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Foundation for Integrating Employee Health Activities for Active Duty Personnel in the Department of Defense

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Preface

In 2007, the U.S. Department of Defense (DoD) had about 1.4 million active duty service members. Because of the size of its active duty workforce and the unique nature of the risks and hazards confronting its service members, DoD faces challenges in meeting the health needs of these employees. Authority for safety and occupational health (SOH) in DoD is complex and involves multiple policies executed by numerous organizations. In recent years, there has been concern within DoD that the traditional division of responsibility for employee health issues has become somewhat fragmented at the policy and program levels.

DoD asked the RAND Corporation to study the issues related to the integration of its employee health activities for its active duty workforce. RAND undertook two primary tasks: (1) document the policy background and the organization of the current SOH system as a starting point for future changes in policy and organization related to employee health activities; and (2) conduct case studies of civilian organizations with integrated employee health systems.

It should be noted that since the research was completed for this monograph, the program offices that provide information technology support to DoD's Military Health System (MHS) have been reorganized. The two newly formed organizations under the Chief Information Officer of the Military Health System are the Defense Health Information Management System (DHIMS) and the Defense Health Services Systems (DHSS) (DoD, 2008a; DoD, undated-e; DoD, undated-f). DHIMS now combines the functions of the Clinical Information Technology Program Office (CITPO) and the Theater Medical Information Program—Joint (TMIP-J). The Defense Medical Logistics Standard Support (DMLSS), Executive Information Decision Support (EIDS), and the Resources Information Technology Program Office (RITPO) have merged to create the DHSS.

This research was sponsored by the Deputy Assistant Secretary of Defense (DASD) for Clinical and Program Policy (C&PP), under the Assistant Secretary of Defense for Health Affairs. The study was conducted jointly under the auspices of the Center for Military Health Policy Research, a RAND Health center, and the Forces and Resources Policy Center of the National Defense Research Institute (NDRI). NDRI is a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, the Unified Combatant Commands, the Department of the Navy, the Marine Corps, the defense agencies, and the defense Intelligence Community. Comments are welcome and may be addressed to the principal investigator, Gary Cecchine at Gary_Cecchine@rand.org.

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Summary

DoD is a unique and immense employer that is committed to providing medical care and meeting the safety and occupational health needs of its workforce. Historically, DoD has approached occupational health and safety as issues largely separate from other aspects of employee health. However, innovative thinking in recent years has coalesced around the idea of integrating all activities related to employee health. Given its large active duty workforce plus the large number of diverse work sites and the widely varying risks of military duty, DoD has growing interest in exploring whether integration of existing DoD programs related to employee health could improve the health and wellness of DoD's active duty service members and also result in other benefits for DoD (e.g., increased productivity).

DoD's Deputy Assistant Secretary of Defense for Clinical and Program Policy, under the purview of the Assistant Secretary of Defense for Health Affairs, asked the RAND Corporation to document the policy background and the organization of DoD's current system as a starting point for future changes in policy and organization related to integration of employee health activities. The DASD (C&PP) also asked RAND to conduct case studies of civilian organizations considered to have integrated employee health systems. At the direction of the sponsor, the study focuses on active duty personnel only¹ and includes safety, which is closely related to occupational health.

In this monograph, we describe the health-related events and encounters that an active duty service member may experience between accession and separation or retirement. Each encounter represents an opportunity for DoD to assess and monitor the service member's health and well-being and provide intervention when needed. In addition, for the purpose of this study, we have defined *integrated employee health system* more broadly than the civilian definition to mean an infrastructure that would support all employee health activities except health care delivery, provide a way to link information about all aspects of the health of employees, and make this information available to leadership across all departments within the DoD for purposes of policymaking, accountability, improvement, surveillance, and other questions related to health.

¹ The DoD workforce includes a large number of civilians for whom the department is also obligated to provide SOH services. This obligation is codified in the Occupational Safety and Health Act of 1970, as discussed in Chapter Three.

Study Purpose and Approach

The project had two objectives. First, we described SOH policies and organizations within DoD to document the current system. Second, we conducted case studies of employee health programs outside DoD in an effort to gather information and opinions about the implementation process related to, and components of, an integrated employee health system.

Our approach entailed

- reviewing and documenting the policy context of SOH, including some events that led to the development of SOH policies
- collecting and analyzing information on the structure and governance of current programs within DoD related to occupational health
- describing current information technology systems within DoD that might support an integrated employee health program for active duty service members
- studying employee health programs outside DoD (i.e., in civilian companies and other government agencies) that might serve as models.

Background: Evolution and Current State of SOH and Employee Health in DoD

Over the past several decades, DoD has generally followed civilian trends in its policies and practices regarding SOH. At the same time, it has also recognized and addressed unique SOH challenges, such as the risks posed by deployments and combat as well as the potential hazards of operating military equipment.

Our review of the research literature and DoD policy documents, as well as our interviews with DoD personnel, yielded the following composite picture of the current state of SOH arrangements in DoD:

- *SOH policy and implementation cut across several organizations at high levels in the Office of the Secretary of Defense (OSD) and in SOH in the military services.* As a result, DoD's SOH programs are considered by most officials we consulted to be somewhat fragmented at the policy and program level. The military services at the major command and installation levels execute their SOH programs largely independently. Because the services generally execute their programs independently, any lack of integration at the OSD level generally does not affect day-to-day operations at the installation level. In addition, there has been movement toward the development of more standardized metrics among services.
- *Recently, leadership attention has focused on safety, apart from occupational health, as a separate priority.* One consequence of the safety focus has been to elevate safety offices to high levels in the services, separate from those offices responsible for their occupational health-related counterparts.
- *Health promotion and wellness have received considerable attention within DoD through periodic health assessments and educational programs.* Self-administered health assessment instruments have been used by active duty personnel for more than a decade to assess health-related behaviors, frequency of preventive medical care, and use of health care

services. In addition, ongoing campaigns have been used to increase healthy behaviors among active duty personnel.

- *DoD and the services have made efforts to increase coordination, including both high-level formal councils, such as the Defense Safety Oversight Council (DSOC), and informally among SOH practitioners.* Efforts supporting policymaking and execution of SOH are most often undertaken through working groups and management councils composed of dedicated SOH professionals.

A Possible IT Infrastructure to Support Integration of Employee Health

Information technology (IT) will be central to any effort to integrate DoD employee health policies and practices. Ideally, an infrastructure to support integrated employee health would combine IT systems for personal health records with IT systems for occupational and environmental exposures, and both would contain information from deployed and in-garrison populations. The result would be an integrated employee health system that tracks and reports on an individual's exposures and health status within a single record. This type of linkage would facilitate activities such as clinical use of occupational information in diagnosing and treating illnesses and analyses of clinical data in conjunction with data on various types of "exposures."

Our document reviews and structured interviews suggested that DoD information technology systems currently in use and under development may provide a basis for this type of IT infrastructure.

IT Systems for Health Care Data

Since the 1991 Gulf War, DoD has made major progress toward creating a longitudinal electronic health record for all active duty service members. Currently, this system (AHLTA) has limited usefulness for evaluating SOH. AHLTA currently documents outpatient encounters and discharge abstracts for hospitalizations and does not contain comprehensive data on inpatient care. Although all data entered into AHLTA in-garrison and in-theater become part of a clinical data repository (CDR), CDR data are not available to users for standardized reports, ad hoc queries, or aggregate analyses. Plans are under way to design a clinical data warehouse that would enable users to access data from AHLTA records more easily for purposes beyond patient care, such as linkage with other Military Health System (MHS) and DoD data systems, including data on benefit eligibility and occupational exposures.

IT Systems for Occupational and Environmental Exposures

There are two promising IT systems for occupational and environmental exposures, both called the Defense Occupational and Environmental Health Readiness System (DOEHRS), one with a focus on hearing conservation (DOEHRS-HC) and the other on industrial hygiene (DOEHRS-IH).

The DOEHRS-HC system creates, analyzes, and stores hearing test results on a longitudinal record for subgroups of active duty service members considered to be at higher risk of hearing loss in all three services (throughout this monograph, the U.S. Navy includes the Marine Corps). Improvements related to DOEHRS-HC would enhance its utility. Hearing test results conducted through DOEHRS-HC could be incorporated into the service member's

electronic health record in AHLTA on a routine basis. In addition, audiometric data from the hearing tests as well as data from other parts of the pre-employment physical examination conducted at the Military Entrance Processing Station (MEPS) at the time of accession are not, but could be, captured by DOEHRS-HC and AHLTA.

The second system, DOEHRS-IH, currently monitors, analyzes, and stores levels of chemical and physical agents in air, water, and soil of the in-garrison work sites of Army personnel. Maximizing the potential of DOEHRS-IH would require expanding it to the Air Force and Navy and addressing methodological and data issues, such as the methods used to categorize a service member's exposure. In addition, troop location data are needed for linking the exposure data collected for a specific location, both in garrison and in theater, with an individual service member. However, troop location data are classified for theater operations and, therefore, may not be available for assigning individuals to a specific location at a specific point in time. A module within DOEHRS-IH, called DOEHRS-EH (Environmental Health), is being developed specifically to support theater environmental health operations. DOEHRS-EH is currently under development but, once deployed, will encompass occupational and environmental health surveillance data collected by Army, Navy, and Air Force preventive medicine personnel in the deployed environment.

A possible barrier to linking health and environmental data is the fact that AHLTA and DOEHRS are being developed and fielded independently of each other. The DOEHRS modules are the responsibility of the Resources Information Technology Program Office (RITPO), while AHLTA is the responsibility of the Clinical Information Technology Program Office (CITPO). Having the two systems located in different program offices might present challenges to the coordination and communication needed during the development and testing of the data sharing and data transfer functions.

It should be noted that since the research was completed for this monograph, the program offices that provide information technology support to DoD's MHS have been reorganized. The two newly formed organizations under the Chief Information Officer of the Military Health System are the Defense Health Information Management System (DHIMS) and the Defense Health Services Systems (DHSS) (DoD, 2008a; DoD, undated-e; DoD, undated-f). DHIMS now combines the functions of the CITPO and the Theater Medical Information Program—Joint (TMIP-J). The Defense Medical Logistics Standard Support (DMLSS), Executive Information Decision Support (EIDS), and RITPO have merged to create the DHSS.

Civilian Approaches to Employee Health—Applicability to DoD?

What can DoD learn from civilian experience with integrating employee health? To answer this question, we reviewed civilian models of integration to identify promising approaches and practices that might inform DoD efforts to integrate employee health activities. We identified general trends from the peer-reviewed literature, with an emphasis on three case studies, two in the private sector (Johnson & Johnson and FedEx) and one in the public sector (National Aeronautics and Space Administration—NASA).

Our analysis focused on the underlying motivation for the integration, program design, execution styles, and the general outcomes of an integrated model:

- *Motivation:* The key motivation for the move to an integrated system for civilian companies was reducing the high cost of health care benefits.
- *Program design:* The most common design features included health risk assessments, health awareness and education campaigns, personalized interventions, and reassessments of employee health.
- *Execution styles:* The key styles involved a central message and strategy, standardized training of managers and leaders, incentives for participation, and continuous assessments and evaluations. The involvement of senior leadership was generally considered essential to successful program implementation.
- *Outcomes:* Although the evidence base on program outcomes is still developing, employee health programs appear to reduce risk factors and lower health care expenditures.

Most of the companies we examined attempted to bring individual health promotion activities under the broader umbrella of employee health. The civilian case studies shed light on integration in the sense of introducing new programs related to employee health, specifically health promotion programs, thereby increasing the breadth of their employee health system. However, there was little effort to link these new health promotion programs with more traditional occupational safety and health policies and practices. Furthermore, there was little activity in the case studies related to linking or information sharing between individual employee health programs (e.g., industrial hygiene staff working with the health promotion staff).

We conclude that there are lessons to be learned from the companies in the case studies related to specific types of program designs and important elements in the programs that lead to better outcomes. A general lesson is that the attention of senior leadership is important for a successful employee health program.

However, we found little evidence of comprehensive employee health integration in these companies. None had a single office responsible for all aspects of employee health or a single IT system containing data on all aspects of employee health that might serve as a model for DoD. In many ways, DoD might be farther along the continuum toward an integrated employee health system² than the companies we studied.

Observations and Conclusions

The lessons from the civilian case studies, in combination with our analysis of DoD policies and programs, prompt the following observations for DoD.

Leadership Attention Is an Important Aspect of Civilian Integrated Employee Health Programs

A significant lesson from the civilian case studies is that leadership attention is key to a successful employee health program. The case study organizations have clear goals and metrics related to employee health that are communicated from the top of the organization. In 2001, the National Safety Council made a similar recommendation to DoD regarding leadership

² *Employee health* refers to all aspects of a service member's experience that relates to his or her health, including inpatient and outpatient medical care, preventive services, other activities related to health promotion and wellness, occupational health, environmental monitoring, surveillance, and health monitoring.

emphasis on safety, and it estimated the cost of safety mishaps as a baseline measure. DoD responded quickly and effectively to this recommendation: the Secretary established clear goals and appointed a high-level committee to oversee program implementation, reporting, and measurement.

As part of the effort to focus leadership attention on issues related to employee health integration, DoD should estimate the incidence and cost of preventable illnesses and occupation-related illnesses among its forces to provide a baseline similar to one established for accidental injuries by the DSOC. This step would allow leaders to set measurable goals and measure progress against a clearly defined performance target, which would lead to accountability. Health outcomes, cost savings, retention, and readiness are all important to measure.

DoD might approach employee health as it has approached safety, by appointing an oversight committee similar to the DSOC or expanding the DSOC charter to include a broader range of employee health activities. The Joint Preventive Medicine Policy Group (JPMPG) or the Defense Health Board could also play an important role in integrating employee health activities by heightening senior leadership awareness of the benefits of integrating employee health activities related to SOH with medical care and health promotion/wellness activities.

Coordination Across Organizational Boundaries Is Essential to a More Integrated System

SOH activities cut across many disciplines. It is not surprising, then, that SOH responsibilities reside in various organizations in DoD. Safety policies are promulgated and monitored by the Under Secretary of Defense (Acquisition, Technology, and Logistics), reflecting the emphasis on safety during the development and procurement of equipment and the critical role of installations in safety. SOH also requires support from the MHS, which is overseen by the Under Secretary of Defense (Personnel and Readiness). While important, SOH is only one of many functions overseen by these offices. This current organization is reflected in the services as well, with safety offices being distinct from health organizations.

It may be desirable to have a more centralized organization for SOH, as in some civilian organizations, with a single entity to set SOH policy and monitor its execution. However, placing all responsibility for SOH in a single organization would not remove the necessity for cross-organizational coordination.

In the current DoD organization, the need for coordination has been addressed, particularly for safety, with the establishment of the DSOC and through both chartered and informal working groups that coordinate SOH activities across organizations. Additional efforts might be considered to increase similar coordination in occupational health, including, for example, a new organization, similar in structure to the DSOC, but specifically focused on occupational health or, more inclusively, employee health. Alternatively, the DSOC charter might be expanded to include not only safety, but other employee health activities, such as occupational and environmental health, health promotion and wellness, and disability management.

Data Will Be Needed for Post-Deployment Health Studies

Evaluation of occupational and environmental exposures related to employee health is a fundamental function of an integrated employee health system. Therefore, access to the data needed to perform this task should be a top priority. Comprehensive data on all environmental monitoring in deployment theaters are not currently available from a centralized source. In addition, data from AHLTA are not linked with workplace environmental exposure data from DOEHRs-IH or service-level systems to allow population-level analysis. Eventually the envi-

ronmental monitoring data in the EH module of DOEHRS-IH and health outcome data in AHLTA will be linked. It is unlikely that these systems will be ready in time to fully support the health studies needed to evaluate the health effects of current deployments in Afghanistan and Iraq. In the interim, OSD health professionals are using other methods to link environmental and health outcome data, without the benefit of a centralized data system.

Multiple IT Systems Contain Individual Health Data

An ideal IT system for an integrated employee health system would create a single record to track and report on an individual's exposures, medical care, and health status. This ideal is the intent of DoD's electronic health record, AHLTA, which will eventually contain all health utilization information in a single record. However, other medical data exist outside the AHLTA system that, if linked or added to the AHLTA record, would create a more complete longitudinal electronic health record. Two opportunities to enhance the completeness of the AHLTA record would be to link or add the following to a service member's AHLTA record:

- audiometric data collected and stored in the DOEHRS-HC system
- all health and medical data collected during the MEPS physical exam (e.g., hearing and vision test results).

Linkage of these data to the individual medical records in AHLTA would be through a clinical data warehouse.

Conclusions

As we began this study, we hypothesized that, despite differences in size, complexity, and governance, civilian models could inform future DoD efforts toward a more integrated employee health system. However, we identified no panacea in the investigation of "model" civilian employee health programs that could be directly adopted by DoD. The civilian companies—motivated by cost savings—provide some useful lessons in their implementation of specific employee health-related initiatives. However, we did not learn lessons regarding coordination among programs related to employee health or data linkages through IT systems.

As noted, the DoD's reasons for seeking to integrate employee health differ in fundamental ways from those of civilian organizations. In addition, DoD potentially has more opportunities to influence the health of its employees, particularly active duty personnel. In comparison to most civilian companies, DoD has more mature employee IT systems and, perhaps more important, is responsible for the complete health care of active duty personnel. These factors provide opportunities for comprehensive data collection and health interventions that can support further integration of employee health activities. The current, comprehensive activities related to employee health in DoD—including industrial hygiene, safety, health promotion and wellness, and medical care, and its relatively mature health IT infrastructure—indicate that there might be less need to introduce new employee health programs and more need to make use of the information generated by the existing programs in a more coordinated manner.

Abbreviations

AFOSH	Air Force's Occupational Safety and Health
AHLTA-M	AHLTA Mobile
AHLTA-T	AHLTA Theater
ASA (I&E)	Assistant Secretary of the Army for Installations and Environment
ASD (HA)	Assistant Secretary of Defense for Health Affairs
AT&L	Acquisition, Technology and Logistics
BLS	U.S. Bureau of Labor Statistics
BUMED	Navy's Bureau of Medicine
C&PP	Clinical and Program Policy
C2PC	Command and Control Personal Computer
CAM	Customer Assistance Module
CCHIT	Certification Commission for Healthcare Information Technology
CDM	clinical data mart
CDR	clinical data repository
CDW	clinical data warehouse
CEO	Chief Executive Officer
CHCS	Composite Health Care System
CHPPM	Center for Health Promotion and Preventive Medicine
CITPO	Clinical Information Technology Program Office
CNO	Chief of Naval Operations
CRC	Combat Readiness Center
DASD	Deputy Assistant Secretary of Defense
DEHE	Directorate of Environmental Health Engineering

DHIMS	Defense Health Information Management System
DHP	Defense Health Program
DHSS	Defense Health Services Systems
DIMHRS	Defense Integrated Military Human Resources System
DMDC	Defense Manpower Data Center
DMLSS	Defense Medical Logistics Standard Support
DMSS	Defense Medical Surveillance System
DNBI	disease and nonbattle injury
DOEHRS	Defense Occupational and Environmental Health Readiness System
DOEHRS-EH	DOEHRS–Environmental Health
DOEHRS-HC	DOEHRS–Hearing Conservation
DOEHRS-IH	DOEHRS–Industrial Hygiene
DOEM	Directorate of Occupational and Environmental Medicine
DOHS	Directorate of Occupational Health Sciences
DSES	Defense Safety Enterprise System
DSOC	Defense Safety Oversight Council
DTAS	Deployed Theater Accountability Software
EHR	electronic health record
EIDS	Executive Information Decision Support
ESOH	environmental, safety, and occupational health
FHP&R	Force Health Protection and Readiness
FY	fiscal year
GAO	U.S. Government Accountability Office
GEMS	Ground Element Minimum Essential Emergency Communications Network (MEECN) System
HART	Health Assessment Review Tool
HCM	Human Capital Management
HEAR	Health Enrollment Assessment Review
HHS	U.S. Department of Health and Human Services
HQ	headquarters
HRA	Health Risk Assessment

HWP	Health and Wellness Program
IH	industrial hygiene
IM/IT	Information Management and Information Technology
IOM	Institute of Medicine
IPT	integrated product team
JMeWS	Joint Medical Workstation
JPERSTAT	Joint Personnel Statistics
JPMMPG	Joint Preventive Medicine Policy Group
JPTA	Joint Patient Tracking Application
LFL	Live for Life [®]
M2	MHS Mart
MEPS	Military Entrance Processing Station
MHS	Military Health System
MSMR	Medical Surveillance Monthly Report
MTF	military treatment facility
NASA	National Aeronautics and Space Administration
NDRI	National Defense Research Institute
NSC	National Safety Council
ODASD	Office of the Deputy Assistant Secretary of Defense
OEH	occupational and environmental health
OEHS	Occupational and Environmental Health Surveillance
OPNAV	Office of the Chief of Naval Operations
OSD	Office of the Secretary of Defense
OSHA	Occupational Safety and Health Administration
PMO	Program Management Office
POPM	Proponency Office for Preventive Medicine
PPIP	Putting Prevention into Practice
PSHPC	Prevention, Safety and Health Promotion Council
RITPO	Resources Information Technology Program Office
SADR	Standard Ambulatory Data Record

SAMS	SNAP (Shipboard Nontactical ADP Program) Automated Medical System
SEG	similar exposure group
SIDR	Standard Inpatient Data Record
SOH	safety and occupational health
TERP	Triservice Electromagnetic Radiation Panel
TIMPO	Triservice Infrastructure Management Program Office
TMA	TRICARE Management Activity
TMDS	Theater Medical Data Store
TMIP-J	Theater Medical Information Program—Joint
TRAC2ES	U.S. Transportation Command Regulating and Command & Control Evacuation System
USD (AT&L)	Under Secretary of Defense for Acquisition, Technology and Logistics
USD (P&R)	Under Secretary of Defense for Personnel and Readiness
VPP	Voluntary Protection Program

Introduction

The Department of Defense (DoD) has the largest workforce in the United States, with more than 1.4 million active duty service members and about 709,000 civilian employees in 2007 (DoD, 2007i). DoD employees account for approximately 1.3 percent of the total U.S. labor force (DoD, 2007i). As part of its benefits package, DoD provides comprehensive health care to active duty military personnel and their families, retirees and their families, and reservists on active duty.

The current DoD active duty workforce and its health issues differ from the civilian workforce in the United States in ways that might affect the design of an employee health system. The active duty workforce is younger (76 percent are less than 35 years old versus 39 percent of the U.S. civilian workforce) (as shown in Table 1.1). In addition, although a higher percentage of active duty service members than the U.S. civilian workforce are high school graduates, a lower percentage have any college education (see Table 1.1).

Table 1.1
Demographic Characteristics of Active Duty Workforce and U.S. Civilian Workforce

Characteristic	Active Duty Service Members (Active Component), 2004	U.S. Civilian Workforce, 2004–2005
Total (in thousands)	1,396	125,889
	Percentage	
Age		
16–19 years	7	5
20–24 years	34	11
25–34 years	35	23
35–44 years	20	24
45 years and over	4	38
Highest educational attainment		
Less than high school	1	10
High school diploma or equivalency	72	30
Some college	7	29
Baccalaureate degree	11	20
Graduate degree	6	10

SOURCES: BLS, 2005; GAO, 2005b.

Deaths due to illness and injury, excluding those caused by hostile action, accounted for 60 to 76 percent of deaths among active duty military personnel from 2003 through 2006 (DoD, 2008g) (see Table 1.2). The largest proportion of these deaths is classified as accidental, followed by those due to illness, those that are self-inflicted, and those due to homicide. Injuries also account for a high proportion of health care utilization among active duty military personnel, with four of the top ten reasons for hospitalizations and ambulatory visits being injury related: back/abdomen (second), knee (sixth), foot/ankle (seventh), and arm and shoulder (ninth) (MSMR, 2006). The injuries result from a mixture of work-related and recreational activities. These numbers indicate that injuries and disease and nonbattle injury (DNBI) deaths account for a high proportion of the health care burden and fatalities among active duty service members.

