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A Professional Bulletin for the AMEDD Community

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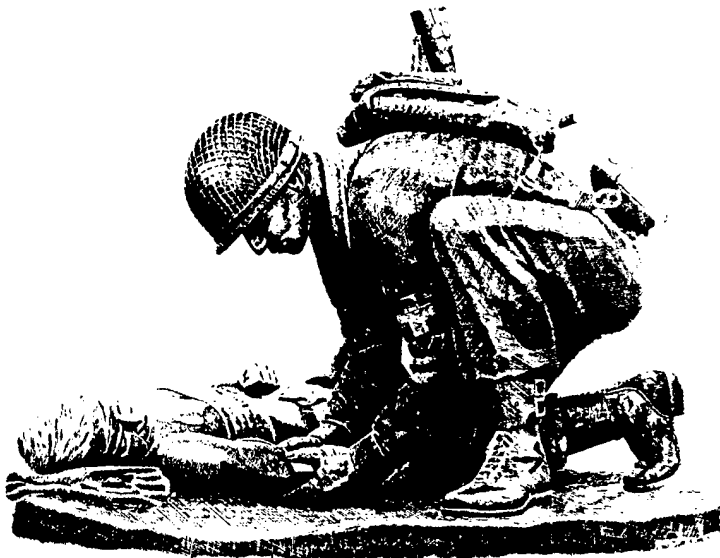
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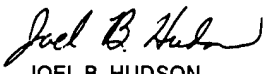
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Perspective

Medical Readiness

The Army Medical Department (AMEDD) is constantly facing new challenges in the delivery of health care, whether it is on the battlefield, in the medical center, in a deployed hospital, or a troop medical clinic. These challenges will impact the entire chain of command, from commanders down to individual soldiers. It is imperative that these changes are recognized early in order to best prepare soldiers and Army health care professionals for all future conflicts. As the Army Medical Department Center and School Commander, it is my responsibility to ensure that soldiers are given the skills to provide the best medical care anywhere in the world.

Within the next year, a significant change in the AMEDD will be the advent of the Military Occupational Specialty (MOS) 91W Health Care Specialist. This new soldier medic will have the medical and technical competencies to deal with casualties in combat and the core skills of an emergency medical technician. This new breed of health care professional will constitute first echelon care in both the battlefield and clinic environments. Yet, if the basic skills taught are not utilized and sustained, the combat medic simply becomes an obstacle to timely and proper medical care. The AMEDD must provide for sustainment of these soldiers so the 91W, in addition to all other medical MOSs, will be able to save lives on the battlefield. The type of response encountered with the 91W initiative may significantly affect the AMEDD's ability to ensure sustainment training for all specialties.

The AMEDD is a very diverse organization that deals with the equally varied aspects of medical readiness. In this issue, the AMEDD Journal highlights manuscripts submitted for the 2000 Clinical Manuscript Competition. These articles, along with the others in this issue including 91W sustainment, demonstrate the many different facets of medical readiness and the challenges that lay ahead.

- *Contingency Planning and Forensic Odontology.* Identifies the requirements and planning involved to prepare dental teams for the forensic identification of

victims in the event of a mass casualty situation.

- *Foodborne Bio-Terrorism.* Discusses the deployment of foodborne biological agents and the effectiveness of food deprivation and destruction as potential weapons. It also highlights the role of the U.S. Army Veterinary Corps in the prevention of foodborne illnesses.



Major General Kevin C. Kiley

- *Race and Endometrial Cancer in the Military.* Presents an in-depth analyses of patients with endometrial cancer and investigates whether race plays a role in outcome and survival differences among Caucasian, African-American, and Asian-Pacific racial groups.

- *91W Health Care Specialist Sustainment in the New Millennium.* Describes the basics of 91W sustainment training and the many innovations in training within the AMEDD to overcome any potential challenges.

- *Preventive Dermatology for Force XXI and the Army After Next.* Emphasizes the concept of Preventive Dermatology in operational medicine and presents recommendations to improve the prevention and treatment of skin disease at all echelons of care.

- *Clinical and Cultural Concerns in OOTW: A Case Study of HIV and Haiti.* Explores the successful application of combat stress control during Operation Restore Democracy in Haiti regarding human immunodeficiency virus and the delivery of appropriate medical care.

- *Role Perceptions of Army Hospital DCAs.* Discusses the ways in which the changing health care environment for military hospitals has greatly affected the role of the Deputy Commander for Administration within the present-day medical treatment facility.

- *Chlamydia Risk Factors in a Military Obstetrical Population.* An observational retrospective study focusing on the incidence of chlamydial infection in antepartum patients and investigating the role for routine screening.

- *Dietary Supplements and the Surgical Patient.* Reviews some of the more popular dietary supplements and how their use may impact the pre- and post-operative management of surgical patients.

2000 AMEDD JOURNAL CLINICAL MANUSCRIPT COMPETITION WINNERS

Several excellent and timely manuscripts were submitted for the 2000 AMEDD Journal Clinical Manuscript competition; these manuscripts are published in this issue of the Journal. The Editorial Board judged the manuscript by Maj Edward Kost (USAF) et al, to be the first place submission, with COL Esther Childers' manuscript in second place and WO1 Phillip Yenokvian in third place. Appropriate recognition of these achievements has been presented to these individuals.

2001 CLINICAL MANUSCRIPT COMPETITION

The Editorial Board is currently soliciting manuscripts for the 2001 Clinical Manuscript Competition. Manuscripts submitted must conform to the writing guidelines listed on the inside back cover of each issue. The Board will judge all manuscripts received by 1 September 2001 for subject analysis, clarity, organization, and writing style. Appropriate recognition for the top three manuscripts will be given and as many as possible will be published in the October-December 2001 issue. Questions regarding the competition may be directed to COL James M. Lamiell, Chairman, AMEDD Journal Editorial Board, DSN 471-2511 or Comm 210/221-2511; (James.Lamiell@amedd.army.mil)

CHANGES TO THE JOURNAL EDITORIAL BOARD

Colonel Glenn W. Mitchell has replaced COL Dale E. Carroll as the Medical Corps representative on the Editorial Board. Colonel Mitchell is the Chief, Clinical Services Division, U.S. Army Medical Command and Chief Consultant, Medical Corps, Office of the Surgeon General.

Lieutenant Colonel Michael J. Morris has recently been named as a Board member. Lieutenant Colonel Morris is the Chief, Physician Extenders Branch, Department of Medical Science, Academy of Health Sciences. He is also a Contributing Editor to the Journal.

CORRECTION

In the July-September 2000 issue of the Journal, the article "Hypoxia and Altitude Training in the U.S. Army" contained a typographical error. The word "hyperbaric" was inadvertently substituted for the correct term, "hypobaric." The Journal regrets any confusion the error may have caused.

Race and Endometrial Cancer in the Military

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United States Surveillance, Epidemiology, and End Results (SEER) data document a poorer prognosis for minorities with endometrial cancer as compared to Caucasians (C). The Department of Defense (DOD) health care system provides access to care without respect to age, race, or socioeconomic status. The authors sought to determine the effect of race as a predictor of survival in patients with endometrial cancer treated in the DOD system. Data was extracted from the DOD centralized tumor registry for the period 1988 to 1997. All patients with endometrial carcinoma were included in the analysis. Data included age at diagnosis, military status, race, tumor histology, grade, FIGO (cancer classification system established by French Fédération Internationale de Gynécologie et d'Obstétrique) surgical stage, adjuvant postoperative therapies, and survival. Despite participation in a health care system with minimal racial bias and minimal impediments to access of care, African-American (AA) and Asian-Pacific (AP) had a poorer 5-year disease-free survival than C. After controlling for imbalances in clinicopathologic factors, AP race was found to be a significant independent prognostic factor. Further research is needed to determine why minority status, and specifically AP race, portends a decreased survival.

Introduction

Endometrial cancer is the most common gynecologic cancer with an age-adjusted annual incidence of 21.1 cases per 100,000 women. The C women are twice as likely to develop endometrial cancer compared to AA women, however, there is a marked racial imbalance in the age-adjusted annual mortality rates. The AA women with endometrial cancer have an age-adjusted annual mortality rate of 6.0 deaths per 100,000 women versus 3.3 deaths per 100,000 for C women.¹

Several studies have attempted to elucidate the factors responsible for the racial disparity in endometrial cancer survival.²⁻¹¹ The AA women have been shown to present with more advanced stages of disease, higher tumor grades, and less favorable histologic tumor

types.^{2-9,11} It has been demonstrated that AA women have lower socioeconomic status, resulting in more limited access to health care.^{5-9,11} Delays in diagnosis result in presentation at higher stages of disease, resulting in poorer outcomes. Attempts have been made to investigate the contributions of racial and economic biases resulting in AA women receiving less aggressive treatment of their endometrial cancer. Several investigators have found that the poor survival of AA persisted even after controlling for differences in clinicopathologic factors, however, these studies have had important limitations.^{6-7,11} Many of the previous studies included hospital-based patient populations with limited numbers of AA patients having endometrial cancer. Most studies included clinically and surgically staged patients, making analysis of pathologic prognostic factors and survival inaccurate. Few controlled for differences in socioeconomic status and the adjuvant

therapy delivered. Finally, due to limitations in study design, economic and racial biases were not adequately addressed.

The DOD health care system provides a unique model to address the racial disparity in outcomes of women with endometrial cancer. All patients in the current study were eligible for comprehensive health care provided through the DOD health care system. Access to care is unrelated to patient age, race, or socioeconomic status. All patients with endometrial cancer were treated by gynecologic oncologists in tertiary care medical centers. In this article, we present an analysis of women with surgically staged endometrial cancer in a health care system with minimal racial, economic, and treatment biases. We sought to determine whether outcome differences exist among three racial groups: C, AA, AP, and whether such differences persist after controlling for clinicopathologic factors.

Materials and Methods

Cases of endometrial cancer diagnosed between 1988 and 1994 and registered in the centralized DOD tumor registry were selected. The DOD tumor registry is a "population-based" program with a database containing information from tumor registries from military health care facilities. Data from 1811 females diagnosed with endometrial cancer were analyzed. Patient, tumor, and treatment characteristics were abstracted. Data were stratified by age at diagnosis (<60 and >60 years of age), ethnicity (C, AA, and AP; Japanese, Filipino, Korean, Vietnamese), military member status (retired, active duty), and patient status (spouse, military member, mother, mother-in-law). Tumor characteristics included FIGO surgical stage (I, II, III, IV), tumor grade (1, 2, 3), and tumor histologic tumor type (adenocarcinoma, papillary serous, clear cell). Clear-cell and papillary serous histologies were defined as unfavorable. Adjuvant postoperative therapies included radiation therapy, chemotherapy, and hormonal therapy. Adjuvant radiation therapy consisted of external-beam whole-pelvic or intracavitary radiation. Chemotherapy varied over the years of study but was predominately cisplatin-based. Hormonal therapy consisted of megestrol acetate or tamoxifen. Adjuvant therapy typically was administered to women with documented extrauterine disease, high-risk early-

stage disease, and unfavorable histologies. All cancer stages were reviewed by the authors (Kost and Farley) to assure compliance with the 1988 International Federation of Gynecology and Obstetrics criteria.¹²

Disease-free survival was defined as the interval from diagnosis to disease recurrence or death. Disease recurrence and cancer-related deaths were considered events in the analysis. Subjects were censored for death due to intercurrent disease. Actuarial curves were calculated using the method of Kaplan and Meier and compared by the log-rank test.¹³⁻¹⁴ The chi square test was used for analysis of the distribution of prognostic factors between racial groups. Variables found to be significant on univariate analysis ($P<.05$) were entered into a multivariate analysis.

Results

Patient characteristics of C, AA, and AP women are compared in Table 1. No significant differences were seen in mean subject age at diagnosis of endometrial cancer. The percentage of patients greater than age 60 years was similar in each racial group. In all racial groups the majority of patients were spouses of retired military members. Subtle differences were detected, however. A higher number of minority patients were either spouses of active duty or nonspouse family members (mother). Tables 2 and 3 compare the tumor characteristics. The AA women had more advanced stages of disease at the time of diagnosis compared to C women and this difference was highly significant ($P<0.001$). The difference is most obvious when comparing stage I disease between AA and Cs; 60.9% and 81% respectively. There was no statistically significant difference in stage distribution between AP and C women. The AA and AP women had a higher frequency of high-grade lesions. Although a trend was observed toward a higher frequency of unfavorable histologies in AA and AP women, this difference did not reach significance.

Adjuvant therapies (radiation therapy, chemotherapy, and hormonal therapy) are summarized in Table 4. The percentages of women who received radiation therapy and hormonal therapy were similar between groups. A higher percentage of AA and AP women received chemotherapy. A higher percentage of AA and AP women presented with

stage III and IV disease and thus were more likely to receive chemotherapy. When controlled for stage of disease, no significant racial difference was seen in the percentage of women receiving chemotherapy.

All patients were followed until the time of death or a minimum of 5 years. As shown in Figure 1, AA and AP women had worse 5-year disease-free survivals compared with C women (72% and 73% versus 89%; univariate analysis, $P<0.001$). No significant differences were seen in survival when AA women were compared to AP women. The 5-year disease-free survival data for all significant

variables is summarized in Table 5. Significant prognostic factors on univariate analysis included race, FIGO surgical stage, tumor grade, histologic type, and age >60 years old (Figures 1 thru 4).

Multivariate analysis was done to determine which variables would remain independent prognostic factors. This model included all variables found to be significant on univariate analysis. Surgical stage, age at diagnosis, and AP race were found to be significant independent prognostic factors. AA race was not found to be an independent prognostic factor. These results are summarized in Table 6.

Characteristic	C (N=1632)	AA (N=79)	AP (N=100)	P
Mean Age (years)	58.6	57.1	56.8	.11
Military Member Status				
Retired	92.1	83.7	82.6	
Active Duty	7.9	16.3	17.4	.025
Patient Status				
Spouse	95.7	88.5	91.9	
Military Member	3.1	5.1	4.0	
Mother	.7	3.8	—	
Mother-in-law	.5	2.6	4.0	.023

Values expressed as percent unless otherwise stated.

Table 1. Patient Characteristics

Characteristic	C	AA	P
Stage			
I	81.0	60.9	
II	7.5	15.2	
III	8.2	6.5	
IV	3.3	17.4	<.001
Grade			
1	56.0	42.2	
2	28.8	31.3	
3	15.2	26.6	.026
Histology			
Adenocarcinoma	95.8	90.8	
Papillary	2.7	7.7	
Clear Cell	1.6	1.5	.05

Values expressed as percent.

Table 2. Tumor Characteristics

Characteristic	C	AP	P
Stage			
I	81.0	74.7	
II	7.5	9.6	
III	8.2	7.2	
IV	3.3	8.4	.101
Grade			
1	56.0	43.7	
2	28.8	27.6	
3	15.2	28.7	.003
Histology			
Adenocarcinoma	94.6	89.0	
Papillary	4.0	9.0	
Clear Cell	1.4	2.0	.048

Values expressed as percent.

Table 3. Tumor Characteristics

Therapy	C	AA	AP	P
Radiation	28.0	23.1	33.7	.24
Chemotherapy	6.8	16.0	13.6	.001
Hormonal	3.8	2.9	5.7	.475

Values expressed as percent.

Table 4. Comparison of Adjuvant Therapy

Disease-Free Survival		
Characteristic	(Percent)	P
Stage		
I	96	
II	92	
III	60	
IV	25	<.001
Grade		
1	96	
2	89	
3	65	<.001
Race		
C	89	
AA	72	
AP	73	<.001
Histology		
Adenocarcinoma	92	
Papillary	76	
Clear Cell	69	<.001
Age (years)		
<60	92	
>60	82	<.001

Table 5. 5-year Disease-Free Survival Univariate Analysis

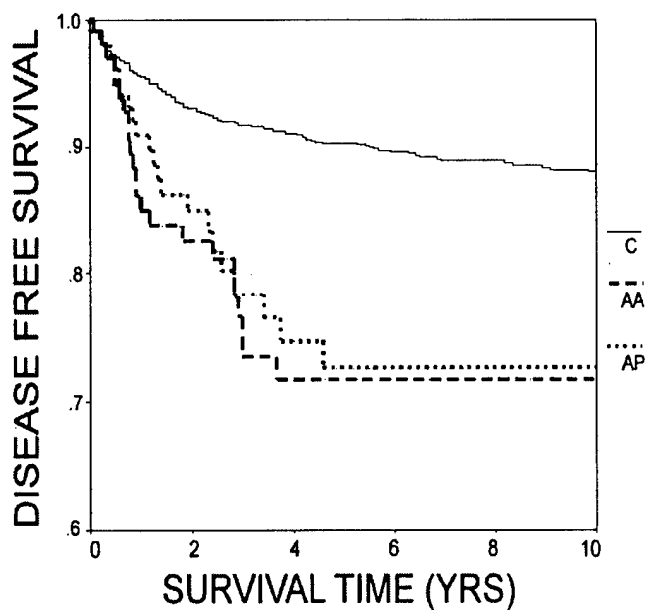


Fig 1. Univariate analysis. Disease-free survival of C versus AA and AP <0.001.

Characteristic	Category	P
Stage	I vs II vs III vs IV	<.001
Grade	1 vs 2 vs 3	.51
Race	C vs AA	.89
Histology	Favorable vs unfavorable	.14
Age (years)	<60 vs >60	.023

Table 6. Multivariate Analysis of Disease-Free Survival

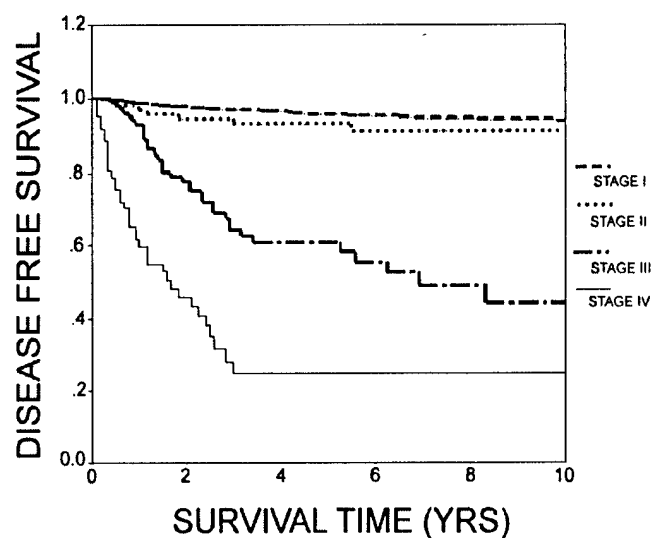


Fig 2. Univariate analysis. Disease-free survival of FIGO stages I, II, III, IV (<0.001).

