NORTH ATLANTIC TREATY ORGANISATION

RESEARCH AND TECHNOLOGY ORGANISATION

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RTO MEETING PROCEEDINGS MP-109 **HFM-100**

NATO Force Health Protection Requirements from Pre- to Post-Deployment: Population Health for the Military

(Les besoins des forces de l'OTAN en matière de soins de santé du pré-déploiement jusqu'au post-déploiement : la santé des populations militaires)

Papers prepared for the RTO Human Factors and Medicine Panel (HFM)

Symposium which was scheduled to be held in Antalya, Turkey,

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Published December 2003

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The Research and Technology Organisation (RTO) of NATO

RTO is the single focus in NATO for Defence Research and Technology activities. Its mission is to conduct and promote co-operative research and information exchange. The objective is to support the development and effective use of national defence research and technology and to meet the military needs of the Alliance, to maintain a technological lead, and to provide advice to NATO and national decision makers. The RTO performs its mission with the support of an extensive network of national experts. It also ensures effective co-ordination with other NATO bodies involved in R&T activities.

RTO reports both to the Military Committee of NATO and to the Conference of National Armament Directors. It comprises a Research and Technology Board (RTB) as the highest level of national representation and the Research and Technology Agency (RTA), a dedicated staff with its headquarters in Neuilly, near Paris, France. In order to facilitate contacts with the military users and other NATO activities, a small part of the RTA staff is located in NATO Headquarters in Brussels. The Brussels staff also co-ordinates RTO's co-operation with nations in Middle and Eastern Europe, to which RTO attaches particular importance especially as working together in the field of research is one of the more promising areas of co-operation.

The total spectrum of R&T activities is covered by the following 7 bodies:

- AVT Applied Vehicle Technology Panel
- HFM Human Factors and Medicine Panel
- IST Information Systems Technology Panel
- NMSG NATO Modelling and Simulation Group
- SAS Studies, Analysis and Simulation Panel
- SCI Systems Concepts and Integration Panel
- SET Sensors and Electronics Technology Panel

These bodies are made up of national representatives as well as generally recognised 'world class' scientists. They also provide a communication link to military users and other NATO bodies. RTO's scientific and technological work is carried out by Technical Teams, created for specific activities and with a specific duration. Such Technical Teams can organise workshops, symposia, field trials, lecture series and training courses. An important function of these Technical Teams is to ensure the continuity of the expert networks.

RTO builds upon earlier co-operation in defence research and technology as set-up under the Advisory Group for Aerospace Research and Development (AGARD) and the Defence Research Group (DRG). AGARD and the DRG share common roots in that they were both established at the initiative of Dr Theodore von Kármán, a leading aerospace scientist, who early on recognised the importance of scientific support for the Allied Armed Forces. RTO is capitalising on these common roots in order to provide the Alliance and the NATO nations with a strong scientific and technological basis that will guarantee a solid base for the future.

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NATO Force Health Protection Requirements from Pre- to Post-Deployment: Population Health for the Military

(RTO MP-109 / HFM-100)

Executive Summary

The HFM panel of the NATO Research and Technology Organisation (RTO) organized a symposium focusing on the integration of all kinds of protection possibilities for different health threats that the military encounter during periods of deployment. In particular, the measures that can be done before, during and post deployment were addressed. The military health care system can be seen as a whole chain of interventions, ranging from prevention to care of veterans. The symposium programme focused on both the required interventions as well as the systems that can monitor health risks, exposure or health changes.

On reviewing the papers received, it can be concluded that exchange of scientific and practical information is needed between several organizations and groups; not only to agree on new protocols and standards but also to develop a comprehensive ("virtual") health care system, in which all kind of health parameters can be related and documented.

Due to circumstances beyond the RTO's control this HFM symposium was cancelled. Given the importance of the topics addressed, it was decided to publish the papers available for the symposium programme. The Technical Evaluation Report is based on the received papers only.

Les besoins des forces de l'OTAN en matière de soins de santé du pré-déploiement jusqu'au post-déploiement : la santé des populations militaires

(RTO MP-109 / HFM-100)

Synthèse

La commission HFM de l'Organisation OTAN pour la recherche et la technologie (RTO) a organisé un symposium sur l'intégration de multiples possibilités de protection contre les différentes menaces pour la santé rencontrées par les militaires lors des opérations. En particulier, les symposium a examine les mesures qui peuvent être prises avant, pendant et après le déploiement. Le système de soins de santé militaire peut être considéré comme une chaîne complète d'interventions, allant des soins préventifs jusqu'aux soins dispensés aux vétérans. Le programme du symposium a couvert tant les interventions nécessaires que les systèmes destinés à contrôler les risques pour la santé, l'exposition aux risques et l'évolution de la santé.