The DoD Work Environment

Active duty personnel work in highly diverse indoor and outdoor environments, the latter including air, land, and sea, in peacetime and war. Many employees work in offices or motor pools and aboard aircraft or ships. During deployments and in garrison, exposure to extreme conditions is common. Service members at some DoD work sites are exposed to fuels, explosives, and other chemicals, as well as other hazards such as radiation and noise and to psychologically stressful conditions during deployment.

The Defense Department's "workplace" consists of 580,000 facilities in more than 5,300 different locations, covering more than 32 million acres in over 160 countries (DoD, 2007f). The work sites range in size from less than one-half acre to 3.6 million acres (the Army's White Sands Missile Range in New Mexico). DoD uses approximately 250,000 vehicles, 11,000 aircraft, and 500 sailing vessels to accomplish its mission (DoD, 2007f).

According to DoD, approximately 30 percent of the active duty enlisted force was in infantry, craftsmen, and service and supply-handling occupations in 2005. Approximately 43 percent of active duty enlisted personnel served in "mid-level skill" jobs in the medical and dental fields, administration, and electrical and mechanical equipment repair, and another

Table 1.2
U.S. Active Duty Military Deaths, 2003–2006

Cause of Death	2003	2004	2005	2006
Accident	576	605	649	559
Hostile action	344	739	739	769
Homicide	43	45	52	46
Illness	234	272	289	252
Pending determination	1	3	5	25
Self-inflicted	187	201	181	210
Undetermined	25	8	26	21
Total	1,410	1,873	1,941	1,882

SOURCE: DoD, 2008g.

21 percent were in “high-skill” areas, including electronic repair, communications, and intelligence. The bulk of officers’ service is in tactical operations and health care (DoD, 2007a).

Purpose of the Study

DoD’s Deputy Assistant Secretary of Defense (DASD) for Clinical and Program Policy (C&PP), under the purview of the Assistant Secretary of Defense for Health Affairs (ASD [HA]), recognized that safety and occupational health (SOH) in DoD is complex and involves multiple policies executed by numerous organizations. For example, based on the organizational charts of the Office of the Secretary of Defense (OSD) and the services, 35 organizations (including working groups) have responsibility related to SOH. Believing that improved integration of DoD activities related to SOH with other employee health activities, including health promotion and wellness, might result in improvements in the health of DoD’s active duty service members, as well as other benefits for DoD (e.g., increased productivity), the DASD (C&PP) asked the RAND Corporation to document the policy background and the organization of DoD’s current system as a starting point for any future changes in policy and organization related to integration of employee health activities. The DASD (C&PP) also asked RAND to conduct case studies of civilian organizations considered to have integrated employee health systems. The goal of both tasks was to create a foundation of information that would assist DoD if it moves toward a more integrated employee health system.¹ At the direction of the sponsor, the study focuses on active duty personnel only² and includes safety, which is closely related to occupational health.

How This Monograph Is Organized

This monograph is organized in six chapters. In this chapter, we described DoD’s active duty workforce and work environment and the purpose of the study. In Chapter Two, we present the study goals and methods as well as definitions of occupational health, preventive medicine, and integration. In Chapter Three, we summarize DoD policies and describe DoD organizations, programs, and activities, including their structure and interrelationships related to safety, occupational health, health promotion, and wellness. In Chapter Four, we discuss how the triservice information technology systems in DoD relate to the integration of employee health activities. In Chapter Five, we present three case studies of integrated employee health programs in organizations outside DoD. In Chapter Six, we summarize our findings. The appendixes present a time line of safety and occupational health policies and programs from 1970 to 2007 and details about the semistructured interviews with DoD officials.

¹ The concept of integration will be discussed in more detail in the next chapter.

² The DoD workforce includes a large number of civilians for whom the department is also obligated to provide SOH services. This obligation is codified in the Occupational Safety and Health Act of 1970, as discussed in Chapter Three.

Project Goal, Methods, and Definitions

In this chapter, we discuss the goals of the project, the research methods, and sources of information. We also present definitions of *occupational health*, *preventive medicine*, and *integrated employee health system*.

The goal of the project was twofold. First, we aimed to broadly describe SOH policies and organizations within DoD to document the current system. Second, we conducted case studies of employee health programs outside DoD in an effort to gather information and opinions about the implementation process related to, and components of, an integrated employee health system. Our approach entailed (a) reviewing and documenting the policy context of SOH, including some historical events that led to the development of SOH policies; (b) collecting and analyzing information on the structure and governance of current programs within DoD related to occupational health; (c) studying employee health programs outside DoD (i.e., in civilian companies and other government agencies) that might serve as models;¹ (d) describing current information technology systems within DoD that might support an integrated employee health program; and (e) formulating observations.

We gathered information about DoD's SOH programs from a variety of sources, including a broad search of the research literature and media (print and online), DoD documents related to policy, guidance and implementation, DoD Web sites, research reports, and meetings with DoD personnel. We gathered information about employee health programs in the civilian case-study organizations from similar sources, including discussions with corporate officials. We conducted a literature review of articles related to SOH for military personnel.²

We also reviewed government reports (e.g., U.S. Government Accountability Office [GAO] and Congressional Research Service), as well as Web sites sponsored by DoD and other relevant organizations, such as the Institute of Medicine (IOM). Other published and unpublished reports and briefings were provided by the project sponsor and DoD personnel with whom we met.

We met with DoD personnel in 12 DoD organizations identified by the project sponsor as being responsible in some way for SOH. The objective of meeting with these individuals was to better understand their perceptions of current programs and their visions of an integrated

¹ Utilizing information (e.g., best practices, lessons learned) from health systems outside of DoD was recommended by the Task Force on the Future of Military Health Care, DoD Task Force (2007).

² We limited the search to English-language articles published in 2000–2006 in the following databases: ABI-Inform (business and trade journals), Air University Index to Military Periodicals, DTIC (military documents), and PubMed (medical and health journals). The following search terms were used: *occupational health* OR *environmental health* OR *integrated employee health program* OR *wellness program* OR *health and safety* AND *military* OR *defense*.

program, including their thoughts regarding possible models of an integrated program within DoD. See Appendix B for more information about how these meetings were conducted.

In an effort to understand and describe the structure of SOH programs in DoD, we depicted graphically the organizations that oversee current DoD programs related to SOH for active duty personnel. We then summarized background information on each entity identified in the organizational charts from available literature, Web sites, and discussions with subject matter experts, to understand their SOH roles.

Using our literature and Web site reviews and through discussions with DoD personnel, we identified information technology (IT) systems within the Military Health System (MHS) that would be central to the integration of employee health activities. We used this information to document the current configuration of these IT systems. This review of the IT systems was focused programmatically and did not attempt a technical assessment of the systems. The review was intended to identify opportunities for improved information collection, sharing, and analysis.

We also reviewed models from civilian organizations and systems to identify approaches applicable to the DoD system. The analysis began with a review of general trends and models of employee health integration in the civilian sector. The review focused mainly on the peer-reviewed research literature, but also included a review of Web sites, trade publications, and other sources.

To provide more detail on approaches to integration and, in particular, on how they are implemented, we conducted three case studies on civilian organizations. We sought civilian organizations with documented experience in the area of integrated employee health programs. We chose organizations that had similar characteristics to those of DoD, in particular,

- large and diverse populations
- multiple locations, both domestically and internationally
- a diverse range of job functions
- large-scale field activities, with continuous operations.

We also sought to identify both private-sector and government organizations. Data collection on the cases included review of program documents and published literature as well as discussions with key program staff.

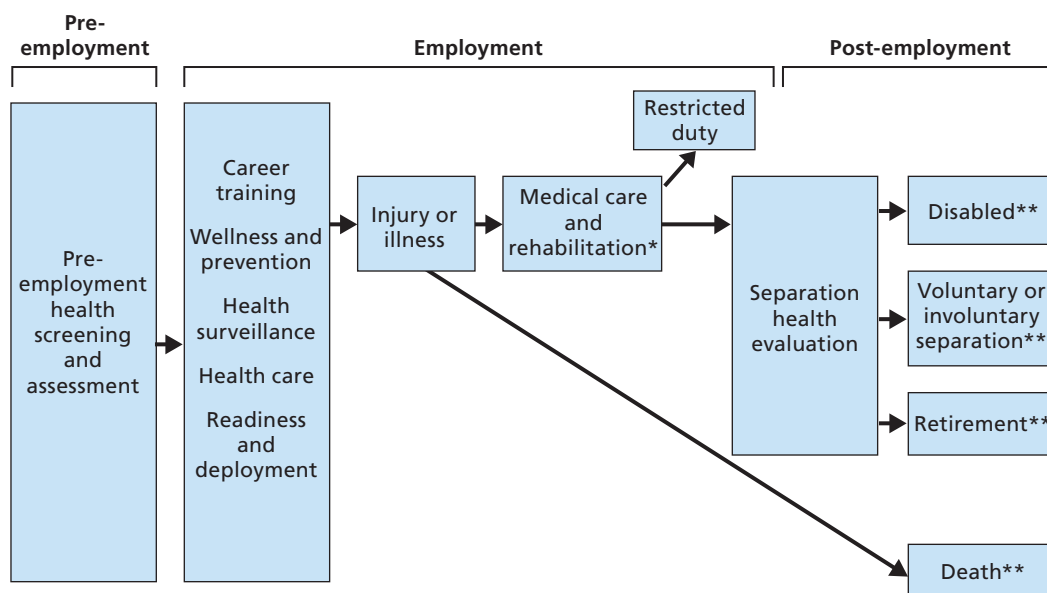
Employee Health Care Encounters in DoD

DoD is responsible for the complete health care of its active duty personnel, from the time they enter the service until they are separated or retire, a situation that differs from civilian companies. This care is provided by DoD's managed health care system, TRICARE, and through direct care in military treatment facilities (MTFs). An active duty service member comes into contact with the military health system many times during even a short military career. These encounters represent opportunities for DoD to assess and monitor the service member's health and well-being and to provide intervention when needed. The information collected during these encounters can be used to inform clinical decisions about the individual service member as well as for policymaking, accountability, improvement, and surveillance.

In evaluating the opportunities for integration of employee health activities in DoD, it is useful to consider the health-related events and encounters that might occur before, during, and after an active duty service member's career ("pre-employment," "employment," and "post-employment," respectively, in Figure 2.1). As Figure 2.1 illustrates, there are multiple points during an active duty career when a service member might interact with the health care system. Each of these interactions provides an opportunity to provide health care services and/or health education to the service member as well as an opportunity to collect data about employee health. This monograph focuses on the policies and context for programs related to occupational health and safety for active duty service members related to the "pre-employment" and "employment" phases of Figure 2.1.

Figure 2.2 focuses more specifically on examples of the types of encounters that might occur between an active duty service member and the military health system during his or her career. During their time in service, many service members are deployed, represented by three time periods in Figure 2.2: "pre-deployment," "deployment," and "post-deployment." Examples of encounters that might occur within each of these periods are described below.

Figure 2.1
Health Care Events and Encounters in an Active Duty Service Member's Career

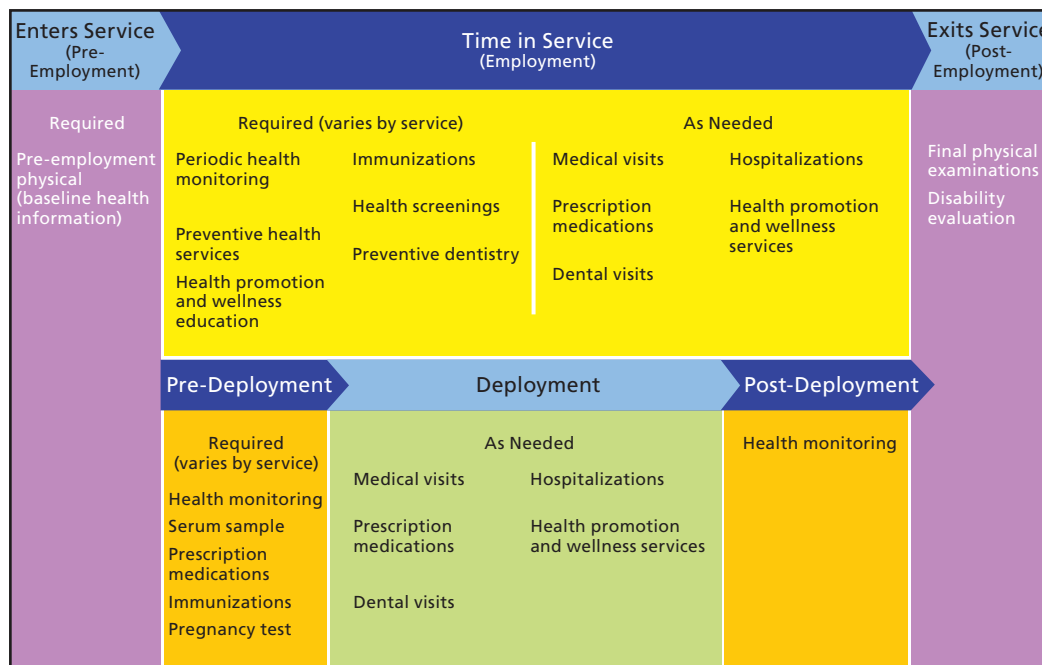


*Depending on the nature of the injury or illness, a service member may return to duty, be placed on restricted duty, or be evaluated for separation.

**Depending on the circumstances and other eligibility criteria, transition and other health benefits may be provided by DoD and/or the VA.

RAND MG799-2.1

Figure 2.2
Examples of Employee Health Care Encounters in DoD



RAND MG799-2.2

Pre-Employment Phase: Health Care Encounter Examples at Entry into the Service

To determine eligibility for employment, the services screen applicants to assess whether they meet various recruitment and accession standards. For example, medical encounters at accession (i.e., when the service member enters the service) occur before a service member even reports for basic training (see “Enters Service” heading of Figure 2.2). Recruiters use standardized forms to ask about medical conditions that may disqualify an applicant for military service. The forms are then forwarded to a Military Entrance Processing Station (MEPS)³, where medical personnel determine whether an individual is medically fit for service. In some cases, applicants may be requested to provide additional medical documentation for review (e.g., records from prior surgeries or other hospitalizations). Prior to basic training, each applicant then undergoes an in-processing physical exam at a MEPS, at which time a more thorough medical examination and screening tests are conducted.

Employment Phase: Examples of Health Care Encounters During Time in Service

The employment (or time in service) phase is the longest phase of a service members’ career. This is the time during which the service member is engaged in activities that include individual and unit training as well as performing duties in garrison. During this phase, there are periodic medical requirements to assess whether the active duty service member remains medically fit for duty and to ensure that relevant health information is captured and that health needs are addressed.

³ MEPS is a joint-service organization tasked with determining applicants’ physical qualifications and aptitude for military service. There are 65 MEPS facilities in the United States.

These periodic requirements include regularly scheduled physicals, audiograms, and health risk assessments. Some preventive efforts are ongoing, such as health and wellness promotion, which includes education about healthy lifestyles. Most of these periodic requirements and ongoing efforts are similar for all service members, but some individuals may require specialized occupational medical surveillance and services.

Other health services are obtained by service members on an as-needed basis during their employment. To diagnose and treat diseases or injuries, individuals might require hospitalizations, emergency room visits, outpatient treatments, or dental procedures, or to target a risk factor, they might participate in intervention programs such as smoking cessation.

Employment Phase: Examples of Health Care Encounters Related to Deployment

A deployment during an individual's time in the service prompts additional medical requirements, some of which are required for all deployments and others that depend on the deployment location and condition. Other health care is provided on an as-needed basis while the service member is in a deployed theater.

As shown in the "Pre-Deployment" box of Figure 2.2, several medical requirements occur in the *pre-deployment* phase.⁴ In preparation for moving overseas, all service members undergo a pre-deployment health assessment. This is composed of a questionnaire and a face-to-face screening with a trained health care provider. The assessment is designed to capture data on the service member's health status shortly before deployment. Individuals also receive immunizations specific to the deployed theater as well as a supply of any prescription medications required. A serum sample is also collected and preserved as a pre-deployment baseline.

During *deployment*, the nature of the health care received by service members on an as-needed basis will be similar to that received by those in garrison, with the notable exception of the treatment of battle injuries and deployment-related diseases (e.g., gunshot wounds or malaria, both of which are also treated, though less frequently, in MTFs when service members are not deployed) (see Figure 2.2). The individual is still being treated within the MHS, albeit at a location where he or she is deployed.⁵ Environmental surveillance is also conducted during deployments, to monitor potentially hazardous exposures.⁶

In the *post-deployment* phase, service members receive additional health assessments (Figure 2.2). Self-administered forms allow the service member to record health concerns that have occurred since his or her most recent deployment.

Post-Employment: Examples of Health Encounters at Exit from the Service

Regardless of the length of employment, each service member receives a final physical examination when "out processing" from the military at the time of separation or retirement (see Figure 2.2). Historically, this exit physical examination has served multiple purposes, including identifying conditions that require immediate medical treatment, assessing military fitness

⁴ More information on individual medical readiness requirements can be found in unpublished RAND research by Brauner, Moore, Relles, Hickman, Lankowicz, and Patton regarding detailed requirements for meeting individual medical readiness requirements across the DoD.

⁵ See section entitled "IT Systems for Health Care Data During Deployment" in Chapter Four of this monograph for a discussion of the systems that collect and store information on the health care provided to service members in theater.

⁶ See section entitled "IT Systems for Occupational and Environmental Exposures" in Chapter Four of this monograph for a discussion of systems that gather and store data on air, water, and soil samples collected during deployments.

for duty, recording health status at exit, and confirming service-connected disabilities for use in the disability evaluation by the Veterans Administration (Goodrich, 2006). In addition, some service personnel may be referred for further evaluation, for example, if the service member has a service-connected disability that may render him or her unfit for duty or qualify him or her for disability compensation or medical retirement.

In conclusion, the continuous health care that DoD provides for its active duty employees from the day of accession until the day of separation or retirement offers an unparalleled opportunity to create a complete set of employee-centered health information.

What Are Occupational Health and Preventive Medicine in DoD?

In DoD directive 4715.1E, Environment, Safety, and Occupational Health (DoD, 2005b), *occupational health* is defined as “[a]ctivities directed toward anticipation, recognition, evaluation, and control of potential occupational and environmental health hazards; preventing injuries and illness of personnel during operations; and accomplishment of mission at acceptable levels of risk.”

In “Joint Publication 4-02, Health Service Support” (DoD, 2006f), *preventive medicine* is defined more broadly such that it encompasses the activities related to occupational health:

Preventive medicine is the anticipation, communication, prediction, identification, prevention, education, risk assessment, and control of communicable diseases, illnesses, and exposure to endemic, occupational, and environmental threats. These threats include non-battle injuries (NBIs), environmental and occupational exposures, combat stress responses, WMD [weapons of mass destruction], and other threats to the health and readiness of military personnel. Communicable diseases include arthropod-, vector-, food-, waste, and waterborne diseases. Preventive medicine measures include field sanitation, medical surveillance, pest and vector control, disease risk assessment, environmental and occupational monitoring and health surveillance, medical countermeasures, health threat controls for waste (human, hazardous, and medical) disposal, food safety inspection, and potable water surveillance.

The overlap between occupational health and preventive medicine centers primarily on environmental and occupational monitoring and health surveillance. However, many activities within preventive medicine could be considered part of preventing illness under occupational health, such as field sanitation, medical surveillance, pest and vector control, disease risk assessment, medical countermeasures, and health threat controls for waste disposal (human, hazardous, and medical). Outside DoD, however, traditional occupational health is thought of as environmental monitoring activities that would be conducted in an industrial environment in the United States.

In what DoD calls “a fundamental reorientation,” MHS is striving to shift from a primary focus on acute-care services toward preventive services. More specifically, under its concept of preventive medicine, the MHS categorizes occupational and environmental hazards as “threats,” including numerous risk factors that influence the rate of DNBI (DoD, 2004c). Historically, DNBI have been the primary force detractor during conflicts, causing more illness and injury than actual combat action (U.S. Census Bureau, 2007). The category of DNBI is of such importance that a DoD directive (DoD, 2004c) enjoins DoD components to “promote

and improve the health of the force through programs on injury prevention, dental health, [and] good nutrition” and to “[p]rovide safe and healthy working conditions and appropriate, periodic occupational health assessments for those potentially exposed to chemical, biological, and physical hazards in the course of their duties.” The same directive requires DoD to “routinely inspect for and mitigate industrial, occupational, operational and environmental hazards and document significant exposures, including those associated with noise, climate, chemicals, radiation, infectious agents, air, food, water, waste, and pests” (DoD, 2004c).

Civilian Definition of an Integrated Employee Health System

In the civilian sector, an integrated employee health system generally refers to the introduction of health promotion activities in the workplace, alongside the more traditional SOH activities. One white paper for the National Institute for Occupational Safety and Health Steps to a Healthier US Workforce Conference suggests that “these parallel efforts [i.e., SOH and health promotion] will be strengthened when they are coordinated and integrated, rather than separate and independent” (Sorensen and Barbeau, 2004). An Institute of Medicine report about integrating employee health efforts in the National Aeronautics and Space Administration (NASA) workplace similarly describes integration as, “improving the health of employees [by] going beyond traditional medical or occupational health to include a variety of fitness and wellness programs as integral components to a comprehensive well-being approach” (IOM, 2005). The IOM report elaborates on the requirements of integrated employee health programs as, “programs that are integrated across multiple functions in the work organization rather than segregated within ‘silos,’ and that are employee-centric rather than driven by employer priorities.” Another view of integration is described as “[a]n integrated health, safety, and productivity management model [that] work[s] across departments to form a coordinated, synergistic and unidirectional set of solution packages” (Goetzel, Ozminkowski, et al., 2005). Although these definitions have similar elements, they illustrate that integration is neither clearly nor consistently defined. One expert in the field more recently referred to the concept of integration as “muddled” (Morrow, 2006). The one common theme of an integrated employee health system is moving beyond the traditional areas of SOH, primarily by including health promotion and wellness. However, other frequently cited characteristics include focusing on the employee rather than the employer and eliminating “silos,” or parallel processes, by increasing coordination and data sharing among organizations.

Despite the lack of clarity and consistency in how integration is defined, the pros and cons of integration efforts have been discussed in general terms. Both the organization and the employees might benefit from integrating these programs. The organization might achieve cost savings and increased productivity (the “business case” for integrated programs), while the employees might experience improved health and a sense of well-being (the “worker case”) (Sorensen and Barbeau, 2004). To realize cost savings, it is necessary to avoid duplication by sharing resources and experiences across functional areas within the organization, including development and application of common metrics (Goetzel, Ozminkowski, et al., 2005). Another benefit for the organization of an integrated approach is that there will be less demand from multiple departments for the attention of senior leadership and for limited resources (Goetzel, Ozminkowski, et al., 2005).

However, from the perspectives of both the organization and the worker, there also might be drawbacks associated with the integration of occupational health and safety and health promotion and wellness programs in the workplace. From the organization's point of view, several common reactions among managers against the process of integration relate to "turf protection," lack of time to do things other than their "real jobs," differences among departments in how business must be done (e.g., because of government regulations), hesitancy to change if the current system works (i.e., "if it's not broken, don't fix it"), and the argument that an integrated model would not necessarily be better than current practices, including the possibility that implementation costs might outweigh the savings in the short term (Goetzel, Ozminkowski, et al., 2005). From the workers' point of view, integration could prove to be problematic if organizations use information about workers' personal health and health habits inappropriately, such as using it as the basis for workplace decisions (e.g., salary increases) or in assessing the cause of a possibly work-related illness in an employee (Sorensen and Barbeau, 2004).

Defining an Integrated Employee Health System for DoD

Although the introduction of health promotion is a central focus of civilian approaches to integrating employee health activities, DoD requested this study to explore many aspects of integration, not only to make health promotion and wellness an integral part of employee health. Therefore, for the purposes of this study, we define *integrated employee health system* more broadly than the civilian definition to mean an infrastructure that would support all employee health activities except health care delivery, provide a way to link information about all aspects of the health of employees, and make this information available to leadership across all departments within DoD for the purposes of decisionmaking, accountability, improvement, surveillance, and other questions related to health. *Employee health* refers to all aspects of a service member's experience that relate to his or her health, including inpatient and outpatient medical care, preventive services, other activities related to health promotion and wellness, occupational health, environmental monitoring, surveillance, and health monitoring.