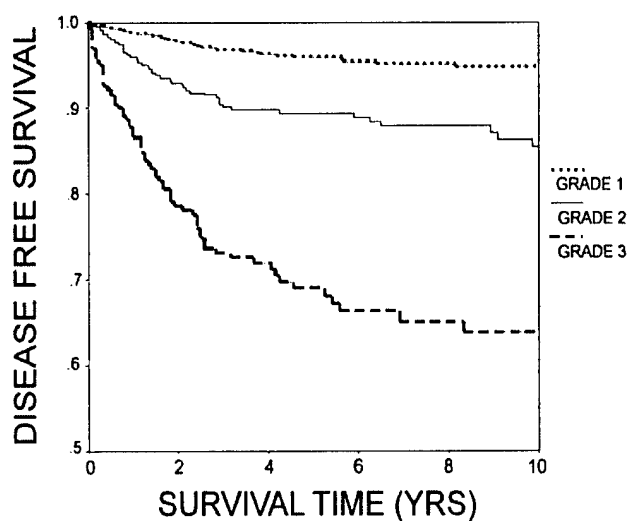


Fig 3. Univariate analysis. Disease-free of grades 1, 2, 3 (<0.001).

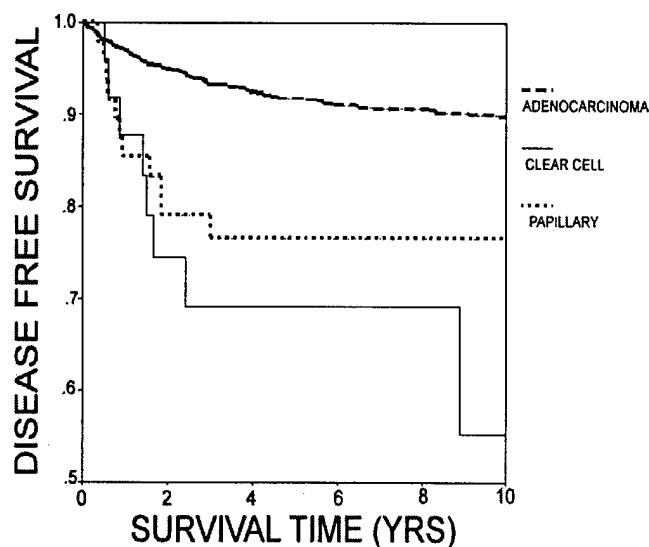


Fig 4. Univariate analysis. Disease-free survival of histology types (<0.001).

Discussion

Analyses of outcomes in patients with endometrial cancer are complicated by numerous interrelated prognostic variables including age, race, stage, grade, histologic tumor type, socioeconomic status, extent of surgical staging, adjuvant therapy, and confounding medical conditions. It is crucial to identify all potential explanatory factors and to understand their relative importance. Only after accounting for these factors can one make meaningful conclusions regarding the impact of race on outcome.

No difference was observed in the frequency of age >60 years old between the three racial groups. However, on both univariate and multivariate analysis, age >60 years was found to be an independent predictor of decreased survival. Several other investigators have confirmed the finding that age is an independent prognostic factor.^{3,5,15} Some have postulated that differences in immune and endocrine functions between the young and the old may account for the differences in survival. While age >60 years old was shown to be an independent prognostic factor in the current study, it does not explain the racial disparity in survival, as this prognostic factor was evenly distributed among the three racial groups.

All patients included in our analysis had surgical

staging performed according to the 1988 FIGO guidelines. In addition, all patients underwent primary surgical treatment by a gynecologic oncologist, including surgical staging. Detailed surgical evaluation including lymph node evaluation was performed as appropriate. Our data indicate that AA women present more frequently with advanced stages of disease and both minority groups present more frequently with poor grade and unfavorable histologic tumor types. As shown in Figure 1, AA and AP women had poorer survival compared to Cs. Similar to other series which included multivariate analysis, stage of disease and grade were dominant poor prognostic factors.^{2-4,6-9,11} It is likely that the decreased survival seen in AA and AP women is due at least in part to their presentation at higher stages of disease and higher frequency of poor grade, and unfavorable tumor histologies.

Besides presenting more often with advanced stages of disease, poor grade, and higher frequency of poor prognosis histologic types, several other factors may play a role in endometrial cancer mortality in AA and AP women. First, in the SEER data, and in subsequent series, more AA women received no care, and in general, minority women received less-extensive treatment.^{7-9,11,16} Our data indicates that the percentages of women who received adjuvant therapies were similar between the three racial groups. Although subtle biases may have entered into treatment decisions, less-extensive treatment was not a determinant of the poor prognosis seen in minorities. Second, several investigators have documented lower socioeconomic status in minority women with endometrial cancer and have suggested poor access to health care and delayed diagnosis as explanations for more frequent presentation at advanced stage.^{5-9,11} In the present study, all patients received comprehensive health care provided through the DOD health care system. Patient socioeconomic status was not a determinant of either access to health care or intensity of care. Third, AA and AP women may present with more poorly differentiated, advanced stage disease because they are alienated from the system and are less likely to seek health care when symptoms develop. It has been suggested that because of poor educational status, minority women may be unaware of the significance of abnormal uterine bleeding, thus delaying presentation for medical care. Although we did not directly address these issues in the current study, Liu et al have demonstrated no racial differences in the interval

from the onset of abnormal uterine bleeding to hysterectomy in AA versus C women.² It's unlikely that limitations in access to care or delay in diagnosis were significant causative factors for decreased survival in the current study.

While a significant amount of research has been directed toward the racial disparity in endometrial cancer survival seen between AA and C women, little effort has been directed toward other racial groups. The DOD tumor registry contained sufficient numbers of patients to allow separate analysis of three racial groups; C, AA, and AP. A MEDLINE search from 1966-2000, using the search terms endometrial, uterine, carcinoma, cancer, Asian, Pacific Islander, and AP failed to disclose data concerning AP race as a prognostic factor for endometrial cancer. The current study shows that AP women have decreased survival compared to C women. Interestingly, when we compared AA and AP women we found no statistically significant difference in distribution of age at diagnosis, stage, grade, histologic tumor type, or survival. Multivariate analysis indicated that AP race was an independent predictor of decreased survival. The AA race was not an independent risk factor. Our results are in agreement with several other series that included multivariate analysis, which found that AA race was not an independent prognostic factor after controlling for imbalances in pathologic features^{2,4,5} It is likely that the decreased survival seen in AA women is due to presentation at higher stages of disease.

Why AP race remained an independent prognostic factor after controlling for clinicopathologic factors is also unclear. One possibility is that tumors arising in minority women are biologically more aggressive. Recently, some of the genetic alterations involved in the development of endometrial cancer have been discovered. Kohler et al found that the incidence of p53 overexpression was significantly higher in AA women relative to C women. Furthermore, p53 overexpression was associated with worse survival in both racial groups.¹⁷ More recently, Maxwell et al have shown that AA have a lower incidence of PTEN mutations which are associated with good prognosis endometrial cancer.¹⁸ In addition, other alterations such as aneuploidy and HER-2/*neu* overexpression have been found in higher frequency in AA women.¹⁹⁻²¹ Further research is needed to determine if

these genetic defects are independent prognostic factors or simply markers of more advanced stages of endometrial cancers. Studies of genetic alterations have not been conducted on endometrial cancers from AP women. It is possible that genetic defects similar to those identified in AA women are responsible for the poor survival seen in AP women in our study. The confirmation of similar genetic defects in both minority groups would strengthen a molecular etiology of the racial disparity seen in endometrial cancer survival.

There may be subtle socioeconomic factors in the DOD health care system which are partially responsible for the decreased survival seen in AP women. Unfamiliarity with the military system, language and cultural barriers, and educational factors may result in delayed presentation for health care, delay in diagnosis, and worsened prognosis. Our study did not address racial differences in comorbid medical conditions, dietary factors, or the frequency of hormone replacement therapy. A detailed analysis of these factors is limited by the nature of our tumor registry data.

Our study suggests that AA and AP women do not have a poorer prognosis than C women because of limited access to care or less extensive treatment. While both minority groups present with higher frequencies of traditional poor prognostic factors, our results suggest that AP race is a newly identified independent poor prognostic factor for endometrial cancer survival. Further research is necessary to identify unique socioeconomic factors and genetic alterations in AP women with endometrial cancer.

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Contingency Planning and Forensic Odontology

COL Esther L.B. Childers, DC†

Introduction

Contingency planning is the cornerstone for a timely, efficient, and professional response to unexpected medical disaster situations.¹ The key elements of contingency planning include the development of a response protocol, training of personnel, preparation of prepackaged equipment, the establishment of necessary liaison, and participation in exercises. A forensic odontology identification mission requires preincident preparation. Routine dentistry provides a background for duties as a forensic odontologist; however, specific preparations prior to performance of a forensic odontology identification mission are quite helpful toward accomplishment in a timely and accurate manner.² Additionally, contingency planning is important because the immediate and unscheduled character of a forensic identification mission does not allow prolonged preparation time following a request for action. Forensic identification mission requirements often arrive on short notice yet require rapid response. Prior planning facilitates swift and precise response to a request for forensic odontology identification. Liaison, equipment, and training are critical elements of preparing for duties as a forensic odontologist. This article will examine preparing for the role of a dental team for a mass casualty situation as it pertains to forensic identification of victims. Successful dental forensic identification involves the collection, preservation, and scientific analysis of dental remains. Planning, training, and employment of the forensic dental team for successful dental forensic identification missions will be discussed.

and should follow command channels. The ME is the appointed forensic pathologist and may be a local medical pathologist or may be part of a ME team from the Armed Forces Office of the ME. Usually, the installation Commander will be responsible for whether forensic identification of fatality victims will be accomplished on post or at the Air Force Port Mortuary Facility at Dover Air Force Base, DE. The local dental team should be prepared either to support an augmentation team from the ME or to otherwise complete the mission as requested by the ME. Occasionally, a lawyer, or family member will try to bypass command channels and call the dentist directly to request assistance on an identification. In that event, the dental Commander should be notified, the request should be redirected, and then acted upon by the Commander.

Dental analysis may be one of several methods of identification available to the ME. Fingerprinting, genetic and serologic analysis, personal effects, and visual recognition are identification methods available to the ME. Dental analysis remains a rapid and reliable method of forensic identification.³⁻⁵ More than one method of identification may be employed in a mass disaster situation

Administrative	Medical	Dental
Inprocess	Radiology	Dental Radiology
Photography	Pathology	Dental Examination
Fingerprints	Anthropology	Antemortem Dental Charting
Mortuary	Laboratory	Dental Charting Comparison
Storage/Shipping		

Note: Antemortem dental charting and dental charting comparisons are best accomplished in a quiet area and may be separate from the postmortem examination room.

Background

Dental forensic identification of victims is initiated at the request of the medical examiner (ME)

Table 1. The Dental Team as Part of the Overall Identification Effort

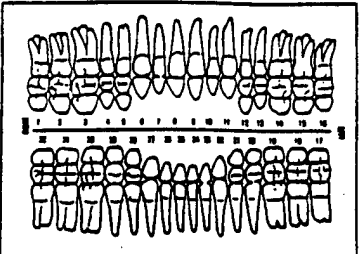
and the dental team functions as part of the overall effort to collect, analyze, and identify human remains in a medical or mass disaster (Table 1.) Operation of the dental forensic team should conform to the guidelines of the American Board of Forensic Odontology (ABFO) (Table 2).⁶

Forensic dental identification guidelines Adapted from the ABFO Body Identification Guidelines ⁶	
• Examination and documentation of dental findings of postmortem remains under the direction of the ME and in compliance with Occupational Safety and Health Administration (OSHA) guidelines. • Examination and documentation of antemortem dental findings. • Comparison of antemortem and postmortem findings. • Reconcile the comparison results and provide a written summary report to the ME.	

Table 2. Guidelines for Forensic Identification

Dental forensic identification hinges upon the availability of antemortem records. Military dental records containing radiographs, charting, and treatment logs are

NAME _____ SSN _____ RANK _____	
SEX _____ RACE _____ AGE _____	X-RAY TYPE & DATE _____
EXAMINERS _____	DATE RECONSTRUCTED _____
	RECORD SUPPLIED BY _____

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Fig 1. Antemortem chart.

ideal for this purpose. Transfer of records may need to be documented. Antemortem findings are charted, then transferred to a format that will facilitate ease of comparison with postmortem findings (Figure 1). Within this context, managing the accuracy, clarity, legibility, and completeness of the dental record on a regular basis promotes the readiness of the forensic dental team. Inadequate and missing dental records have been noted to present problems to forensic missions.⁷ Every dentist makes a contribution to this effort each time a dental record is completed accurately and fully and returned to the correct position in the files.

Current policy has shifted repository records from the dental panoramic radiographic record to the genetic, or deoxyribonucleic acid record. However, most investigators believe no method of identification is 100% reliable in all types of situations and therefore the dental forensic team is still a viable tool for the identification of fatality victims.³ Panorex duplicates are no longer required to be sent to the Central Storage Panorex Facility, the radiographs currently on file are available for forensic identification use in the event the service member's original dental record is not readily located. Although the repository will continue to be utilized as long as possible, the proportion of active duty members with a current panorex on file will continue to be a diminishing percentage. We can no longer be confident that a duplicate panoramic radiograph will be available and it is incumbent upon every dental practitioner to regularly assess the service member's record during treatment opportunities for a current, panoramic radiograph of diagnostic quality. This includes U.S. Army Reserve and Army National Guard personnel in accordance with U.S. Army Dental Command (DENCOM) Policy 99-08, *Dental Records and Panoramic Radiographs for U.S. Army Reserve and Army National Guard Personnel*.

Postmortem examination of dental evidence should be recorded and labeled in a format that promotes ease of comparison with antemortem records. In addition to the dental findings, the record should include the name and rank of the examiners, location of the examination, requesting authority, case number, and date. Photographs should be utilized to augment radiographs and charting information. Because photographs are often developed after the remains have been released, recording the photograph number directly on the postmortem record will

simplify sorting and labeling the photos (Figure 2).

BODY NUMBER _____		EST AGE _____		RACE _____		SEX _____		DATE _____	
EXAMINERS _____		PLACE OF EXAMINATION _____							

DESCRIPTION/COMPUTER CODES		RESTORATIONS & MISSING TEETH																															
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Fig. 2 Postmortem chart.

Written documentation of the forensic identification team results should be recorded and a copy submitted to the ME along with a copy of the antemortem charting, a copy of the postmortem charting, and a copy of the radiographs. Summary conclusions are usually categorized as positive identification, possible identification, exclusion, or insufficient evidence (Figure 3).⁶

Liaison

Liaison must first be established within the dental staff. Properly trained and interested personnel must be identified and a roster should be updated regularly. A list of experienced and interested dental personnel should be maintained and updated regularly. The appointed forensic dentist, on orders in accordance with DENCOM Policy Letter 99-12, *Forensic Dentistry*, is the designated team leader. Other personnel should be annotated on the roster as experienced or trainee, so that the proper mix of personnel may be achieved. Coupling older team members

who are more experienced with younger, less experienced staff has been shown to minimize stress.⁷ Experienced personnel should mentor less experienced personnel, particularly with respect to our dental technicians, who may not be afforded the opportunity for formal training. Documentation and recording of dental findings, both antemortem and postmortem, should be performed by at least two independent examiners. This will minimize the opportunity for error and maximize the training benefit for junior staff.^{8,9} Any discrepancy may then be resolved on the spot, before the remains are released.

Liaison with the pathology department is essential. Insuring the appropriate pathologist has current telephone alert rosters may assist the pathology team in notification of the dental team. The appointed forensic dentist should coordinate with the local pathologist and become familiar with the morgue operation. The morgue size may be a limiting factor in a mass casualty situation and should be considered in planning. Access to the morgue area is usually limited, and prior recognition of the dental team as authorized personnel is advisable. Important points of discussion include level of experience of both the dentist and the pathologist, historical data on the number of forensic autopsies encountered per year, and equipment and supplies usually stocked in the morgue that may be available for use by the dental team. The dental team may have more experience with clinical photography than their medical colleagues and this may be a useful area in which to share expertise.

