Chapter 5

COLLECTION OF ACCESSION HEALTH DATA

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INTRODUCTION

The difficulties determining the characteristics and causes of health problems among 1990–1991 Persian Gulf War veterans illustrated the necessity for collecting accurate medical records and risk factor data in military populations.[1] As a result, several scientific review panels recommended that the US military collect more comprehensive health and exposure data.[2-5]

Health surveillance efforts are often inadequate because (*a*) implementation of surveillance efforts may lag behind time-sensitive deployments conducted in response to crises; and (*b*) accurate medical and psychological data are difficult to obtain once military personnel are told they are being deployed and may be facing combat.[6] Often the lack of preexposure risk factor data reduces the ability to calculate how military training, deployments, and militarily unique occupational factors affect an individual's health and well being. To fill this need, the Recruit Assessment Program (RAP) was developed to collect baseline health data at the start of military service from all active and reserve enlistees and accessioned officers. Collection of baseline health data is essential to (*a*) evaluate health risks and behaviors before entrance into military service, (*b*) understand the potential impact of deployments and other exposures of military concern throughout the service member's military career and potentially thereafter, and (*c*) develop and assess intervention and prevention programs for force health protection. Additionally, a clear understanding of baseline behaviors may provide insights that can improve the overall military training process, producing a more fit fighting force.

THE SAILOR'S HEALTH INVENTORY PROGRAM

The Sailor's Health Inventory Program (SHIP), a prototype program demonstrating the feasibility of administering a computer-based, electronically scanned health survey to recruits, was established in 1995 at the Navy Recruit Training Command, Great Lakes, Illinois.[7] SHIP was created to facilitate recruit in-processing by automating the completion of several pages of medical history, required for the creation of both medical and dental paper records. Although SHIP was not developed specifically as an electronic medical record, the designers foresaw that paper records would one day be obsolete and wrote the questionnaire in a simple, fill-in-the-bubble format readable by basic scanning equipment.

SHIP included 191 health questions, many taken verbatim from Standard Form 93, Report of Medical History, which was in use at medical entrance processing stations in 1995. The developers of SHIP, however, took the opportunity to add other relevant health history questions such as use of tobacco and alcohol, maintaining a simple yes/no format for responses. Sometimes these dichotomous-response questions were difficult to interpret, however. For example, because they were required to abstain from tobacco during basic training, recruits had trouble with the question, "Do you [smoke] tobacco?" SHIP was administered by healthcare professionals (Navy corpsmen) to groups of recruits in classrooms, and these professionals assisted with interpretation of challenging questions. Unfortunately, interpretation was still not standardized.

SHIP was administered during the first few days after arrival at basic training. The developers considered it advantageous to administer SHIP soon after the "moment of truth" briefing, in which trainers strongly admonished new recruits to reveal any previously undisclosed information about themselves (such as drug use) that could affect their military service.[7] There was consensus that recruits were very forthcoming with personal and health history information in this setting.

THE RECRUIT ASSESSMENT PROGRAM

The RAP expanded on the SHIP survey to include data on demographics, clinical and medical history, family history, psychosocial history, occupational history, and substance abuse and risk factor screens. Questions were incorporated from standard survey instruments such as the Alcohol Use Disorders Identification Test,[8,9] the two Medical Outcomes Short Forms (Short Form-12 and Short Form-36),[10,11] the Patient Health Questionnaire derived from the PRIME-MD instrument,[12,13] and the Adverse Childhood Experiences Study.[14-16] The initial RAP survey, developed by public health officials, clinicians, and researchers from the Department of Defense (DoD), Veterans Administration, and Department of Health and Human Services, was 17 pages in length and took an average of 60 minutes to complete.

A pilot study to establish the RAP at a recruit training center began in February 2000 at the US Marine Corps Recruit Depot (MCRD) in San Diego, California.[6,17] Many formal meetings were held with different

MCRD stakeholders, including recruit training staff and medical support, to lay the groundwork for administration of the RAP survey to recruits. The MCRD stakeholders agreed to accept the RAP, provided that it did not interfere with usual recruit in-processing or training and that it facilitated existing recruit care. The facilitation of recruit health care was achieved by establishing an electronic interface between the RAP database and the Composite Health Care System (CHCS), the DoD's primary automated medical information system, to automate the entry of basic demographic information.