La lecture des communications reçues nous permet de conclure qu'un échange d'informations scientifiques et pratiques entre différentes groupes et organisations s'avère nécessaire, non seulement pour définir de nouveaux protocoles et de nouvelles normes, mais également pour développer un système de soins de santé compréhensif (« virtuel »), permettant de constater et de documenter une grande diversité de paramètres de santé.

En raison de circonstances indépendantes de la volonté de la RTO, ce symposium RTO a dû être annulé. Pourtant, étant donné l'importance des sujets examines, il a été décidé de publier les communications reçues. Le rapport d'évaluation technique est basé uniquement sur ces communications.

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SESSION VI: POST-DEPLOYMENT HEALTH SURVEILLANCE

POSTER SESSION

Human Factors and Medicine Panel

Technical Evaluation Report

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INTRODUCTION

In the "Operational Medicine" area of the HFM panel health problems pre-, during and post-deployment are the focus of different programs. Mostly, the activities are focused on separate or specific health problems. This symposium attempted to integrate the different health aspects pre-, during and post-deployment. Especially because of the problems that are encountered worldwide post-deployment there was a need for a comprehensive view of all aspects of health protection. This should not only be seen as an individual health problem, but also as a population (or group) problem.

Up to the beginning of March 2003 a lot of work was done to get papers and presentations ready. The symposium was officially cancelled 3-4 weeks before the actual date scheduled, because of the international political situation. Prior to cancellation several authors withdrew their papers.

In the mean time 22 papers were received. The Program Committee and the HFM Chairman decided to make an evaluation report of these papers and combine them into a publication.

THEME

Throughout history military forces have suffered more casualties from endemic disease and accidents than from military action (DNBI). This trend continues in the era of peacekeeping operations and operations other than war (OOTW) that now occupy the alliance. Of particular current interest are the threats posed by toxic industrial chemicals and other exposures caused by the breakdown of societal infrastructure as a result of military operations. Military medical authorities must now cope with these threats to health by anticipating and preventing exposure and taking appropriate prophylactic measures.

The HFM panel chose the theme of this symposium to try and integrate the protection possibilities for different health threats that military encounter during deployment. The preventive measures that can be done before, during and post-deployment are the focus. Health care can be seen as a chain of interventions. They range from prevention to care and rehabilitation of veterans. The specific health interventions are not the only part of the symposium, but also the systems that can monitor health risks, exposure or health changes. A former HFM Exploratory Team (ET 013, concerning "long term epidemiological follow up") was integrated into the symposium.

The Call for Papers mentions the following topics:

1) Protection of the soldier on the toxic (industrial vice BC agent) battlefield
    a) Personal Protective Equipment
    b) Exposure limitation by pre-deployment clean up
    c) Exposure limitation by administrative means

2) Pre-deployment immunization
   a) Endemic Disease protection
   b) Emerging Disease protection
   c) Biological terrorism considerations

3) Pre-deployment medical screening requirements
   a) What should be screened for?
   b) When?
   c) How often?
   d) Documentation requirements

4) Public health protection (communicable disease control) of deployed forces
   a) Field Sanitation
   b) Potable Water supplies, purification technologies
   c) Safe Food procurement

5) Environmental and occupational risks to deployed forces
   a) Industrial hygiene for the deployed soldier
   b) Surveys for health risks
   c) Environmental Hazard Response Team requirements

6) Pre-deployment reconnaissance needs (development of Medical Intelligence)
   a) New sources of Medical Intel
   b) New technologies (computerized databases) for health surveillance (EPINATO)

7) On deployment protection strategies
   a) Lifestyle programs
   b) Injury Prevention Programs
   c) Preventive Medicine Practice in the field

8) Post deployment health surveillance
   a) Follow up of deployed personnel
   b) What demographic information should(is) being collected
   c) Use of national morbidity and mortality databases

On the basis of the received abstracts a symposium program was made. To make it practical different presentations were put together in “themed” sessions. These sessions were focused on the following themes:

1) General policies and considerations (1-7):
   Law, civilian health care system and policies, international and joint operations, future, pitfalls.

