res. Rev.* 2011;68(1):112-117.
176. Categorizing accountable care organizations: Moving toward patient-centered outcomes research that compares health care delivery systems. *Health Serv. Res.* 2014;49(6):1875-1882.
177. Gillies R, Shortell S, Anderson D. Conceptualizing and measuring integration: Findings from the health systems integration study. *Hosp. Health Serv. Adm.* 1993;38(4):467-489.
178. Shortell S, Gillies R, Anderson D, Erickson K. *Remaking Health Care in America: Building Organized Delivery Systems.* San Francisco, CA: Jossey-Bass; 1996.
179. Maeda JLK, Lee KM, Horberg M. Comparative health systems tesearch among Kaiser Permanente and other integrated delivery systems: A systematic literature review. *Perm J.* 2014;18(3):66-77.
180. Cosgrove DM, Fisher M, Gabow P, et al. Ten strategies to lower costs, improve quality, and engage patients: The view from leading health system CEOs. *Health Aff. (Millwood).* 2013;32(2):321-327.
181. Berwick D, Nolan T, Whittington J. The triple aim: Care, health, and cost. *Health Aff. (Millwood).* 2008;27(3):759-769.
182. Burns L, Muller R. Hospital-physician collaboration: Landscape of economic integration and impact on clinical integration. *Milbank Q.* 2008;86(3):375-434.
183. Washington State Hospital Association. Governing Board Orientation Manual. 2006:3-4.
184. Lawrence P, Lorsch J. *Organization and Environment: Managing Differentiation and Integration.* Boston, MA: Harvard University Press; 1967.
185. Lawrence P, Lorsch J. *Organization and Environment: Managing Differentiation and Integration (Revised Edition).* Boston, MA: Harvard

Business School Press; 1986.
186. Shortell SM, Wu FM, Lewis VA, Colla CH, Fisher ES. A taxonomy of accountable care organizations for policy and practice. *Health Serv. Res.* 2014;49(6):1883-1899.
187. Shortell S, Gillies R, Anderson D. The new world of managed care: Creating organized delivery systems. *Health Aff. (Millwood).* 1994;13(5):46-64.
188. Shortell S, Casalino L, Fisher E. *Implementing Accountable Care Organizations.* May 2010.
189. Coddington D, Moore K, Fischer E. *Integrated health care: Reorganizing the physician, hospital, and health plan relationship. 2nd ed.* Englewood, CO: Center for Research in Ambulatory Health Care Administration;1995.
190. Grone O, Garcia-Barbero M. Integrated care: A position paper of the WHO European office for integrated health care services. *Int. J. Integr. Care.* 2001.
191. Strandberg-Larsen M, Krasnik A. Measurement of integrated healthcare delivery: A systematic review of methods and future research directions. *Int. J. Integr. Care.* 2009.
192. Kodner D, Spreeuwenberg C. Integrated care: Meaning, logic, applications, and implications - A discussion paper. *Int. J. Integr. Care.* 2002;2(e12).
193. *Jonas and Kovner's Health Care Delivery in the United States. 10th ed.* New York, NY: Springer Publishing Company; 2011.
194. Margolis J. *The Healthcare Cure: How Sharing Information Can Make the System Work Better.* Amherst, NY: Prometheus Books; 2011.
195. Shortell S, Schmittdiel J, Wang M. An empirical assessment of high-performing medical groups: results from a national study. *Med. Care Res. Rev.* 2005;62(4):407-434.