Defining an integrated employee health system clearly is an essential step in creating an integrated system. For purposes of this monograph, we will use the description of an integrated employee health system in the paragraph above as a working definition. DoD might improve upon this definition of an integrated employee health system by identifying and prioritizing the goals and objectives of such a system.

Safety and Occupational Health in the Department of Defense

In this chapter, we provide a historical perspective on how SOH programs have evolved in DoD, and we present the results of our review of SOH and health promotion and wellness policy and organization.

Historical Perspective

This section briefly describes the history of SOH in DoD. A time line of key SOH policies and organizations can be found in Appendix A. This historical perspective is presented to provide a foundation for subsequent discussions of SOH policies and organization in DoD. It was compiled from a variety of sources, such as DoD documents (memoranda, directives and similar policy documents, doctrinal publications, training materials, reports, etc.), reports by other government agencies, nongovernmental organization reports, and journal and press articles.

In brief, SOH efforts were first formally organized in the U.S. military during World War I (Deeter and Gaydos, 1993). More recently, the evolution of SOH policy in DoD has generally paralleled civilian trends, as discussed further below. However, DoD also faces unique challenges, such as combat and deployments, placing on it a larger burden for SOH activities, including information collection and management.

DoD Policy Parallels Civilian Initiatives

The most significant U.S. event related to SOH was the passage of the Occupational Safety and Health Act in 1970. At that time, the newly formed Occupational Safety and Health Administration (OSHA) set national standards for exposure to many physical and chemical agents without specific mention of the federal government or the military, except that it allowed the OSHA Secretary to provide exemptions for matters of national defense.¹ However, a decade later, exemptions for the military were codified in cases when an Executive Order applied OSHA standards to the federal government. Executive Order 12196 applied portions of the OSHA Act of 1970² to federal employees, but exempted “military personnel and uniquely military equipment, systems, and operations” (White House, 1980). Nonetheless, DoD decided to

¹ “The Secretary, on the record, after notice and opportunity for a hearing may provide such reasonable limitations and may make such rules and regulations allowing reasonable variations, tolerances, and exemptions to and from any or all provisions of this Act as he may find necessary and proper to avoid serious impairment of the national defense. Such action shall not be in effect for more than six months without notification to affected employees and an opportunity being afforded for a hearing” (Public Law 91-596, 1970, 29 USC 665).

² As amended (Public Law 91-596, 1970, 29 USC 668).

conform to OSHA standards wherever possible, at least for operations and places that were not determined to be *militarily unique*: “The DoD Components shall comply with the standards promulgated by OSHA . . . in all nonmilitary unique DoD operations and workplaces” (DoD, 1998b). Despite the executive order exemption of military operations, this policy document went even further to conform to OSHA standards: “The DoD Components shall apply OSHA and other non-DoD regulatory safety and health standards to military-unique equipments, systems, operations, or workplaces, in whole or in part, insofar as practicable” (DoD, 1998b). This same document also recognized that work settings for military personnel are in many cases distinct from the eight-hour civilian industrial workday environment that underpins OSHA standards—identifying the unique aspects of the military work environment remains a challenge for DoD, as discussed elsewhere in this monograph. In these cases, DoD leadership directed that the DoD components use a risk-based method to develop their own standards and regulations.

From 1980 to 2007, DoD’s programs on health promotion and wellness continued to generally reflect national programs and initiatives. For example, after the U.S. Surgeon General published his “Healthy People” initiative in 1979, DoD followed suit by publishing a directive on physical fitness and weight control for active duty personnel (DoD, 1981). Similarly, the U.S. Surgeon General launched another initiative, “Healthy People 2000,” in 1990 (HHS, 1990), which DoD followed with the similar “Promoting Health 2000” (DoD, 1994; Bibb, 2002). The U.S. Department of Health and Human Services (HHS) later initiated its Putting Prevention into Practice (PPIP) program nationwide in August 1994 to increase the appropriate use of clinical preventive services, such as screening, immunizations, and health counseling (HHS, 1998). Shortly thereafter, DoD implemented PPIP in all its continental U.S. military treatment facilities in the late 1990s (DoD, 1998e). Currently, selected DoD installations are participating in OSHA’s Voluntary Protection Program (VPP) in an effort to achieve excellence in performance related to safety (DoD, 2006l).³

The fact that DoD develops programs related to civilian “public health” initiatives is not surprising, given that SOH and health promotion and wellness within DoD are executed by military and civilian professionals who share training and experience with their counterparts in nonmilitary settings—and given that DoD is the largest employer in the United States, with a commensurate requirement to protect its workers, particularly civilians in industrial settings. It is difficult, however, to track the evolution of these health initiatives over time. It is unclear whether new initiatives were logical progressions of existing ones or unique endeavors; however, we have observed that initiatives in the civilian sector also seem to change over time, with similarly unclear relationships between them.

DoD Has Faced Unique SOH Challenges

While DoD’s SOH programs have generally followed civilian initiatives, DoD also faces SOH challenges, such as the need to protect service members in deployed settings—including combat—and circumstances posed by the acquisition of military equipment not used by civilian companies. We heard from DoD officials that military occupations present a unique occupational health challenge. Some of DoD’s active duty population does not conform to

³ Through the Defense Safety Oversight Council (DSOC), the DoD VPP Center of Excellence is supporting selected installations to achieve and maintain OSHA VPP recognition, meaning “they have exemplary Safety Management Systems and Programs.” The VPPs have demonstrated success in decreasing incident rates and lost work days within organizations.

the 40-hour workweek model, and service members face exposures during deployment and combat that have few, if any, analogs outside the military. Military service can be a unique occupation with implications for DoD's responsibility in injury and illness prevention, assessment, and compensation.

The acquisition of military equipment has played a large role in DoD's safety efforts. In general, DoD takes an active role in identifying and mitigating risk at early stages of development and procurement of technology and equipment, rather than addressing issues in a post hoc fashion. For example, in a 2004 memorandum directing integration of safety risk management into acquisition programs, the Under Secretary of Defense for Acquisition, Technology and Logistics (USD [AT&L]) states, "Our intent is to design safety into our weapons systems, not add it afterwards as an operational consideration" (DoD, 2004e; DoD, 2007r). The other challenge, protecting service members from potentially harmful exposures in deployed settings, began to receive increased attention in the 1990s.

Increased Attention to Deployment Health Following 1991 Gulf War

In 1996, after the experience of unexplained illnesses following the Gulf War and in the wake of concerns about potential exposures during peacekeeping and other overseas missions, the ASD (HA) directed a detailed medical surveillance and health protection plan for forces deploying to Bosnia (DoD, 1996a). A DoD directive, "Joint Medical Surveillance," and its accompanying instructive document, "Implementation and Application of Joint Medical Surveillance for Deployments," attempted to correct perceived inadequacies in health protection during deployments (DoD, 1997a; DoD, 1997b; Trump, Mazzuchi, et al., 2002). A year later, the Joint Staff and ASD (HA) specified preventive actions for before, during, and after deployments to ensure better disease surveillance, health protection, and properly documented health care (DoD, 1998b).

Recognizing that more robust environmental and medical surveillance (i.e., of hazards and individuals before, during, and after deployment) might alleviate future problems such as unexplained illnesses following deployment, DoD increased its occupational health policy focus on deployments at about the same time that Operations Enduring Freedom and Iraqi Freedom commenced. For example, in 2004, OSD issued a policy for the routine, comprehensive health surveillance of all service members during active service, including deployments (DoD, 1997a). The policy designated the Army as executive agent for the Defense Medical Surveillance System (DMSS) and the DoD serum repository. As part of the latter program, serum samples are collected from all service members before and after they are deployed to provide clues about exposures and medical consequences. The overall responsibility for comprehensive health surveillance rests with ASD (HA). ASD (HA) also has responsibility for Force Health Protection and Readiness (FHP&R), which is a program designed to monitor and improve the health of service members, particularly in deployment settings. FHP&R "encompass[es] the full spectrum of missions, responsibilities, and actions of the DoD Components in establishing, sustaining, restoring and improving the health of their forces" (DoD, 2004a). Two years after the policy was issued, DoD further clarified it with an instruction: "for deployment health activities for Joint and Service-specific deployments to monitor, assess, and prevent Disease and Non-Battle Injury" (DoD, 2006e). This instruction includes guidance to document and link exposures for deployed personnel, including exposures to chemical, biological, radiological, and nuclear warfare agents; and to record the daily locations of deployed personnel.

Current Operations Continue a Focus on Deployment Health

In 1997, Congress passed legislation requiring DoD to establish a medical tracking system to assess the medical condition of service members before and after deployments. DoD established a deployment health quality assurance program that is now being used in worldwide deployments, including combat operations in Afghanistan and Iraq. However, as the GAO (2007a) notes, “DoD’s policy does not specify uniform standards that should be used in collecting and reporting health information during deployment. . . . Instead, DoD’s policy directs the services to determine the scope and methodology of their respective programs,” and “the service’s differing interpretations of DoD’s policy have resulted in the services utilizing different approaches for the collection and reporting” of health information during deployment. In short, DoD has made progress in establishing policies for monitoring deployment-related health issues, but its decentralized execution has made it difficult to measure progress. The problem of documenting individual service members’ locations also persists, but progress in reporting and in uniformity across the services is being addressed through venues such as the Joint Environmental Surveillance Working Group (GAO, 2005a).

Recent Focus on Safety

In July 1999, President Clinton launched the Federal Worker 2000 Presidential Initiative to decrease federal workplace injuries in the subsequent five years. Specific goals included reducing injuries by three percent annually. That same month, DoD established a Prevention, Safety and Health Promotion Council (PSHPC), under the Under Secretary of Defense for Personnel and Readiness (USD [P&R]) (DoD, undated-a). Similar initiatives followed in DoD, including policies on traffic safety (DoD, 1999a) and accident reporting (DoD, 2000b).

Shortly thereafter, in 2001, the National Safety Council (NSC) partnered with DoD in an expert panel–based study of DoD’s safety and occupational health management systems. While NSC found “many areas of occupational safety and health excellence,” it also found “the lack of an effective Department-wide safety and occupational health management system.” Further, the study found “no central, corporate management system to ensure coordinated policy, advocacy and oversight [of safety and occupational health].” NSC “conservatively” estimated the annual cost to DoD for injuries and illnesses at \$10 to over \$21 billion (NSC, 2001).

In response to the NSC report, the Secretary of Defense tasked the DoD Military Injury Metrics Working Group in February 2002 to study causes of lost work days. The working group published a white paper in November, recommending injury metrics and identifying “data gaps.”⁴ The group warned against setting SOH goals too high, stating that “reducing the injury metrics 30–50% over five years will require a significant and sustained commitment” (DoD, 2002c). In 2003, concerned about rising injury rates, the Secretary of Defense issued a policy memorandum on reducing preventable accidents, with a goal of reducing “mishaps and accident rates by at least 50% in the next two years”⁵ (DoD, 2003f), and he also established the Defense Safety Oversight Council (DSOC), chaired by USD (P&R).

The DSOC has been the primary actor in safety policy and initiatives within DoD since its inception, supporting the NSC view that such an oversight function was needed. DoD published a policy directive in 2005, enjoining protection of DoD personnel from accidental death,

⁴ For example, in ambulatory medical data, outsourced care, duty limitation information, convalescent leave recording, cause coding, deployment injury data, shipboard injury data, personnel data, and safety data.

⁵ In 2004, the Secretary of Defense increased this goal to 75 percent by 2008.

injury, or occupational illness (DoD, 2005b). Later that year, the DSOC tasked the ASD (HA) to “identify the top five causes of non-combat injuries and recommend mitigation initiatives to reduce injuries” (DoD, 2005e). In addition, the Military Training Task Force of the DSOC recommended a process for setting injury prevention priorities and recommended interventions (DoD, 2005f). Focusing on NSC recommendations (and based on surveys conducted jointly by NSC and the DoD Office of the Inspector General), the Joint Staff also increased similar emphasis on centralized command responsibility for safety in a 2006 memorandum, stating, “We need to integrate the Joint Staff and combatant command safety programs with the well-established Service safety programs,” and “[t]here is limited safety guidance governing the joint operating environment; safety is widely accepted as a Service-only domain” (DoD, 2006g). That memorandum sought input for future directive guidance.

The high-level attention to safety has continued more recently. The Secretary of Defense issued another memorandum on reducing preventable accidents in 2006, stating “We will fund as a first priority those technologies and devices that will save lives and equipment” (DoD, 2006j). Later that year, responsibility for safety was given to the USD (P&R), reinforcing his position as DSOC chairman. The memorandum which defines USD (P&R) responsibilities includes “safety and accident reduction activities to prevent accidents and injuries . . . in accordance with guidelines of the DSOC” (DoD, 2006a). The current Secretary of Defense has continued the high-level DoD focus on safety, setting a goal of zero preventable accidents and a 75 percent accident reduction target in 2008 (DoD, 2007o).

Implications of the Recent Focus on Safety

The DoD focus on reducing preventable accidents in the last several years does not represent an integrated approach to SOH or a clear path toward an integrated employee health program. However, it should not be assumed that making safety the primary focus has come at the expense of other employee health programs, such as occupational health or wellness. OSD and the services have been very active in promoting wellness activities, such as smoking cessation.

The NSC study focused leadership attention on quantifiable safety goals, and safety metrics are readily definable, partly because of decades-old practices of measuring injuries to comply with OSHA standards. In other words, safety lent itself to focused attention because it is measurable and, being workplace-based, can be directly influenced by leaders.

OSD leadership was presented with clear metrics showing increasing accident and injury rates: a relatively clearly defined problem. For example, in the 1990s, across the services, accidental injuries caused

- 47 percent (Air Force) to 57 percent (Marine Corps) of all deaths
- 22 percent (Air Force) to 63 percent (Navy and Marine Corps) of all disabilities
- 22 percent (Air Force) to 31 percent (Marine Corps) of all hospitalizations (Jones and Amoroso, 1999).

Noncombat injury rates in 2006 were 25 percent higher than a 2002 baseline, prompting the Secretary of Defense’s safety memorandum (DoD, 2006j). The DoD Military Injury Prevention Priorities Working Group (under the DSOC) published a report on injury causes, mitigation, and recommendations. The report detailed the top five injury causes and recommended that the greatest reduction of lost duty days could be realized by interventions focused on sports-related and physical training–related injuries, followed by falls (DoD, 2006b). This

illustrates how data can inform top leadership regarding the extent of the outcomes associated with specific employee health issues—in this case, safety.

As part of the effort to understand the root causes of injuries and mishaps (such as “near misses”), a decision support system called the Defense Safety Enterprise System (DSES) has been developed under the office of the Deputy USD (Readiness) under the USD (P&R). The system, which was in the beta-testing stage in mid-2008, allows authorized users to generate standard reports or query the system with ad hoc requests. The standard reports focus on injuries and mishaps in six categories: maritime, aviation, ground, motor vehicle, medical cases, and overall. Data in the system started to be entered in 2000 and are updated on a daily to monthly basis depending on the data source.

By contrast, occupational health and health promotion/wellness programs tend to be more diffuse—they are targeted outside of the workplace, too, and their outcomes are less easily defined and measured. For other areas of the military health system, the ASD (HA) adopted the use of the “balanced scorecard” approach in the late 1990s. The scorecard operationalizes the goals of the MHS by providing benchmarks and accountability data for managers and supervisors. The MHS balanced scorecard has six dimensions, which provide leadership with perspective on how the “customers” and stakeholders see the system, the financial and resource health of the system, and what the growth perspectives of the system are. The six dimensions are resources, learning and growth, internal process, customers, financial, and stakeholder (De Lorenzo, 2005; DoD, 2007p). The MHS balanced scorecard is continually evolving. Over the past few years, there has been an effort to include more MHS activities, in addition to health care measures that are already included.

Activities Related to Health Promotion and Wellness

While many Secretary of Defense–level initiatives have focused recently on reducing injuries as part of the safety initiatives, health promotion and wellness have also received attention in recent years. Since 1996, DoD has supported the continued use of a periodic health assessment as part of a program to assess the “preventive health needs, health risks, chronic disease history, and health status” of active duty personnel (DoD, 2003e; DoD, 2005e).

In 1996, the ASD (HA) established the use of the Health Enrollment Assessment Review (HEAR) as the TRICARE health assessment survey instrument (DoD, 1996c). The HEAR instrument was a self-administered questionnaire designed to assess health-related behaviors (e.g., smoking, alcohol consumption, and exercise), frequency of preventive medical care, and use of health care services among active duty personnel (Grayson and Brustrom, 2001). The instrument was developed by the U.S. Air Force together with academic and health care experts and the Centers for Disease Control and Prevention. It resembled the Behavioral Risk Factor Surveillance System, a survey administered by the Centers for Disease Control and Prevention to a national sample of adults in the United States.

In 2005, the design and content of the HEAR instrument was revised by the DoD Individual Medical Readiness working group and renamed the Health Assessment Review Tool (HART) (PKC Corporation, 2008). There are four versions of HART: Accession HART (for new recruits), Readiness HART (for deployment readiness of active duty, National Guard, and Reserve personnel), Screening HART (a short version of the health care information), and Full HART (comprehensive information on service member health for clinical review and further analysis). In 2007, several questions related to traumatic brain injury were added to the Readiness HART instrument.

During the past ten years, several campaigns aimed at increasing healthy behaviors among active duty personnel have been launched (DoD, 2008d), including alcohol abuse awareness (see DoD, undated-g), smoking cessation (see DoD, 2008e), weight management, and fitness (see DoD, 2008f). Neither the safety nor the healthy lifestyles campaign is restricted to the workplace, making the impact of these campaigns on their performance outcomes more difficult to measure and also possibly less likely to be influenced by Secretary of Defense-level directives that hold leaders directly accountable for related outcomes.

Safety and Occupational and Other Employee Health Policy

All of the activities described above are governed by DoD policies. We reviewed these policies to understand how these activities have evolved in DoD and to understand how current activities are organized and managed. This section describes the relevant policy documents. These documents establish policy (DoD directives) and provide implementation guidance (DoD instructions). For example, directives establish goals, assign responsibilities, and set reporting requirements. Memoranda may also serve to direct policy, such as the Secretary of Defense's safety memoranda described in the previous section. These policies are typically implemented by the services and combatant commands, which often publish their own supporting policies and doctrine; this section focuses on OSD-level policies. In brief, this collection of documents is highlighted by an overarching document (DoD, 2005b) that divides responsibility for SOH at a high level in OSD.

Policy Documents Related to SOH

SOH permeates most DoD activities, so many policy documents that may be only peripherally related to SOH often include some language that might affect SOH activities within DoD. These include, for example, documents setting acquisition and facilities management policies. Further, implementation of DoD SOH policies is performed by the services, and the military departments have published their own policy guidance—including both SOH-specific documents and documents in which SOH is mentioned in the context of other operations. Taken together, therefore, the number of OSD and service documents containing SOH guidance in some way is large. Over 50 documents focused on OSD-level policy were reviewed during this study. The overarching policy document is DoD directive 4715.1E, "Environment, Safety, and Occupational Health," issued March 19, 2005, which is described below. Other documents are described in the above section and are included in the time line in Appendix A.⁶

The USD (AT&L) is the proponent for DoD directive 4715.1E (DoD, 2005b). This directive is broad in scope, applying to

pollution prevention, compliance, conservation, restoration, munitions response, safety, occupational health, environmental health, explosives safety, fire and emergency services, pest management, environmental technology, and international activities.

The document defines DoD policy as intending to "protect DoD personnel from accidental death, injury or occupational illness."

⁶ See also the References of this monograph.

Responsibility for SOH-related programs is inherently divided in the OSD and service organizational structures because SOH relates to diverse functions performed by multiple organizations. For example, SOH is an important consideration in acquisition, and it also relies upon the health system for implementation. DoD directive 4715.1E addresses this by defining responsibilities for SOH in different organizations in OSD, recognizing that no single organization is able to exercise sufficient authority over all SOH-related activities. However, this arrangement also means that complementary programs are managed by different organizations, making the coordination of SOH activities a challenge.

In DoD directive 4715.1E, one under secretary (AT&L) is given policy responsibility for SOH: “Provide oversight for DoD ESOH [environmental, safety, and occupational health] programs.” This oversight includes establishing “goals, objectives, guidance and procedures for ESOH aspects of the DoD mission” and establishing a subordinate, the deputy under secretary for installations and environment, as the DoD Designated Agency Safety and Health Official. Further, USD (AT&L) is responsible for issuing “ESOH management asset policy for use by the DoD components in planning, programming, and budgeting, including recommendations concerning the occupational health aspects of the Defense Health Program [DHP].”⁷

The DHP is managed by another under secretary (P&R), who in DoD directive 4715.1E is given responsibility to “[p]rogram, budget, and monitor execution of DHP resources for the occupational health program.” So, at least for occupational health, USD (AT&L) sets policy while USD (P&R) manages the relevant program and budget policies. Safety largely remains within the purview of USD (AT&L), except that 4715.1E designates USD (P&R) as the chairman of the DSOC, a mechanism intended to promote coordination at a high level in OSD.

Policy Documents Related to Health Promotion and Wellness

Since 1996, several memoranda related to health promotion and wellness policy have been issued by the ASD (HA). The first of these was issued in 1996 to establish the HEAR instrument as the standard for collecting health data on all TRICARE enrollees (DoD, 1996c). In 1998, policy was issued related to improving the delivery of clinical preventive services by implementing the Put Prevention into Practice program in all MTFs around the world. This memorandum specified using the HEAR instrument annually for all TRICARE Prime enrollees, including active duty personnel (DoD, 1998d). Further guidance was issued in 1999 that ended the requirement of annual completion of the HEAR instrument, but mandated the completion of HEAR at the time of enrollment in TRICARE Prime (DoD, 1999b). In 2003, the requirement for a TRICARE enrollment assessment was rescinded, so the completion of the HEAR instrument at the time of enrollment into TRICARE Prime was no longer required (DoD, 2003c). In 2005, the name of HEAR was changed to HART, and several variations of the instrument (as described in a section above) were made available through TRICARE Online (DoD, 2005d). In 2006, initial and annual assessments using HART were again mandated for active duty and selected reserve members along with the recommendation that health risks, occupational risks, and preventive needs be identified and managed (DoD, 2006h).

⁷ Note that Defense Agencies and Washington military headquarters are not covered for occupational health in the DHP and were not considered in the scope of this project.

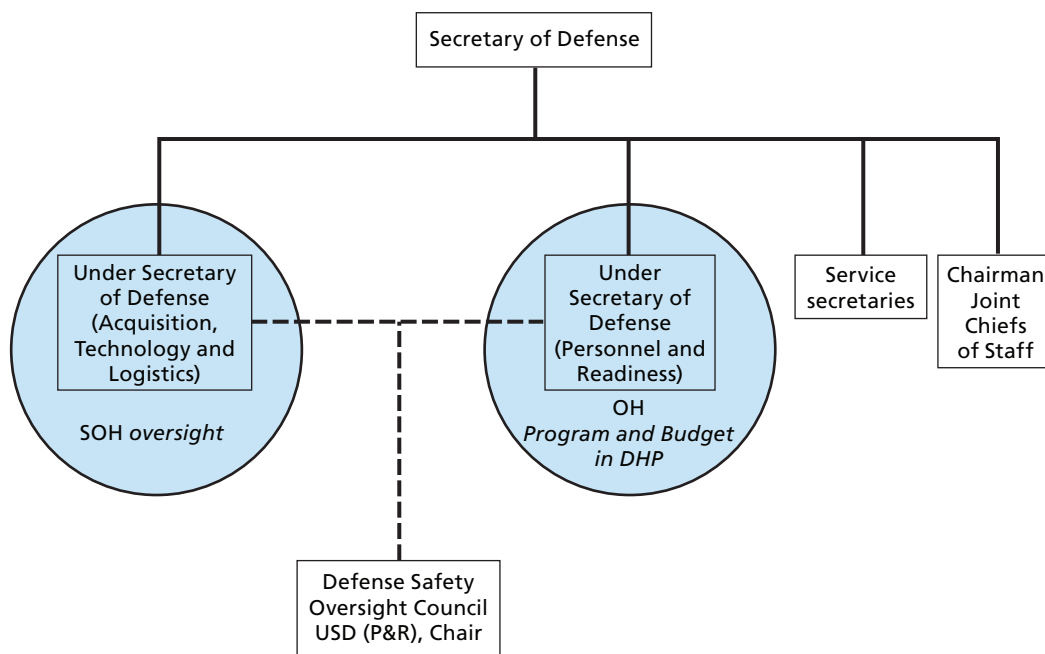
Safety and Occupational Health Organization

Because of the cross-cutting nature of SOH, it is not surprising that responsibility for SOH governance and activities resides in multiple organizations within DoD. This structure has led to what some consider a fragmented system for SOH, presenting guidance challenges for consistent measurement and reporting. At the OSD level, SOH responsibilities are shared by two under secretaries (AT&L and P&R), as shown in Figure 3.1. This figure also shows the DSOC, chaired by the USD (P&R), and the services and joint staff, members of which are responsible by policy for implementation and execution of SOH policy and programs.

