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Measuring the Strategic Value of the Armed Forces Health Longitudinal Technology Application (AHLTA)

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Summary

Background

The purpose of this project, which was undertaken between June 2006 and October 2007, was to help the Military Health System develop an analytic framework and define specific outcome measures for assessing and reporting the efficiency, safety, and health benefits of AHLTA, DoD's electronic medical record system, as it becomes fully deployed.

Deployment of AHLTA is occurring in several planned phases or "blocks." Block 1 deployment to military treatment facilities (MTFs) throughout the world began in January 2004. The timing of Block 4 deployment (the last planned block) has yet to be determined. As of the end of 2006, AHLTA Block 1 had been installed at 138 fixed military installations worldwide, and virtually all outpatient care they delivered was being documented in AHLTA's clinical data repository (CDR). The CDR can be accessed (with appropriate permissions) from any installation, so if a beneficiary is treated at one installation and later seeks care at another installation, his record is available.

The CDR cannot now be accessed electronically from a theater of operations, such as Iraq or Afghanistan.¹ The MHS is addressing this problem through the Theater Medical Information Program-Joint (TMIP-J).

AHLTA will gain functionality as blocks 2–4 are rolled out. By the end of 2007, Block 2 will add ordering and management of eye-

¹ AHLTA has been deployed at a number of permanent overseas installations in Germany, South Korea, and Japan. The CDR can also be accessed from these locations.

glasses and dental charting and documentation. By the end of 2011, Block 3 is scheduled to replace legacy pharmacy, laboratory, anatomical pathology, radiology, occupational health, and surveillance capabilities. Also by the end of 2011, Block 4 will extend AHLTA to inpatient encounters. By this time, essentially all aspects of health care provided by the MHS (but not care purchased from civilian providers) will be documented in AHLTA.

The MHS is simultaneously deploying a clinical data mart (CDM), which imports data from AHLTA's CDR and facilitates enterprise-level analysis and decision support. The CDM was in operation as of the end of 2006, but its analysis capability was immature. There are also plans to implement a clinical data warehouse (CDW). This capability would access and link data from sources beyond the CDR—such as eligibility and enrollment data, accounting data, and surveys—and would have the potential to support more complex analyses than does the CDM.

Views of Senior MHS Leadership

Senior leaders of the MHS will be the primary customers for measures of the performance of the MHS and of the strategic value of AHLTA. Therefore, we conducted a series of 14 interviews with senior MHS leaders. Through these interviews we discovered the dimensions of performance that the leadership deemed important, and how the leadership anticipated that AHLTA would affect those dimensions. They were unanimous that the correct dimensions of performance to use were the strategic objectives contained in their strategic plan (OASD, 2007a). The strategic objectives go beyond efficiency, safety, and health to include the medical readiness of service members to deploy and the ability of the military medical system to provide outstanding health care in support of military operations.²

The leadership anticipated that AHLTA will have effects on performance similar to those reflected in the published literature on electronic medical records (EMRs). These effects include improved qual-

² Specific strategic objectives are depicted in Figure 2.1.

ity and safety of care through point-of-care alerts and reminders and reduced cost through avoidance of duplicate tests. AHLTA-generated reminders, they expected, will improve individual medical readiness. Improved continuity of care will benefit service members evacuated from theater with wounds, injuries, or disease. A few participants mentioned AHLTA's potential as a tool to support process improvement efforts through measurement and feedback.

The Framework

To assess the strategic value of AHLTA, we recommend the standard treatment-outcomes³ methodology described in textbooks on program evaluation (Mohr, 1988; Rossi, Freeman, and Lipsey, 1999). The methodology has four elements:

1. *Outcome measures* capturing valued domains of system performance plausibly influenced by the presence of AHLTA
2. A *treatment* describing a way of using AHLTA that is expected to influence one or more outcome measures
3. A *logic model* describing the mechanisms or processes by which uses of AHLTA (i.e., treatments) influence outcome measures
4. An *evaluation design* for estimating AHLTA's effect on outcome measures in quantitative terms.

Given AHLTA's complexity and evolving nature, we do not consider AHLTA, as a whole, to be a "treatment." Instead, we consider a treatment to be a specific use of AHLTA under defined circumstances. An example of a treatment is the following: "When an active duty service member arrives for an appointment, determine whether the patient meets all the criteria to be medically ready to deploy; if not, remind the physician to inform the patient of his readiness status."

³ Throughout this monograph we use the word *treatment* as it is used in the program evaluation literature: the action or intervention whose effects on outcomes is to be estimated. This is more general than the use made of the word in healthcare, where a treatment is something done to a patient to affect his health status.

Logic models trace the cause-and-effect chains through which treatments influence outcome measures. Each treatment requires its own logic model, although many treatments should have very similar models. A logic model describes cause-and-effect relationships qualitatively, and data are needed to turn the qualitative arguments into quantitative estimates.

An evaluation design is the strategy for separating a treatment's quantitative effect on outcome measures from the confounding effects of other factors. The evaluation design will determine what data are needed and how those data could be used to generate the estimates. It is standard practice to measure this effect by comparing outcomes observed in the presence of the treatment to estimates of the outcomes that would have occurred in the absence of the treatment.

If the data are insufficient to estimate AHLTA's effects quantitatively, it is possible to use methods that combine logic models and a mixture of qualitative and quantitative evidence to support the existence of a cause-and-effect relationship between AHLTA and relevant outcomes. However, such methods rely heavily on quantitative measures of AHLTA-relevant outcome measures.

Specific Measures

The MHS strategic objectives are too abstract to serve as outcome measures. We have suggested detailed measures (i.e., measures specific to care setting, condition, procedure, and patient characteristics) for a wide range of strategic objectives that AHLTA could plausibly influence. Where possible, we suggest using detailed measures of healthcare quality that are in the public domain, which can be obtained from the National Quality Measures Clearinghouse (NQMC). While the NQMC measures represent the practical universe of existing quality measures, they cover only a minority of MHS strategic objectives. Measures for other strategic objectives must be developed from scratch. Where possible, we have suggested what those measures might be.

Before they are used, however, measures should be assessed for *reliability* (the degree to which the measure is free from random variation) and *validity* (the degree to which the measure is associated with what it purports to measure).

In order for high level managers to avoid information overload, we discuss methods for creating higher-level measures by selecting, aggregating, and summarizing the detailed measures. With this approach, it remains possible to drill back down to more-detailed levels to pinpoint a problem when a high-level measure reveals a problem.

Implementation Issues

Calculating a detailed outcome measure requires specific data elements and a precisely defined algorithm for combining them. To implement a given measure, therefore, one must identify sources for each data element, and those sources must reliably contain correct values for the data elements. Moreover, the data should not be buried in free text. For the measure to be practical, it must be possible to retrieve the needed data automatically.

Many measures of potential interest cannot be implemented because the necessary data are not collected. If the MHS deems a measure sufficiently important, MHS leadership may choose to change their information systems and policies to collect the necessary data. AHLTA enhancements are fielded regularly, and the need to collect additional data may be the purpose of future enhancements. Changes for this purpose could be made to other information systems; they need not be confined to AHLTA alone.

Finally, to implement our proposed framework, there must be an organizational home for a measurement system. The organization chosen will need ready access to data from many other systems as well. In addition, it will need considerable analytic capability. We anticipate that many of the treatments to be analyzed will originate as process improvement exercises at individual installations. That organization

will need to provide analytic support for these efforts, and it should act as a clearinghouse for information on all installations' improvement efforts.