A point of contact with the mental health team should be established for psychological debriefs of the dental team as needed, based on the mission duration and extent. A forensic mission may be the team member's first contact with human remains, particularly junior enlisted staff. Daily debriefs, careful monitoring of work hours with particular attention to rotating personnel, and follow up counseling should be coordinated for all personnel. Stress has been identified as a problem area by Brannon and Kessler.⁷

Equipment

Some expendable supplies will be readily available in the morgue operation and some equipment will be specific to the dental procedures. Dental supplies and equipment,

NAME OF DECEASED _____ BODY NUMBER _____
 RANK _____ SEX _____ RACE _____ AGE _____ SSN _____
 EXAMINERS _____ DATE _____ PLACE _____

COMPARISON OF ANTEMORTEM AND POSTMORTEM DENTAL RECORDS AND RADIOGRAPHS REVEAL CONCORDANCE
 ON TEETH (DESCRIBE FEATURE)

1 _____	9 _____	17 _____	25 _____
2 _____	10 _____	18 _____	26 _____
3 _____	11 _____	19 _____	27 _____
4 _____	12 _____	20 _____	28 _____
5 _____	13 _____	21 _____	29 _____
6 _____	14 _____	22 _____	30 _____
7 _____	15 _____	23 _____	31 _____
8 _____	16 _____	24 _____	32 _____

REMARKS _____

FINDINGS (CIRCLE ONE) POSITIVE IDENTIFICATION CONSISTENT WITH UNIDENTIFIED
 SIGNATURE OF EXAMINERS _____
 FINDINGS CONFIRMED BY _____ (DENTAL TEAM LEADER)

Fig 3. Summary report chart.

infection control materials, radiographic equipment and supplies, photographic equipment and supplies, and administrative supplies should all stand ready to go at a moment's notice (Table 3). Supplies used in a forensic identification mission are essential and should not be available for routine access by the clinic. Once established as a "go-kit," the supplies should only be accessed for a forensic mission. Good lighting equipment is crucial to accurate postmortem dental charting and yet, the lighting in the morgue is rarely equal to the standard dental unit. Headlights provide the best visibility. Goose neck lamps and flashlights are less desirable, but may be adequate. Mobile radiographic equipment and supplies should be kept stocked, calibrated, and checked regularly. Radiation hygiene must be considered. Lead aprons or mobile lead screens may be needed to safely operate radiographic equipment in the morgue facility. Radiographic developing equipment is key to a timely and accurate mission and must be carefully coordinated. Coordination between the morgue location and the developing equipment is crucial. Discrete transport of radiographs between the morgue and the clinic may be necessary. Personnel must understand the importance of avoiding commingling of postmortem radiographs, particularly at the developing and mounting station. Some adjustment of radiographic technique may

be needed to insure diagnostic quality radiographic records of postmortem remains.¹⁰

Infection control procedures must be followed in accordance with the Centers for Disease Control (CDC) and Prevention recommendations for dentistry and the necessary supplies included in the "go-kit." The practice of universal precautions and barrier protection applies to morgue procedures. Equipment that is shared between the morgue and the clinic must be disinfected or sterilized according to CDC recommendations. Personnel operating in both the clinic and the morgue must be particularly careful to avoid carrying contaminated equipment or supplies into clean areas.

The protection of the health and safety of the dental team must be assured. Chemicals must be utilized in a safe manner according to OSHA guidelines. Radiation protection must be monitored and maintained.

Training

Mass casualty exercises are trained throughout the AMEDD system, but what happens when a "casualty" dies? Usually, the casualty-player is finished with the exercise at that point. Too often, mass casualty exercises fail to include fatality management. Further, even if the medical team includes fatality management in the exercise, the dental team may not be included. Yet, training for forensic dental identification is a crucial aspect of preparedness for response to a medical disaster. Participation in hands-on exercises and the groundwork that precedes an exercise provide a very effective means of training. On the job training or apprenticeship is also important as discussed by Brannon and Kessler.⁷ In addition to the technical skills, training exercises may identify weak areas in disaster plans. For example, the planned workspace may be too small for the team, or the work area may not maintain the quiet and privacy that is needed for charting and comparison of dental findings. Training is the foundation of excellent performance under difficult circumstances.

Dental Examination	Need	Have
Dental mirror		
Dental explorer		
Mouth prop		
Toothbrush		
Tissue scissors		
Irrigation bulb		
Tissue forceps		
Surgical handle		
Surgical blade		
Tongue depressor		
Cotton sponge		
Infection Control		
Hydrogen peroxide		
Bleach		
Gloves		
Flashlight or headlight		
Batteries		
Safety glasses		
Face mask		
Scrub suit		
Shoe cover		
Overgarment		
Radiographic/Photographic		
Portable Xray unit		
Xray developer		
Periapical film (double pack)		
Bitewing film (double pack)		
Film mounts		
Film envelopes		
View boxes		
Aiming devices		
Modeling clay		
Camera and flash		
Slide or print film		
Batteries		
Ruler (plain or ABFO No. 2)		
Administrative		
Pencils, pens		
Clipboards		
Manila folders		
Large envelopes		
Antemortem forms		
Postmortem forms		
Summary report forms		
References		
Personnel roster		
Telephone numbers		

Note: Most items will fit in a carrying case, tool, or tackle box. Number of items required will vary with size of mission.

Table 3. Supply and Equipment Checklist for Forensic "Go-Kit"

Formal training courses are offered at various sites throughout the year (Table 4). Weeklong courses are

offered by both military and civilian centers that provide the fundamental information and are often augmented by a laboratory "hands-on" scenario. Current policy supports formal training in forensic identification methods. The DENCOM Policy Letter 99-22, *Training in Wartime Emergency Medical Treatment* includes 1 hour training in forensic dental identification as part of the curriculum. The DENCOM Policy Letter 99-12 advocates short course training for the appointed forensic dental officer, as offered by the Armed Forces Institute of Pathology Department of Oral and Maxillofacial Pathology.

Selected Training Resources for Forensic Odontology	Web Site
Armed Forces Institute of Pathology	www.afip.org
American Academy of Forensic Sciences, Odontology Section	www.aafs.org
American Society of Forensic Odontology	www.asfo.org

Table 4. Formal Training

Training for forensic identification includes both individual education and team exercise experience. Informal training and practice during mass casualty training, as implemented by the hospital, offers an opportunity to improve skills and identify areas of weakness. Priority training should be given to the dentist locally appointed as responsible for forensic dental identification missions. That dentist is then able to return to the unit and provide annual training required by others. Smaller forensic missions, involving one or two casualties, offer an opportunity to include personnel without prior experience working alongside those with more experience. Consideration must be given to this mentoring for both dental and auxiliary staff as team-building and educational experience.

Training as part of preparedness for a medical disaster is an ongoing process. Coordination with the medical mass casualty exercises affords a realistic scenario in which to critically assess performance, equipment, and coordination of the dental team forensic identification plans. Personnel changes necessitate continued updating and practice of procedures. Equipment and maintenance checks must be on a periodic cycle. After-action analysis of an exercise offers opportunity for improvements. Formal training should be periodic within the unit for all personnel.

Summary

Prior planning and training can facilitate the smooth operation of a dental forensic team under the difficult circumstance of a medical disaster. Advance coordination of personnel and the establishment of positive liaison with all departments will significantly reduce the confusion that accompanies a medical disaster. Organization and identification of equipment, supplies, and spaces for use by the dental team will contribute toward a smooth team operation. Training of personnel and exercises to maintain expertise will ensure the accidental does not become the unplanned. Contingency planning and preparation are the keys to an efficient, effective, and professional response to a medical disaster situation (Table 5).

Key Areas of Preparation for Forensic Odontology Missions	
Liaison	Dental Officers
	Dental X-Ray Technicians
	Medical Pathologist
	Morgue Personnel
	Psychologist
Supply	Prepare "Go-Kit"
	Identify Portable X-Ray Unit
	Identify X-Ray Developer
	Identify View Boxes
Space	Identify Area for Antemortem Charting and Comparison
Training	Advanced Training
	Periodic Training
	Exercise Training

Table 5. Key Elements of Contingency Planning

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Foodborne Bio-Terrorism

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Background

Food deprivation has disastrous effects on the will to resist. Food can be used to spread infectious agents. Agriculture is one of the few industries that generates a significant trade surplus for the U.S. (\$18 billion in 1992).¹ Under the forward-looking and realistic concept of the nonlinear battlefield, the means to impact food or food production becomes the perfect weapon. In the face of this ominous potential, Veterinary Corps personnel must plan to increase levels of deployment to support heightened levels of vigilance.

The U.S. does not have a strategic food reserve program. Fortunately, only minor attacks on food involving biological agents have occurred. However, defense strategists have proposed horribly feasible scenarios proving that biological attacks on food could undermine national security, weaken the economy, and achieve terrorist objectives here and throughout the world.

Constraints against the use of biological weapons are weakening. Food supplies are more vulnerable now than ever. Terrorists may be finding foodborne bio-terrorism very attractive after the failure of conventional tactics to achieve desired results. This article discusses the effectiveness of food deprivation, destruction, and contamination as weapons, how foodborne biological agents might be deployed, and the role that the U.S. Army Veterinary Corps must play before and after an act of foodborne bio-terrorism.

Introduction

The history of struggle between political entities reflects the constant use of terrorist tactics. To the Romans, Barbarians were terrorists because they lacked structure and their military lacked bureaucratic features normally

associated with “legitimate” armies. Today in the Western World, terrorism generates disgust. This occurs in societies that are *not* limited to the use of terrorist tactics to achieve their objectives. In parts of the Middle East, as in other parts of the world and throughout history, terrorists are idolized as national heroes. As a result, terrorism, guerilla warfare, sabotage, the “fifth column,” etc, have secured a place as necessary and successful military strategies. It is important to understand current world politics because little else has changed to cause increased vulnerability to foodborne bio-terrorism. Legitimization of terrorism is at a high point today and has implications for terrorists’ ability to procure materiel and support necessary to conduct “high tech” warfare. This includes support to perpetrate deliberate and sophisticated attacks involving food.

Terrorism is simply another means to an end, replacing conventional warfare when justified. Jessica Stern, when defining terrorism in her book entitled *The Ultimate Terrorists*, states that “. . . only two characteristics are critical for distinguishing terrorism from other forms of violence. First, terrorism is aimed at noncombatants. This is what makes it different from fighting in war. Second, terrorists use violence for a dramatic purpose, usually to instill fear in the targeted population. This deliberate evocation of dread is what sets terrorism apart from simple murder or assault.”² Because religious, ethnic, or political issues are at the heart of terrorist attacks, the world condition has much to do with their frequency. If nations are able to resolve such issues, terrorist acts do not occur. When they are not, and when dissatisfied elements are unable to achieve success through conventional means, terrorism becomes the method of choice. According to Defense Secretary William Cohen, “Our supremacy in the conventional arena is prompting adversaries to seek unconventional asymmetric means to strike our Achilles heel” (*Washington Post*, July 26, 1999:A19).

Terrorism can easily be conducted on a small scale. Terrorism is safer for the perpetrator in that he remains invisible until exposure enhances the achievement of objectives. Terrorist campaigns consist of a series of small-scale events. Food contamination fits well within the arsenal of tactics available to the terrorist. It does not require an Army to weaken an economy or undermine a nation's sense of security.

"Foodborne bio-terrorism" is defined as the use of biological agents: (1) in an attack using food as a means of transmission, or (2) in an attack against agricultural production. Biological agents include viruses, bacteria, fungi, protozoa, rickettsiae, and toxins, according to Jeffrey D. Simon.³

What could achieve the objectives of creating fear, damaging the economy, and destroying national security better than the intentional poisoning of food supplies or destruction of crops? Terrorists would enjoy additional benefits resulting from a lack of confidence even in unaffected foods. This phenomenon was observed in 1988 when Chilean grapes were found to contain small traces of cyanide. As a result, sales of all grapes suffered. The same occurred during the more recent "Tylenol scare" when people discarded all of their Tylenol, even though they were told which specific lots were contaminated.

Objectives of this article are to:

- Show why the use of chemical and biological weapons leading to food deprivation, destruction of crop and animal foods, and contaminated food could be highly attractive to terrorists, and provide evidence that development of potential foodborne pathogenic weapons appears to be increasing.
- Present scenarios in which foodborne bio-terrorism might occur and would weaken this nation's economy, the American sense of personal and national security, and, most importantly, this nation's resolve to deter terrorists from further obtaining their objectives.
- Identify steps necessary to prepare a response to foodborne bio-terrorism. Recommendations are consistent with those made by the General Accounting Office (GAO) and should be consistently applied by U.S. Army Veterinary Corps personnel in all theatres of operations.

There are many facets to this topic. Foodborne bio-terrorism could be directed against military or domestic targets, plant or animal food, used strategically or tactically, and in any phase of food production and storage. This article does not focus on any single subject; rather, it lightly addresses all aspects of foodborne terrorism.

Discussion

Biological attack against food is not a new idea. In 1925, Winston Churchill envisioned "pestilence's methodically prepared and deliberately launched upon man and beast . . . Blight to destroy crops, Anthrax to slay horses and cattle . . ."⁴ The U.S. developed many biological agents during World War II and even considered using one of them, rice blast, against Japan.

The U.S. still pays strict attention to biological weapons. Defense Secretary William Cohen stated "The race is on between our preparations and those of our adversaries. There is not a moment to lose" (*Washington Post*, July 26, 1999:A19). *Emergency Preparedness News* (February 24, 2000; 24:43) reports that the President has requested \$265 million for the Department of Health and Human Services (\$13.4 million for the Food and Drug Administration) to prepare for and respond to the medical and public health consequences of a bio-terrorist event. This funding and the huge and numerous federal grants available to domestic agencies for the purchase of anti-terrorist equipment are reflections of the vulnerability we now face in this country to bio-terrorist acts. Attempts to control biological terrorism have not solved the problem. As a result of the Biological Weapons Convention, in force since 1975, 162 countries have banned biological agents and weapons. However, there are no measures in force today to ensure compliance. The Federal Bureau of Investigation includes the following states as official sponsors of terrorism: Iran, Iraq, Syria, Sudan, Libya, Cuba, and North Korea. In addition, up to 25 countries are thought to be developing biological weapons. This list, in addition to the countries listed above, includes Russia, China, Israel, and Taiwan.

Analysts quoted by Jonathon R. White find that "There is an increasing nihilism among terrorist groups. Technology offers the ultimate weapon. Western democracies may have to accept minimal levels of terrorism."⁵ White states "Another point about U.S.

vulnerability has been raised by many analysts. If a mass destruction threat were to develop, the initial public reaction would probably be one of panic. A fear of chemical weapons and radioactivity pervades popular culture. If the American public believed a major city were in jeopardy, there is reason to believe that fear would sweep the nation." Jeffrey D. Simon agrees, stating "Biological agents can thus provide terrorists with new ways of committing violent acts, ranging from extorting bigger payoffs from governments or companies to inflicting damage to a country's economic, political, and even military structure."⁶ These terrorist objectives are consistent with those previously provided by Jessica Stern. As she states, "A terrorist attack using chemical or biological weapons would be far easier to accomplish, and could be equally devastating to public confidence and civil liberties. In recent years, terrorists have been acquiring crude chemical and biological agents, and some have plotted or threatened to use them. It would be relatively easy to use them to poison agricultural commodities, infect livestock, or gas passengers on trains or planes."⁷

For all of these reasons (excusing the frankness) terrorism makes good sense. As opposed to conventional tactics incorporating explosives, hostages, and the like, weapons of mass destruction are more capable of striking fear deep in the hearts of Americans. For example, remember the effect on American society during the Gulf War when word spread of Iraq's ownership of chemical and biological weapons. Suddenly, gas masks were being sold at premium prices throughout the nation. Compare this situation to the negligible affect that a New York kidnapping or hijacking would have in downtown Boise.

Biological weapons can be impressively effective. The Canadian Security Intelligence Service quotes one source saying that "one-half ounce (of Type A botulinum toxin), properly dispersed, could kill every man, woman, and child in North America." Another author states that 8 ounces of the substance could "kill every living creature on the planet." One study reports that a person drinking less than a cup of water from a 5 million liter reservoir would become severely sick and possibly die if the water were contaminated with 1/2 kg of *Salmonella typhi*, 5 kg of botulinum toxin, or 7 kg of staphylococcal toxin. Ten tons of potassium cyanide would be required to contaminate the reservoir to the same level of toxicity.⁸

Biological weapons, compared to both nuclear and chemical weapons, are cheap and easy to procure. All that is generally needed to obtain a shipment from a supply house is a statement on letterhead that the requestor has appropriate laboratory facilities and is properly trained. *Bacillus anthracis* specimens cost about \$35. The Canadian Security Intelligence Service states that one supply house, promoting the "sale" of five toxins for the price of four, offered five sample toxins, including T2 toxin (the so-called Yellow Rain in Afghanistan), for \$100. On the other hand, a single nuclear weapon is estimated to cost at least \$200,000,000.⁹ Because biological agents can be purchased relatively inexpensively and reproduced in less than a mid- or even low-tech environment, they are very accessible for use by terrorist groups without the means to wage full-scale war. A means of delivery might cost more than the biological agent itself.

Jeffrey D. Simon offers other facts that justify increased concern over the likelihood of biological terrorism. Simon lists constraints that have, in the past, limited such acts. These include difficulty in obtaining biological agents, fear and misunderstanding of risks to terrorists themselves, concern over world opinion, and lack of state sponsorship. Simon argues that ". . . as long as terrorists believe that present-day tactics are sufficient to meet their objectives and they remain fearful of the political and personal risks associated with biological agents, there will be a reluctance to utilize these weapons." He then lists a number of indications that constraints against terrorists' use of biological weapons are weakening. Included is an increasingly desensitized public regarding threats involving conventional tactics, and the weakening of terrorists' reluctance to experiment with unfamiliar weapons as state sponsorship of terrorism increases.¹⁰ As Bruce Hoffman predicted in his 1990 work for the Rand Corporation, ". . . if Saddam (Hussein) remains in power and if Iraq retains its military might, unconventional tactics, such as international terrorism, will then become institutionalized as instruments of modern warfare. Foreign governments are quite capable of training terrorists in the use of biological agents, providing them with the means of obtaining such agents, and offering a false sense of security regarding their own safety."¹¹

Another issue is that, as Simon expresses, "Terrorists may also be drawn to biological or chemical agents as a

means of achieving objectives that are precluded by the use of conventional weapons.”¹² A bombing, hostage episode, or shooting will not affect a nation’s economy, while even the threat of poisoning key export products can create serious economic problems.

The “promise” of foodborne terrorism is becoming better known. Considering the degree of conflict, foodborne terrorism was relatively unpracticed in World War II. Then, in 1978, Israeli oranges were injected with mercury by Palestinian extremists intending to sabotage the Israeli economy. Tamil guerillas of Sri Lanka, in 1986, notified several embassies that they had placed potassium cyanide in Sri Lankan tea reserved for export.