To assess the effectiveness of this division of responsibilities, it is useful to understand how this organizational relationship may have evolved. Several DoD officials who were interviewed for the study described the division of policy oversight and funding between the Under Secretaries for AT&L and P&R as an evolution of past responsibilities. That is, safety was traditionally viewed as an installation and acquisition function (which would fall under AT&L), while occupational health was treated as a more traditional medical function (under P&R).

Mirroring (or perhaps slightly ahead of) civilian-sector trends at the time, efforts began in the 1970s to consolidate ESOH efforts. In 1976, in an effort to consolidate these activities, the Secretary of Defense combined ESOH into the Office of the Deputy Assistant Secretary of Defense (ODASD) for Environment and Safety. Another Secretary later included ESOH with explosives, safety, and pest management into ODASD (Environment) (DoD, undated-b). Since then, these offices have become subordinate to USD (AT&L). When the DHP was originated in the 1990s, programming and funding for occupational health aspects of ESOH—

Figure 3.1
Division of SOH Responsibilities in OSD



SOURCE: Based on a chart from the Office of the USD (AT&L).

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being considered medical functions—were included in the DHP, under the purview of the USD (P&R) (DoD Task Force, 2007).

The DoD officials interviewed did not feel that this organization at the OSD level hindered the execution of SOH. However, procedures for formal coordination of documents and decisions between the two USD offices were described as sometimes inconsistent and often lengthy. For example, a significant formal tasking or a request from a subordinate office must travel up to its under secretary, laterally to the other (and sometimes through an even higher office), and then back down through that USD to the working level. In recognition of the importance of coordination given the OSD organizational structure, the DSOC was created to oversee these activities for safety.

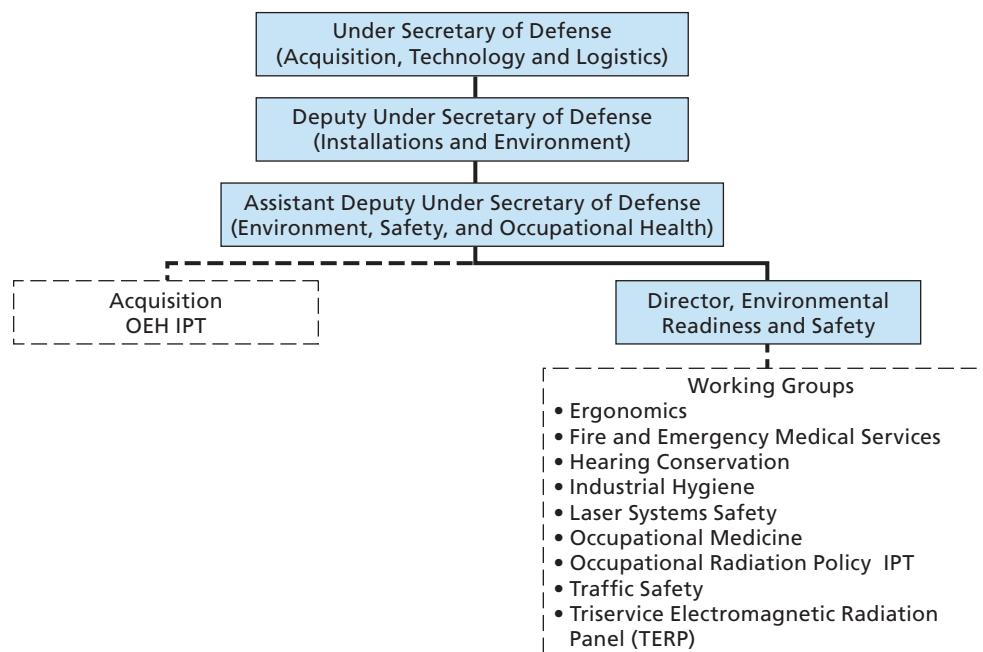
Interview participants described informal coordination among safety and health professionals with common goals that often helped to avoid lengthy formal coordination procedures and ultimately provided guidance and/or policy to those responsible for executing the programs. Such venues for coordination include subject-oriented working groups—approximately ten chartered groups and an unknown number of less formal groups, all of which are typically triservice.

The organization of the offices of USD (AT&L) and USD (P&R) are shown in Figures 3.2 and 3.3, respectively.

Under the USD (AT&L), the Assistant Deputy Under Secretary of Defense for Environment, Safety, and Occupational Health is primarily responsible for most SOH-related policy. Several organizations and teams have been established to support SOH in both the in-garrison

Figure 3.2

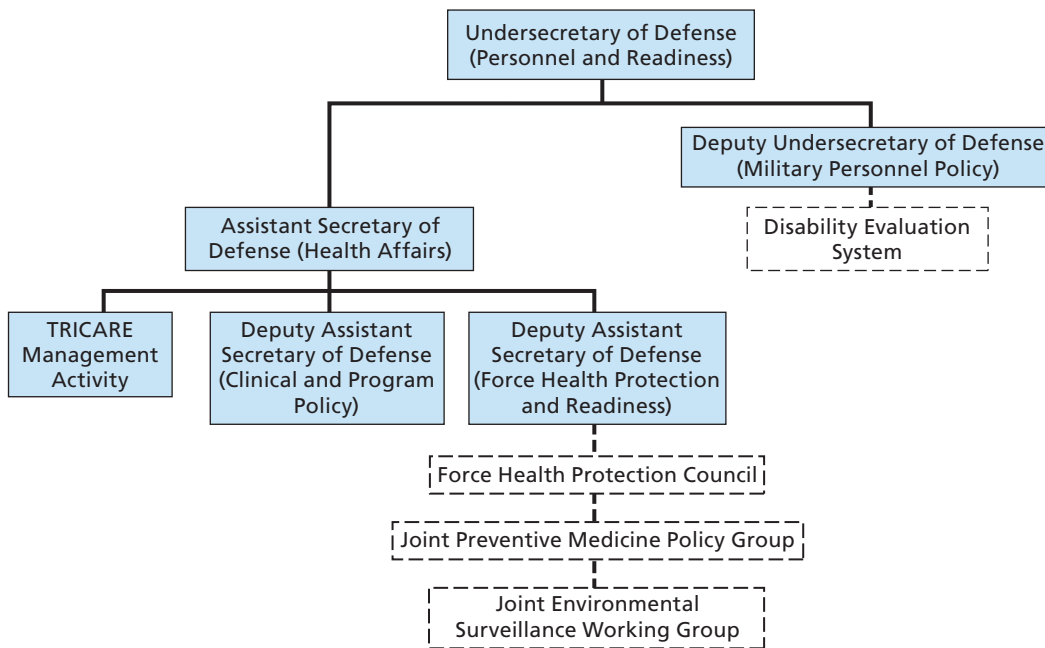
Organization of the Office of the Under Secretary of Defense (Acquisition, Technology and Logistics) for Safety and Occupational Health



SOURCE: Based on a chart from the Office of the USD (AT&L).

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Figure 3.3
Organization of the Office of the Under Secretary of Defense (Personnel and Readiness) for Safety and Occupational Health



SOURCE: Based on a chart from the Office of the USD (AT&L).

RAND MG799-3.3

and deployed settings, including an occupational and environmental health integrated product team (OEI IPT), which considers OEI requirements related to the development and fielding of information management systems. The OEI IPT makes recommendations to decisionmaking bodies on the prioritization of functionalities to be developed and fielded in supporting information management systems. A number of working groups have been established. They include subject matter experts from across OSD, the joint staff, and the services.

The Office of the USD (P&R) includes the ASD (HA), who is responsible for administering the DHP. This Assistant Secretary is responsible for both TRICARE, the department's managed health care system, and direct care provided in MTFs. Most health care for active duty personnel is provided through MTFs (e.g., medical centers, hospitals, and clinics); these MTFs are managed by the services and are not shown in these figures (or other figures in this chapter), but they do include some occupational health clinics. As discussed earlier in this chapter, a DASD is responsible for FHP&R, which, in practice, is primarily concerned with deployment health. The DASD for clinical and program policy (C&PP) is particularly responsible for occupational health programs that occur outside of a deployed theater (i.e., in garrison settings). The FHP&R and C&PP offices interact frequently through policy and working groups shown in Figures 3.2 and 3.3, and as necessitated by continuing health care following service members' redeployment. The Deputy USD (Readiness) has some budget and policy responsibility, largely as it relates to injury prevention, and the Deputy USD (Military Personnel Policy) utilizes SOH information at the individual service-member level to inform retention and compensation decisions.

In addition to the multiple offices at the OSD level responsible in some way for SOH, the combatant commands and military departments play a significant role in that they are responsible for implementation and execution of SOH policy. Over time, the services have developed essentially parallel systems for SOH, including, for example, largely separate monitoring, surveillance, and reporting systems and individual service policy guidance.

During discussions with DoD officials, we learned that execution of SOH programs at the service and installation levels relies on SOH methods and metrics that are developed independently by each service and rely on separate systems and procedures; although there are some recent efforts to coordinate metrics including, for example, the Defense Safety Enterprise System (see Chapter Four). For example, the services conduct baseline audiograms at different times, either at the start of initial training or not until the service member arrives at his or her first permanent duty station. Most officials remarked that, because of service differences (i.e., a service may have an occupation or use equipment that differs from the other services), this orientation best suits individual service needs. The organization of SOH in the services is also different, ranging from more to less centralized. As described in the following sections, the Army and Navy organizations generally mirror that of OSD, with safety and medical organizations separated, aligning the former with installation and environment offices and the latter within the MHS (medical commands). The Air Force is somewhat different, in that its medical units fall under line (wing) commanders at the installation level, unlike the Army and Navy. However, like the other services, the highest-level Air Force safety office is distinct from the MHS. Safety offices appear to have become more prominent in recent years, given the DoD's recent focus on safety goals as directed by the Secretary of Defense and overseen by the DSOC. Each service's SOH policy and organization is described below.

Army

There are two primary organizations within the Army that have OEH responsibilities, similar to the setup in OSD. The first is the Assistant Secretary of the Army for Installations and Environment (ASA [I&E]), and the second is the Office of the Surgeon General (see Figure 3.4). ASA (I&E) has primary responsibility to integrate DoD directives and policies into Army OEH policies, doctrine, and guidance and to ensure compliance with Army OEH requirements. Further, ASA (I&E) is tasked to "establish goals, policies, priorities, and oversight for Army OEH" (Army, 2007a). ASA (I&E) claims executive agency across DoD for the Defense Occupational Health Program (Army, 2006).

Safety is the responsibility of the Director of Army Safety, who supervises both the U.S. Army Combat Readiness Center and the Army Safety Office (Army, 2007b). In 2005, the Secretary of the Army issued a memorandum that instructed the ASA (I&E) to assess the management of the Army safety program and identify improvements. ASA (I&E) was also tasked to coordinate initiatives from the DSOC and Army agencies, with the goal of establishing SOH performance metrics (Army, 2005). In coordination with the ASA (I&E), the Director of Army Safety has the responsibility to establish policy, guidance, and procedures for implementing the Army Safety Program. Further, the Director of Army Safety is tasked to coordinate with the Surgeon General and the Proponency Office for Preventive Medicine (POPM) for occupational health and occupational safety issues. The short-term Army Safety and Occupational Health Objectives for fiscal year (FY) 2007 were to reduce accident rates by 20 percent from the 2006 rates, and the short-term objectives for FY 2008 were to reduce accident rates again by another 20 percent (Army, 2007e).

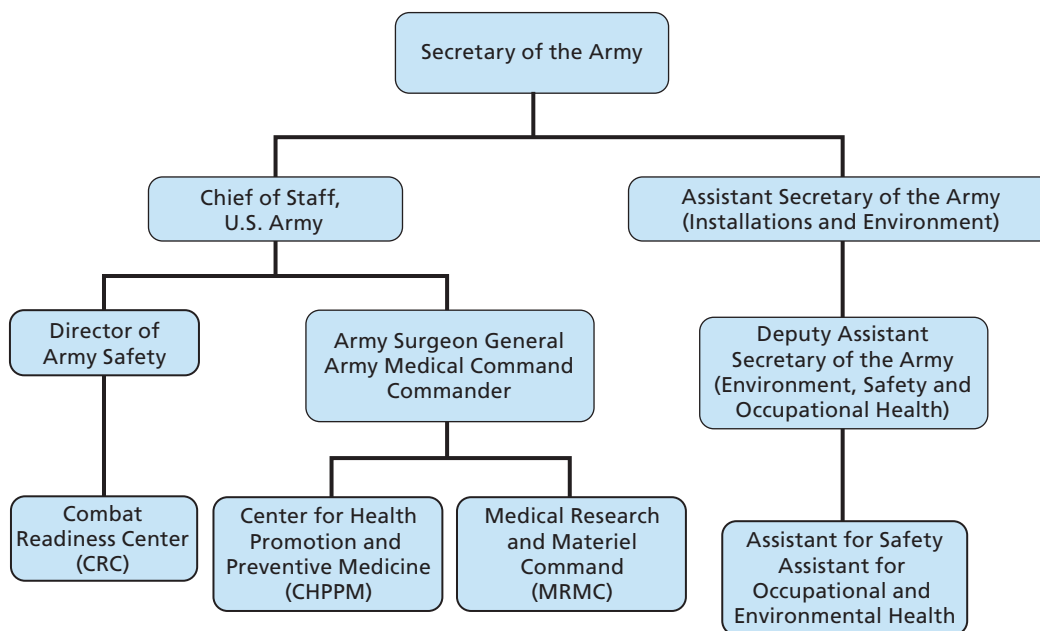
Under the Office of the Surgeon General, there are two agencies with primary responsibility to execute OEH: POPM and the Center for Health Promotion and Preventive Medicine (CHPPM). Two other agencies are responsible for safety within the Army: the Army Safety Office and the U.S. Army Combat Readiness Center (CRC). The organization of SOH in the Army is shown in Figure 3.4.

The Surgeon General's role is to advise the Secretary of the Army and Army Chief of Staff on occupational health issues (Army, 2007c). Further, the Surgeon General is responsible for developing policy for medical care to prevent disability from occupational injuries and illnesses and for executing the medical aspects of the Army's occupational health program (Army, 2007a). The POPM serves as a principal advisor to the Surgeon General, and it establishes policies, standards and regulations (Army, 2007a).

CHPPM's responsibilities include providing support for comprehensive health surveillance for the Army and DoD, including the Defense Occupational and Environmental Health Readiness System (DOEHRS). CHPPM further has responsibility to provide feedback to commanders in their efforts to reduce occupational and environmental health risks and to provide reference lab support for OEH surveillance. Army Regulation 40-5 also directs CHPPM to "partner" with the Director of Army Safety in support of the Army SOH program (Army, 2007a).

Within CHPPM, which is the executive agency for deployment occupational environmental health programs, is the Directorate of Health Risk Management, which oversees the Deployment Environmental Surveillance Program, the Global Threat Assessment Program, and the Deployment Data Archive and Policy Integration program (Kirkpatrick, Moser, et al.,

Figure 3.4
Organization of the Army for Safety and Occupational Health



SOURCE: Based on a chart from the Office of the USD (AT&L).

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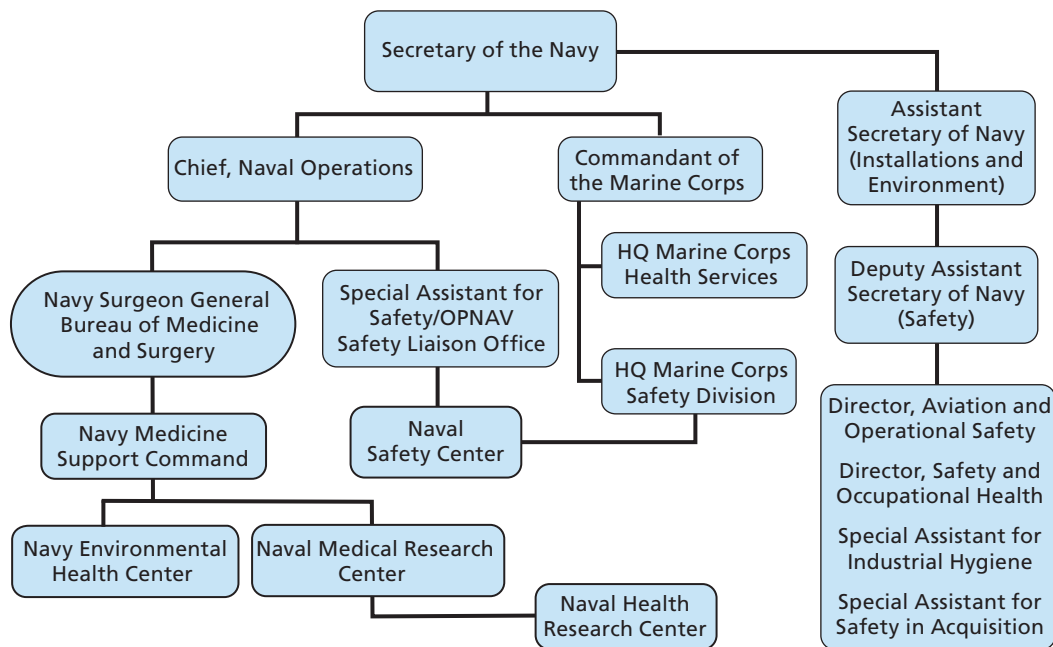
2006). Combined, these three programs have the responsibility to provide complete deployment OEH surveillance and preventive medicine support.

CHPPM has three other directorates that influence occupational and environmental health practice for the Army: the Directorate of Environmental Health Engineering (DEHE), the Directorate of Occupational and Environmental Medicine (DOEM), and the Directorate of Occupational Health Sciences (DOHS) (Army, undated). DEHE has DoD and Army missions to support environmental quality programs. For example, DEHE has programs relating to surface and waste water, air quality, and operational noise. The mission of DOEM is to provide occupational and environmental medical services. DOEM is the functional proponent for the Hearing Conservation Program within DoD and oversees the Defense Occupational and Environmental Health Readiness System–Hearing Conservation (DOEHRS-HC) application and the DOEHRS Data Repository (DOEHRS-DR) (see Chapter Four). DOEM also has an environmental medicine program and an occupational medicine program. DOHS is focused on Army programs relating to ergonomics and industrial hygiene.

Navy and Marine Corps

The Chief of Naval Operations (CNO) has responsibility for implementing the Navy's Safety and Occupational Health Program⁸ and has the additional duty assignment as the Commander, Naval Safety Center. Organization of SOH in the Navy is shown in Figure 3.5. The Navy's Safety and Occupational Health Program has two components: the safety component,

Figure 3.5
Organization of the Navy for Safety and Occupational Health



SOURCE: Based on a chart from the Office of the USD (AT&L).

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⁸ This program also covers the Marine Corps.

which seeks to eliminate or control hazards that can result in acute injury or death; and an occupational component, which seeks control or mitigation of exposure to agents which produce chronic or long-term illness (Navy, 2005).

The Assistant Secretary of the Navy for Installations and Environment is the Designated Agency Safety and Health Official for the Navy and Marine Corps (Navy, 2001). The Commander of the Navy Safety Center is responsible for the functional safety program. The Commander of the Navy Safety Center develops programs and policies, maintains reporting and recording systems, and collects, reports, and analyzes safety data. Operational safety is assigned to four subordinate organizations: the Expeditionary Warfare Division is responsible for parachute, diving, and air drop safety; the Surface Warfare Division is responsible for surface ship safety; the Submarine Warfare Division is responsible for submarines; and the Air Warfare Division is responsible for aviation safety within the Navy and Marine Corps. The Navy also executes a Nuclear Propulsion Safety program, an Explosives Safety program, and a Shore Safety program.

The Navy's Bureau of Medicine (BUMED) provides support to the CNO for all occupational health, occupational medicine, industrial hygiene, and environmental health matters. BUMED is tasked to perform research, development, testing, and evaluation to establish exposure limits in naval-specific environments; maintain data about potentially hazardous exposures; and provide for occupational health surveillance (Navy, 2005). Much of this activity is performed by the Navy Environmental Health Center and the Naval Health Research Center, similar to the functions performed by CHPPM for the Army.

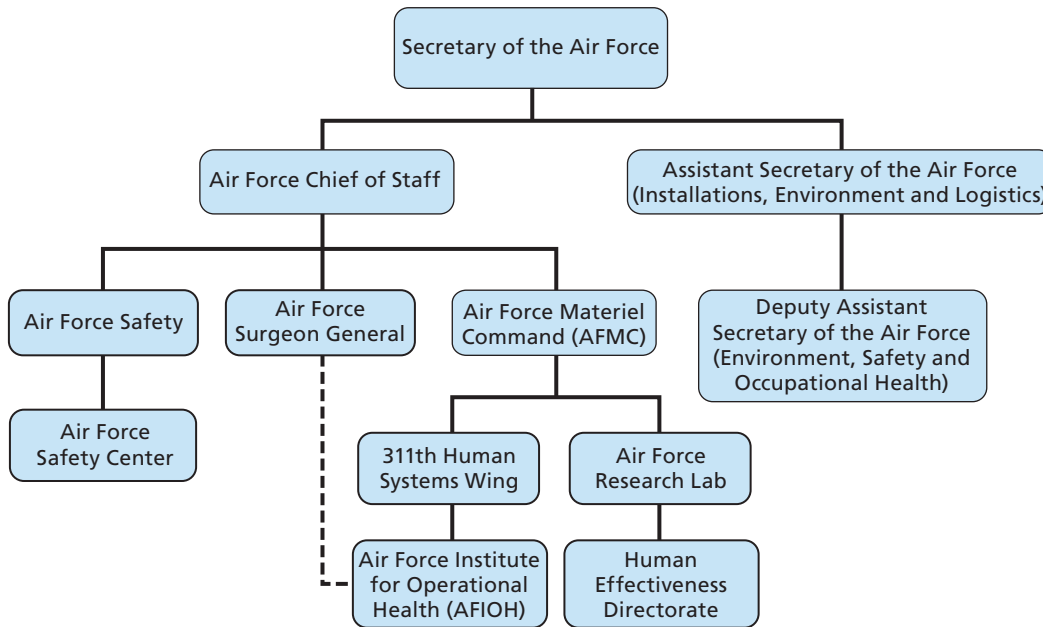
The occupational health component of the SOH program in the Navy is performed by industrial hygiene and occupational and environmental medicine specialists, each having a surveillance program. The Preventive Medicine and Occupational Health Division conducts administration of the occupational health functions for BUMED, and the occupational health and preventive medicine directorate conducts occupational health programs at Navy MTFs (Navy, 2005). BUMED conducts environmental surveillance via the Navy Environmental Health Center (Navy, 2001). Navy doctrine specifies that industrial hygiene and occupational medicine are divisions contained within the occupational health and preventive medicine directorates (Navy, 2005). Further, because the Navy provides occupational health both afloat and ashore, doctrine specifies that military industrial hygienists provide occupational health services to operating forces and to the fleet (i.e., afloat), whereas civilian industrial hygienists are used ashore. In addition, Navy Environmental and Preventive Medicine Units support the occupational health programs for the fleet.