In the fall of 2000, 198 male Marine recruits, in focus groups of 10 to 20, tested the survey and commented on difficulties in comprehending and answering individual questions. Revisions were made, improving readability and comprehension, especially on family history issues, so that by June 2001, when the survey was administered to all recruits as part of general recruit in-processing, it was 12 pages in length and took an average of only 30 minutes to complete.

Surveys were monitored for completion rates (Figure 5-1). Completion rate tracking, in combination with epidemiologic expert input and conduction of additional focus group tests, led to further modifications of the survey. It was noted that some questions with the instructions "mark all that apply" had low completion rates. Many of these problematic questions were modified, changing instructions to mark "yes" or "no" for these questions, and further tests of focus groups were conducted, resulting in better completion rates without requiring more time for completing the survey.

Other modifications included further clarification of many questions on family history issues. Significant numbers of recruits have divorced parents and do not grow up with their biological parents in traditional two-parent homes. In focus group tests, these recruits identified the need to add another category to the question asking if parents were divorced: "They were never married." Many family history questions were rephrased to ask about "the father who raised you" or "mother who raised you." Focus group testing also led to adding the option "This does not apply to me" on family history questions for recruits raised by single parents.

Input from experts in health survey development and findings from research published on variables in the SHIP survey[18,19] led to the addition of more questions on education, including questions on history of learning disability, hyperactivity, home-schooling, suspension or expulsion from school. Also added was one question asking about deliberately cutting, burning, or harming oneself. As a result of all of these modifications, the RAP survey administered at MCRD, San Diego, went through four versions, to ultimately become 13 pages in length and require an average of 30 minutes for completion.

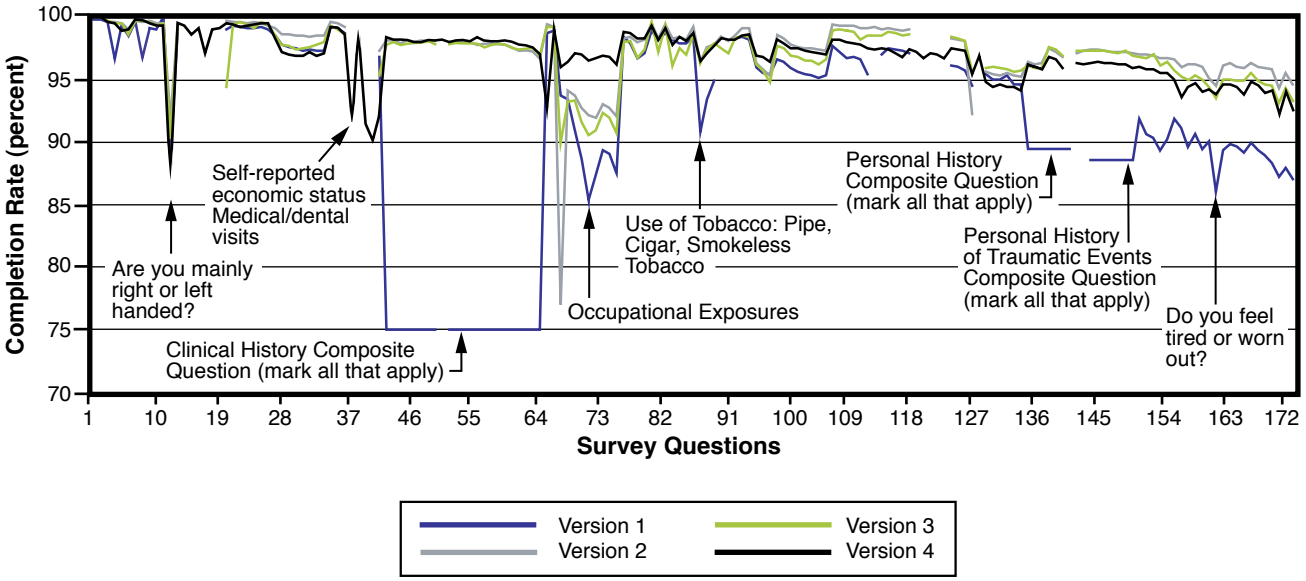

Fig. 5-1. RAP survey completion rate for each question by version from Marine Corps Recruit Depot, San Diego, California, 2001–2003.
Data source: unpublished RAP data.