While the above referenced incidents might seem too small in scale to elicit much concern, the Aum Shinrikiyo cult, responsible for chemical and biological attacks in Japan’s train stations, proved that large scale attacks are possible and that there are groups willing to commit them. Government agents found a large amount of *Clostridium botulinum* and 160 barrels of growth media in their arsenal. Members even visited Zaire with the apparent objective of acquiring samples of the Ebola virus for cultivation and use in biological attacks.¹³

It might be argued that these incidents occurred overseas and the barrier protecting the U.S. from conventional attack also protects this country from foodborne bio-terrorism. To some extent, this appears to be true. Only two bio-terrorist attacks have occurred in the U.S., both using food as a means of transmission. According to Jessica Stern, the first known use of biological agents in the U.S. involved the Rajneeshee cult in Oregon in 1984. Local residents objected to the cults presence and strategized to elect a candidate promising to remove the commune. The cult ran its own candidate and attempted to poison the local population to prevent them from voting. They poisoned salad bars in 10 restaurants with *Salmonella Typhimurium*, sickening 751 citizens. According to another report by the GAO, 13 laboratory workers were poisoned in 1996, in Texas, with *Shigella* spp bacteria obtained from the laboratory itself. Intentionally contaminated food was simply left out in the lunchroom to be shared by coworkers.¹⁴

The Canadian Security Intelligence Service places

“contamination of foodstuffs or liquids, whether at their source or at some point in the production or distribution process,” first on their list of possible means for the delivery of biological agents. It is not a matter of “if,” but “when” more incidents of foodborne bio-terrorism occur. Foodborne bio-terrorism must be given serious consideration by U.S. Army Veterinary Corps personnel.

The study of foodborne bio-terrorism does not require additional “microscope work.” Bacterial agents act exactly the same when used by terrorists. We live in balance with mircoorganisms. It is their weaponization that creates this new threat.

The American Phytopathological Society (APS) is concerned about “crop biosecurity.” They have developed the following scale from which a desirability rating can be assigned to organisms useful to foodborne bio-terrorists (Table 1).

Characteristic	Value
Produces toxin	15
Easy to obtain, handle, and deliver	10
Easy to grow in large amounts	10
Highly infectious under many conditions	10
Results in the establishment of a quarantine	10
No chemical control or host resistance available	10
No method for rapid or reliable detection	10
Infects systemically by natural means	10
Spreads quickly by natural means	5
Causes severe crop losses	5
Survives long periods and is persistent	5
A perfect organism would have an Effective Pathogen Index of 10. For example, add the total points and divide by 10.	

Table 1. Bioterrorist Pathogen Rating Criteria and Points (from Schaad)¹⁵

The APS published the list on the following page of what they believe are the most likely pathogens to be used in attacks against food crops (Table 2).

Incidents in which the U.S. Army has been involved over the past 15 years are increasingly categorized as low-intensity “small scale contingency operations.” FORSCOM 500-3-3 makes reference to the likelihood of

Disease Agent	References
BACTERIA	
Liberobacter spp (Huanglongbin or citrus greening disease)	Weller et al
Erwinia amylovora	Weller et al
Ralstonia solanacearum	Weller et al
Xanthomonas albilineans	AG*, Weller et al
Xanthomonas campestris pv citri	AG, Weller et al
Xanthomonas oryzae pv oryzae (X campestris pv)	AG, Weller et al
Xylella fastidiosa	AG
Genetically modified microorganisms.	AG
FUNGI	
Cochliobolus miyabeanus (Helminthosporium oryzae)	AG, Weller et al
Colletotrichum coffeanum var virulans (C Kanawae)	AG, Weller et al
Deuterophoma tracheiphila (Phoma tracheiphila)	AG
Dothistroma pini (Scirrhia pini)	Weller et al
Magnaporthe grisea/Pyricularia oryzae	Rogers et al
	Weller et al
Microcyclus ulei (Dothidella ulei)	AG
Monilia rorei (Moniliophthora rorei)	AG
Phytophthora infestans	Rogers et al
	Weller et al
Puccinia erianthi	Weller et al
Puccinia graminis (Puccinia graminis f sp tritici)	AG, Rogers et al
	Weller et al
Puccinia striiformis (Puccinia glumarum)	AG, Weller et al
Sclerotinia sclerotiorum	Weller et al
Tilletia indica	Weller et al
Ustilago maydis	Weller et al
VIRUS	
Banana bunchy top virus	AG
Sugar cane Fiji disease agent	Weller et al

*AG refers to the Australia Group list of plant pathogens. The AG consists of 30 nations including the U.S. Their purpose, as was that of Weller and Rogers, was to identify microorganisms that, if obtained by nations having biological weapons, could pose a world-wide threat. As a result of this work, these microorganisms are banned from export.

Table 2. Pathogens Likely to be Useful in Foodborne Bio-Terrorism (Crop Production) (from Schaad)¹⁵

an increased frequency of these types of conflicts in the future. It is clear that terrorist tactics, including biological terrorism, will become more common in wars of the future.

There are many avenues of attack that bio-terrorists might use in a military setting. The U.S. Army Medical Research Institute of Infectious Diseases and the Centers for Disease Control and Prevention jointly published a book entitled *Biological Warfare and Terrorism*. Within a listing of potential battlefield biological agents, *Staphylococcal Enterotoxin B* (SEB) is described as one which "... could render up to 80% or more of exposed personnel clinically ill and unable to perform their mission

for 1-2 weeks." The document also states that SEB could be effectively used in a special forces or terrorist mode to sabotage food or quantities of water supplies.¹⁶

What would precipitate a series of incidents requiring an increased defense posture by Veterinary Corps personnel? Revenge is a common motivation used by terrorists to justify their acts. At least one writer believes that the U.S. has committed bio-terrorist attacks against his nation, and that retaliation in kind is justified. The anonymous author suggests that the U.S. is responsible for the outbreak of hoof-and-mouth disease and therefore the death or crippling of more than 1 million sheep and cattle in Iraq (International Action Center Alert, February 2, 1999). His statement that the U.S. is engaged in biological warfare against Iraq accompanies angry language claiming its catastrophic impact on the protein intake of the already malnourished Iraqi people. The U.S. allegedly caused this disaster by destroying Iraq's only facility that produced hoof-and-mouth vaccine. The U.S. may even have introduced the hoof-and-mouth virus into Iraq's herds, according to the writer, where the disease had previously been eradicated due to an excellent vaccination program. The author of this opinion recognizes the effect that biological terrorism has had on the stability of the Iraqi

government. He claims that as a result of U.S. led actions, more than 1.7 million Iraqis have died of hunger and disease.

United States Air Force Lieutenant Colonel Robert P. Kadlec, in his work entitled *Battlefield of the Future*, identifies agriculture as the primary focus of future economic warfare. World agriculture, once providing only vague target objectives, now comes more easily into focus since the compression of agricultural activity into smaller geographical areas and populations. In short, the world's population depends on fewer land parcels and fewer people for food. We are putting our eggs into fewer baskets that are much smaller and more vulnerable. According to

the 1993 World Economic Survey, developing nations increased agricultural productivity by 45.3% and 25.2% respectively. This occurred at a time when the percent of population involved in agriculture decreased by 31.2%. Compressed areas of agricultural activity give the foodborne terrorist a more defined target and one that can produce a greater impact on world food production.¹⁷

Lieutenant Colonel Kadlec offers examples of injury and destruction to agricultural economies caused by nonindigenous species. These include the introduction of the sweet potato fly to California and South American leaf blight (*microcyclus ulei*) to Malaysia. It is Lieutenant Colonel Kadlec's contention that the U.S., due to its sophisticated agricultural and public health programs, is capable of defeating or mitigating most threats caused by the chance introduction of nonindigenous species to farm production. These examples provide a vision of how insects, fungus, virus, and bacteria might serve as effective biological weapons in a more scientifically engineered attack. Effects would be greater in third world nations with limited food production capabilities and single crop economies. Photographs on this and the following page show the effects of microorganisms on food crops.

Lieutenant Colonel Kadlec describes a scenario in which China, using its commercial flights to Chicago and St Louis, sprays the *fusarium graminearum* spore over the U.S. Midwest. The spore, which grows aggressively in wet soil, decimates the U.S. corn crop. Although corn set-aside requirements are eliminated and although 80 million



Bacterial canker of tomato, caused by *Clavibacter michiganensis* pv *michiganensis*. (Photo courtesy K. Serfontein.)



Bacterial wilt of potato, caused by *Ralstonia solanacearum*. (Photo courtesy C. Mortensen, Danish Govt Inst of Seed Pathology, Denmark.)



Black rot of cabbage (photo) and other crucifer crops, caused by *Xanthomonas campestris* pv *campestris*. (Photo courtesy C. Mortensen, Danish Govt Inst of Seed Pathology, Denmark.)



Halo blight of beans, caused by *Pseudomonas syringae* pv *phaseolicola*. (Photo courtesy K. Serfontein, South Africa.)



*Tomato field destroyed by late blight (*Phytophthora infestans*). (Photo courtesy Hasan Bolkan.)*



*Wheat scab, caused by *Fusarium graminearum*. (Photo courtesy J. Watkins, University of Nebraska.)*



*Potato field destroyed by late blight (*Phytophthora infestans*) in southwestern Idaho in mid Jul 95. (Photo courtesy Robert Forster.)*



Sweet corn field with severe high plains disease (caused by High Plains virus) in south central Idaho in late Jul 93. (Photo courtesy Robert Forster.)

acres are planted in corn, the fall harvest is 30% below expected levels. As a result, the U.S. imports corn for the first time in history just to meet domestic needs. Higher than expected food and animal feed prices cause inflation and threaten American agricultural stability. Meanwhile, China, already the world's second largest corn exporter, claims a higher percentage of the world corn market and realizes tens of billions of dollars in additional profit from its corn crop. Of course the U.S. could retaliate, but it is not difficult to see that the effect of repeated acts would lead eventually to severe economic weakening, loss of national security, and an increase in world starvation. For some nations, the effect would be immediate economic disaster and starvation.

Conclusion

The State Department believes that the risk of use of chemical/biological weapons is remote, although it cannot be excluded. As an added security measure, and consistent with Department of Defense's Family and Force Protection Initiative, gas masks are provided to civilian employees and their families deployed to Korea.¹⁸

The U.S. Army Veterinary Corps must assume the same level of vigilance in regard to foodborne terrorism. The medical response *after* the hostile contamination of food during production, processing, or storage would be virtually the same as in peace. There are no field expedient methods for identification of food suspected of biological contamination. Resupply is the preferred response to loss

of food due to biological attack. Affected quantities, whether plant or animal, would be surveyed and destroyed. The Veterinary Corps must be able to expedite and expand detection and identification functions. An effective response will require the Veterinary Corps to work with the State Department, U.S. Department of Agriculture, and other federal agencies before and after foodborne terrorism occurs.

Defense Secretary William Cohen calls preparedness itself a deterrent (*Washington Post*, July 29, 1999:A19). Preparedness allows for a more rapid response to biological terrorism. Early, rapid, and accurate detection and identification of pathogens are the key to disease control. This is true in either a domestic or military setting. Prudent planning will mitigate its affects and increase the likelihood that perpetrators will be caught. Veterinary Corps personnel must be trained in the implementation of Standard Operating Procedures (SOPs) such as that of the Southern Europe Veterinary Detachment. This SOP, entitled "Food and Water Vulnerability Assessments" (Southern Europe Veterinary Detachment, June 1999) requires the identification of potential threats to food and water supplies. It establishes trigger points to implement contamination prevention measures such as increased monitoring of food production and processing, implementation of a sealed vehicle protocol, and increased security checks for local nationals working in food processing plants. Foodborne terrorism SOPs must be universally adopted and exercised. Exercising will validate plans by verifying their feasibility and identifying resources necessary to implement enhanced defense postures. Questions relating to types of increased food production monitoring, testing, inspection, and sources for additional inspection personnel must be addressed. Methodologies to distinguish intentional acts of food sabotage from routine contamination must be developed.

In 1988, Charles Kerley and Sujit Das called for the creation of a strategic food reserve. The major concern was nuclear attack affecting agricultural production, but benefits would apply today. Kerley and Das found that if existing food stocks in the U.S. were unavailable and if the normal distribution of food was hindered, the population could survive less than 30 days. Kerley and Das proposed the development of a national 30-day grain/cereal food supply program which was never implemented.¹⁹

Factors increasing the dangers of foodborne bio-terrorism are listed below:

- Capacity to severely damage the economy of a state.
- Compressed areas of agricultural activity.
- Low cost of biological agents.
- Time lag between release of an agent and its affect on humans.
- Ease of obtaining biological agents.
- Ease of maintaining a constant reservoir.
- Ease of dissemination.
- Sheer terror value.
- Ease of using biological agents, which are undetectable by x-ray, metal detector, dogs, or neutron bombardment, in attacks against foods.
- Ability to leave the infrastructure in place while attacking human life.
- Weakening of constraints against the use of biological agents.
- Failure of conventional tactics to achieve terrorists' objectives.

These reasons explain why biological terrorists are increasingly likely to attack food production and food stores. Given the food-related vulnerabilities stated above and the ability of food-related attacks to accomplish terrorist objectives, any attention given by U.S. Army Veterinary Corps personnel to the security of food supplies and preparedness for attacks of foodborne bio-terrorism is justified.

Throughout history, weapons developed at the end of one war became strategically important in the next. Lieutenant Colonel Kadlec warns that "In the post-cold war era and as we enter the 21st century, the economy determines superpower status."²⁰ The battlefield of the future will undoubtedly involve economic strategies, and

these will undoubtedly involve world *agricultural* economies.

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Role Perceptions of Army Hospital DCAs

COL David A. Rubenstein, MS†

Introduction

The Army's hospital Deputy Commanders for Administration (DCA) of 1999 are survivors caught up in significant and fast-moving changes in their profession. These changes impact on the DCA's simultaneous duties as an Army officer and as an Army hospital chief operating officer (COO). As an Army officer, the DCA is held responsible for the combat readiness of himself, his subordinates, and his hospital. As an Army hospital COO, he is held responsible for the facility's adherence to the many military regulations, civilian laws, and accreditation standards governing the peacetime administration of military health care.

The DCA's health care environment, in particular, is changing. And it is changing at a seemingly ever-faster rate. Not long ago, the DCA's focus was to distribute a fairly reliable and sufficient budget. Now, the DCA fights daily to help his hospital make its financial ends meet. In the past, the DCA and his hospital could send patients out to civilian hospitals, knowing that another governmental agency would pay the bill. Now, the DCA and his hospital work hard to keep all patients in their facility, knowing that the resulting civilian facility bills are paid by a program internal to, and budgeted out of, the Army hospital's ever-limited resources. This article describes the extent to which this changing health care environment has impacted on the self-perceived roles of Army DCAs.

Background

In the May 1990 issue of the *AMEDD Journal*, then published by the 7th Medical Command as the *Journal of the U.S. AMEDD*, I presented original research on role perceptions of Army health care administrators.¹ These role perceptions were based on the findings of a survey

administered to all DCAs of Army hospitals in the continental United States (CONUS). The purpose of the original 1988 study was to determine how the wide-ranging duties of the Army hospital administrator impacted on his or her perceived roles.

The many roles of the DCA are found along a spectrum founded on both military and administrative functions. As an Army officer, the administrator is held responsible for the deployment readiness of himself, his subordinates, and his organization. As an administrator, he is held responsible for his hospital's adherence to the many complex military regulations, civilian laws, and private accreditation standards that govern the peacetime administration of military health care. In either case, the DCA's role is also a factor of intangibles such as education, attitudes, and personal skills. The model for depicting these many roles is at Figure 1.

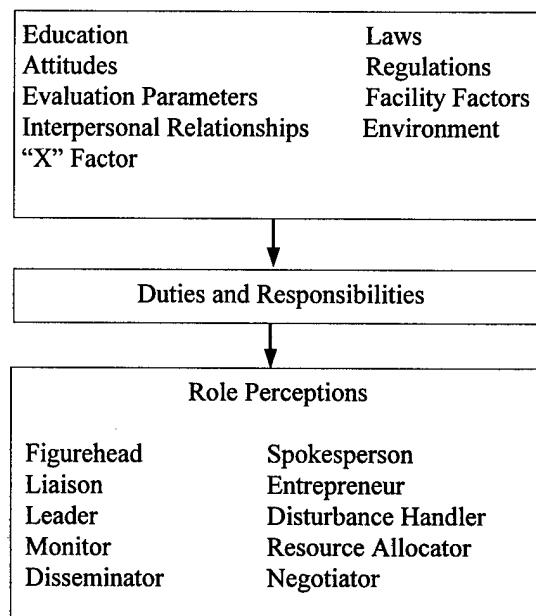


Fig 1. Army DCA role perceptions.

The original research showed that, despite the existence of many competing requirements, the DCA's role perceptions were strongly cohesive across the population. The survey results indicated that the Army DCA saw himself as a leader within the hospital who was equally successful at being an entrepreneur and a resource allocator. While acknowledging the importance of being a skilled and successful entrepreneur, the Army DCA recognized the simultaneous need to become more proficient at this skill. Being an entrepreneur also brought the DCA personal and professional satisfaction, as did being a leader.

Though the entrepreneur role brought the most satisfaction, being a resource allocator was deemed as most critical to success. Additionally, the DCA of 1988 saw this role as the one he was best prepared to perform, and the role that took up a great deal of his time. Clearly, distributing the medical facility's available dollars was seen as more critical than finding entrepreneurial (innovative) ways of saving resources or providing services.

Health Care Changes Since 1988

Between 1988 and 1999 the Army DCA's entire range of environmental impacts, from both a healthcare and military perspective, has changed. America has gone to war on several occasions, become engaged in numerous open-ended peacekeeping missions, dramatically reduced the size of its military, and embraced (in a dizzying array of models) the need for health care reform. Even the population of CONUS-based hospitals has been reduced. When this study was first initiated in 1988, I mailed surveys to the 36 CONUS-based hospitals. In 1999, there were only 23 hospitals still in the CONUS inventory, a 36% reduction.

All these impacts have taken a toll on the Army DCA. Those that remain have avoided selection by annual boards designed to downsize senior leaders through early retirement. They have also chosen to not accept numerous and lucrative offers to join civilian contractors working on health care reform with the military. But being survivors doesn't translate to having an easier road to follow.

While the DCA has survived to become a senior

leader of the AMEDD, the Medical Department is also changing. The changes began with a number of health reform initiatives to improve quality of, access to, and cost of health care. They culminated in a global health care system known as TRICARE. This particular health care reform initiative is Department of Defense-wide and will cause the military health service system to "change from the traditional (military) health care delivery system model with the acute care, inpatient facility being at the epicenter of the system."³ Central to the TRICARE concept are civilian-military contracts, hard and fast budgets, and accountability for developing broader access to quality health care while controlling costs.