The Navy has also established a Navy and Marine Corps Safety Council to recommend safety improvements to the CNO (Navy, 2005). All Navy regions and activities are also required to establish a safety council.

Air Force

The Office of the Secretary of the Air Force for Installations, Environment, and Logistics provides overall policy guidance for environment, safety, and occupational health programs in the Air Force (Air Force, 2005). The Air Force Surgeon General provides advice to the Air Force Chief of Staff on health issues and generally oversees all medical activities, including coordination with the Deputy Assistant Secretary of the Air Force for Acquisition on SOH matters in weapons acquisition. The organization of SOH in the Air Force is shown in Figure 3.6.

Figure 3.6
Organization of the Air Force for Safety and Occupational Health



SOURCE: Based on a chart from the Office of the USD (AT&L).

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The Deputy Assistant Secretary for Environment, Safety, and Occupational Health has program oversight responsibility for the Air Force's Occupational Safety and Health (AFOSH) programs, including policy direction and oversight, coordinating with other federal agencies, and acting as the primary point of contact within DoD for AFOSH (Air Force, 1996). The Headquarters, Air Force Safety Center has overall execution responsibilities for the AFOSH program. The Air Force Medical Operations Agency has the responsibility to develop policy and provide "occupational and environmental health guidance," that focuses on safety, presumably, given the context of the instruction. The Air Force Medical Operations Agency also develops AFOSH standards, coordinates with other federal agencies and DoD components, and publishes Air Force inputs to the Occupational Safety and Health Annual Report for the Department of Labor.

The Air Force differs from the other services in its medical organization. Its medical system is the most integrated with line command and control (Hosek and Cecchine, 2001). The Chief of Aerospace Medicine at each MTF has the responsibility under Air Force instruction 48-101 (Aerospace Medicine Operations) to serve as the primary installation consultant for occupational medicine, human factors and aviation, ground, space and weapons safety programs, preventive medicine including population health, and risk assessment and risk communication on occupational and environmental health issues (Air Force, 2005). Under Air Force Instruction 48-145, the local Commander of the Aerospace Medicine Squadron (or equivalent) is responsible for executing the occupational health program since the Air Force coordinates its medical efforts with operations at the installation level (Air Force, 2008). This level of coordination of operational and medical activities at the installation level is unique among the services, because the Air Force has greatly integrated its medical system with its line organization.

Additional expertise resides in other Team Aerospace agencies and may be accessed via request by installations. The Air Force Institute for Operational Health provides reach-back expertise on OEH surveillance and analysis, and the 311th Human Systems Wing also has occupational health expertise (U.S. Air Force, 2005, para. 1.2.10.1.2 and 1.2.10.1.4). In some respects, the Air Force Institute for Operational Health may be considered to fill a role similar to those of CHPPM for the Army and the Navy Environmental Health Center/Naval Health Research Center for the Navy.

Finally, each Air Force installation has an Occupational Health Working Group, which draws its membership from bioenvironmental engineering, flight medicine, public health, and aerospace physiology fields. The Occupational Health Working Group provides guidance for the execution of the Air Force's occupational health program at the installation, and it is established by the local Commander of the Aerospace Medicine Squadron (or equivalent) (Air Force, 2008). Each installation also has an Environmental, Safety, and Occupational Health Council that provides oversight and professional input from bioenvironmental engineers and public health personnel on occupational and environmental issues (Air Force, 2005).

Summary and Conclusions

DoD has generally followed national civilian trends in SOH initiatives and the implementation or expansion of new policies and programs over the last several decades, while also recognizing that it faces SOH challenges not encountered in the civilian workplace, such as exposures to uniquely military equipment and operations, which might include chemicals and radiation, and hazardous deployment and combat conditions. Based on its experience following the 1991 Gulf War and more recent emphasis related to current operations in Iraq and Afghanistan, DoD has heightened its SOH focus for deployments in recent years to address what it perceived as shortfalls in previous deployments (DoD, 1997a; DoD, 1997b; Trump, Mazzuchi, et al., 2002).

Since the National Safety Council report was submitted to DoD in 2001, senior leadership attention has increased its focus on safety. One effect of the safety focus has been to elevate safety offices to high levels in the services, distinct from occupational health-related organizations (see Figures 3.4, 3.5, and 3.6). DoD has also been active in promoting wellness activities. However, if the focused safety effort in DoD achieves its goals, experiences from increased safety activities may provide a road map for how to make similar progress in other areas of employee health within DoD.

The cross-cutting nature of SOH and the organization of OSD and the services have resulted in SOH policies that recognize shared responsibilities among various organizations. DoD and the services have made efforts to increase coordination among these organizations, mainly through management councils and working groups. However, the services have exercised broad latitude over their SOH programs, promulgating their own guidance and practices within DoD's overarching policy and developing SOH organizations and approaches largely independently—resulting in parallel systems across DoD that do not have consistent reporting (GAO, 2007a).

In conclusion, while there may be many areas of SOH excellence throughout DoD, the current policy and organizational landscape suggest that an integrated employee health system, in which standardized procedures, metrics, and reporting exist across services, could not be

achieved in the current organization without significant efforts to cut across organizational boundaries.

DoD Information Technology Systems Related to Safety and Occupational Health

In this chapter, we address information technology (IT) systems in DoD and how they relate to an integrated employee health system. IT systems are considered an essential part of an integrated system because they provide leadership for an organization, with a standard set of information to be used in managing the health of the workforce and the work environment and making related decisions (IOM, 2005). Data and information from an integrated employee health system can serve several purposes, including providing information on program utilization and effectiveness, addressing accountability for the program's performance, improving the program, and reevaluating following changes in the program (Edington, 2001).

In this chapter, we describe general IT requirements for an integrated employee health system. We then examine the most relevant IT systems within DoD, discuss their potential for supporting employee health integration efforts, and identify gaps in the current IT systems that integration would need to address.

IT Requirements in an Integrated Employee Health System

Data related to employee health can be used for a wide variety of purposes in an organization (Goetzel, 2005). Measurement and analysis of such data can address various questions that might be raised within an organization (Edington, 2001; IOM, 2005). Categories of activities that would be supported by measurement and data analysis might include the following:

- *Decisionmaking*: accurate and reliable data can inform decisions about health care and readiness.
- *Accountability*: a standardized set of measures can provide a mechanism for evaluating program success.
- *Improvement*: data collection and analysis can assist by identifying areas in need of improvement, facilitating the implementation of improvement efforts, and evaluating the effect of the improvement initiatives.
- *Surveillance and other analyses*: IT systems can support organizational activities related to ongoing monitoring of employee health, answering specific questions related to the health of employees, and broad-based information about the health of employees (Solberg, Mosser et al., 1997; Edington, 2001; IOM, 2005).

Data on employee health can be used and reported at several levels of aggregation, ranging from the individual service member to the entire DoD workforce (IOM, 2005). Data on individuals and small groups of service members can be useful to clinicians for treatment purposes, other health care professionals for intervention programs, and commanders for readiness assessment. Data on groups of service members can also be used for post-deployment health studies. Reporting of measures at the clinician or MTF level can be used for quality reporting for accountability purposes. Data analyzed for installations can be used to assess the need for health promotion interventions (e.g., smoking cessation programs). Comparison of standardized measures across the services and at the DoD-level can be used to assess how the services compare to each other and to external benchmarks.

These types of analyses require, at a minimum, the following general categories of data:

- medical care
- pharmacy utilization
- indicators of productivity (disability and leave [short-term disability, family medical, and sick leave])
- health behaviors and other risk factors
- quality-of-life measures
- occupational and environmental monitoring (in garrison and during deployment)
- participation in health management programs (disease management and health promotion and wellness)
- location of individual service members (in garrison and during deployment)
- workforce/workplace characteristics (e.g., demographics and occupation).

To facilitate data analysis, a standardized set of these data elements would be made available in a centralized data warehouse. Analysts at each local medical facility would have the ability to access their local data through the warehouse. Furthermore, the data warehouse should allow analysts to aggregate data to various levels, as outlined above.

In an effort to evaluate the current capability of DoD's IT systems within the MHS, we compiled information about a number of triservice IT systems related to employee health.

Organization of Information Management and Information Technology Within the Military Health System

Through the MHS, DoD provides health care services to more than nine million beneficiaries, including active duty personnel, some reserve personnel, retirees, and their families. The medical care utilized by these beneficiaries within the MHS produces a large volume of information as well as complex information technology requirements for managing and storing this information. These requirements, including system design and purchase and distribution of software and hardware, are addressed by the MHS Information Management and Information Technology (IM/IT) Program located in the Office of the ASD (HA) under the TRICARE Management Activity (TMA) (DoD, 2007h).

The Joint Medical Information Systems Office, located within the MHS IM/IT Program, is responsible for all stages in the development of medical information systems, from design through deployment. Six program management offices (PMOs) are located within the Joint

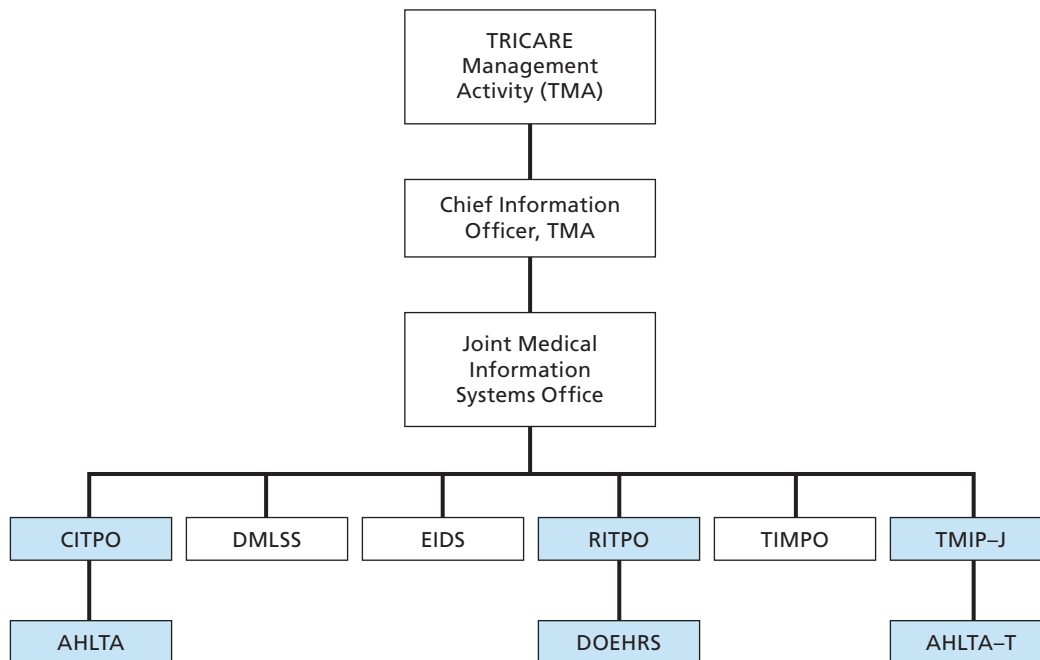
Medical Information Systems Office, each of which is responsible for several IT systems critical for the operation of the MHS (see Figure 4.1). The six PMOs are

- Clinical Information Technology Program Office (CITPO)
- Defense Medical Logistics Standard Support (DMLSS)
- Executive Information Decision Support (EIDS)
- Resources Information Technology Program Office (RITPO)
- Theater Medical Information Program–Joint (TMIP-J)
- Triservice Infrastructure Management Program Office (TIMPO).

Three of these PMOs—CITPO, RITPO, and TMIP-J—are of particular interest to the current study because they are responsible for IT systems that support functions related to employee health. The first PMO of interest, CITPO, is responsible for MHS IT systems that support functions related to patient encounters with providers and “population health, medical surveillance, clinical decision support, and force health protection” of deployed military personnel (DoD, 2007b). Among the systems supported by CITPO is AHLTA¹: the electronic health record system that is discussed in more detail later in this chapter.

RITPO, the second PMO of interest, is responsible for MHS IT systems related to the “business management of the Military Health System” (DoD, 2007c).

Figure 4.1
Program Management Offices Located Within the Joint Medical Information Systems Office



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¹ AHLTA originally stood for Armed Forces Health Longitudinal Technology Application, but at the time this monograph was written, DoD did not identify AHLTA as an abbreviation.

Among the major IT systems under RITPO is DOEHRS, which refers to two systems, DOEHRS-HC (Hearing Conservation) and DOEHRS-IH (Industrial Hygiene), and a module under DOEHRS-IH called DOEHRS-EH (Environmental Health).

The third PMO of interest is TMIP-J, which supports MHS IT systems related to provision of health care during deployment, including the following:

- *AHLTA Mobile (AHLTA-M)*: a handheld tool that captures medical treatment data and provides resources to medical personnel (discussed below)
- *AHLTA Theater (AHLTA-T)*: a system that supports the electronic health record used in theater (discussed below)
- *Joint Medical Workstation (JMeWS)*: a system that provides information related to “medical situational awareness” for use by medical personnel
- *U.S. Transportation Command Regulating and Command & Control Evacuation System (TRAC2ES)*: a system for tracking patients leaving the theater by aero-evacuation
- *Joint Patient Tracking Application (JPTA)*: a system that tracks patients once they reach a level-two medical facility² (DoD, 2007q).

The systems in the CITPO, RITPO, and TMIP-J PMOs are in general large and support triservice functions in a standardized manner. They represent the main IT systems used to support the provision of health care services to MHS beneficiaries. Table 4.1 lists the main categories of data elements needed for an integrated employee health system (as discussed above) and, for each type of data, the IT system within DoD in which these data reside. Below, we describe several of these IT systems in more detail.

It should be noted that since the research was completed for this monograph, the program offices that provide information technology support to DoD’s MHS have been reorganized. The two newly formed organizations under the Chief Information Officer of the Military Health System are the Defense Health Information Management System (DHIMS) and the Defense Health Services Systems (DHSS) (DoD, 2008a; DoD, undated-e; DoD, undated-f). DHIMS now combines the functions of CITPO and TMIP-J. DMLSS, EIDS, and RITPO have merged to create the DHSS.

IT Systems for Health Care Data (in Garrison)

Since the 1991 Gulf War, DoD has made major progress toward creating a longitudinal electronic health record for all active duty service members. This system was developed in part based on the authority of the policies discussed in Chapter Three. It was also a natural outgrowth of the movement toward an electronic health record in many medical care systems in the United States. AHLTA is the name of DoD’s Internet-based electronic health record (EHR)

² “Medical treatment during a military contingency begins with level one care, which consists of basic first aid and emergency care at a unit in the theater of operation. The treatment then moves to a second level of care, where, at an aid station, injured or ill personnel are examined and evaluated to determine their priority for continued movement outside of the theater of operation and to the next (third) level of care. At the third level, injured or ill personnel are treated in a medical installation staffed and equipped for resuscitation, surgery, and postoperative care. Finally, at the fourth level of care, which occurs far from the theater of operation, injured or ill personnel are treated in a hospital staffed and equipped for definitive care” (GAO, 2007b).

Table 4.1
IT Systems Containing Data Essential to Employee Health for Garrison and Deployment

Type of Essential Data	IT System	
	In Garrison	Deployment
Medical care utilization	Outpatient: AHLTA; Standard Ambulatory Data Record (SADR) (M2) Inpatient: CHCS; Standard Inpatient Data Record (SIDR) (M2) Purchased Care Claims Data (M2)	Outpatient: AHLTA-T Inpatient: AHLTA-T
Pharmacy utilization	AHLTA; Pharmacy Data Transcription Service	AHLTA-T
Hearing tests	MEPS (various data systems), DOEHRs-HC, AHLTA	AHLTA-T
Vision exam	MEPS (various), AHLTA	AHLTA-T
Participation in disease management programs	Not in centralized database	Not applicable
Participation in health promotion programs (e.g., smoking cessation)	Not in centralized database	Not applicable
Pre-deployment health assessment, post-deployment health assessment, and post-deployment health reassessment	DMSS	Not applicable
Disability	Current: Personnel Data Repository (DMDC) Future: Defense Integrated Military Human Resources System (DIMHRS)	Not applicable
Leave, temporary duty, deployment	Current: Personnel Data Repository (DMDC) Future: DIMHRS	Current: Personnel Data Repository (DMDC) Future: DIMHRS
Quality-of-life indicators	DMSS (in Post-Deployment Health Reassessment)	Not applicable
Occupational and environmental exposures	AHLTA	AHLTA
Area occupational and environmental monitoring data	DOEHRs-IH, CHPPM (Army), SAMS (Navy), GEMS (Air Force)	DOEHRs-EH, CHPPM, (Army), SAMS (Navy), GEMS (Air Force)
Individual location	Current: Archived at DMDC; collected by services Future: DIMHRS	Current: C2PC (unit), JPERSTAT (unit), DTAS (individual-Army only) Future: DIMHRS
Job title	Current: Personnel Data Repository (DMDC) Future: DIMHRS	Current: Personnel Data Repository (DMDC) Future: DIMHRS
Demographics	Current: Personnel Data Repository (DMDC) Future: DIMHRS	Current: Personnel Data Repository (DMDC) Future: DIMHRS

system. The EHR information in AHLTA is available 24 hours a day, seven days a week through a secure system that can be accessed only by authorized personnel at MTFs worldwide. Implementation of AHLTA (previously known as the Composite Health Care System [CHCS] II) began in January 2004 (DoD, 2007d).

By December 2006, information on outpatient encounters was being entered and could be retrieved by the 55,000 MHS care providers at 138 Army, Navy, and Air Force treatment facilities in the United States and in other countries. Information on the health of an individual service member is available to authorized users of AHLTA at the point of care, regardless of where the service member was previously seen by a provider (MHS Conference, 2007). When an EHR is created for a service member, up to two years of their medical history (including laboratory, anatomic pathology, pharmacy, and radiology data) is entered into the EHR from MHS legacy systems (DoD, 2007d; DoD, 2007e). In 2007, AHLTA supported 2.2 million prescriptions, 642,400 outpatient encounters, 102,900 dental procedures, 19,600 inpatient admissions, and 2,100 births for service members, retirees, and their families in one week (DoD, 2007e).

The AHLTA system is intended to provide the following (DoD, 2007b):

- encounter documentation and coding
- problem list generation
- order entry
- results retrieval
- consult tracking
- allergies warning
- medical alerts
- immunization documentation
- wellness reminders
- self-reporting tools.

As of 2007, AHLTA (Version 3.3) was premarket, conditionally certified by the Certification Commission for Healthcare Information Technology (CCHIT), and met CCHIT ambulatory EHR criteria for 2006. This is one step away from full certification, which would come when operational use at a physician office site has been verified. As a CCHIT-certified product, AHLTA has met all of the criteria for functionality, interoperability, and security (DoD, 2007k).

The AHLTA functions related to providing health care are being deployed in four phases, each referred to as a block (MHS Conference, 2007). Block 1 deployment, which was completed in January 2007, consists of all information related to ambulatory encounters (i.e., outpatient care).³ Implementation of Blocks 2–4 will incorporate functions (i.e., order entry and results retrieval) from legacy system ancillary services (laboratory, pharmacy, and radiology), inpatient documentation, and interface exchange with other MHS information support systems (DoD, 2007d).

The AHLTA Dental module was pilot-tested from May to July 2007 at MTFs in all three services. This will mark the first time that medical and dental information have been combined

³ Information related to outpatient care in Block 1 includes visit information, immunizations, orders and results, alerts, reminders, clinical practice guidelines, and security information (DoD, 2007d).

into one EHR (DoD, 2007s). When all these functions have been implemented, the record in AHLTA for each beneficiary will contain information on all types of health care delivered by the MHS.

Much of the medical record information entered at an installation is stored in a clinical data repository (CDR) that is available electronically to authorized users at any other installation where AHLTA has been deployed. Thus, if a service member receives medical care at one installation and later is seen by a health care provider at another installation, his or her record from the first encounter is available through AHLTA to the second provider (DoD, 2007d), and the second provider can input information to the same record. All outpatient encounter data at facilities using AHLTA flow into the CDR. Data in the CDR are stored so that the complete record of any individual patient can be accessed easily by a provider. Health care providers in a theater of operations, however, cannot access medical record information from the AHLTA CDR because of security and bandwidth constraints (Bigelow, Harris, and Hillestad, 2008).

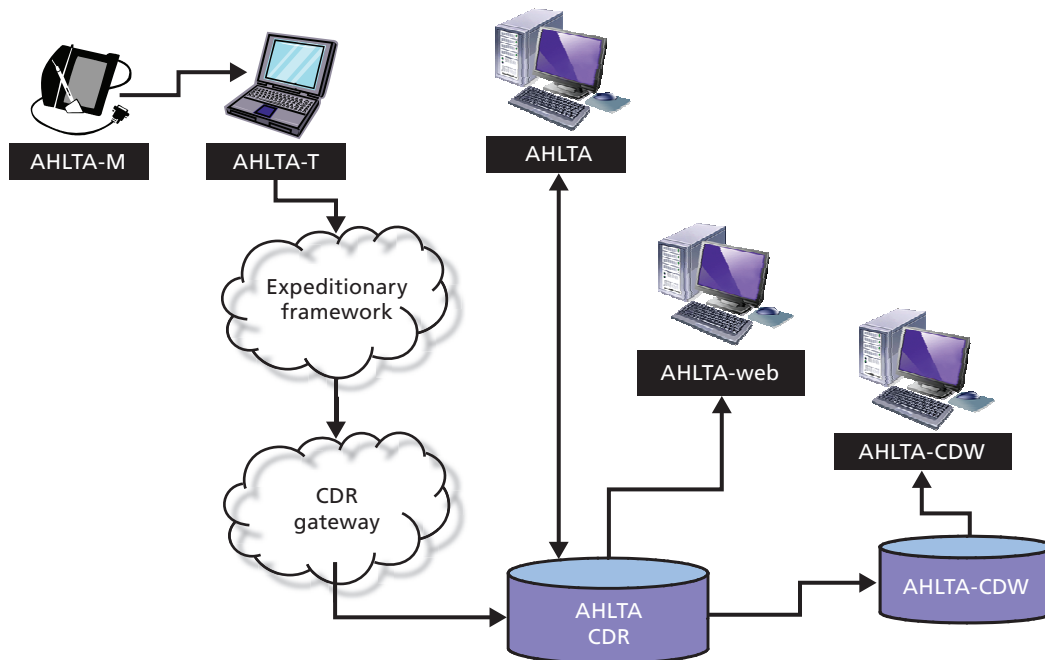
AHLTA patient records are not stored in a format that is compatible with analytic needs, such as selecting data for a large number of patients, to be analyzed and aggregated using statistical methods. To address these issues, the data in the CDR are copied into a clinical data mart (CDM), which stores the data in a format more appropriate for analysis (Bigelow, Harris, and Hillestad, 2008). Although CDM was operational as of December 2006, many types of analyses were still not possible. Future plans for AHLTA also include a clinical data warehouse (CDW) that will facilitate access to a richer array of data elements than the MHS Data Repository or the MHS Mart (M2) (i.e., the current systems for linking patient data from multiple databases) allows. The planned CDW would allow users to access the AHLTA CDR data and link them with other military data (e.g., eligibility data and pre- and post-deployment health assessment survey data). A system such as this would facilitate more complicated and informative analyses that would not be possible with only the AHLTA data available from the CDM (Bigelow, Harris, and Hillestad, 2008). The relationship of these components of the AHLTA information network is shown in Figure 4.2.

In February 2007, DoD announced that it will work with Microsoft Corporation, Hewlett-Packard, and Intel to develop a prototype CDW that will allow easy access and analysis of health data currently stored in the AHLTA CDR. One objective of this work will be to design a CDW system that will not slow the performance of the CDR. The ability to analyze AHLTA data will enable DoD to design more effective force health protection and health promotion activities for preventing illness and injury among service members, both while at home and deployed (DoD, 2007j). AHLTA is the largest EHR system in the world to employ structured documentation to collect patient health care information in structured fields (rather than “free-text notes”), making computer analysis possible. Plans for the new CDW include allowing standardized queries of interest to clinicians and analysts. In addition, the proposed CDW will facilitate medical surveillance, ad hoc studies of relationships between health outcomes and patient risk factors, and projections of needs for clinical manpower (DoD, 2007j).