EARLY RECRUIT ASSESSMENT PROGRAM DATA

Examples of aggregate RAP data collected between 2001 and 2004 at MCRD, San Diego, are shown in Figure 5-2.

To quantify reproducibility, kappa statistics were calculated. Guidelines to evaluate the kappa coefficient indicate that a value greater than 0.75 denotes excellent reproducibility; between 0.4 and 0.75 denotes good reproducibility; and between 0 and 0.4 denotes marginal reproducibility.[20,21] Test-retest RAP data show strong reliability, with an overall kappa coefficient of 0.92. Focus group testing, tracking of questionnaire completion rates, and analyses of kappa statistics have led to questionnaire revisions, improving completion rates.

Internal validation done by examining questions that should be correlated revealed strong concordance. For example, responses to a question about having a biological mother or father who has had an alcohol problem were compared with responses to a question about having grown up with someone who was a problem drinker or alcoholic; this resulted in a kappa coefficient of 0.51, illustrating good correlation (Figure 5-3). An excellent kappa coefficient of 0.94 resulted when comparing the response "I have never had sex" in a question asking for age of first sexual intercourse with the response "I have not had sex" in a question asking about condom use (Figure 5-4).

Other analyses using RAP baseline data include (*a*) differences in baseline data in US Marines who remain on duty 2 years after induction, compared with those who prematurely separated from enlistment; (*b*) the association of baseline behavioral and health characteristics, including body mass index, of Marine recruits placed in the remedial physical conditioning platoon compared to those placed in a regular training platoon; (*c*) the relationship of childhood experiences and family support to obesity in Marine recruits; (*d*) the relationship of childhood experiences and family support to problem drinking in Marine recruits; (*e*) the relationship of childhood experiences and family support to current smoking in Marine recruits; and (*f*) examination of homeschooling among young men before Marine Corps basic training.

A separate study, the US Marine Corps Health Assessment Project, resurveyed marines in 2004–2005 in order to (*a*) assess later health status in a large cohort of marines 2 years after boot camp, with additional questions on deployment and exposure information; (*b*) determine if baseline health data were associated

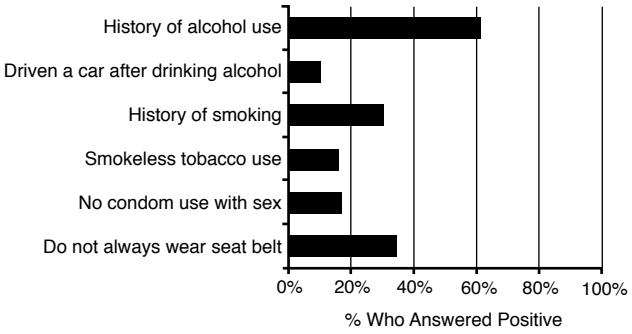

Fig. 5-2. Examples of aggregate data from Recruit Assessment Program at Marine Corps Recruit Depot, San Diego, California, between 2001 and 2004. Percentage of respondents who answered "yes" to specific questions. (N = 60,992)
Data source: unpublished RAP data.

Analysis of "Home Alcohol Problem"		Grew up living with problem drinker/alcoholic	
		Yes	No
Biological mother or father had alcohol problem	Yes	2,089	1,774
	No	1,452	28,959

Chi-square <.0001 Kappa = 0.5116 UCL = 0.5263 LCL = 0.4970

Fig. 5-3. Internal validation of a family member having an alcohol problem by kappa analysis comparing family history of biological mother or father with an alcohol problem to growing up with a problem drinker or alcoholic. January 2005.
UCL: upper confidence limit
LCL: lower confidence limit
Data source: unpublished RAP data.

Analysis of "Never Having Had Sex"		"I have not had sex" (from condom use question)	
		Yes	No
"I have never had sex" (from age of first intercourse question)	Yes	8,690	237
	No	628	42,169

Chi-square <.0001 Kappa = 0.9424 UCL = 0.9462 LCL = 0.9386

Fig. 5-4. Internal validation of never having had sexual intercourse by kappa analysis comparing responses on age of first sexual intercourse to condom use. January 2005.
UCL: upper confidence limit
LCL: lower confidence limit
Data source: unpublished RAP data.

with subsequent postdeployment mental and physical health problems identifiable from surveys and inpatient or outpatient records. This type of analysis enhances the efforts of intervention and prevention programs to protect health and readiness, adds to research in chronic multisymptom illnesses and mental health challenges, and may improve the health of military personnel in future deployments.