Changes have also occurred in the civilian health care environment in which the DCA must now cooperate and compete. David Goff talks about "radically changing established systems" in order to provide quality and improve satisfaction while keeping a lid on costs.⁴ Elsewhere, Community Hospital of Springfield, Ohio, leases floorspace within its hospital to another facility, the Arthur G. James Cancer Hospital.⁵ Even the purchase of supplies and equipment has been affected in the rapidly changing health care environment as "internet suppliers (set) their sites on health care."⁶ "In reaction to these pressures (to rein-in resource use and improve efficiencies), hospitals reduce services, expand management systems, reorganize, merge, diversify, divest, and close."⁷

The Army has likewise expanded management systems (TRICARE) and reorganized (having reduced its CONUS-based hospitals). Whether the Army DCA turns to Army, military, or civilian colleagues, he is faced with the same pressures he feels within his own facility. The following findings will compare the role perceptions for the population of CONUS-based DCAs in 1988 to those of 1999.

Findings

The 1988 survey had a 100% return from the initial mailing while the 1999 survey had a 100% return rate after two mailings. The survey instrument used in 1988 has been administered to all DCAs biennially since then, in an identical form. The respondents answered 10 questions, shown in Figure 3, with the single best answer based on

the DCA's perception of his or her role. For a discussion of the reliability or validity of the survey instrument, see the initial article, as noted in reference 1.

The definitions offered to the respondent for answering each question are at Figure 2. These descriptive responses were originally used by Henry Mintzberg to describe the roles performed by managers.⁸

Figurehead.....	Representative ceremonial duties
Liaison.....	Developer of outside contacts/networks for information and favors
Leader.....	Aligns the needs of subordinates with those of the hospital
Disseminator.....	Shares outside information with subordinates
Spokesperson.....	Informs outsiders concerning hospital matters
Monitor.....	Sifts information to maintain hospital awareness
Entrepreneur.....	Initiates changes to solve problems and create opportunities
Disturbance.....	Deals with problems and crises
Handler	
Resource.....	Establishes priorities and determines Allocator who gets what
Negotiator.....	Brings information and authority to negotiate with other parties

Fig 2. Definitions of roles.

Discussion

The results of the survey show remarkable consistency over time. The leader trait, so key to a successful military career, is also the trait reported as the one best performed by the DCA. This is true for each of the past six surveys over 12 years. The same can be said for the one role that the DCA would like to improve. Biennially, the DCAs have repeatedly reported the entrepreneur role as the one role that requires the most improvement. This is despite the fact that being an

entrepreneur has commonly been reported as one of the best-performed roles.

The results also show other consistent findings. The role claimed to be the least critical to the DCA's survival and the one the least amount of time is spent in was, year-to-year, the role of figurehead. And the two roles repeatedly mentioned as the areas in which the most time is spent are disturbance handler and resource allocator.

Not surprisingly, the leader and entrepreneur roles mentioned time and again as the roles best performed, are also the roles reported as those that bring the most satisfaction. Finally, being a disturbance handler, the role that takes the most of the DCA's time, is also the role that is first or second most mentioned as the one that provides the least satisfaction.

The DCAs are telling us that they see themselves as leaders and entrepreneurs of their hospitals, though they would like to be better entrepreneurs. They spend most of their time as disturbance handler and resource allocator. Their greatest satisfaction comes from being leaders and entrepreneurs while their least satisfaction comes from having to be a disturbance handler.

Despite the many similarities over the years, there are also areas where change is quite evident. And, in several of these areas, the changes have very important implications for preparing future DCAs to succeed in their duties.

The first four survey questions relate to the impact of the specific roles on the DCAs success as a hospital COO. In the first three of these questions we see the greatest change when comparing the most recent survey to the previous five.

We see the sudden emergence of disturbance handler as a best performed role. Four of the six DCAs who answered "disturbance handler" to this question are among the most senior and seasoned DCAs in the Army. One has to wonder if these DCAs, squeezed to make every penny count from an ever-reducing, firm budget, are realizing that innovative programs and approaches become increasingly more difficult to develop as managed care matures.

1. Which role do you perform best?

1988	%	1999	%
Leader	28	Leader	39
Entrepreneur	22	Disturbance Handler	26
Resource Allocator	22	Entrepreneur, Negotiator	26
Other	25	Other	9

2. Which role would you most like to improve?

1988	%	1999	%
Entrepreneur	36	Entrepreneur	30
Liaison	22	Monitor	17
Spokesperson	17	Spokesperson	13
Other	25	Other	40

3. Which role is most critical to your survival as an administrator?

1988	%	1999	%
Resource Allocator	39	Leader	30
Disturbance Handler	25	Negotiator	26
Entrepreneur	19	Resource Allocator	17
Other	17	Other	27

4. Which role is least critical to your survival as an administrator?

1988	%	1999	%
Figurehead	75	Figurehead	83
Spokesperson	14		
Other	11	Other	17

5. Which role did your education best prepare you for?

1988	%	1999	%
Resource Allocator	36	Resource Allocator	43
Leader	28	Entrepreneur	22
Entrepreneur	19	Leader	17
Other	17	Other	18

Fig 3. Role Perceptions Comparing 1988 to 1999 Army Hospital DCAs, Items 1-5.

6. Which role did your education least prepare you for?

1988	%	1999	%
Liaison	22	Negotiator	26
Negotiator	19	Entrepreneur	22
Figurehead	14	Figurehead	17
Spokesperson	14		
Other	31	Other	35

7. In which role do you spend the most time?

1988	%	1999	%
Disturbance Handler	36	Disturbance Handler	52
Resource Allocator	31	Resource Allocator	17
Entrepreneur	8		
Negotiator	8		
Other	3	Other	31

8. In which role do you spend the least time?

1988	%	1999	%
Figurehead	58	Figurehead	48
Liaison	14	Spokesperson	26
Negotiator	11	Liaison	13
Other	14	Other	13

9. Which role brings you the most satisfaction?

1988	%	1999	%
Entrepreneur	44	Entrepreneur	43
Leader	42	Leader	22
Other	14	Other	35

10. Which role brings you the least satisfaction?

1988	%	1999	%
Figurehead	39	Disturbance Handler	30
Disturbance Handler	14	Figurehead	26
Negotiator	11	Liaison, Monitor, Negotiator	39
Other	30	Other	5

Fig 3. Role Perceptions Comparing 1988 to 1999 Army Hospital DCAs, Items 6-10.

1. Which role do you perform best?

'88.. Leader.....	28%	Entrepreneur, Resource Allocator.....	22%
'90.. Leader.....	46%	Entrepreneur.....	23%
'92.. Leader.....	43%	Entrepreneur.....	26%
'94.. Leader.....	43%	Entrepreneur.....	29%
'96.. Leader.....	33%	Entrepreneur.....	20%
'99..Leader.....	39%	Disturbance Handler.....	26%

The disturbance handler deals with problems and crises. A second-order question, then, related to the emergence of disturbance handler as a best performed role, is why this role needs to be performed. The DCAs seem to be reporting that the ever-changing environment and expectations placed on their hospitals now require them to be particularly good disturbance handlers. This finding is particularly noteworthy given that this same role is claimed to be the most frequently performed and the least enjoyed.

competitors for his beneficiaries' loyalty. That information must then be sifted, analyzed, and shared with the hospital staff in such a way as to affect change, as needed, such that the Army hospital and health care system remain the care providers of choice for beneficiaries.

We see a complete change to the top two roles perceived by today's DCAs as most critical to their

2. Which role would you most like to improve?

'88.. Entrepreneur.....	36%	Liaison.....	22%
'90.. Entrepreneur.....	20%	Liaison, Spokesperson.....	20%
'92.. Entrepreneur.....	26%	Liaison.....	23%
'94.. Entrepreneur.....	29%	Liaison, Leader.....	14%
'96.. Entrepreneur.....	40%	Negotiator.....	20%
'99.. Entrepreneur.....	30%	Monitor.....	17%

A monitor sifts information to maintain hospital awareness. Clearly, a rapidly changing health care environment requires that the hospital leadership stay fully focused on, and attuned to, the hospital's external environment. That gathered information must then be synthesized to determine the likely or, at least, potential impacts on the facility. This may be all the more vital in today's competitive military health care setting. The DCA now finds himself having to look at potential and actual

survival. The DCAs are telling us that establishing priorities for distributing resources (resource allocator), usually dollars, and initiating change to solve problems (entrepreneur) are no longer the critical roles to surviving as an administrator, and, presumably, as a hospital. Instead, having the leadership ability to recognize subordinates' needs and having the demonstrated ability to negotiate with other parties are now reported as the keys to surviving as the hospital's administrative leader.

3. Which role is most critical to your survival as an administrator?

'88.. Resource Allocator.....	39%	Disturbance Handler.....	25%
'90.. Resource Allocator.....	34%	Entrepreneur, Leader, Disturb Handlr.....	17%
'92.. Resource Allocator.....	29%	Entrepreneur.....	29%
'94.. Entrepreneur.....	37%	Resource Allocator.....	26%
'96.. Entrepreneur.....	37%	Resource Allocator.....	30%
'99.. Leader.....	30%	Negotiator.....	26%

6. Which role did your education least prepare you for?

'88..Liaison.....	22%	Negotiator.....	19%
'90..Liaison.....	20%	Negotiator, Entrepreneur.....	20%
'92..Negotiator.....	20%	Liaison, Disturbance Handler.....	17%
'94..Figurehead.....	23%	Liaison.....	20%
'96..Figurehead.....	20%	Liaison, Negotiator.....	20%
'99..Negotiator.....	26%	Entrepreneur.....	22%

This sixth question of the 1999 survey also demonstrates a significant change from previous surveys. The current answers to this question now allow for the development of two important relationships that have impact on the DCA's success in his duties as the hospital's COO. The first relationship ties the role that the DCA's education least prepared him for to the role now identified as among the most critical to the DCA's survival. For the first time, the DCAs are telling us that the role of negotiator has risen in importance such that it is now the role for which their education least prepared them for while being among the roles deemed most critical for survival.

This most-mentioned role for which the DCA feels least prepared by his education has several previous showings in earlier surveys. For the first time, however, the second most-mentioned role for which the DCA's education has least prepared him is that of entrepreneur. A second relationship, then, is that this is also the same role that the DCAs claim is the one they would most like to improve. This is an important new finding given the consistency with which DCAs report entrepreneur as the primary role needing improvement.

Conclusion

This article is the culmination of 12 years of research into the role perceptions of an Army DCA. It describes the DCA as an individual who performs best as a leader. Most of this leader's time is spent as a disturbance handler while, at the same time, the least satisfying role is as that same disturbance handler.

The DCAs acknowledge that their most critical role has evolved from resource allocator to entrepreneur to, currently, leader. There are other significant evolutions, as discussed previously. Each of these changing roles should

provide notice to the senior leadership of the AMEDD. Specifically, each set of role perceptions, taken both as a snapshot in time and as a longitudinal pattern, might well be used as the start of a decision-making process for the Department. In particular, the AMEDD (my AMEDD) should be asking:

- Is the decision criteria to select and appoint our contemporary DCAs appropriate to the roles they will have to perform?
- Is there a linkage between the evolution of role perceptions and the move to, or requirements of, managing care as defined by TRICARE?
- How should the U.S. Army-Baylor University Graduate Program in Health Care Administration use the longitudinal findings of this study to refine or refocus the curriculum of the program?
- What continuing education can the Medical Department provide to address the current findings of roles that DCAs would most like to improve and the roles now reported as least prepared for by education?
- How can the Medical Department ensure DCAs have rapid, simple access to on-demand continuing education to fine-tune skills in roles that the DCA feels need immediate improvement?

The focus of this study has been on the roles performed as an Army hospital COO. A final suggestion is for further research to determine if the roles, first presented by Henry Mintzberg in 1975, are still valid today. An open-ended study using the Delphi technique may well allow researchers to pinpoint a fresh set of roles performed by the DCA. This would also allow better answers to the previous page questions.

Six sets of DCAs, over 12 years, have contributed to this article. Their candor can best be repaid by using the findings to improve the readiness, skill, and abilities of all future DCAs.

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91W Health Care Specialist Sustainment in the New Millennium

MAJ Robert A. De Lorenzo, MC†

Introduction

The Army Medical Department (AMEDD) has entered the new millennium with an improved and redefined combat medic: the 91W Health Care Specialist. This new medic embodies all the spirit and tradition of the combat medic combined with a new mandate for technical and medical competency. The 91W will serve alongside the Army's warfighters, as well as in hospital clinics throughout the world.

To assure continued competency throughout their careers, 91W medics must continually sustain these vital skills. In an era of high operational tempo, reduced manpower, and tight budgets, sustainment can be a significant challenge. The reserve components face additional challenges, especially in terms of available training time. This article will explore the basics of 91W sustainment, and most importantly, describe innovations that may help overcome the challenges that hinder sustainment.

Key Skills

Combat casualty care is the primary mission of the 91W. This mission is so fundamental that all 91W medics regardless of rank, position, or duty should always be capable of performing emergency and combat casualty care. The 91W key skill areas include basic life support (the familiar "ABCs"), patient assessment, bleeding control, fracture management, and the treatment of shock. As it turns out, the core skills of the 91W largely overlap the competencies of the emergency medical technician (EMT). This is a natural outcome when the lifesaving and emergency care roles of combat medics and EMTs are

considered. Both have similar job descriptions, roles, and missions. What differs is the environment and circumstances of their performance. The EMT skills are drawn from U.S. Government (Department of Transportation) standards and are in use by all civilian state and federal government agencies and sister military services. There are significant advantages to the Total Army in joining other government agencies in adopting the EMT standard, as will be discussed in the following sections.

Sustainment

Sustainment refers to the maintenance or continued competence of skills. Sustainment of emergency and combat casualty care skills is an integral part of a 91W career progression regardless of job or assignment. Sustainment should always be an ongoing unit training priority, and not relegated to a "last minute" approach. This ensures the 91W is ready to perform critical lifesaving treatment whenever called upon.

Because of the close relationship between 91W skills and EMT training, it is natural for the Army to take advantage of the existing civilian and military EMT training and testing infrastructure. The reserve components, in particular, can benefit from the well-developed emergency medical service training system in place in all 50 states.

All 91Ws are expected to attain and keep National Registry of Emergency Medical Technician (NREMT) certification as an EMT-Basic (EMT-B). Ultimately, this is expected to become a firm requirement for attaining and keeping the 91W military occupational specialty (MOS).

National Registry requirements include biennial (every 2 years) completion of 48 hours of continuing education (sustainment training), 24 hours of EMT refresher, and demonstration of proficiency in several key skills (Table 1). Satisfying routine EMT-B recertification every 2 years simultaneously sustains the bulk of 91W emergency care skills. Thus, commanders and leaders only need to focus on a common set of skills to satisfy both EMT-B and 91W requirements.

- Patient Assessment – Trauma
- Patient Assessment – Medical
- Cardiac Arrest
- Apneic patient – Bag-Valve-Mask
- Spinal Immobilization
- Bleeding Control
- One of the following randomly selected:
 - Long bone injury
 - Joint injury
 - Traction splitting
 - Upper airway adjuncts
 - Mouth-to-mask
 - Supplemental oxygen

Table 1. Key Psychomotor Skills Required for EMT Preregistration

The 91W is more skilled than an EMT-B, and this is reflected in a few advanced core skills (Table 2) related to trauma assessment, advanced airway management, intravenous therapy, medication administration and pharmacology, and shock management. These skills also need to be sustained. Incidentally, these advanced skills relate directly to the skills of a NREMT-Intermediate (or Paramedic). Thus, any soldier maintaining NREMT-I or NREMT-P certification simultaneously satisfies Army requirements. The Army is providing further incentive to

- Advanced Airway
- Intravenous Therapy
- Medication Administration
- Shock Management
- NBC Medical Emergencies

Table 2. Additional Psychomotor Skills for 91W Sustainment

maintain proficiency in NREMT-I and NREMT-P skills: in June 2000, the Army will offer 30 promotion points for achieving EMT-I certification (40 for EMT-P).

EMT Sustainment

Sustainment in the new millennium will require the combined efforts of soldiers, leaders, commanders, and the AMEDDC&S. Sustainment requires time, personnel, and material resources, all in short supply. Therefore, an effective sustainment solution must focus the training effort. By concentrating required sustainment to those skill areas deemed critical to the combat casualty and emergency care mission of the 91W, leaders can concentrate their resources for maximal effect. Additionally, by setting required sustainment time to approximately 72 hours every 2 years (less than 1 hour per week or 3 hours per month), commanders can effectively plan for time away from competing missions.

The EMT-B recertification is the foundation for 91W sustainment and permeates the sustainment plan. The 48 hours of biennial continuing education are flexible and can be performed at the small unit level in both the active and reserve components. A 91W noncommissioned officer (NCO), physician, physician assistant (PA), or nurse can teach this requirement. Unit leaders will need to become experienced in continuing education administration and soldier-training documentation.

The EMT-B refresher course is a 24-hour program based on U.S. Department of Transportation standards and focuses on the key topic areas needed to maintain EMT competency. At the conclusion of the refresher course, a practical skills evaluation is conducted that measures competency of the 91W and EMT in psychomotor skills (Table 1). Experienced NCOs under the guidance of a physician or PA can readily teach refresher courses at the unit level.

While emergency care and EMT represents the minimal competency set for all 91Ws, there exists a broad array of less critical but still important skills and knowledge required for full job performance. These broad-based competencies fall into four categories, including training schedules just like other sustainment training.

Maximizing Resources

Scarce time, personnel, and material resources limit the impact of current sustainment efforts. To maximize sustainment, commanders and leaders will need to utilize all available opportunities for training. This may require examining new and innovative approaches to training or utilizing resources outside of traditional Army boundaries.

It is important to recognize that 91W sustainment is not an additive requirement. In other words, units should shift the training time and resources currently applied against 91B and 91C sustainment towards the 91W. For example, U.S. Army Forces Command medics are required by FORSCOM Regulation 350-4 (formerly 350-41) to train at least 45 days per year in hospitals and other medical treatment facilities. The modular medical proficiency training catalog features several modules dedicated to EMT training. These training resources should be leveraged toward 91W sustainment.