IT Systems for Periodic Health Assessment Forms

DoD directive 6200.4 (DoD, 2004a) on force health protection enjoins all components within the department to “provide health assessments and wellness interventions to all military per-

Figure 4.2
DoD AHLTA Information Network



SOURCE: Based on a diagram from the Office of the Military Health System Chief Information Officer, January 2007.

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sonnel,” including “pre- and post-deployment health assessments.” These self-administered questionnaires, together with a mandatory face-to-face screening with a trained health care provider, are designed to capture data on the service member’s health status shortly before deployment and at two points in time following redeployment.

The pre-deployment health assessment form (DD Form 2795) is a questionnaire about general health that all deployed personnel (Active and Reserve components) are required to complete within the 30 days before deployment. The form allows the service member to record health concerns and health care providers to diagnose and treat medical conditions before, during, and after deployment. Copies of the completed forms are sent to the DMSS at the Army Medical Surveillance Activity (DoD, 2003a).

The post-deployment health assessment form (DD Form 2796) is a questionnaire about health status that all redeploying personnel (Active and Reserve components and DoD civilians) are required to complete at some time between the 30 days before and the 30 days after redeployment. These forms are completed electronically or in a Web-enabled format and are sent electronically to the DMSS at the Army Medical Surveillance Activity (DoD, 2008b).

The post-deployment health reassessment form (DD Form 2900) is a questionnaire about health. All deployed personnel (Active and Reserve components and DoD civilians) must be offered the opportunity to complete the form between 90 and 180 days (120–150 days preferred) after returning to home station following a deployment. The reassessment is scheduled for completion before the end of 180 days after return to allow Reserve members the option of treatment using their TRICARE health benefit. The form allows the service member to record

health concerns that have occurred since the service member's most recent deployment. These forms are also completed electronically or in a Web-enabled format and are sent electronically to the DMSS at the Army Medical Surveillance Activity (DoD, 2008c).

IT Systems for Health Care Data During Deployment

As described above, the TMIP-J PMO supports a suite of software, also referred to as TMIP-J, designed to assist deployed medical personnel in all aspects of patient care in theater. Starting in November 2005, health care providers in theater began sending records generated during medical encounters to the AHLTA CDR, where they are appended to the member's existing EHR (DoD, 2007m; MHS Conference, 2007). As of April 2007, the TMIP-J software was being used in several theater settings according to a DoD press release: "by the Marine Corps in Operation Iraqi Freedom, the Air Force in Balad and Bagram hospitals, the Navy in Kuwait and the Army in more than 100 units, including 50 medical units and 12 combat support hospitals" (DoD, 2007l). Before TMIP-J was introduced, tracking medical information in theater was difficult. Historically, during deployment, service members' medical records were hand-written paper files that would frequently not follow the patient from one level of care to the next—and were generally not available to the rest of the MHS until the medical unit creating the record redeployed from the theater. Without the medical record, medical providers would not know what care and prescriptions the patient had received, or the patient's exposures, to the extent they are included in the medical record (DoD, undated-d).

The first responder in the field captures clinical data on AHLTA-M, a handheld device that stores medical data until they can be downloaded to AHLTA-T, which is the laptop application used in deployable MTFs that documents outpatient encounters and transmits the data through a theater data repository (Theater Medical Data Store, or TMDS) to the AHLTA CDR (see Figure 4.2). AHLTA-T outpatient encounter data can be viewed through TMDS and AHLTA while inpatient encounters and other ancillary care can be viewed through the TMDS application (Wounded Warrior Commission, 2007). As of November 2007, the U.S. Army and the U.S. Marine Corps were using AHLTA-M and AHLTA-T in Iraq, Kuwait, and Afghanistan (DoD, undated-c). Other programs in the TMIP-J software suite track the patient's location and the location of expensive medical equipment (DoD, 2007q). One of these, JMeWS, is a Web-based medical surveillance tool run on a classified network (Army, 2007d). JMeWS provides medical surveillance information in charts, tables, and maps to medical providers and commanders for a particular location and time period. JMeWS also provides information about MTFs regarding the availability of equipment, personnel, supplies, and blood supplies, allowing MTFs to reallocate resources as needed.

IT Systems for Occupational and Environmental Exposures

The overall goal of DOEHRS is to provide a single integrated system for collecting, storing, and analyzing occupational and environmental exposure data in the field for all relevant DoD personnel. The long-term goal of the system is to create a longitudinal exposure record for each service member in all services (Hagen, 2007). DOEHRS includes two data collection and reporting systems: DOEHRS-HC and DOEHRS-IH, and a module under DOEHRS-

IH called DOEHRS-EH (DoD, 2007n). RITPO of the Office of the ASD (HA) oversees the development of and provides the funding for DOEHRS (DoD, 2007n).

The first DOEHRS system, DOEHRS-HC, is a triservice system designed to “provide noise exposure surveillance; diagnostic evaluation and management of auditory pathology, hearing loss and injury referrals; auditory readiness documentation; and documentation of medical outcomes” (DoD, 2007n). DOEHRS-HC was first deployed in 1998. As of September 2007, the system was being used by more than 1,600 users at over 800 sites, including 628 DoD hospitals and clinics, 18 mobile health vans, 30 ships, 54 Army National Guard units, 99 Air Force Guard and Reserve units, and other sites (Monk, 2007).⁴ Using commercial off-the-shelf equipment, audiologists in the services conduct hearing tests for all military and civilian personnel, and foreign nationals who fall under the hearing conservation program (DoD, 2007g). The test results are stored in the DOEHRS-HC database, which is programmed to perform standard audiometric calculations and to generate a clinical interpretation of the results. Through the Web-based DOEHRS Data Repository, standard and ad hoc reports can be generated on individual service members for clinicians, on groups for commanders, and at the population level for the hearing conservation program and for purposes of policy decisionmaking. Upon request, audiometric data can be transferred from the DOEHRS-HC data repository to the services and other organizations (e.g., major commands) for analytic purposes (Monk, 2007). Hearing test results conducted through the DOEHRS-HC system are not incorporated into the service member’s electronic health record on a routine basis. In addition, audiometric data from the hearing tests as well as data from other parts of the pre-employment physical examination conducted at MEPS at the time of accession are not captured by DOEHRS-HC and AHLTA.

The second DOEHRS system, DOEHRS-IH, is a Web-based tool designed “to collect, store, manage, report, and analyze occupational and environmental health (OEH) hazard information” (Wisniewski, 2007). DOEHRS-IH focuses on occupational exposures to potentially hazardous substances in military workplaces in garrison by collecting and testing air, water, and soil samples (Wisniewski, 2007). The goal of DOEHRS-IH is to create longitudinal exposure records containing a history of pre-deployment, deployment, and post-deployment exposure. Such records would provide a baseline to facilitate post-deployment follow-up (DoD, 2007g). The system has the capability to collect data on a mobile basis using computer tablets that are not connected to the DOEHRS network. After the industrial hygiene data are collected and processed, the data are uploaded when the tablet is next connected to the network. Civilian staff members employed under the DOEHRS-IH contract support the collection of data and related decisions by industrial hygienists and environmental health specialists at these sites (DoD, 2007c; Wisniewski, 2007).

The design of the DOEHRS-IH system is based on the DoD industrial hygiene (IH) Exposure Assessment Model, which was developed by the DoD Industrial Hygiene Working Group (DoD, 2000a). The model incorporates concepts from the American Industrial Hygiene Association’s Strategy for Assessing and Managing Occupational Exposures, which the working group felt to be a best-practices guideline. The operational portion of DOEHRS-IH involves several functions. First, the DOEHRS-IH staff identifies the organizations within

⁴ Other sites include, for example, battalion aid stations, basic training sites, and other government agencies such as the National Security Agency, the National Aeronautics and Space Administration, and North Atlantic Treaty Organization clinics.

DoD that will be supported. The staff characterizes each workplace to be tested in terms of “processes, personnel, equipment, hazardous materials, controls, and potential hazards” (DoD, 2000a). They then establish similar exposure groups (SEGs) that aggregate processes and personnel according to similar exposures. Based on this information, a plan is developed for assessing the exposures in the workplace. Then samples are collected using several techniques (e.g., air, noise, swipe/wipe, and direct reading), and results are interpreted using statistical analysis to assess the level of exposure. For levels that exceed occupational exposure limits, DOEHRS-IH recommends methods for controlling exposures and conducting medical surveillance. The basic design and requirements of the Exposure Assessment Model have been incorporated in the current version of DOEHRS-IH (DoD, 2005a). DOEHRS-IH is capable of generating a variety of reports, including worker exposure histories, workplace monitoring, and SEG reports (DoD, 2005a). As of November 2007, DOEHRS-IH had been deployed to all continental U.S. Army installations. According to DOEHRS-IH personnel, testing was scheduled to begin at two Air Force sites by the end of 2007 (Wisniewski, 2007).

Occupational and environmental health surveillance (OEHS) in the deployed environment is the focus of a module under DOEHRS-IH, DOEHRS-EH. As of late 2007, DOEHRS-EH was under development, but once it is deployed, it will support theater environmental health operations. Soil, water, and air samples are collected routinely from sites where U.S. forces are deployed (Heller, undated). The plans for DOEHRS-EH include conducting deployment surveys to assess base camp conditions, including food service and water production. Other functions will include collecting air, water, and soil samples and comparing results to military exposure guidelines (Wisniewski, 2007).

IT Systems for Troop Location

OEHS data collected by the services do not include the location of individual members during deployment, which would be needed to identify their exposures. However, because these location data are classified, they might not be available to all interested users for at least some deployed military personnel. Several troop tracking systems might have potential for data on individual location during deployment (Heller, undated). The systems include the Command and Control Personal Computer (C2PC), Joint Personnel Statistics (JPERSTAT), and Deployed Theater Accountability Software (DTAS). However, C2PC and JPERSTAT provide deployment location data only at the unit level, not for individual service members. In the absence of data on location for individual service members, however, unit location might be considered a surrogate for individual location. DTAS is a stand-alone Army system that can track individual service members over time to specific locations.

Based on a DoD instruction, “daily location[s] of deployed personnel” collected during deployment are supposed to be archived at the Defense Manpower Data Center (DMDC) (DoD, 2006e). However, according to a 2005 GAO report, location data for individuals deployed to Iraq and Afghanistan in 2004–2005 are incomplete (GAO, 2005a). Even if recorded, individual location data are archived at DMDC only if they are classified as SECRET or lower. Individual location data that exceed the SECRET classification can be retained by the combatant

command commander or service component commander until the time at which the records are downgraded to SECRET (DoD, 2006e).^{5,6}

DIMHRS is another possible source of location data in the future. DIMHRS is a data system designed to provide personnel information on service members in all services and all components. Plans for future capabilities of the DIMHRS system include providing the location of individual service members during deployment.⁷ DIMHRS is being developed by the Enterprise Program Management Office for DIMHRS within the Office of the USD (P&R). Each service member has one record in the system regardless of change in duty status or service. DIMHRS was developed to solve problems with delayed pay and delayed access to benefits. Deployment is scheduled for March 2009 for the Army and for the Air Force, Navy, and Marine Corps thereafter (GAO, 2008). DIMHRS will replace more than 90 legacy systems in the Army and Air Force (Browne, undated).

Summary and Conclusions

Information technology could play a key role in efforts to integrate DoD's activities related to employee health. Below we highlight issues that deserve further attention in order to ensure the benefits of IT on employee health are realized.

IT Systems for Health Care Data

Since the 1991 Gulf War, major progress has been made toward creating a longitudinal electronic health record for all active duty service members. However, there are currently limitations to the utility of DoD's EHR (AHLTA) for evaluating safety and occupational health. AHLTA currently documents outpatient encounters and discharge abstracts for hospitalizations and does not contain comprehensive data on inpatient care. Although all outpatient data entered into AHLTA in garrison and in theater become part of a CDR, these data are not available to users for standardized reports, ad hoc queries, or aggregate analyses.⁸ Plans are under way to design a CDW, which would enable users to access data from AHLTA records to use for purposes beyond patient care, such as linkage with other MHS and DoD data systems, including data on eligibility and occupational exposures.

⁵ "DMDC maintains classified data at the SECRET level and below. COCOM [combatant command] commanders or Service component commanders will retain all location records for missions that exceed the SECRET classification. When these records are downgraded to the SECRET level of classification (or lower), they will be transmitted electronically to DMDC for archiving via the Services' system of record" (DoD, 2006e).

⁶ These classification issues could be overcome—and are, in some cases—by designating an appropriate data repository and with support from the combatant commands and the services in reporting operational data. For example, the Army and Marine Corps have undertaken recent initiatives to track individuals via a database. However, participants indicated that the services have not agreed on how environmental data should be collected and reported (e.g., on an area basis versus an individual basis). There are technological solutions being developed for improved individual tracking, but previous concepts, such as electronic medical identification tags, have been rejected on security grounds.

⁷ Personal communication, Norma St. Claire, Director, Joint Requirements and Integration, for the Office of the Under Secretary of Defense for Personnel and Readiness, March 2008.

⁸ CDM is a reporting tool that extracts data from the CDR. However, there are limits on the number of users and the speed of data retrieval due to technical constraints.

IT Systems for Occupational and Environmental Exposures

The DOEHRS-HC system creates, analyzes, and stores hearing test results on a longitudinal record for subgroups of active duty service members considered to be at higher risk of hearing loss in all three services. However, several enhancements of the DOEHRS-HC system would improve the utility of the system. Hearing test results conducted through the DOEHRS-HC system should be incorporated into the service member's electronic health record on a routine basis. In addition, audiometric data from the hearing tests as well as data from other parts of the pre-employment physical examination conducted at MEPS at the time of accession are not, but should be, captured by DOEHRS-HC and AHLTA.

The second system, the DOEHRS-IH system, currently monitors, analyzes, and stores levels of chemical and physical agents in air, water, and soil of the in-garrison work sites of Army personnel. Maximizing the potential of the DOEHRS-IH system would require expanding it to the Air Force and Navy and addressing methodological and data issues, such as the methods used to classify a service member's SEG. In addition, troop location data are needed for linking the exposure data collected for a specific location, both in garrison and in theater, with an individual service member. However, troop location data are classified for theater operations and, therefore, may not be available for assigning individuals to a specific location at a specific point in time.

OEHS in the deployed environment is a module under DOEHRS-IH, called DOEHRS-EH. DOEHRS-EH is currently under development, but once deployed, it will support theater environmental health operations.

Another barrier to linking individual and environmental data is the fact that AHLTA and DOEHRS are being developed and fielded independently of each other. DOEHRS systems are the responsibility of RITPO, while AHLTA is the responsibility of CITPO. Having the two systems located in different program offices might present challenges to the coordination and communication needed during the development and testing of the data sharing and data transfer functions.

In conclusion, there are many possible benefits of linking AHLTA with other MHS and DoD data systems. However, it is not possible to predict what all of the benefits would be, because the exact nature of the linkage would determine how the systems would interact. Therefore, we recommend that before this linkage occurs, DoD should identify the reasons for linking these IT systems and should plan carefully how to maximize the benefit of linking these IT systems.

Civilian Approaches to Integration

In recent years, a number of public and private organizations in the civilian sector have taken steps toward a more integrated approach to SOH. We reviewed civilian models of SOH integration to identify approaches and practices that might be applied to DoD's employee health system. In this chapter, we describe relevant findings from a literature review and from case studies of three civilian organizations. Most of these findings relate to expanding employee health to include health promotion and wellness programs in addition to traditional SOH. Little information was found related to strengthening the linkages between health promotion activities and an occupational health and safety program or integrating employee health data systems. The different concepts of integration were discussed in Chapter One.

Cases and Methods

Our analysis included two tasks: (a) a broad review of the literature in order to identify current developments related to integrated employee health programs, and (b) three case studies designed to detail approaches to integrated employee health programs. The review focused on studies of employers in the United States in the peer-reviewed literature.

We sought civilian organizations with documented experience in the area of integrated employee health programs that had similar characteristics to those of DoD. However, identifying civilian organizations that are comparable to DoD is difficult, given its unique mission and characteristics (e.g., size and number of work sites). Nonetheless, in choosing the three cases, we identified organizations that, like DoD, have

- large and diverse populations
- multiple locations, both domestically and internationally
- a diverse range of job functions
- large-scale field activities, with continuous operations.

Based on these criteria, we selected two private-sector companies (Johnson & Johnson and FedEx) and one government organization (NASA) on which to base the case studies.

- *Johnson & Johnson (J&J)*: J&J is a manufacturer of health care products for consumers, pharmaceuticals, medical devices, and diagnostic markets. It is a relatively decentralized organization with over 250 operating companies producing multiple brands. It employs over 119,500 people in 57 countries (Johnson & Johnson, undated).

- *FedEx*: FedEx specializes in transportation, logistics, e-commerce, and supply chain management services. It has over 894 stations worldwide (668 in the United States), with over 200,000 employees. Its service area includes 220 countries and territories (FedEx, 2007).
- *NASA*: The U.S. National Aeronautics and Space Administration (NASA) is a government agency charged with space exploration, scientific discovery, and aeronautics research. This case provides an example of another public-sector organization seeking to better integrate SOH. NASA was formed in 1959, has 14 sites in ten states and the District of Columbia, and, in 2004, employed 72,881 people, including 18,909 federal employees and 53,972 contractors (IOM, 2005). In 2008, 13 percent of NASA's federal employees were less than 35 years of age and 35 percent were female (NASA, 2008).

These organizations also represent variation in program longevity. J&J is the vanguard example of an integrated employee health system, with activities dating back to the late 1970s. The J&J program's long tenure has permitted fairly extensive program evaluation, much of it appearing in the peer-reviewed literature. FedEx's program is newer, but it has been in place since the early 1990s. While subject to fewer program evaluations, the FedEx case provides useful comparisons to J&J in approaches to executing integration strategies. NASA, by contrast, only recently began its integration efforts and is just beginning the transition from design to actual program practice.

Our case study analysis focused on three stages of the integration process: design, program practice, and outcomes. Each of these is described briefly below.

- *Design*. First, we explored the motivation behind key elements in the effort to integrate SOH. We examined efforts to expand the reach of work-site health and safety programs into the domain of health promotion as well as efforts to improve linkages between those programs.
- *Program practice*. Second, we examined approaches to executing integrated SOH programs, including strategies for implementing them, increasing participation among employees, and continuous quality improvement.
- *Outcomes*. Finally, we examined evidence of the impact of these programs on health status and health- and safety-related costs.

There were several key questions we addressed in conducting our analysis. First, we examined the *designs* of each of the approaches, including the motivations that led to their creation; key program elements; and strategies for maintaining linkages across the elements. We also sought to learn about what these designs look like in actual *program practice*, including strategies for rollout, increasing program uptake, and methods used to continuously improve the approaches. Finally, we reviewed evidence of the programs' effects on *outcomes*, such as health status and costs.

Motivation Behind Integration Efforts

As noted in Chapter One, integration of employee health generally means either bringing activities related to individual-level and population-level health under the umbrella of work-site

health and safety or creating linkages (e.g., IT systems) across employee health activities. However, most efforts to improve employee health in the civilian sector have focused on adding health promotion (i.e., activities, such as smoking cessation, designed to help employees to change their lifestyle to improve their health status) to the list of employee health benefits in the work site. In the 1970s, most SOH programs focused on compliance with the regulations promulgated by the newly formed OSHA, which focused mainly on preventing and mitigating acute injuries and exposures to chemicals and other hazards. Few companies looked beyond traditional occupational health to promote the overall health of their employees with health promotion and disease management activities.

Rising health care costs in the 1970s and 1980s, however, motivated some companies to seek a different strategy. Based on the recognition that the impact of many chronic medical conditions can be reduced through attention to lifestyle, companies began seeking strategies for controlling costs through the promotion of healthy behaviors and lifestyles (Goetzel, Ozminkowski, et al., 2005; Loepke, Taitel, et al., 2007). The emergence of effective treatments for high blood pressure, for instance, provided approaches for preventing costly diseases and conditions (Breslow, Fielding, et al., 1990).

Today, efforts to add health promotion to companies' SOH programs are increasingly common and have received considerable attention in the academic and trade literatures. In addition to J&J and FedEx, other prominent companies pursuing this approach are Dow Chemical, Citibank, DaimlerChrysler, and GlaxoSmithKline. Concerns about employee health and escalating costs figured prominently in the rationale for this type of integration in each of the three case study organizations, discussed in more detail below.

Johnson & Johnson

In 1978, then Chief Executive Officer (CEO) Jim Burke believed that unhealthy behavior, such as smoking, alcohol abuse, and lack of physical activity, was responsible for a large share of the company's ballooning health care costs. Thus, Burke and other J&J managers set out to achieve two goals:

- Make J&J one of the healthiest companies in the world through education and easy access to behavior modification programs and opportunities.
- Implement on-site programs and services to reduce health care costs for the corporation.

Pursuit of these goals resulted in the formation of the Live for Life® (LFL) program in 1978. LFL's mission was to encourage employees to accept responsibility for their own health and well-being by providing them and their families with resources and opportunities that could help them achieve healthier lifestyles (Isaac and Flynn, 2001). The LFL program offered workshops in nutrition, weight management, and blood pressure control. LFL succeeded in reducing hospitalization costs (by one-third compared with similar companies), a decrease in absenteeism, and a 3 to 5 percent reduction in company health care costs. The LFL program transitioned into the Health and Wellness Program (HWP) in 1995. While LFL sought to decrease health care costs by reducing prevalence of unhealthy behavior, HWP placed greater emphasis on health promotion and disease prevention, and it sought to reduce risk factors before they led to disease and disability.

FedEx

The need to increase productivity in a tight labor market with rising health care costs was the driving force behind the creation of the health promotion program at FedEx.¹ Consequently, in 1990, the Human Capital Management (HCM) program was created. HCM is a combination of health promotion, injury prevention, and disability management. Like Johnson & Johnson's HWP, FedEx's HCM was intended to combat high health care costs, but HCM also focuses on increasing productivity and reducing safety hazards.

NASA

NASA's integration program was motivated by the effect of poor health on mission success. However, there was also recognition of the need to tailor an approach to NASA's unique culture and mission. To combat the increase of health risks due to its aging workforce, NASA's Director of Occupational Health requested that the Institute of Medicine prepare a report that would make recommendations to NASA's office of Chief Health and Medical Officer (IOM, 2005). The IOM report (IOM, 2005) came to the following conclusions:

- NASA's occupational health programs did not reflect enough appreciation of the extent to which work-related health and safety conditions are linked to factors outside the direct purview of the workplace.
- Data collection across sites and programs was not integrated, leading to inconsistencies (e.g., data definitions and file formats).
- NASA's approach to SOH led to segregation rather than integration of health programs, leading to redundant treatments, increased costs, and lost opportunities to exploit synergies across programs and sites.
- There was a need for more effective, coordinated, and data-driven health program policy development to support the agency's mission and goals.

Though the three organizations differ in their organizational structure and overall mission, they are similar in their desire to reduce costs and improve employee health through the creation of an integrated system. J&J and FedEx were also motivated by the impact of high health care costs on their bottom line.

Design: Bringing Health Promotion into the Work Site

Having examined the primary motivations behind civilian-sector attempts to integrate health promotion into efforts to improve employee health, we now describe the design of these programs.

Common Elements

There are some common elements of the employee programs in the organizations studied. These include the following:

¹ As described in the award to FedEx of the 2002 C. Everett Koop National Health Award (FedEx, 2002).