TRANSITION TOWARD DEPARTMENT OF DEFENSE–WIDE IMPLEMENTATION

In the fall of 2002, the Armed Forces Epidemiological Board (AFEB) recommended:

> a. the RAP should be implemented DoD-wide to collect baseline health data from all enlisted and officer accessions using consistent data collection methodology at all training sites. To accomplish this, the AFEB recommends using a system that is employable at all training sites given current capabilities (such as scannable forms) and compiling the data with periodic transfer to a central data repository.
>
> b. The RAP should be capable of collecting the information needed to register new recruits into CHCS-I/CHCS-II.
>
> c. CHCS I/CHCS-II should serve as the central repository for RAP data.

The board further recommended that a triservice subgroup from the participating recruit training sites, in collaboration with the TRICARE information management directorate and the Office of the Assistant Secretary of Defense for Health Affairs, should convene to finalize and transition the RAP from a pilot program to a standard healthcare program, define the functional requirements, and draft a capabilities statement to initiate the requirements development process for the RAP/CHCS-I/CHCS-II interface.[22]

The Office of the Assistant Secretary of Defense for Health Affairs followed the AFEB recommendations and championed the convening of the triservice subgroup to reach agreement on a common baseline recruit assessment instrument across DoD. The workgroup concluded that the concept of operations would include the following requirements:

- The baseline health assessment should be administered at the earliest time possible in the member's military career.
- A common, preferably paper-based instrument should be employed that can be completed in no longer than 30 minutes by 95% of new accessions.
- The instrument should be capable and mapable to the greatest extent possible to already existing DoD health assessment questionnaires such as the Health Evaluation Assessment Review (HEAR).
- The information collected should not be used pejoratively against the new accessions.
- A central program support office should be created during program start-up.
- The questions employed should be validity tested in the targeted population.
- Scheduled periodic review should be incorporated into the program.

In order to reach agreement on a common survey instrument for DoD-wide use, to finalize the integration of the RAP into CHCS-II, and to transition to a standard healthcare program, the workgroup met several times over a period of months. TRICARE Management Activity provided programmatic support. The new survey will be called the Health Assessment Review Tool–Accession (HART-A). Questions on the HART-A instrument, likely to differ to some degree from the survey instrument that evolved during piloting at MCRD, San Diego, will cover personal information, general background, general health, tobacco and alcohol use, injury prevention, chronic diseases or conditions, exercise and fitness, general clinical history, nutrition, family history, dental health, reproductive health issues, and mental health.

On October 28, 2004, President George W. Bush signed the Ronald W. Reagan National Defense Authorization Act for Fiscal Fear 2005. This act states:

> The Secretary of Defense shall carry out a program (1) to collect baseline health data from each person entering the armed forces, at the time of entry into the armed forces; and (2) to provide for computerized compilation and maintenance of the baseline health data. (b) PURPOSES.—The program under this section shall be designed to achieve the following purposes: (1) To facilitate understanding of how subsequent exposures related to service in the armed forces affect health. (2) To facilitate development of early intervention and prevention programs to protect health and readiness.[23]

Implementation of the program to collect computerized baseline health data from all persons entering the armed forces is to be accomplished by November 2006. The efforts involved in early RAP development and those of the DoD RAP workgroup have helped to ensure a successful employment of baseline health assessment survey as Congress directed.

Other military systems in other countries have expressed strong interest in RAP as well. As of 2005, the Canadian Forces had taken steps to implement a Canadian Forces recruit health questionnaire, and the United Kingdom and Australia were modeling recruit assessment surveys after the US RAP.

SUMMARY

Baseline health assessment can be successfully integrated into general recruit in-processing, with minimal disruption of training. Military systems in other countries are using the US RAP as a model for beginning a computerized medical record.

RAP success at MCRD, San Diego, led to efforts to extend the program throughout the DoD, integrating the collection of computerized baseline health data from new accessions into CHCS-II and transitioning to a standard health care program, supported by TRICARE Management Activity. These data provide a comprehensive profile of health characteristics of young adults in the United States. This is an important baseline when prospectively following the health of service members, who may subsequently experience illness, injuries, and hazardous exposures as part of their service. These data will help guide early intervention and prevention programs to ensure force health protection.

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