In a similar fashion, Army Regulations 40-3 (formerly HSC Reg 40-5) and 500-4 have long required 91B medics assigned to emergency service and ground or air ambulance duty to sustain NREMT-B training. Commanders can avoid "sticker shock" when estimating the required 91W sustainment resources by first estimating the training time, equipment, and manpower already assigned toward the medic sustainment mission.

The EMT training provides multiple opportunities for 91W sustainment. The military has an existing network of approved EMT training sites that can be utilized for sustainment. Most major installations including those in Europe and the Pacific boast at least one active program. Air Force and Navy programs also frequently train Army personnel. The civilian community has thousands of EMT-B and hundreds of EMT-I and paramedic programs nationwide. Some offer college credit and many provide outreach programs to rural or underserved areas. Continuing education is also available from hospitals and regional emergency medical service agencies as well as national journals, computer-based training programs, and conferences. Leaders need to become familiar with this training network and learn how to access the available resources.

As part of its distance learning initiative, the Army is

embarking on a bold plan to link active installations, U.S. Army Reserve centers, and Army National Guard armories with tele-education capability. Ultimately, Army active and reserve component soldiers will be able to receive distance education in a variety of formats including internet-based and live video-conferencing. The AMEDDC&S is exploring a variety of additional products for this medium including a televised EMT-B refresher course, internet-based continuing education, and off-the-shelf computer-based (CD-ROM) refresher training.

Measuring Effectiveness of Sustainment

Leaders and soldiers need reliable information on the impact and effectiveness of their sustainment efforts. The ultimate test of sustainment training is whether it maintains critical emergency care skills. To assist commanders and soldiers in assessing individual proficiency, the AMEDD is embarking on two initiatives. First is a comprehensive training and sustainment tracking mechanism; second is a metric or evaluation tool to measure actual hands-on-skills proficiency of individual soldier medics.

Any system that tracks training, sustainment (continuing education), and credentials (for example, EMT certification) must be usable, reliable, and available to small unit commanders. Several systems already in place including the Army Training Requirements and Resource System, Military Occupational Data System, and Defense Medical Human Resource System are being examined as potential tools to track 91W soldiers. Ultimately, leaders and commanders will be able to access up-to-date information on the training and sustainment status (for example, EMT recertification) of individuals and whole units with point-and-click ease.

Measuring the proficiency or competency of a particular soldier is more challenging than merely tracking certification. Any measure of individual proficiency must be reliable (give consistent results), valid (be a good predictor of actual patient care performance), and easy to apply across the Army. The AMEDDC&S is developing just such a metric. Fashioned after the armor community's "Tank Table VII," the Medical Proficiency Metric will test soldiers in such critical skills as airway management, bleeding control, and shock treatment. Ultimately, the metric will be integrated into collective training and the

Army Training and Evaluation Program, thus providing commanders with quality information on individual and unit performance. The metric is undergoing design at the AMEDDC&S and will be piloted over the next few years.

Conclusion

Sustainment of 91W medics provides new opportunities to improve the AMEDD's ability to execute the combat casualty care mission. Among the challenges faced by medics, leaders, and commanders is keeping up with the rising expectations for medical proficiency and certification. By focusing training, maximizing available resources, and accurately measuring sustainment outcomes (Table 3), the Total Army can achieve the ultimate measure of AMEDD success: To Conserve the Fighting Strength.

• Focuses training effort • Maximizes available resources • Mechanism for reliable feedback on effectiveness
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Table 3. Elements of an Optimal Sustainment Plan

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Preventive Dermatology for Force XXI and the Army After Next

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Preventive Dermatology, as a doctrinal concept, is nothing new. Becker and James, in their insightful introduction to the Military Dermatology volume of the *Textbook of Military Medicine*, published in 1994, pointed out the historical data that clearly shows the critical nature of diseases of the skin in any combat operation. From this data, they were able to make specific recommendations for the utilization of trained dermatologists in both the hospital environment, and in operational medicine. Their recommendations, unfortunately, were not widely read outside the specialty of dermatology, were even less widely read within the Army Medical Department, and were probably unheard of in the operational environment. There has been, therefore, no change in medical doctrine concerning dermatology and no inclusion in the operational plans for Force XXI. With the dawn of the 21st century and the current operational tempo of deployments in peacekeeping/peace enforcement, and humanitarian assistance missions, and with the unknown nature of future warfare, Preventive Dermatology is an idea whose time has finally come.

To understand the importance of dermatology in the operational setting, it will be necessary to briefly revisit the history of warfare, and the impact that diseases of the skin have had on military operations. From the earliest reports on war, diseases have caused more casualties than actual combat. Without specific epidemiological data, it is unknown how many of the ancient disease and nonbattle injuries (DNBI) affected the skin, but an idea can be gleaned from any readings on the Athenian and Punic Wars, and any ancient battles that included siege warfare. Many of the disease descriptions will include boils and blisters, indicating that ancient practitioners recognized the importance of cutaneous lesions in the process of disease.

Significant medical and epidemiological data began

to be collected during the last century. During the American Civil War, dermatology, as a specialty, was still in its infancy in Germany. Medical records from that period, however, do indicate a significant number of diseases with cutaneous manifestations. In 1861, there were 247,700 DNBI reported by the U.S. Army. These included diarrhea, dysentery, pulmonary diseases, and typhoid as major diseases. Also included in significant numbers were measles, mumps, chicken pox, smallpox, gonorrhea, and syphilis.¹ More specifically, erysipelas and "phagedaena" were noted to be complications often seen in the wounded on board U.S. hospital boats.²

During World War I (WWI), hospitalizations for skin diseases numbered 126,365 U.S. soldiers, with an estimated 2 million man-days lost.³ Similarly, the British Expeditionary Forces suffered admission rates of 126.13/1000 men, with one British Army reporting 90% of all diseases being related to the skin.⁴ During the war, The Surgeon General's office had a considerable interest in dermatology, having a laboratory devoted to it and to urology, having specialists assigned to each camp and large Army hospital in the U.S., and directing that the American Expeditionary Forces (AEF) have two consultants in dermatology. Additionally, during 1918, some field hospitals within divisions of the AEF operated as skin hospitals.⁵

In the period after demobilization, no qualified dermatologists were on active duty in the U.S. Army. Military hospitals did not include dermatologists in the tables of organization and equipment (TOE), the tables of distribution and allowances, or equivalent documents.⁶ As America entered the next war, physicians volunteered or were drafted in significant numbers.

By the end of WWII there were almost 50,000

physicians in uniform in the Army, with 107 board-certified and 30 board-eligible dermatologists, and with another 151 medical officers with some training in dermatology.⁷ Statistics indicated that up to 25% of outpatient visits in the temperate climates and up to 75% in the tropical zones, were for diseases of the skin. For admissions, data indicates that 20% of admissions in the tropics were for skin, and 16% of patient evacuations from the Pacific Theater were for dermatologic diseases. Individual hospital units reported significantly higher statistics. British data for the same time period is similar, with individual reports of higher rates. The New Zealand forces reported 1,000 cases of skin disease from one force of 7,800 troops in the first 8 months of 1945.⁸ The man-days lost in association with these statistics were certainly significant to tactical operations, as they represented actual decrements in troop strength in the field.

Major General A.N. Tasker, writing in 1928, and Major General J.C. Magee writing during the early years of WWII, both noted that while there are few fatalities from diseases of the skin, the loss of effective manpower is extremely important to any Army operating in the field.⁹

The Korean War presented a different set of statistics. The DNBI represented a significant number of man-days lost; however, diseases of the skin were the fourth highest causes of outpatient visits and the fifth highest for hospital admissions.¹⁰ Interestingly, statistics on abrasions, blisters, infective and parasitic diseases, and diseases of the orofacial areas were not included in statistics for skin diseases. These diseases all have significant overlap with dermatology.

The expanding involvement of the U.S. in Southeast Asia, particularly the Republic of Vietnam, saw an increase in the significance of diseases of the skin. During this conflict, dermatologic disorders were the number one cause of outpatient visits with 1,412,500 recorded. There were 45,815 hospital admissions for skin diseases. Twenty-five percent of patients admitted by dermatologists required evacuation from Vietnam. Over all, dermatologic diseases accounted for 9.7% of the total admitted patients (for DNBI) who required evacuation from the theater of operations.¹¹ As an example of the impact on tactical operations, it is estimated that these diseases accounted for 47% of the man-days lost in the 9th Infantry Division,

operating in the Mekong Delta region during 1968-1969.¹²

The last decades of this century have seen one major theater engagement, Operation Desert Shield/Desert Storm, and multiple smaller peacekeeping/enforcement, and humanitarian operations around the world. In one forward line regiment in Desert Shield, dermatologic diseases were 7.1% of total DNBI.¹³ They have also proven to be a significant part of the post-war work-up of the "Gulf War Syndrome." In the Saudi Arabian theater of operations, there was only one dermatologist actually assigned as a skin specialist. All others served as general medical officers or as internists.¹⁴ In the Balkans (Croatia, Bosnia-Herzegovina), British reports indicate that skin disease and ectoparasites represented 13% of outpatient visits between December 1995 and April 1996, with 1.3% being hospitalized.¹⁵ A significant number of dermatologic diseases were also reported during the mission to Somalia.¹⁶

The U.S. Navy completed a survey of dermatologic and venereologic diseases during a 3-month deployment of the USS Saratoga in the Mediterranean Sea. Their data indicates that 40% of sick call visits, and 22% of disease morbidity, were caused by skin disorders and venereal disease.¹⁷ Navy and Marine Corps statistics for WWII, Korea, and Vietnam similarly reflect the importance of skin disease to DNBI. Military dermatologists have also seen a significant workload in refugee populations from Haiti and Cuba, during operations at Guantanamo Naval Base, and in Panama in 1994.¹⁸

What then are some of the specific recommendations for the utilization of skin specialists in the Army? Historically, recommendations made in WWII are still valid today. Pillsbury and Livingood recommended that for every 100,000 troops, the Surgeon in charge should have an advisor in dermatology. Canadian Forces recommendations were that each corps or Army should have a consultant dermatologist, with one to two assigned per division. New Zealand's official history of WWII notes that "each hospital unit in an overseas force should have a skin specialist on its staff."¹⁹ The British Army was the best organized for dermatologic care. Each Army Surgeon's staff had a consultant dermatologist, each corps had a consultant dermatologist responsible for training in diagnosis, treatment, and prevention, and there were

established skin treatment centers manned by fully qualified dermatologists.²⁰

With these historical views in mind, and appreciating the tailoring of this and the future Army for various multiple, contingency operations, the following recommendations are offered:

- The addition of a consultant in dermatology to the staff of each corps and Army sized organization. These special staff officers can be hospital-based, but on call for their expertise as necessary in time of peace and actively assigned to the staff in time of conflict.
- The addition of a consultant in dermatology to the staff of each division. Here, the Division Surgeon could actually be a dermatologist.
- The establishment of a Dermatology Team, consisting of one or two dermatologists or a dermatologist and physician's assistant, a 91W, or 91C Licensed Practical Nurse trained in skin diseases, and several 91B medics who are trained dermatology technicians. This team, according to Becker and James, would be a mobile corps-level asset.²¹ They would be responsible for staff assistance visits to troop level medical facilities to diagnose and treat patients, and to give training in diagnosis, treatment, and prevention to health care providers and medics at those facilities.
- Assignment of a dermatologist to the Preventive Medicine (PM) team. This would ensure that PM inspections and training would include dermatologic diseases, and would identify environmental factors that have significant impact on the health of the skin.
- Assignment of a dermatologist to the Infectious Disease/Tropical Medicine Team. Many infectious diseases, and most tropical diseases have cutaneous manifestations. Having a qualified skin specialist can decrease morbidity through more rapid diagnosis.
- The TOE of the current and future Echelon III hospitals should include at least one dermatologist assigned to the staff.
- The reinstitution of specific military occupational specialty training in dermatology for select 91B medics. In this period of continuing draw down with a decrease in the number of dermatologists on active duty, having program trained dermatology technicians, as opposed to simply on the job training, will greatly enhance the ability of these medics to serve as physician extenders. These medics, once trained, could also serve at the battalion aid station and medical company level (Echelons I and II), to provide initial dermatology PM training to their supported troops.
- The institution of training programs in dermatology for select physician's assistants. For the same reason as having trained medics, the dermatology physician assistant would be a vital and valuable physician extender for the dermatologist. They could serve at all echelons of health care in an operational environment, and could be assigned to the dermatology and PM teams.
- Reserve component dermatologists should be identified and assigned to the previously mentioned teams and positions via the professional filler system to ensure a full complement as needed in time of conflict. They should then perform their annual 2-week active duty training with the unit, team, or command to which they are assigned in time of conflict.
- The medical sets, kits, and outfits for medical units at each echelon of care should include a good supply of dermatologic therapeutic agents and diagnostic tools.
- A rotation in dermatology should be mandatory for all nonsurgical interns, and for all officers scheduled to perform a tour of duty as a General Medical Officer.
- Dermatologists at all hospitals and Medical Department activities should actively pursue a program of staff assistance visits to the outlying health clinics and troop medical clinics that they serve as consultants. This will ensure continued training in dermatology for the primary care physicians, physician's assistant, and medics at those facilities, and will promote the concept of preventive dermatology for the troops. A program of regular rotations (1 day each month, 1 week each quarter, etc) should be established so that the health care providers can "shadow" the dermatologist in the clinic environment, and thus gain additional knowledge of skin diseases.

This past year, for the first time, there was both a

dermatologist serving as one of the 10 Division Surgeons and a dermatologist serving as a Deputy Corps Surgeon. This is just a start, but it is an important step in the integration of Preventive Dermatology into operational medicine doctrine. As these other recommendations are phased in, there will be a significant improvement in overall statistics for dermatologic care, and for awareness at all levels of the importance of diseases of the skin, today and in the Army of the future. Just as trauma surgery is the critical specialty for the care of combat injuries, dermatology is the critical specialty for DNBI.

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Dietary Supplements and the Surgical Patient

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Introduction

One can hardly open a magazine or turn on a television without mention of the numerous beneficial effects of a multitude of dietary supplements and vitamins. More and more people, especially the middle-aged and elderly, are taking a wide variety of these supplements for the control and prevention of such conditions as ischemic heart disease, hypertension, hypercholesterolemia, arthritis, and cancer to name a few. It was estimated that in 1990, 2 billion dollars were spent on vitamins and diet supplements.¹

When these patients present to our office, they are not likely to consider these supplements true drugs or medicines, and do not volunteer any information about them.¹ In addition, most of these patients fail to realize that these various supplements can have an important impact on surgery. This article reviews some of the more popular dietary supplements, their uses, and how they might impact on the management of the surgical patient.

Vitamin E

Vitamin E is very popular as a nutritional supplement. Two landmark studies, published in 1993, demonstrated that supplementation of the diet with vitamin E decreased the risk of coronary artery disease (CAD).^{2,3} Vitamin E, a group of compounds known as the tocopherols (d-alpha-tocopherol is the most important, with the greatest biological activity), is a potent antioxidant. It prevents lipid peroxidation by free radicals, which leads to membrane instability. Vitamin E acts in a similar manner as the glucocorticoids, by stabilizing membranes, inhibiting the inflammatory response, and inhibiting collagen synthesis.⁴

With regard to platelet function, individuals with normal platelets did not show a change in aggregation when treated with 800 IU/day of vitamin E.⁵ On the other hand, individuals with abnormal platelets (for example, diabetics) have reduced platelet aggregation in response to vitamin E.⁶ Although platelet aggregation in individuals with normal platelets does not seem to be affected by vitamin E, Steiner showed a decrease in platelet adhesion to collagen, fibrinogen, and fibronectin in individuals treated with low doses of vitamin E (200IU/day).⁷ It should be noted that any patient taking vitamin E in addition to an arachadonic acid inhibitor (for example, aspirin, garlic) is at increased risk for bleeding during surgery due to a synergistic effect.⁸

It has been recommended that in patients with normal platelets taking vitamin E supplements, vitamin E should be discontinued prior to surgery because of decreased platelet adherence. Diabetics and others with abnormal platelets would benefit from stopping vitamin E prior to surgery due to decreased platelet aggregation.⁸ It has not been clearly defined in the literature for how long vitamin E should be discontinued prior to surgery.