- *Health Risk Assessments.* The cornerstone of many integrated programs is the Health Risk Assessment (HRA), which helps provide a common operating picture of health status that can promote coordination among health providers and programs. HRAs usually come in the form of a questionnaire and are used to help identify risk factors related to nutrition, physical activity, smoking, sexual behavior, cholesterol levels, weight, and blood pressure. This tool gives employees the opportunity to understand their health risks, consult with a doctor, and implement lifestyle changes. By creating a new source of data tailored to the company's health care management needs, HRAs can also provide a data source that sidesteps interoperability problems often created by using multiple preexisting data sources. HRA-generated data can be used to track changes, identify companywide risks, evaluate programs, and refine targets and goals.
- *Health Education and Awareness Programs.* The goal of health education and awareness programs is to provide information on health risks and health promotion strategies to employees in the forms of brochures, health fairs, or educational videos. Much of this information is focused on how to improve overall health, but some of the information can be targeted to individual needs based on HRA results.
- *Individualized Interventions.* While health education and awareness programs are generally population focused, interventions can be customized for individuals or small groups—usually high-risk groups. For example, common interventions may include individualized counseling, nutrition plans, and exercise plans.
- *Reassessments.* The success of personalized interventions is determined using reassessments of employee health—usually through repeated administration of HRAs. This provides critical feedback that can be used to assess and improve the effectiveness of interventions.

Specific instances of these elements can be seen in the three case study companies.

Johnson & Johnson

A key goal of J&J's approach is to address disconnects among previously uncoordinated parallel service systems as a way to ease the cross-utilization of resources and, ultimately, reduce costs. Thus, HWP professionals from various disciplines work as teams in addressing the employees' health needs and incorporating them into program design. The programs focus on both health and safety components. Some of the main programs are described below.²

HRAs. The initial step in an employee's involvement in J&J's Live for Life program is completion of HRAs. All employees are encouraged to complete an HRA and are offered monetary incentives (up to \$500 in benefits credits [Ozminkowski, Ling, et al., 2002]) to do so. HRA results are used to target educational and awareness information provided through mailings. Some at particularly high risk receive personalized assessment and education.

Safe Decision for Life. This program serves as a major platform across J&J for promoting personal responsibility for safety at work and at home. It is designed to bring attention to common preventable accidents that can occur at work *and* home by means of awareness campaigns and group interventions followed by reassessments of employee health to gauge the effectiveness of programming. The program was initially focused on hand safety. Currently, the program focuses on both hand safety and fall prevention.

² Personal communication, Dr. Fikry Isaac, medical director, September 21, 2007; and Johnson & Johnson (2007).

Ergonomics. J&J's ergonomics program was initiated in 1995 under the name ERGO to enhance ergonomic awareness, risk management, and injury prevention at the company and individual level. The program involves awareness and education, group intervention, and in some cases personalized intervention during a "Job Fit" analysis. The Job Fit analysis takes into account an employee's job function, age, and potential risk when making recommendations and/or changes.

SAFE Fleet Program. Started in the mid-1990s, this program at J&J seeks to increase the number of employees who drive safely by using education and group- and individual-level interventions. These include hands-on driving experience combined with group and individual training sessions, as well as companywide awareness campaigns.

Healthy People. This J&J program, based on the U.S. Department of Health and Human Services' Healthy People 2010 program, seeks to modify risk factors that pose a significant risk to employees and their families. These include lack of physical activity, smoking, high cholesterol, and high blood pressure. The program works mainly through educational awareness campaigns.

Eat Complete. Program staff at J&J collaborates with cafeteria vendors to provide nutritionally sound food options to all employees.

FedEx

FedEx's human-capital-management approach consists of employee health programs, all of which utilize combinations of risk management, operations, safety, disability, health and wellness, and human resource services. Specific programs are described below.

Safety Above All. This cornerstone program at FedEx is a combination of initiatives, ranging from ensuring that safety is included in corporate strategies and business planning; to providing safety training for everyone from top management to ground-level employees. Under this program, employees form teams to review safety in their work areas, provide solutions to safety issues, and support new hires' transition into safe work practices. This program implements many different design elements, but the two main elements are group intervention and reassessment.

Health and Wellness Centers. To harness the benefits of regular exercise, FedEx provides onsite fitness centers in several of its locations in the United States. In other locations without fitness centers, FedEx offers employees preferred pricing on home fitness equipment or a reduction in membership rates at fitness centers.

Life Works. This program supplements the company's employee assistance programs by improving employee health and quality of life through reduction of stress, work/life support, shift work education, self-care, and employee education and counseling. Life Works has a model in which employees who take (medical) leave can stay connected with work, and it helps them reconnect upon their return. The program also has consultants available 24 hours a day, seven days a week to all FedEx employees. The program seeks to facilitate the employee's ability to focus on work and reduce stress associated with personal issues.

Temporary Return to Work. This program in which employees work up to 70 percent of their full duty capacity encourages and facilitates early return after an injury or illness to help speed the recovery process, to maintain a sense of belonging in the work group, and to allow employees to continue to contribute to the productivity of the company.

NASA

At the time interviews were conducted for this study, NASA was in the process of implementing recommendations from the IOM designed to improve integration in its employee health system (IOM, 2005).³ These recommendations included the following:

- *Creation of NASA's Health Vision.* Make employee health a part of NASA's core mission and goals.
- *Consolidation and Consistency.* Encourage consistency among core occupational health programs, health data collection, impact assessment, and program evaluation.
- *Program Integration.* Incorporate mission-essential elements of integrated health programs in contracting requirements. Develop data-based approaches to policy, planning, programming, budgeting, implementing, operations, evaluations, and management.
- *Manager Education.* Provide education and training to first-line managers and supervisors that focus on the relationship between health and productivity.
- *Health Risk Appraisal.* Implement a basic health risk assessment tool to identify what types of information and programs will be needed.

In the two years since the release of the IOM report, NASA has responded to the recommendations by making changes in the following areas:

- *Data Collection and Consistency.* NASA is in the process of implementing an electronic health record for occupational health encounters and HRA results. This is being done in partnership with the U.S. Department of Health and Human Services Indian Health Service. NASA hopes that the database can be searchable and serve as an epidemiological tool.
- *Health Risk Appraisals.* NASA has offered various HRAs at different sites and is now making efforts to implement a standardized form, similar to one developed by the Mayo Clinic.
- *Standardized Professional Education.* NASA has a few onsite clinics. To ensure that employees receive standardized and current care, physicians and nurses at these clinics are encouraged to attend seminars and workshops, to update their skills, and learn about new technologies.

NASA has made efforts to implement the IOM recommendations. However, NASA officials report that slow progress on program design is the result of challenges in introducing a health focus to a largely safety-focused engineering culture, difficulties in providing uniform access to geographically isolated sites, and inadequate resources.⁴

Other Companies

Table 5.1 shows how the design approaches taken by the three case study organizations compare with some other companies undertaking notable integration strategies. As noted in

³ Personal communication, NASA Health Officer (Dr. Richard Williams) and Worker's Compensation Manager, September 27, 2007.

⁴ Personal communication, NASA Health Officer (Dr. Richard Williams) and Worker's Compensation Manager, September 27, 2007.

Table 5.1
Common Design Elements of Integrated Health Programs

Company Name	HRA	Education and Awareness Campaigns	Onsite Program	Personalized Intervention	Reassessments
Citibank (Goetzel, 2005)	√	√		√	
Daimler-Chrysler (Serxner, Gold, et al., 2003)	√	√	√		√
GlaxoSmithKline (Stave, Muchmore, and Gardner, 2003)	√	√	√		
Dow Chemical Company (Goetzel, Ozminkowski, et al., 2005)	√	√	√		
Johnson & Johnson	√	√	√	√	√
FedEx		√	√	√	
NASA ^a	√	√	√	√	√

NOTE: The shaded rows are case study organizations.

^a If NASA fulfills all of the recommendations from the IOM report (IOM, 2005), its integrated program will include these design elements.

Table 5.1, programs at the three case study organizations are more complete than those in the other companies. All of the other companies use health risk assessments and education/awareness campaigns, and most have some sort of onsite program. Personalized interventions and the use of reassessments of employee health, however, are less common.

Program Practice: Changing Practices Across Multiple Sites

Like DoD, most of the civilian organizations we studied have large numbers of employees working across a large number of sites, both domestic and international. Thus, a common challenge is to develop effective strategies for program practice that align practices across these many sites.

Common Elements

Once again, while there is no one program practice, there are common approaches to integration. These include the following:

- *Central strategy.* A key approach is a health care strategy and message developed and communicated from the central office. Top management is extremely involved in the message, design, and evolution of a program. One example of a central strategy is the alignment of health with the overall business strategy of the organization and communicating its importance in the organization's overall mission (Goetzel, 2005).
- *Standardized leader/manager training.* Another common strategy is standardized leader/manager training across sites. Many large organizations have multiple locations and diverse populations. Standardized training for managers and other leaders can help promote consistency in implementation across sites.

- *Continuous assessment and evaluation.* After the implementation of programs, many companies assess the effectiveness of programs by a follow-up HRA or another reassessment tool. This reassessment can help identify whether targets were reached. This helps keep programs effective and relevant, allowing maximization of results and achievement of company goals.
- *Incentives for participation.* Another key strategy for program practice is the use of incentives to increase participation. Programs will not work if employees are not engaged. Many companies provide incentives to increase participation rates. Incentives include monetary or other tangible benefits such as reduced insurance premiums.

These common elements of program practice can be found across the three case study organizations.

Johnson & Johnson

To accomplish a single goal such as the HWP mission, Johnson & Johnson executes a variety of strategies. Below is a brief description of the main strategies used.

Central Message. A “central message” refers to a practice in which emphasis on health promotion originates from the office of the CEO and is felt down to the assembly line. The importance of health can be seen in the company’s original mission set forth by former CEO Jim Burke of making “Johnson & Johnson employees the healthiest in the world” (Ozminkowski, Goetzel, et al., 2000). Annual goals are set by the central office and executed by the regional managers in their individual departments.⁵

Identifying a Champion. HWP follows the champion idea: Each program component (safety, health, nutrition) has a champion on the company’s executive committee, and champions are actively involved in leading, motivating, and monitoring the effort in a highly visible way.

Standardization in Training. J&J seeks to balance standardization and flexibility in actual program practice. The central office creates clear program guidance for all operating companies. This is accomplished, in part, through the company’s electronic Safety and Health and Environment document management system, which ensures consistent deployment of standards and guidelines and allows for the online management of quality-controlled health and safety documents from the process of generation through distribution to the end of their life cycle (Johnson & Johnson, 2005). However, J&J also encourages the companies to adapt guidelines in ways that make them congruent with local context and needs. Consultants employed by the central office work with individual sites to help determine the mix of services purchased from the central office, help them achieve goals and benchmarks, and otherwise ensure that programs are congruent with local needs and context.

Incentives. For all domestic employees that complete an HRA, J&J offers a \$500 credit in benefit premiums (Johnson & Johnson, 2003). This incentive has resulted in a 90 percent participation rate in HWP.

Promotion of a “Culture of Health.” Top-level management seeks to place a premium on quality of life and health through active promotion of health and wellness programs, thus creating a “culture of health” in the organization and among its employees. This culture is promoted by providing access to health programming to all employees at all locations and through

⁵ Personal communication, Jim Burke, CEO, Johnson & Johnson, 2007.

the creation of metrics, both for standard and supplementary health promotion programs, thus giving operating companies direction they can take regarding activities.

FedEx

Unlike Johnson & Johnson, which operates with a relatively decentralized management style over its numerous operating companies, FedEx has fewer operating companies (eight) and a more central management approach. The overall management philosophy and culture of FedEx focuses on “people—service—profit.” FedEx uses this approach in the practical execution of employee health programs. The main approaches to program practice are highlighted below.

Goal Setting by Front Office. At the beginning of each fiscal year the corporate office reviews the previous year’s results and sets new goals. These goals (e.g., safety targets) are passed down the management chain and shared with employees. These goals are also used throughout the year in business planning.

Incentives. FedEx offers incentives to meet safety goals by linking them to bonus pay and performance reviews. Recognition awards are also given to employees who meet goals.

Standardized Training of Program Managers. There are 60 HCM managers across FedEx who are responsible for coordinating and managing employees on medical leave. These managers are distributed among the sites and help ensure the quality and uniformity of HCM services provided to employees. This approach is different from J&J’s consulting approach, which allows sites to customize programming and services offered to employees.

Continuous Assessment and Program Improvement: In an effort to improve quality and performance, goal achievement is assessed by the corporate office and by site-level managers on an annual basis to see if changes are needed to improve attainment.

NASA

NASA has not been able to fully execute many of the changes recommended in the IOM report (IOM, 2005). Delays in execution can be attributed to lack of communication across sites, thus limiting the ability to market programs agencywide. NASA has a central budget to fund and execute some programs, with each site having a separate and variable funding stream, resulting in programming and practical execution differences across sites.

Other Companies

The broader literature has highlighted the approaches to program practice of other organizations, which are presented in Table 5.2. Having a central message is the most common practice across organizations. Especially when championed by the corporate office, it highlights the importance of a strong foundation for the success of a program.

Outcomes: Measuring the Effects on Health and Health Care Costs

The ultimate goal of company efforts to introduce health promotion programs is to reduce the costs associated with health care and improve health outcomes and productivity. The evidence base is still evolving. Currently, it consists of a small number of studies with treatment and comparison groups not randomly assigned, plus numerous reports based on anecdotes and

Table 5.2
Common Elements in Program Practice of Integrated Health Programs

Company Name	Central Message	Standardized Training	Incentives	Continuous Evaluation
Citibank (Goetzel, 2005)	✓			
Daimler-Chrysler (Serxner, Gold, et al., 2003)	✓			✓
GlaxoSmithKline (Stave, Muchmore, and Gardner, 2003)	✓	✓	✓	
Dow Chemical Company (Goetzel, Ozminkowski, et al., 2005)	✓			✓
Johnson & Johnson	✓	✓	✓	✓
FedEx	✓	✓	✓	✓
NASA ^a	✓	✓	✓	✓

NOTES: This table does identify some common execution styles, but it is also limited. Information for non-case study organizations was obtained from peer-reviewed literature, but much of the literature focused on the programs and outcomes, and it did not go into extensive detail about the execution styles of the organizations. The shaded rows are case study organizations.

^a If NASA fulfills all of the recommendations from the IOM report (IOM, 2005), its integrated program will include these program practice elements.

relatively unsystematic observations. Below we report findings from the most rigorous of those evaluations.

Johnson & Johnson

J&J's Health and Wellness Program has been evaluated more than any other similar program, with evaluations by both the company and outside researchers. In the past decade, there have been multiple peer-reviewed studies comparing participants and nonparticipants within the company. Two studies have focused on the long-term effects of HWP on employee health risk (Goetzel, Ozminkowski, et al., 2005) and health care utilization (Ozminkowski, Goetzel, et al., 2000). Goetzel et al. compared HRA data from two time periods (1995 and 1999) for individuals of similar age, gender, and race, controlling for differences in their characteristics, and evaluated their medical data to assess changes. Ozminkowski et al. studied health-care utilization claims for U.S. employees based on data for at least one year before and one year after the start of HWP at their company location.

These studies as well as others in the peer-reviewed literature and the Koop award committee have documented the benefits of HWP (Breslow, Fielding, et al., 1990; Isaac and Flynn, 2001; Johnson & Johnson, 2003). HWP resulted in a savings of \$225 per employee per year in medical plan utilization costs (Ozminkowski, Goetzel, et al., 2000). Savings from medical costs and administrative streamlining of the program produced overall savings of about \$8.6 million per year.

Although outcomes have been well documented, the studies have several limitations. For example, during the implementation of HWP, Johnson & Johnson also implemented a new health maintenance organization plan, which makes estimating the independent effects

of HWP difficult. Furthermore, participation in HWP is not mandatory, thus people with an interest in health tend to participate. Although statistical controls are possible, they may not fully account for selection bias that may exist because of voluntary participation in non-mandatory programs. The information from the HRAs is also self-reported and is not usually validated.

FedEx

FedEx's Human Capital Management program has been in operation for almost two decades, but there has been little peer-reviewed evaluation of results. The only publicly available results are from the Koop National Health Award received by FedEx in 2002, but it should be noted that these are unpublished. FedEx reports that the HCM program has reduced costs and utilization of health-care services (FedEx, 2002). At FedEx, the average duration of a disability claim is 61 days, compared to 107 days for the rest of the transportation industry. There was also a 7.2 percent decrease in the number of disability claims between FY 1994 to FY 2000. The participants of the FedEx fitness program reduced the overall costs of health benefits utilization from \$1,210 to \$1,021 per employee, a 16 percent decrease compared with a 7 percent reduction in nonparticipants.

NASA

NASA has initiated a few programs. However, it has not conducted any evaluations, and there is no evidence related to the effectiveness of NASA's approach to integration.

Other Companies

The benefits experienced by the case studies fall in line with those experienced by other organizations. The general economic benefits of an integrated employee health system have been a reduction in health care expenditures and utilization of health services, a decrease in absenteeism, and an increase in worker productivity. The general health benefits experienced by an integrated health system have included reduced smoking rates, increased physical activity, and increased awareness of health status. Table 5.3 highlights specific benefits experienced by companies in the United States (Goetzel, 2005).

Summary and Conclusions

In this chapter, we reviewed civilian models of integration to identify approaches and practices that might inform DoD regarding integrated employee health systems. We identified general trends from the peer-reviewed literature, with an emphasis on three case studies, two in the private sector (Johnson & Johnson and FedEx) and one government agency (NASA).

This chapter focused on identifying the key motivations, program design, program practice, and general outcomes of an integrated model. The key motivation for the move to an integrated system for civilian companies was the high cost of health care benefits. The most often used program designs by civilian companies were health risk assessments, health awareness and education campaigns, personalized interventions, and reassessments of employee health. The key elements of program practice employed were a central message/strategy, standardized training of managers and leaders, incentives for participation, and continuous assessments and

Table 5.3
Economic and Health Benefits from Integrated Programs

Company Program, If Applicable	Economic Benefit	Health Benefits
Citibank: <i>Health Management Program</i> (Goetzel, 2005)	\$4.56–\$4.73 return on investment for every dollar invested	A reduction in 8 out of 10 health risk categories (i.e., seatbelt use, exercise habits, fiber intake, stress level, fat intake, salt intake, cigarette use, and high blood pressure)
Daimler-Chrysler: <i>National Wellness Program</i> (Serxner, Gold, et al., 2003)	A cost savings of \$5–\$16 per employee per month from those who participated in a HRA versus those who did not	Over the course of 6 years, employees who completed 2 or more HRAs reported a reduction in smoking (33%), excess alcohol consumption (32%), and poor nutrition (23%) compared to those who did not complete an HRA
GlaxoSmithKline: <i>Contract for Health and Wellness</i> (Stave, Muchmore, and Gardner, 2003)	A savings of \$5.5 million dollars in benefits utilization costs for participants over a four-year period, with savings increasing each year	Participants showed improvement in healthy behavior and a progression in readiness to change based on self-reported data
Dow Chemical Company: <i>Health and Human Productivity</i> (Goetzel, Ozminkowski, et al., 2005)	A decrease of 0.17% in each risk factor was the break-even point; any greater decrease resulted in a positive return on investment (based on projected health expenditures)	No benefits yet reported
Johnson & Johnson: <i>Health and Wellness Program</i>	\$225 savings per employee per year in medical care utilization costs for those who participated in HWP compared with those who did not. Overall savings of \$8.6 million per year for the company	Reduction in high-risk factors, such as cigarette smoking, sedentary lifestyle, high cholesterol, high blood pressure, and poor nutrition, for those who participated in HWP compared with those who did not
FedEx: <i>Human Capital Management</i>	A savings of \$189 per participant in utilization costs from the FedEx Fitness program. Reduction in duration of disability claim compared with the duration in the transportation industry. (61 days at FedEx compared to 107 days for the rest of the transportation industry)	No benefits yet reported
NASA	No benefits yet reported	No benefits yet reported

NOTE: The shaded rows are case study organizations.

evaluations. While the evidence base on program outcomes is still developing, it seems that employee health programs may lead to reductions in risk factors and reductions in health care expenditures.

Perhaps the most important finding, however, is that most of the companies examined have attempted to bring individual health promotion activities under the umbrella of employee health. However, there has been little effort to establish strong linkages between health promotion and traditional occupational safety and health.⁶ In conclusion, the case studies demonstrated integration in the sense of introducing new programs related to employee health,

⁶ An exception to this is Highmark Blue Cross/Blue Shield's Research@Work project, which has used patient data from companies to monitor the prevalence of conditions that often have strong work causality.

specifically health promotion programs, thereby increasing the breadth and coverage of their employee health system. However, we observed little activity in the case studies related to linking or information-sharing between individual employee health programs (e.g., industrial hygiene staff working with the health promotion staff).

We conclude that there are lessons to be learned from the companies in the case studies related to specific types of program designs and important elements in the programs that lead to better outcomes. However, these companies did not have a single office responsible for all aspects of employee health or a single IT system containing data on all aspects of employee health that might serve as a model for DoD. In many ways, DoD might be further along the continuum toward an integrated employee health system⁷ than were the companies we studied.

⁷ As stated in Chapter One, for the purposes of this study, an “integrated employee health system” means an infrastructure that would support all employee health activities except health care delivery, provide a way to link information about all aspects of the health of employees, and make this information available to leadership across all departments within DoD for the purposes of decisionmaking, accountability, improvement, surveillance, and other questions related to health.

Observations and Conclusions

The sponsor of this research, DASD C&PP, asked RAND to perform two primary tasks. First, because the DASD (C&PP) recognized that safety and occupational health in DoD is complex and involves multiple policies executed by numerous organizations, we were asked to document the policy background and the organization of the current system as a starting point for changes in policy and organization related to employee health activities. Second, we were asked to conduct case studies of civilian organizations with integrated employee health systems. The goal of both tasks was to create a foundation for a more integrated employee health system within DoD. For the purposes of this study, we will use the term “integrated employee health system” to mean an infrastructure that would support all employee health activities except health care delivery, provide a way to link information about all aspects of the health of employees, and make this information available to leadership across all departments within DoD for the purposes of decisionmaking, accountability, improvement, surveillance, and other questions related to health. The main goal of such a system is to support and improve service members’ health, wellness, and productivity. In an integrated system, policies and activities would be designed and monitored centrally to provide consistency and emphasize leadership focus, and they would be implemented locally, focusing on individuals and their specific workplaces.

To address the first task, we conducted a broad review, including an analysis of historical and current SOH-related policies and organizations, as well as interviews with stakeholders in the department and the services. We found that DoD policies and activities in SOH have generally tracked civilian trends. However, DoD faces unique challenges, including an active duty force that experiences exposures during combat and deployment that would not be encountered by personnel in a civilian organization. Finally, DoD operates a system that provides health care to its active duty members, a unique situation among employers.

Efforts supporting policy making and practical execution of SOH are often accomplished by dedicated SOH professionals in working groups that operate across—and often in spite of—formal organizational boundaries. Such boundaries originate at high levels, as funding and policy-making activities are divided between two under secretaries.

The second task, the case studies of civilian organizations, was conducted based on the hypothesis that the integrated employee health systems in these organizations would provide useful models for DoD.¹ The analysis of civilian employee health programs was conducted with

¹ Studying civilian models for ideas related to employee health systems has been recommended more recently by others, including the 2007 DoD Task Force on the Future of Military Health Care. The Task Force found that DoD has not looked sufficiently outside of its own systems to study, and potentially adopt, best practices in health care (DoD Task Force, 2007).

the realization that DoD is unique in many ways but also with the expectation that civilian programs might be able to inform DoD's efforts to move toward an integrated employee health program. We found, however, that the civilian organizations in our case studies focused primarily on the introduction of health promotion in the workplace. While these companies have integrated health promotion into their workplace activities, none of them have an integrated program that could serve as a model for DoD, even though they were most often mentioned in the available literature as noteworthy examples of this goal.

The lessons from the civilian case studies, in combination with our analysis of DoD policies and programs, prompt the following observations and recommendations for DoD.

Observation: Leadership Attention Is an Important Aspect of Civilian Integrated Employee Health Programs

A significant lesson from the civilian case studies is that leadership attention is one of the most important aspects of a successful employee health program. The case study organizations have clearly articulated goals and metrics related to employee health that are communicated from the top of the organization. In 2001, the National Safety Council made a similar recommendation to DoD regarding leadership emphasis on safety, and it estimated the cost of safety mishaps as a baseline measure. DoD responded quickly and effectively to this recommendation: the Secretary established clear goals and appointed a high level committee to oversee program implementation, reporting, and measurement.