As mentioned previously, systemic vitamin E has a similar effect as glucocorticoids on wound healing. Ehrlich showed an inhibitory effect of vitamin E on collagen synthesis and wound repair in rats.⁹ Greenwald demonstrated that flexor tendon repair in vitamin E-treated chickens had a significant decrease in breaking strength.¹⁰ With this in mind, vitamin E should not be used in the perioperative or healing phases (see table), especially when the surgeon is depending on a strong collagen repair.⁸ The only exception is in the case of wounds from radiation sources. Tarin demonstrated an increase in breaking strength of rat wounds pretreated with vitamin E prior to irradiation.¹¹

	Bleeding Potential	Wound Healing	Perioperative Management
Vitamin E	Increased due to altered platelet Adhesion	Impairs collagen synthesis	Stop Pre-Operation
Garlic	Increased due to altered platelet aggregation	_____	Stop Pre-Operation
Omega-3 Fatty Acids	Increased due to altered platelet aggregation and adhesion	_____	Stop Pre-Operation
Vitamin A	_____	Improves wound healing and Stimulates immune functions	Consider Pre-Operation Supplementation

Table

Topical vitamin E is widely used in cosmetics and creams with the claim that its use will improve the cosmesis of scars and enhance skin appearance. In this topical form, vitamin E has been shown to cause a dermatitis.⁴ In spite of the many claims by cosmetic companies, prospective double-blind randomized trials have not demonstrated any beneficial effects of topical vitamin E on wound healing or scar formation.⁴

Garlic

Garlic is a very popular supplement that is available in a powdered tablet form, in a capsule containing garlic oil, and in cloves. Garlic has been used as a herbal medicine for thousands of years. It has been used to treat infections, circulatory problems, and asthma.¹² When garlic cloves are chopped, a reaction is triggered causing the formation of at least 100 sulfur-containing compounds, many of which have been linked to medicinal uses.¹³

Two of these thiosulfinate compounds that have received the most research attention are ajoene and allicin. When garlic cloves are chopped, the dominant thiosulfinate released is allicin (diallyl thiosulfinate).¹³ Allicin has been shown to inhibit platelet aggregation in vitro without affecting the activity of cyclooxygenase or thromboxane synthetase. Cyclic adenosine monophosphate levels are also unaffected.¹² Mayeux speculated that allicin altered platelet function by preventing the uptake of calcium into platelets, acting similar to calcium channel blockers.¹² Allicin has been

shown in vivo to have vasodilating effects independent of beta-adrenergic receptor activity or the formation of cyclooxygenase products. This effect is thought to be related to the influencing of calcium related processes, similar to calcium channel blockers.¹²

Ajoene is one of the many metabolic products of allicin. Ajoene has been extensively studied and has been shown to irreversibly inhibit platelet aggregation to all known aggregating agents.¹³ It was shown by Srivastava to inhibit both cyclooxygenase and lipooxygenase products. Ajoene has a second site of action at the membrane level where it inserts itself between the two monolayers of the plasma membrane causing membrane perturbation, possibly by altering the expression of fibrinogen receptors.¹³ Its antiaggregatory effect was synergistic with that of aspirin, indomethacin, and dipyridamole.¹⁴ Animal and human studies have confirmed the findings of the previous studies.⁸

Summarizing the data, garlic compounds have been shown to decrease platelet aggregation and have a vasodilatory effect.¹⁵ These antiplatelet effects would be a relative contraindication in a surgical patient. Preoperatively, patients should be advised of the bleeding potential associated with garlic and garlic supplements, and should be advised to stop its use (see table). There is nothing definitive in the literature as far as the amount of time necessary to discontinue garlic prior to surgery, however, it seems prudent to take the same precautions one would with other antiplatelet agents.⁸

Omega-3 Fatty Acids (Fish Oil)

The inverse relationship between fish consumption and death from CAD has been well demonstrated in coastal Eskimos.¹⁶ These coastal Eskimos have been found to have favorable serum lipid profiles, prolonged bleeding times, decreased platelet aggregation, and a vasodilatory shift of the eicosanoid system, all of which are probable protective mechanisms from CAD. The traditional Eskimo marine diet is high in omega-3 fatty acids that are responsible for the antiplatelet effects. Eicosapentanoic acid (EA) is one of the antiplatelet compounds present in fish oil. The EA competes with arachadonic acid for platelet cyclooxygenase in an activated platelet. The metabolic products of EA (thromboxane A3 and prostaglandin G3) are essentially nonactive compared to the metabolic products of arachadonic acid (thromboxane A2 and prostaglandin G2) which are potent vasoconstrictors and cause platelet aggregation.¹⁶ In addition, when ingested on a long-term basis, EA is incorporated into platelet phospholipids at the expense of arachodonic acid, so less arachadonic acid is available to produce thromboxane A2.¹⁶

In summary, EA has been shown in humans to decrease platelet aggregation, lower cholesterol and triglyceride levels, and favorably regulate blood pressure.^{16,17} Silverman demonstrated that a single supplement of fish oil increased plasma EA and inhibited platelet aggregation and adhesion.¹⁸ The maximal effect of EA on platelet adhesion occurred with a dose of 6 grams/day.⁸ Other studies have shown that EA not only decreases platelet aggregation, but also causes a decrease in thromboxane A2 production, an increase in bleeding time, and a decrease in platelet adhesion.⁸

The EA is readily available as a dietary supplement and is widely used. Based on the current literature, it appears the fish oil supplements should be discontinued prior to a surgical procedure to avoid excessive bleeding.⁸ The length of time that EA needs to be discontinued prior to surgery has not been addressed in the literature (see table).

Vitamin A

Unlike the previous vitamins and supplements

discussed, vitamin A, when used judiciously, can actually help improve wound healing in certain types of patients. Numerous studies have shown that vitamin A can counteract the delayed healing seen in patients taking long-term corticosteroids.¹⁹ It is well known that corticosteroids prevent the inflammatory phase of healing and reduce the accumulation of fibroblasts. Part of their anti-inflammatory action is due to the fact that corticosteroids stabilize the membranes of lysosomes that contain numerous acid hydrolases known to play an important role in inflammation.²⁰ Vitamin A has been demonstrated to be a lysosomal labilizer by causing the release of lysosomal hydrolytic enzymes resulting in the destruction of connective tissue and the initiation of the inflammatory process.²⁰ The positive effects of vitamin A on healing have only been seen in corticosteroid-retarded wounds. Vitamin A has also been shown to be an immune stimulant in humans. Cohen et al demonstrated that the immune depression that occurs after major surgery can be improved significantly with perioperative administration of vitamin A.²¹ Other studies have shown that vitamin A can prevent radiation induced wound healing defects in rats.²²

As discussed above, vitamin A supplements administered in the perioperative period can be of significant benefit in immune suppressed and steroid dependent patients (see table). Trauma and sepsis are other potential indications where the immune stimulating effects of vitamin A would probably be of value.⁸ Vitamin A should be used with caution in those patients where corticosteroid use is essential to control inflammatory disease and is contraindicated in pregnancy.¹⁹ In the immediate perioperative period, 25,000 IU/day is an appropriate dose for vitamin A.²³

Conclusion

Clinicians need to query patients about their use of unconventional dietary supplements and vitamins when obtaining a history.¹ This will not only open the lines of communication between the clinician and patient, but will potentially avoid any unexpected and untoward complication from surgical therapies. In addition, by having a firm knowledge of these dietary supplements and their actions, surgeons can take advantage of their beneficial effects.

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Clinical and Cultural Concerns in OOTW: A Case Study of HIV and Haiti

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The challenge of providing mental health and combat stress control (CSC) in a theater of operations other than war (OOTW) is based on the ability of the deployed prevention team to integrate itself into the task force and host nation to which it is assigned, the missions of the units in theater, and the availability and mobility provision of CSC to the entire theater of operations while maintaining cultural awareness as a means of providing more comprehensive information to the medical task force. One such lesson learned stemmed from the ethical issues pertaining to the Haitian human immunodeficiency virus (HIV) problem and its impact on the popular imagination of the troops deployed to Operation Uphold Democracy. This investigation discusses the keys to creating an environment in which units will seek out CSC for its mental health expertise as well as utilize them to augment the preventive medicine mission, medical civil affairs, and as medical surveillance and intelligence resources. Pertinent to social work, CSC units in a theater of operations involving foreign civilian nationals and multinational forces can be a valuable resource for units having daily contacts, concern, or frustrations with people from a different culture. Clinical and tactical work in current multi-national/United Nation missions and future operations must have culturally sensitive policies. Combat stress social workers are in a unique position to provide education to military personnel on culturally sensitive issues.

Statement of the Problem

In response to the growing concern for cultural/ethnic aspects of clinical and combat stress work in other than war operations, this investigation focuses on the sociocultural differences of the Haitian people and how they impact on medical service delivery to the host nation and the troops supporting the missions. In pre-deployment situations, medical commanders often rely on the same general demographic information given to the soldier as a source of medical intelligence. This data is insufficient as information on the culture and culturally consistent belief systems, history, medical practice, and behavioral pattern. By describing the HIV issue in Haiti across the aforementioned subjects, this investigation will illustrate the vital need for culturally and clinically sensitive data in order to provide proper and effective patient care in any location, but especially a deployment. In order to provide effective treatment, clinicians must ascertain medical history and gather data as it applies to the patient. Other general pieces of cultural history may not prove as useful

as past medical records and the patient's beliefs about treatment. This kind of data collection must occur on a macro or theater level of assessment. During Operation Restore Democracy, the greatest threat to medical delivery and military interventions with Haitians arguably has been the HIV virus, yet it was not identified by pre-deployment civil affairs pamphlets and information papers from the Center for Applied Linguistics as a medical threat. Soldiers deploying to this theater of operations were not equipped with important safety information nor were they presented with facts or myths about the prevalence of HIV. This investigation addresses those concerns and demonstrates how this information can be utilized to paint a sociocultural backdrop for medical service delivery in a theater of operations. Moreover, it illustrates another unique application of CSC and preventive mental health by utilizing the social policy training of the organic clinical social workers to this end.¹

Epidemiology

Prior to the 85th Medical Detachment (CSC)'s Jan

95 deployment to Operation Uphold Democracy, Haiti was cited among the top 20 nations with the highest number of recorded acquired immunodeficiency syndrome (AIDS) cases per 100,000 population.² The HIV seroprevalence rate in asymptomatic adult cohorts in Haiti is 9% in urban areas and 3% in rural areas.³ Rates are comparable for men and women. In a country that can ill afford another health burden, AIDS has indeed become a source of considerable suffering for the Haitians and source of fear for multi-national troops serving there.

Epidemiological patterns of HIV infection among Haitians suggests that the most frequent route of transmission for both males and females is heterosexual contact. Cross cultural counseling done by the 85th Medical Detachment in Haiti seems to confirm that. Researchers studying AIDS in Haiti found that 23% of patients reported bisexuality as a risk behavior, 11% reported being blood transfusion recipients, and 1% reported being intravenous drug users. Among those reporting bisexual transmission in this sample, many were male prostitutes who had had contact with North American tourists.⁴ The Collaborative Study Group of AIDS in Haitian-Americans in the U.S. (1987) also found that homosexuality does not play as important a role in the transmission of HIV as does heterosexual contact.⁵ The demographic patterns demonstrate the need for the AMEDD to develop policies and precautions for units deploying to foreign theaters of operation.

Historical Roots to the Haitian Settlement

In order to discuss the personal, familial, social, and political implications of HIV infection in the Haitian settlement, it is important to describe the process of the migration as it is experienced by Haitians in the U.S. Although many characteristics of Haitian migration distinguish it from other migratory patterns, the phenomenon of Haitian migration may be examined within the larger context of black peoples from the West Indies and the Caribbean basin.

The French were the last Europeans in St. Dominique, as Haiti was called during its colonial history. In 1804, through a revolt of slaves who had been brought by Europeans to St. Dominique from Africa, Haiti became the second republic in the Western Hemisphere and the

first free black country in the world.⁶

Migratory movements of the Haitians to the U.S. predate the independence of both nations.⁷ Migration during the 19th century to the U.S. was not significant, most likely because of racial discrimination. The first wave of migrations came after the U.S. Marine expedition and occupation of Haiti from 1915-1934.^{7,8}

In more recent decades, the U.S. has been a major receiving country for emigrating Haitians.⁹ N. Glick Miller (6/1/92) estimates that approximately 940,000 Haitians are in the U.S. with the largest concentrations in New York, Florida, New Jersey, Illinois, and Massachusetts.⁷ New York City alone has an estimated 250,000 Haitians. To put this in perspective, the population of U.S. Haitians is the equivalent of one-sixth of Haiti's population. The mean age of a Haitian immigrant is 29 years and 59% of them are female.¹⁰ Like other immigrant groups to the U.S., early Haitian immigrants were drawn mainly from the upper and middle classes. However, sociodemographic profiles show that after 1972, Haitian immigrants were mostly lower-class semiskilled arrivals.^{7,8}

The pressure to gain contact with American troops during deployments such as Uphold Democracy was felt because Haitians, in addition to economic and political pressures, want to be reunified with family members in the U.S.¹¹

Against the backdrop of illiteracy, sociocultural differences, politics, demands of resettlement, and acculturation in the diaspora, AIDS among Haitians in our care and areas of operation may be examined and understood.

Responses to the Political Construction of Disease

Haiti's role in the AIDS pandemic has been unique.⁴ In 1983, The Centers for Disease Control (CDC) categorized Haitians as a high-risk group for AIDS. This categorization suggested to some in the scientific and political communities that AIDS had originated in Haiti. This was the first time in the history of modern medicine that a country was loosely associated with a pathological condition.

Scientific basis for this attribution was lacking.

Farmer described the classification as "bad science."⁴ The use of culturally insensitive instruments had failed to identify behaviors now known to place individuals at risk for HIV infection. Consequently, Haitians were singled out by virtue of their ethnic and cultural features.¹² In 1985, with considerable pressure applied by the Haitian community, the CDC removed the Haitians from the list of risk groups.⁴ However, the Food and Drug Administration did not reverse its ban on Haitians as potential blood donors until 1990. Understand that a stigma still persists and the repercussions have been tremendous. The AIDS has a more negative impact on our willingness to provide care in the field and on Haiti's fragile international image than political repression and intense poverty.¹³ Another consideration is while Haitians have been removed from these lists, they often remain on the lists of our soldiers' popular imagination.⁴ Anti-Haitian backlashes can be felt in cities throughout North America. Farmer documented the discrimination experienced by Haitians with AIDS in areas of health care, employment, housing, education, and commerce.⁴ These biases are readily apparent where Haitian peoples and U.S. soldiers mix.

As a result of the disastrous consequences of the initial attribution of blame, the Haitian community in the U.S. and the Aristede government delayed acknowledging the toll that AIDS has exacted upon its people. The community's denial slowed efforts to combat the spread of the disease as it indirectly discouraged prevention and education efforts. In this regard, one must consider the other issues that besiege Haiti as well.¹⁴ For Haitians, AIDS is but one more problem which they must contend with in the rebuilding process of this democracy.

AIDS and Racism

In the U.S., the perception often held by the larger society is that black Americans are an indistinguishable, homogeneous mass. However, our soldiers of color will tell us that they are keenly aware of the cultural differences that separate them from one another and from whites. Simply stated, black skin color can encompass many cultures, and generalizations based on color can lead to great misunderstanding.¹ Haitians are even more different because they are culturally different than African-Americans. Even after some time with troops deployed to Haiti, it is clear that we Americans still tragically

misunderstand these people, harbor personal ambivalence and animosity, and believe that we can empower and change a culture overnight. It is logical from this end that this factor effects behavior and medical treatment in this theater of operations.

The Contextual Framework of Intervention

A group's cultural characteristics and value systems influence its concepts of disease and illness. The critical issue here is understanding how and by whom a situation or problem is defined. Among Haitians, the community's understanding of AIDS not only determines the degree to which it avails itself of services, but also determines compliance with recommended treatment regimens as well as the potential course of illness.¹⁴

In review of Haitian ethnomedicine, Charles, Lefley and Pedersen state that rural Haitians believe that illness can be of natural or supernatural origin.¹⁵ Few Haitians of lower socioeconomic status adhere to the germ theory of disease as an explanation for illness.⁷ Hence, Haitian patients tend to perform self-diagnosis and adopt a rather uncooperative stance toward western explanations of disease. One can also see how rejection of germ theory is carried out behaviorally, that is, personal hygiene causing a nightmare of problems for providers of preventive medicine.

For many Haitians, two related but distinguishable AIDS entities can be identified: (1) AIDS the infectious disease and (2) AIDS that is brought on by unnatural causes.⁴ Protective measures are thought to be helpful against the former, but useless against the latter. Some Haitians believe that magical intervention is effective against the unnatural form of the disease, thereby making it the less virulent of the two. The natural, infectious version of the illness, however, is considered to be universally fatal.⁴

A Haitian person with AIDS may, therefore, seek more traditional (folk) forms of care, as such treatments are thought to be more valid and reliable. The range of treatment options available to patients is thereby increased. They may seek the assistance of a medical provider, a voodoo priest, an herbalist, prayer, the Catholic Church, or any combination of these. The option selected is

determined by the perceived cause of the illness and the perceived credibility of American medical providers. This is important when you consider resistance to treatment and establishing a therapeutic alliance with a Haitian patient. The factors predictive of the options chosen are patient's social class, residential background in Haiti (urban versus rural), education, and religion. As the disease progresses, it is not unusual for patients to shift in their attribution models and their conceptual understanding of the illness. This shift can be a therapeutic weapon against their cultural biases. Practitioners must learn to describe the progression of the illness and the patient's options with an understanding of the patient's belief systems. The practitioner might then convince a Haitian patient to get the treatment needed.

In both of these disease paradigms, however, blaming the victim is an uncommon response to AIDS.¹⁵ In the Haitian world-view, personal accountability is not valued as much as is the primacy of Haitian metapsychology. External locus of control is emphasized. Consistent with this sociocentric world-view, the self is defined in relation to a collective of related and unrelated family members. In this model, socialization is accomplished by reference to the field, that is, it is achieved by inducing shame as opposed to guilt from early stages of a child's development and sometimes maintained by interpersonal violence.¹

Gender-Role Issues

The Haitian home is mostly a patriarchal environment. Traditional sociocultural role expectations determine how males and females view themselves and each other. Hence, Haitian women tend to continue to defer to men in sexual matters. Communication between males and females regarding sexuality is not consistent with Haitian culture.¹⁴

As potential spouses, Haitian women are considered to be desirable if they are perceived as being sexually inexperienced. Women who assume responsibility in sexual matters are thought to be of less strict moral standards and, therefore, considered undesirable. Thus, a woman who is prepared for sex (one who initiates the use of a condom) goes beyond her defined role, the potential result of which is rejection.¹⁴ Moreover, Haitian men, at

times, are reluctant to suggest the use of a condom, as doing so may be perceived as a lack of interest in a long-term relationship with a sexual partner. It is not uncommon for Haitian men to engage in sexual activity outside marriage as an assertion of their virility to themselves and others.¹⁴

AIDS as a Family Disease

Among Haitians, AIDS is a family disease. When a Haitian contracts AIDS, his or her illness is synonymous with failure.¹⁴ The experience of the illness is shameful in that one not only fails oneself but also those dependent on them to improve their own life circumstances. The AIDS is a family disease particularly because of extramarital behavior and forced abuses of the previous regimes. Family members get AIDS sexually or congenitally.¹⁴

In times of difficulty, Haitians "put their feet in water," a Creole expression to seek assistance or healing from their kin networks. Because of the additional stigma the CDC had placed on Haitians, many HIV-infected patients will not disclose their status, even to those with whom they are very close.¹⁶

Practice Implications

Haitians often delay seeking treatment. For some, delay is the result of denial and misunderstanding; others fear that utilization of American Army medical care will compromise their ability to get on-post work passes and chances to migrate to the U.S. Ethnic and cultural barriers to service utilization also exist in that the numbers of bicultural and trilingual (English, French, and Haitian Creole) providers are insufficient to address the needs of the Haitians. This situation worsened after the UN takeover as there were smaller allowances for interpreters.

In providing services cross-culturally, it is critical that providers and soldiers remain ethical and accountable at all times. When working with Haitians, providers must acknowledge the patient's conceptual system by formulating plans **with**, not **for**, the patient that neither contradict nor violate the conceptual system and that they convey respect for it. It is also important to integrate indigenous structures in the treatment plan for patients who request such services when these resources are available.

For example, with patients who are engaged in psychotherapy and who are also receiving traditional (folk) medical care, it may be appropriate to support them in their wish to avail themselves of the services of an herbalist or a folk healer.¹⁴

Psychiatric Care in Haiti and Defining Haitian Identity

Haiti is 85% rural and 15% urban and the majority of its people are unfamiliar with psychiatric care. Historically, Haitian society, family, and a supernatural belief system provided resources for dealing with stressors that impinge on mental health. People with overt psychiatric disorders- "les fous" -were, like medieval bouffons, a source of entertainment and pity for the populace. In Port-au-Prince there are many such "les fous" and the violent treatment of these dispossessed created critical events for American soldiers to assimilate individually and search for some rational explanation. "Fous" were accepted and fed by the people except when this violence occurs and then they are often beaten, taunted, or placed in "asyles" or institutional settings. Since the 18th century, these "asyles" were custodial and there to penalize and not to treat.¹⁵

In Port-au-Prince, the Centre Psychiatrique developed in the 1960s. Social workers, psychiatrists, and psychologists were few and located in the city. Moreover, Haitian MDs were generally not interested in becoming psychiatrists. Mental health tended to be psychoanalytic in orientation. Although these professionals had some influence on alerting teachers in school systems to psychological problems, mental health care is usually limited to the educated and wealthy.¹⁵ Nevertheless, psychiatric care was considered stigmatizing and even many affluent Haitians would only seek psychiatric care in the U.S.¹

The Haitian situation itself was intrinsically traumatic for the populace. The Duvalier regime had perpetuated a paranoia-inducing atmosphere of fear and ambiguity, some of which was based on actual history and not fantasy. The victimized were directly influenced by the system, but the innocent bystanders were also traumatized by their own uneasiness and instability. Haitian self-esteem is closely tied to economic standing and an awareness of the low

prestige of Haiti worldwide. There is an increasing rejection of Haitian identity. This can be seen in a novel by Marie Colimon entitled "*Le Chant*," in which a Haitian girl writes to her mother in New York "I am languishing in my exile in Haiti" and begs her to hasten her visa to the U.S.¹⁷

This growing rejection of national identity was manifested by external aggression, intolerance, violence, physical abuse, demonstrations, and interpersonal family violence and witnessed by U.S. troops. The U.S. Military Police at Station No. 4 in Port-au-Prince on Rue J.J. Desallenes often reported to the members of the 85th CSC that criminal acts were committed in the name of supernatural and voodoo sources, but were acted out to maintain material possessions or positions of power in a village.

To help the soldier witnessing these behaviors, combat stress prevention teams helped interpret the disturbing events the soldiers witnessed. The psychological perspective on behaviors observed outside the range of a U.S. soldier's experience was "explained" or discussed via debriefings. Thus, what might have been interpreted as unacceptable behavior to an American soldier and treated with intolerance before combat stress intervention, was now interpreted as the Haitian desire for satisfaction of spiritual and emotional needs and met with some understanding by troops in contact with Haitian civilians.

Voodoo is also a therapeutic system. In voodoo, the universe is an interaction of forces. These forces begin with an almighty force known as "Gran Met." After Gran Met created the universe he shared his powers with "loas" or lesser deities. Human beings are in constant interaction with loas and are forced to make deals with them for control of themselves and others. The loas are perceived pragmatically as instrumental in conducting one's life. As power brokers, loas are amoral; it is up to humans to use loas according to their hopes and needs. Many behaviors are therefore justified by the voodoo belief system.

Psychiatric healing may be defined by spiritual reshaping, supernatural strengthening, and exorcism. It is not until illnesses have progressed and these methods have failed that Haitians often turn to western medicine. This sets up American practitioners for failure because they cannot eliminate the problem.

Haitians often will not exhibit symptoms of depression or remorse because they project or deny it as defense mechanisms against such severe adversity. Paranoia is also motivated by escape so that a wrongful act does not have any personal responsibility associated with it. These behaviors are barriers to soldier interventions whether you are an Military Police investigating a robbery, a Special Forces commander attempting to gain information about a prominent villager, or a doctor gathering personal data for treatment plans. Trust is undermined by adverse problems such as poverty and cramped living conditions and erode at a Haitian's ability to provide mutual support and the creation of an atmosphere of confidentiality.

Summary and Conclusion

The provision of cross-cultural services requires self-awareness relative to one's own attitudes, ideal and actual norms, and a sense of social organization. An awareness of these psychosocial elements of culture are often difficult to achieve and gaining trust is even more difficult. Providers have much to learn from their patients, who must be considered experts regarding their needs. Haitians should be encouraged to speak within their own communities about AIDS. Providers need to acknowledge differences based on national, ethnic, and cultural origin so as not to obscure the variety, depth, and richness of the patient's experiences.¹⁸ With this awareness, Army medical personnel are in a position to educate the rest of our deployed soldiers in similar operational situations, in other theaters, and other than war operations. The CSC and division mental health officers were called upon to become these cultural educators. These units went beyond the scope of civil affairs units, which provided demographic information only during "country briefs." Our soldiers need to know more than how much coffee per capita a nation produces. Soldiers must be prepared to witness the difficulties of these struggling nations. There will be conditions of extreme poverty, violence and murder, crimes against children, and other atrocities beyond any imagining of the typical soldier. This is critical because operational stress reactions were intensified by such situations in places like Haiti, Bosnia, and Rwanda and can lead to post-traumatic stress disorder.

As American soldiers, we are trained to embrace

national and military values. These values are professed and executed daily. Values are an excellent foundation when studying a foreign culture. Understanding the Haitian culture allows for better treatment interactions. A good understanding of a people's values helps the foreigner negotiate differences and establish trust.

The AIDS issue was used to demonstrate how fear and ignorance can create barriers to treatment and military intervention. Just as in Haiti, AIDS moves along the fault lines of our society. In exploring the AIDS issue in Haiti, along with other issues, combat stress teams learned that AIDS is a disease that reflects our social and global inequities in many areas. In the development of effective health prevention and intervention programs for governments such as Haiti, soldier-practitioners must address the cultural, contextual, and environmental factors that impinge on the functioning of the Haitian community. Leaders preparing for military intervention must do the same.

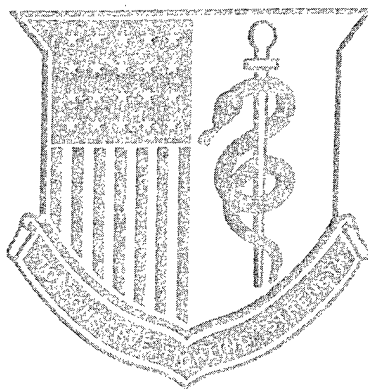
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Chlamydia Risk Factors in a Military Obstetrical Population

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The objective of this study was to determine the incidence in a military obstetrical population and investigate age, race, marital, and maternal active duty status as potential risk factors for antepartum Chlamydia infection. Findings indicate the overall incidence of Chlamydia in the obstetrical population of this military facility is low. Of the variables found to be associated with an increased risk for Chlamydia infection, unmarried patients showed the strongest correlation, followed by age less than 20, active duty status, and African-American (AA) race.

Objective

Chlamydia is the most frequently reported sexually transmitted disease (STD) infecting an estimated 4 million people a year.¹ Chlamydia is caused by the bacterium *Chlamydia trachomatis* with approximately 75% of infected women asymptomatic. At the Centers for Disease Control and Prevention 1998 National STD Prevention Conference, Georgia was noted to be one of 10 states with the most severe level of Chlamydia among young women ages 15-24 (7.6%). The incidence of Chlamydia infection in female military recruits was observed to be 9.2% in a 1998 study published in the New England Journal of Medicine.² The purpose of this study was to determine the incidence of Chlamydia infection in the obstetrical population at Winn Army Hospital (WAH), Fort Stewart, GA. The association of age, race, and active duty status with the incidence of Chlamydia was further evaluated. Also, the incidence of Chlamydia in the married and non-married patients in the nonactive duty obstetrical population at our facility was calculated and the relative risk (RR) determined.

Study Design

This is an observational retrospective

study with data obtained by reviewing the delivery log from Jan to Jun 97 at WAH for maternal age, race, marital, and active duty status. The Chlamydia test results on the initial prenatal visit were retrieved from a computerized database. All obstetrical patients at WAH underwent routine screening for STD at the initial prenatal visit. The Chlamydia test was performed using an enzyme immunoassay (Sanofi Diagnostics Pasteur, Inc). The incidence of Chlamydia was calculated for each group and the RR determined.

Results

Six hundred and eighty-five records were reviewed

	Positive Test	Negative Test	Percent Total Population	Percent Positive Results
AGE			N=590	N=19
<21	10	121	131 22.2%	10 52.6%
21-25	5	255	260 44.1%	05 26.3%
26-30	4	123	127 21.5%	04 21.0%
>30	0	72	72 12.2%	00 00.0%
RACE				
White	6	325	325 55.1%	06 31.6%
Black	11	212	212 35.9%	11 57.9%
Hispanic	2	47	47 8.8%	02 10.5%
Other	0	1	6 01%	00 00.0%
Active Duty	9	118	118 20%	09 47.4%
Non-Active Duty	10	472	472 80%	10 52.6%

Table 1. Incidence of Chlamydia by Age, Race, and Military Status

and 590 results obtained. Ninety-five patients did not have a test available. The overall incidence was calculated to be 3.22% (n=19). The incidence of Chlamydia, stratified by age, race, and active duty status is shown in Table 1.

Nonactive duty patients comprised 80% of the total obstetrical population (n=472). Only 3.8% of patients were unmarried. However, the incidence of Chlamydia in this group was 30%, a 7.9 fold increase (Table 2).

Non-Active Duty	Positive Test	Negative Test	Percent Total Population	Percent Positive Results	RR
Married	7	447	96.2%	70.0%	0.7
Single	3	15	3.8%	30.0%	7.9

Table 2. Marital Status and Risk of Antepartum Chlamydia Infection in the Non-Active Duty Population

The incidence of Chlamydia stratified by age is shown in Figure 1. The population is divided into four age groups. Patients less than 21 years of age account for 22% of the total obstetrical population (n=131) yet comprise 53% (n=10) of those with antepartum Chlamydia infection (RR=2.4). The 21-25 age group represent 44% of the total population (n=260) and 26.3% (n=5) of those with

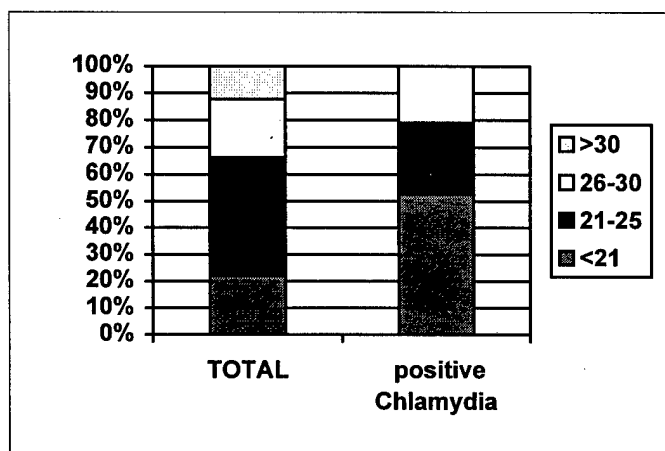


Fig 1. Frequency of each age group in the total obstetrical population and the Chlamydia positive population.

antepartum Chlamydia infection (RR=0.6). Patients 26 to 30 years of age represent 21.5% (n=127) of the obstetrical population and 21% (n=4) of those with antepartum Chlamydia infection. Patients over 30 represent 12.2% of the obstetrical population. No patients in this group tested positive.

The association of race and the incidence of Chlamydia in our obstetrical group are shown in Figure 2. People of AA race comprise 36% (n=212) of the total obstetrical population and 58% (n=11) of those positive for Chlamydia (RR=1.6). Hispanics are 8% (n=47) of the total population and 10% (n=2) of those Chlamydia positive (RR=1.3). Whites are 55% (n=325) of the total population and account for 31% (n=6) of the Chlamydia positive group (RR=0.6).

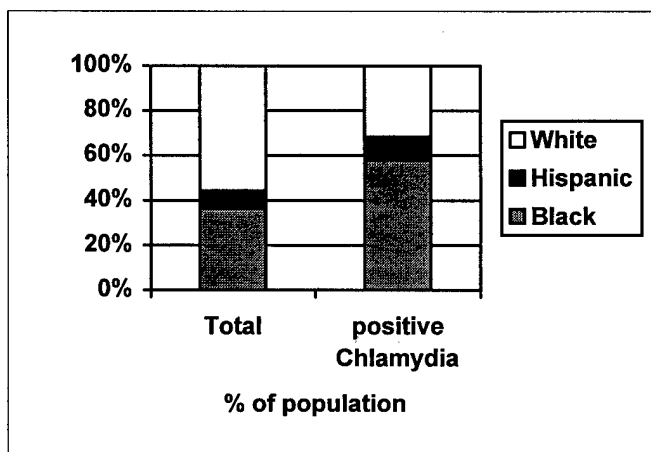


Fig 2. Incidence of Chlamydia stratified by race.

The incidence of Chlamydia was also reviewed in the active duty versus nonactive duty obstetrical population as shown in Figure 3. Active duty patients account for 20% (n=118) of the total population and 47% (n=9) of the Chlamydia positive group (RR=2.4). The nonactive duty are 80% (n=472) of the total population and 53% (n=10) of the Chlamydia-positive patients (RR=0.65).

Marital status and the incidence of Chlamydia in the nonactive duty population are shown in Figure 4. Though unmarried patients comprise only 3.8% (n=18) of the nonactive duty population (n=472) they accounted for 30% of those with positive Chlamydia results (RR=7.9).

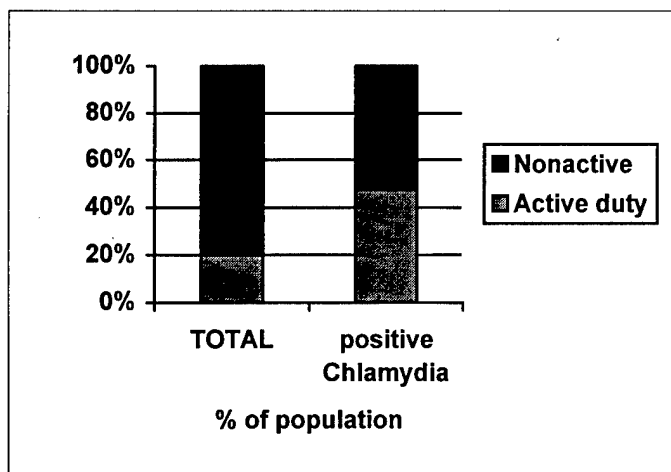


Fig 3. Incidence of Chlamydia stratified by active duty status.

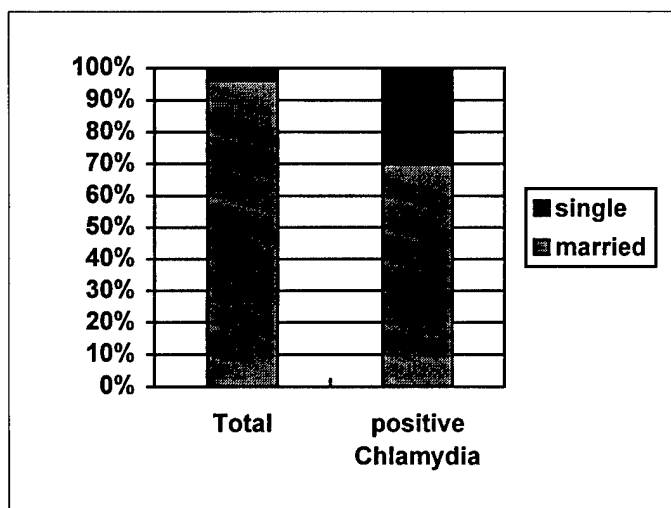


Fig 4. Incidence of Chlamydia in the nonactive duty population.

Conclusion

The incidence of Chlamydia trachomatis in women in the U.S. ranges from 0% to 37%.³ The incidence of Chlamydia in the obstetrical population at this military facility is 3.22%. This is below the incidence considered to be cost-effective for universal screening (5%).³ The reported incidence in the state of Georgia for women ages 15 to 24 is 7%. The Chlamydia incidence of pregnant women in rural Georgia has been reported to be 12%.⁴ The groups most at risk in our obstetrical population are single (RR=7.9), less than 20 years old (RR=2.4), active duty (RR=2.4), or AA (RR=1.6).

The limitations of our study include the fact that 95 women did not have culture results available. This may be due to miscarriage, ectopic pregnancy, elective termination, or transfer to another duty station. This group not represented may have a higher incidence and cause the incidence of Chlamydia at this facility to be under-reported. Potential risk factors not analyzed include the number of sexual partners, age of first intercourse, history of STD, history of abnormal Pap smears, or abnormal findings on physical exam. The data in this study identifies at-risk groups. Race as a risk factor for Chlamydia infection was evaluated in an article of the American Journal of Obstetrics and Gynecology in which black women had a colonization rate of 16% versus 5% for white women.⁵ Identifying at risk groups and the incidence of Chlamydia in our population is essential to design a cost-effective screening policy. These groups may also benefit from follow up Chlamydia testing in the second or third trimester. Untreated maternal Chlamydia has a vertical transmission rate of 20%-50% for neonatal conjunctivitis and 10%-20% for pneumonia.³ Maternal effects of Chlamydia include septic abortion, preterm delivery, and ectopic pregnancy. More study is needed to determine when universal screening is appropriate in an asymptomatic obstetrical population.

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