As part of the effort to focus leadership attention on issues related to integration of employee health, DoD should estimate the incidence and cost of preventable illnesses and occupation-related illnesses among its forces, to provide a baseline similar to one established for safety accidental injuries by the DSOC. This would allow leaders to set goals and measure progress against a clearly defined performance target that would allow for improved accountability. In addition to a concern about the health of their workers, civilian companies have a strong financial incentive to improve employee health and promote safety, and they measure the return on their investment. While health outcomes and cost savings are important for DoD, other measures are also important, such as retention and readiness.

Some measures related to health are already on the current MHS balanced scorecard, and others can be added as the scorecard evolves to increase the attention paid to other aspects of employee health such as SOH and wellness. In fact, the MHS balanced scorecard is currently being revised to include more measures in addition to health care, such as substance abuse.² For example, the 2007 MHS balanced scorecard includes the rate of DNBI for theater and nontheater areas. In the future, more-focused measures, such as the rate of back injury, might be a more useful measure because of opportunities for intervention (MSMR, 2006).³

DoD might approach employee health like it has approached safety, by appointing an oversight committee similar to the DSOC or expanding the DSOC charter to include a broader range of employee health activities. The Joint Preventive Medicine Policy Group (JPMPG) or

² In 2005, substance abuse disorders affected 25,632 individuals in the U.S. Armed Forces, accounting for 201,159 medical encounters and 13,165 hospital bed-days. See MSMR (2006).

³ In 2005, injuries of the back/abdomen affected 157,415 individuals in the U.S. Armed Forces, accounting for 380,254 medical encounters and 13,805 hospital bed-days (MSMR, 2006).

the Defense Health Board could also play an important role in integrating employee health activities by raising awareness of senior leadership about the positive impact of integrating employee health activities related to SOH with health promotion/wellness activities.

Observation: Coordination Across Organizational Boundaries Is Essential to a More Integrated System

SOH activities cut across many disciplines. It is not surprising, then, that SOH responsibilities reside in various organizations in DoD. Safety policies are promulgated and monitored by the USD (AT&L), reflecting the emphasis on safety during the development and procurement of equipment and the critical role of installations in safety. SOH also requires support from the MHS, which is overseen by the USD (P&R). The current organization is designed to optimize the primary missions of these under secretariats: acquisition, technology, and logistics; and personnel and readiness. While important, SOH is only one of many functions overseen by these offices.

This current organization is reflected in the services as well, with safety offices being distinct from medical organizations. In these cases, the organization closely aligns safety activities with line commands, to capitalize on the ability of commanders to directly influence workplace activities.⁴ Most occupational health activities, on the other hand, are less directly influenced by commanders, being instead more related to the MHS.

It may be desirable to have a more centralized organization for SOH, as in some civilian organizations, with a single entity to set SOH policy and monitor its execution. However, placing all responsibility for SOH in a single organization would not remove the necessity for cross-organization coordination. SOH requires attention from both the acquisition and technology fields—considering safety in equipment design, for example—and medical fields, including for example preventive medicine, wellness and health promotion, and medical treatment.

In the current DoD organization, DoD has addressed the need for coordination, particularly for safety, with the establishment of the DSOC and through both chartered and informal working groups that coordinate SOH activities across organizations. Additional efforts might be considered to increase similar coordination in occupational health, including, for example, an organization like the DSOC specifically for occupational health or, more inclusively, employee health. Alternatively, the DSOC charter might be expanded to be more inclusive of employee health activities.⁵

Observation: Data Will Be Needed for Post-Deployment Health Studies

Evaluation of occupational and environmental exposures related to employee health is a fundamental function of an integrated employee health system. Therefore, access to the data needed to perform this task should be a top priority. As discussed in Chapter Four, comprehensive

⁴ The Air Force is a slight exception in that its medical units also fall under line (wing) commanders at the installation level, unlike the Army and Navy. However, like the other services, the highest level Air Force safety office is distinct from the MHS.

⁵ The DSOC includes a prevention, safety, and health promotion council, but its charter is focused specifically on safety.

data on all environmental monitoring in theater are not currently available from a centralized source. In addition, data from AHLTA are not currently linked with workplace environmental exposure data from DOEHRS-IH or service-level systems to allow population-level analysis. Eventually the environmental monitoring data in the EH module of DOEHRS-IH and health outcome data in AHLTA will be linked. While it is unlikely that these systems will be ready in time to fully support the health studies needed to evaluate the health effects of current deployments in Afghanistan and Iraq, other means exist to link environmental and health outcome data.

There are many possible benefits of linking AHLTA with other MHS and DoD data systems. However, it is not possible to predict what the benefits would be, because the exact nature of the linkage would determine how the systems would interact. Therefore, we recommend that before this linkage occurs, DoD should identify the reasons for linking these IT systems and should plan carefully how to maximize the benefit of linking these IT systems.

Observation: Multiple IT Systems Contain Individual Health Data

An ideal IT system for an integrated employee health system would create a single record to track and report on an individual's exposures and health status. This is the intent of DoD's electronic health record, AHLTA which will eventually contain all health utilization information in a single record. However, other medical data exist outside the AHLTA system that, if linked or added to the AHLTA record, would create a more complete longitudinal electronic health record. Two opportunities to enhance the completeness of the AHLTA record would be to link or add the following to the service member's AHLTA record:

- audiometry data collected and stored in the DOEHRS-Hearing Conservation (HC) system
- all health and medical data collected during the MEPS physical exam.

Linkage of these data to the individual medical records of AHLTA will be through CDW.

Conclusions

It was hypothesized that, despite differences in size, complexity, and governance, civilian models could inform future DoD efforts toward a more integrated employee health system. However, no panacea was identified in the investigation of "model" civilian-employee health programs that could be directly adopted by DoD. The civilian companies, motivated by a concern for the health of their employees but also significantly by cost savings, provide some useful lessons in their implementation of specific SOH-related initiatives. However, the companies we studied—reputed to be leaders in integrated employee health programs—offer few lessons related to optimal organizational strategies, interaction among programs related to employee health, or linkages through IT systems.

In addition to the differences between DoD and civilian companies described above, it should be noted that DoD potentially has more opportunity to influence the health of its employees, particularly active duty personnel. Compared with most civilian companies, DoD has more mature health information technology systems and, perhaps more importantly, is

responsible for the complete health care of active duty personnel, providing opportunities for comprehensive data collection and health interventions.

We were asked to look at civilian models for information that might be useful to DoD should it decide to pursue a more integrated employee health system. Our analysis indicates that DoD is in fact ahead of even the best civilian companies in its employee health activities. Furthermore, DoD has opportunities not shared by civilian companies, because DoD provides complete medical care for its active duty population and can therefore have access to that population and data useful for determining the progress of employee health programs. The comprehensive set of activities related to employee health in the DoD, including industrial hygiene, safety, health promotion and wellness, and medical care, and its relatively mature health IT infrastructure indicate that there might be less need to introduce new employee health programs, and more need to make use of the information generated by the existing programs in a coordinated manner.

Time Line of Safety and Occupational Health Policies and Programs, 1970–2007

This appendix provides a summary of key events related to safety and occupational health policies and programs in the nation and DoD, beginning with the Occupational Safety and Health Act in 1970. It represents some of the events and documents that were reviewed as part of this research. It is not intended to be an exhaustive historical accounting but is provided for reference.

- 1970. Congress passes Occupational Safety and Health Act.
- 1972, *March*. DoD Directive setting prevention and treatment policies for military personnel regarding drug and alcohol use (DoD, 1972).
- 1980. Executive Order 12196 applies Section 19 of the OSHA Act of 1970 (as amended (29 U.S.C. 668) to Federal employees, but exempts “military personnel and uniquely military equipment, systems, and operations” (White House, 1980).
- 1980, *April*. DoD Instruction 6055.5, Industrial Hygiene and Occupational Health (later superseded)
- 1981. DoD issues Directive on physical fitness and weight control for active duty personnel (DoD, 1981), based on U.S. Surgeon General’s 1979 report on health promotion and disease prevention, “Healthy People”.¹
- 1983, *August*. DoD directive 1010.7, Drunk and Drugged Driving by DoD Personnel (superseded).
- 1984, *October*. DoD Instruction 6055.1, DoD Occupational Safety Health Program.
- 1986. DoD issues directive on general health promotion (DoD, 1986), including six broad focus areas: smoking prevention and cessation, physical fitness, nutrition, stress management, alcohol and drug abuse prevention, and hypertension prevention.
- 1989, *April*. DoD Instruction 6055.7, Mishap Investigation (superseded).
- 1990. DoD publishes “Promoting Health 2000” (DoD, 1994; Bibb, 2002), based on U.S. Surgeon General’s “Healthy People 2000” (HHS, 1990).
- 1990, *October*. DoD Instruction 6050.5, DoD Hazard Communication Program (superseded).
- 1992. DoD forms triservice subcommittee (DoD Subcommittee on Health Promotion and Program Evaluation) to prioritize Promoting Health 2000 objectives and to determine data sources necessary to establish baselines (DoD, 1992).

¹ See Bibb (2002) for a discussion of how health promotion was poorly funded and supported in DoD during the 1980s.

- *1994, October.* DoD MHS conducts a triservice PPIP conference (DoD, 1998e). PPIP was implemented by HHS nationwide in August, 1994, to increase the appropriate use of clinical preventive services such as screening immunizations and health counseling (HHS, 1998). DoD implemented PPIP in all TRICARE regions in late 1990s.
- *1996, January.* Policy memorandum directs a detailed medical surveillance and health protection plan for forces deploying to Bosnia (DoD, 1996a).
- *1996, February.* DoD directive 4715.1, Environmental Security (superseded in 2005).
- *1996, April.* DoD instruction 6055.12, DoD Hearing Conservation Program (superseded).
- *1996, May.* DoD instruction 6055.4, “DoD Traffic Safety Program,” 6 May 1996 (superseded).
- *1996, May.* Latest change to 1989 DoD instruction 6055.5, Industrial Hygiene and Occupational Health (DoD, 1996b). Establishes uniform procedures to recognize and evaluate health risks associated with exposure to chemical, physical, and biological stresses in DoD workplaces. Authorizes publication of DoD 6055.5-M, “Occupational Health Surveillance Manual,” which recommends medical examinations and biological monitoring criteria for selected occupations.² DoD components’ medical surveillance programs shall include medical examination requirements of OSHA and other Federal agencies that may prescribe, as a condition of employment, physical examination of DoD personnel to perform specific duties.
- *1996, October:* HA Policy 97-003. Memorandum from ASD (HA) established the Health Enrollment Assessment Review (HEAR) Survey as the TRICARE health assessment survey instrument (DoD, 1996c).
- *1997, March.* DMSS established by transitioning from an Army-specific system (Trump, Mazzuchi et al., 2002).
- *1997, August.* Directive, “Joint Medical Surveillance,” and accompanying instruction, “Implementation and Application of Joint Medical Surveillance for Deployments,” attempt to correct perceived inadequacies in health protection during deployments (DoD, 1997a; DoD, 1997b; Trump, Mazzuchi, et al., 2002).
- *1997, August.* DoD Instruction 6490.3, Implementation and Application of Joint Medical Surveillance for Deployments (superseded).
- *1997.* Army named as occupational health executive agent: “In late 1997, as part of the defense reform initiative, the DOHP was devolved to the Department of the Army for program management and executive agent functions even while it remained under the oversight of the [Deputy USD (ES)]” (Tierno and Anderson, 1999).
- *1998.* Joint Staff and ASD (HA) specify preventive actions that must take place before, during, and after deployments to ensure better disease surveillance, health protection, and properly documented health care (DoD, 1998c; DoD, 1998a; Trump, Mazzuchi, et al., 2002).
- *1998, March.* Memorandum from ASD (HA) prescribes policy for implementing PPIP as part of the MHS. PPIP, a campaign developed by HHS, aimed to improve the delivery of preventive services and to shift the focus from “treatment of illness and injuries to health

² This manual is currently under revision.

promotion and wellness, prevention of illness and injuries, and improving the health of TRICARE PRIME enrollees” (DoD, 1998d) (superseded by HA Policy 99-00017).

- 1998, *August*. DoD Instruction 6055.1, DoD Safety and Occupational Health Program (DoD, 1998b). Updates policies, procedures, and responsibilities for administering a comprehensive DoD SOH program under DoD directive 4175.1, Environmental Security, 24 Feb 1996 (this reference was later cancelled by DoD directive 4715.1E).
- 1999. Institute of Medicine report on protecting the health of deployed forces (IOM, 1999).
- 1999. DoD implements a medical reengineering plan including a focus on health promotion and preventive medicine to reduce utilization of medical resources (DoD, 1999c; Bibb, 2002).
- 1999, *June*. HA Policy 99-00017. Memorandum from ASD (HA) establishes guidance for the Health Enrollment Assessment Review (HEAR) program (DoD, 1999b) (superseded by HA Policy 03-024).
- 1999, *July*. President Clinton launches the Federal Worker 2000 Presidential Initiative to decrease federal workplace injuries in the subsequent five years. Specific goals include reducing injuries by three percent annually.
- 1999, *July*. Establishment of DoD Prevention, Safety and Health Promotion Council, under ASD(P&R), ASD (HA) as executive agent (DoD, undated-a). Rotating chairmanship among service surgeons general. Initiatives include Alcohol Abuse and Tobacco Use Reduction Committee, Joint Preventive Medicine Policy Group, Injury and Occupational Illness Prevention Committee, Put Prevention Into Practice Committee, Self-Reporting Tools Committee, and Suicide Prevention and Risk Reduction Committee (DoD, 2002a).
- 1999, *July*. DoD Instruction 6055.4, DoD Traffic Safety Program (DoD, 1999a). Responsibility of USD (AT&L).
- 2000, *October*. DoD Instruction 6055.7, Accident Investigation, Reporting and Record Keeping (DoD, 2000b). Responsibility of Deputy USD (ES).
- 2001, *December*. National Safety Council Report (NSC, 2001).
- 2002, *February*. JCS updates procedures for deployment health surveillance and readiness. All deployment health surveillance information is to be forwarded to DMSS for permanent archival and integration with DoD health information systems (DoD, 2002b).
- 2002, *July*. Secretary of Defense memorandum establishing the Military Injury Metrics Working Group (DoD, 2002c; DoD, 2002d).
- 2002, *November*. DoD Military Injury Metrics Working Group publishes white paper, in response to Secretary of Defense tasking, February 4, 2002, regarding lost days (DoD, 2002c). The group recommended four injury metrics: injury case rate, lost day injury case rate, limited duty injury case rate, and lost days rate. The group identified “data gaps” in the ambulatory medical data, outsourced care, duty limitation information, convalescent leave recording, cause coding, deployment injury data, shipboard injury data, personnel data, and safety data. Recommendations were made to fill these gaps. The group warned against setting goals too high, stating that “reducing the injury metrics 30–50 percent over five years will require a significant and sustained commitment.”
- 2003, *April*. USD (P&R) Memorandum, Enhanced Post-Deployment Health Assessments (superseded).

- *2003, April.* ASD (HA) Policy Memorandum, Policy for use of Force Health Protection Prescription Products (superseded).
- *2003, May.* Secretary of Defense memorandum on reducing preventable accidents, with goal of reducing “mishaps and accident rates by at least 50 percent in the next two years” (DoD, 2003f).
- *2003, July.* DSOC established and tasked with the goal of reducing DoD mishap and accident rates by 50 percent within two years (DoD, 2004e).
- *2003, August.* DoD directive 1010.10. Health Promotion and Disease/Injury Prevention. Updates policy and responsibilities for health promotion, disease and injury prevention, and population health within the Department of Defense (DoD, 2003b).
- *2003, September.* Memorandum from Armed Forces Epidemiological Board makes recommendations regarding the use of routine periodic exams in the services (DoD, 2003d).
- *2003, November.* HA Policy 03-024. Memorandum from ASD (HA) provides policy guidance related to the Health Enrollment Assessment Review Program (HEAR)(DoD, 2003c).
- *2004, January.* President initiates the Safety, Health, and Return-to-Employment (SHARE) Initiative.
- *2004, March.* DoD Instruction 6055.12, DoD Hearing Conservation Program (DoD, 2004d). Responsibility assigned to USD (AT&L).
- *2004, September.* USD (AT&L) publishes memorandum directing integration of safety risk management into acquisition programs. “Our intent is to design safety into our weapons systems, not add it afterwards as an operational consideration” (DoD, 2004e; DoD, 2007r).
- *2004, October.* DoD directive 6490.2, Comprehensive Health Surveillance (DoD, 2004b). Policy for routine, comprehensive health surveillance of all service members during active Federal service. Designates Army as Executive Agent for DMSS and serum repository. Gives overall responsibility for comprehensive health surveillance to ASD (HA). Directs that USD (AT&L) ensure that safety, environment, and occupational/environmental health program activities efficiently address requirements for comprehensive health surveillance.
- *2004, October.* DoD directive 6200.4, Force Health Protection and Readiness (DoD, 2004a). “Assigns responsibility for implementing [FHP&R] measures, on behalf of all Military Service members during active and Reserve military service, encompassing the full spectrum of missions, responsibilities, and actions of the DoD Components in establishing, sustaining, restoring and improving the health of their forces.” Assigns responsibility to ASD (HA), through USD (P&R) for programming and policy for FHP&R.
- *2004.* National Military Strategy: “Pursuing the [War on Terror], conducting stability operations in Afghanistan and Iraq, ensuring power projection from the Homeland and sustaining global commitments while protecting the long-term health of the Armed Forces will require actions to mitigate risk” (JCS, 2004).³
- *2005, Feb–May.* DoD Inspector General teams with National Safety Council for safety perception surveys.

³ It is unclear whether *health* in this document is intended in a medical or SOH-related context, or if it more generally refers to the interests of the armed forces as an institution.

- *2005, March.* DoD directive 4715.1E, Environment, Safety, and Occupational Health (DoD, 2005b). Directs protection of DoD personnel from accidental death, injury, or occupational illness. Builds upon the Defense Installations Strategic Plan to guide ESOH decisionmaking.
- *2005, July.* At a DSOC meeting, USD (P&R) (DSOC Chair) tasks ASD (HA) to “identify the top five causes of non-combat injuries and recommend mitigation initiatives to reduce injuries” (DoD, 2005e).
- *2005, August.* Military Training Task Force of DSOC publishes recommended process for setting injury prevention priorities and recommended interventions (DoD, 2005f).
- *2005, October.* HA Policy 05-021. Memorandum from ASD (HA) changes name of the DoD Automated Health Assessment Tool from Health Enrollment Assessment Review (HEAR) to Health Assessment Review Tool (HART) (DoD, 2005d).
- *2005, December.* DoD directive 5134.01, USD (AT&L) (DoD, 2005c). USD (AT&L) is designated principal staff assistant and advisor for all matters relating to various areas, including environment and SOH management.
- *2006, February.* Quadrennial Defense Review Report: “New innovations and prevention and wellness offer the opportunity to develop a 21st century Military Health System that will improve health and save both lives and money. . . . It is the Department’s goal to have a lifetime relationship with the entire Department of Defense family which maximizes prevention, wellness and personal choices and responsibility” (DoD, 2006i).
- *2006, February.* HA Policy 06-006. Memorandum from ASD (HA) provides guidance regarding performance of a routine annual periodic health assessment for all members of the active duty and all selected reserve members (DoD, 2006h).
- *2006, February.* DoD Military Injury Prevention Priorities Working Group (under DSOC) publishes report on injury causes, mitigation, and recommendations (DoD, 2006b). Top five injuries (using outpatient data): (1) lower extremity overuse, (2) lower extremity fractures, (3) upper extremity fractures, (4) torso overuse, and (5) lower extremity sprains and strains. Recommended that greatest reduction of lost duty days can be realized by efforts focused on sports- and physical training-related injuries, followed by falls. In the 1990s, medical and safety data revealed that across the services accidental injuries caused (Jones and Amoroso, 1999):
 - 47 percent (Air Force) to 57 percent (Marine Corps) of all deaths,
 - 22 percent (Air Force) to 63 percent (Navy and Marine Corps) of all disabilities, and
 - 22 percent (Air Force) to 31 percent (Marine Corps) of all hospitalizations.
- *2006, March.* Joint Staff memorandum on Joint Staff and combatant command responsibilities for safety (DoD, 2006g). “We need to integrate the Joint Staff and combatant command safety programs with the well-established Service safety programs.” “There is limited safety guidance governing the joint operating environment; safety is widely accepted as a Service-only domain.” Memo sought input on joint and command responsibilities that “will eventually be codified in directive guidance.”
- *2006, May.* Memorandum from USD (AT&L) to USD (P&R), requesting continued coordination with DSOC and responding to the Inspector General report to DSOC (that report recommended “change the mindset,” “build accountability,” “transform the program,” and “measure progress”) (DoD, 2006k). USD (AT&L) concurs to provide “biannual culture survey results to the SecDef [Secretary of Defense],” which “would

complement annual environment, safety and occupational health program reviews by the ADUSD (ESOH).”

- *2006, June.* Secretary of Defense memorandum on reducing preventable accidents (DoD, 2006j). “We will fund as a first priority those technologies and devices that will save lives and equipment. We will retrofit existing systems, and consider these devices as a “must fund” priority for all new systems.”
- *2006, August.* DoD instruction 6490.03, Deployment Health (DoD, 2006e). “Implements policies and prescribes procedures for deployment health activities for Joint and Service-specific deployments to monitor, assess, and prevent Disease and Non-Battle Injury”; to control or reduce Occupational and Environmental Health risks; to document and link OEH exposures with deployed personnel, including exposures to chemical, biological, radiological and nuclear warfare agents; and to record the daily locations of deployed personnel.” Responsibility assigned to ASD (HA)/USD (P&R).
- *2006, August.* DoD Instruction 6050.05, DoD Hazardous Communications Plan (DoD, 2006d). Responsibility assigned to the Deputy USD (I&E).
- *2006, September.* President extends the SHARE initiative through FY 2009, noting a 5.5 percent reduction in illness and injury rates across the Government as a whole, compared to 2003 (Bush, 2006).
- *2006, October.* DoD directive 5124.02, Under Secretary of Defense for Personnel and Readiness (DoD, 2006a). USD (P&R) is principal staff assistant and advisor for various areas, including health affairs and “safety and accident reduction activities to prevent accidents and injuries . . . in accordance with guidelines of the DSOC.”
- *2006, November.* ASD (HA) sponsors this RAND study.
- *2007, May.* Secretary of Defense Memorandum, “Zero Preventable Accidents” (DoD, 2007o).

Semistructured Interviews with DoD Officials

We conducted 14 semistructured interviews with DoD policymakers and practitioners of SOH regarding their perceptions of past and current SOH programs, and we also inquired about the desirability and feasibility of further integrating SOH efforts. Participants were identified by the research sponsor and included representatives of the following organizations:

- DoD, Office of the Inspector General
- Assistant Secretary of Defense (Health Affairs), Office of Force Health Protection and Readiness
- Assistant Secretary of Defense (Health Affairs), Clinical and Program Policy, Office of Health Promotion and Preventive Services
- DASD (Health Affairs), Chief Medical Officer, TMA, Population Health and Medical Management Division
- USD (AT&L), Office of Deputy Under Secretary of Defense (Installations and Environment)
- Defense Health Board
- Office of the Deputy Under Secretary of Defense (Military Personnel Policy)
- Offices of the Surgeon General (Army, Air Force, and Navy)
- DOEHRs-HC and DOEHRs-IH under RITPO
- AHLTA under CITPO
- DSOC.

Interviews were designed to last between one and two hours and followed a protocol approved by RAND's Human Subjects Protection Committee (HSPC) and the Internal Review Board of the Office of the Assistant Secretary of Defense (Health Affairs). Interview participants were volunteers. To promote candor, we assured each interview participant of confidentiality. The interviews also served as opportunities to collect relevant documents and other information about SOH in DoD. We asked interview participants to discuss the following topics in an open-ended fashion:

- the current organization and execution of DoD's SOH programs.
- the participants' roles and responsibilities related to SOH.
- the characteristics of an ideal comprehensive and integrated employee health program;
- the current level of integration of DoD's SOH programs
- the need and opportunity for increasing SOH integration in DoD.

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