2) Pre-deployment considerations (8-13):
   Reconnaissance needs (development of Medical Intelligence), New sources of Med Intel, Network of (NATO and/or civil) expert centers and databases.

3) Environmental and occupational risks deployed forces (14-17):

   Industrial hygiene for the deployed soldier, Surveys for health risks, Environmental Hazard Response Team requirements, Pre-deployment immunization, Endemic Disease protection, Pre-deployment medical screening requirements, Care and cure, communication, lessons.

4) On-deployment protection strategies (18-22):

   Protection of the soldier on the toxic (industrial vice BC agent) battlefield, Personal Protective Equipment, Exposure limitation by pre-deployment clean up, Exposure limitation by administrative means, Emerging Disease protection, Biological terrorism considerations, Public health protection (communicable disease control) of deployed forces, Field Sanitation, Potable Water supplies, purification technologies, Safe Food procurement, Lifestyle programs, Injury Prevention Programs, Preventive Medicine Practice in the field, Care and cure.

5) Mental health issues (23-27):

   Screening, care, cure, evaluation, veteran problems.

6) (Post-) deployment health surveillance (28-35):

   New technologies (computerized databases) for health surveillance (EPINATO), Follow up of deployed personnel, psychosocial and medical questionnaire, care and cure, compensation, What demographic information should (is) being collected, Use of national morbidity and mortality databases, scientific work.

7) Posters: 36-41.

PURPOSE AND SCOPE

The purpose of the Symposium was to bring together Public Health, Occupational Health and Military Health professionals to discuss the strategies and technologies available to combat the threats mentioned. The specific objectives would be to share expertise and approaches so that the protection of the health of deployed NATO forces might be optimized.

EVALUATION

In the Call for Papers a broad approach was used to gather information from the whole chain of health inducing and health protection factors. The topics that were addressed in the received abstracts covered most items, but to make an attractive program the afore-mentioned combination in 6 “sessions” was made.

This arrangement of sessions has been adapted for evaluation reasons. A selection of 8 subjects is made. The numbers behind the theme correspond with the numbers of the related presentations. Sometimes the presentations can be put in different subjects.

1) Screening/selection (before the military service, deployment, function or special task) (23, 27, 41)
2) Education, training (4, 7 ,16 ,23 ,27)
3) Documentation of health changes pre-, during and post-deployment, function or task (1, 5, 33)
4) Risk assessment (for specific function, task or deployment) (1, 4, 5, 6, 8, 16, 19, 38)
5) Health Protection (4, 19, 38, 39, 40)
6) Individual detection of exposure and health changes (questionnaires, monitor, EPINATO) (1, 5, 7, 11, 15, 16, 23, 25, 30, 33)

7) Specific health care systems (portable, aftercare) (5, 17, 23, 25, 41)
8) Total overview of the military health care system and (legal, political, problems, etc.) (1, 2, 5, 23, 36)

Using the information in the presentations the visual description and interaction of the various themes is made in the illustration below. In this scheme some essential points (coming from the presentations) are worth elaborating:

1) Screening information and screening activities.

   Presentations on: selections and screening items.

   The scientific base of screening of health items is not much addressed by the presentations. At a minimum, the documentation on the screening items should be available and usable to guide management of the individual cases. On the other hand: out of the individual health records information can be obtained for a risk appreciation and new screening parameters.

2) Information and activities on education, training, medical advice, health promotion.

   Presentations on: health promotion programs, education, training programs.

   There were not many presentations about these methods. It would be desirable to know, what kind of information the individual militaries in the alliance are given (for instance: about taking anti-malaria tablets), what kind of training he/she has had about environmental health hazards and lifestyle issues and what kind of advice is given. It would also be desirable to relate the results of the health status to evaluate the prevention programs.

3) Military health record.

   Presentations on: health information systems, results of these systems, problems.

   Each nation has its own (written or automated) systems. The different automated systems cannot easily be connected (nor within a country, nor internationally). Automated connection to civilian systems is also not possible. Making a connection to veteran systems depends on the national veteran care programs.

4) Information and activities pre-deployment (pre-task, pre-function).

   Presentations on: reconnaissance needs (development of medical intelligence), new sources of Medical Intelligence, a network of (NATO and/or civil) experts centers and databases, environmental and occupational risks deployed forces, industrial hygiene, surveys for health risks, environmental hazard response team, endemic disease protection.

   The health protection activities carried out before a military force is sent to do a certain job (function) or deployment should be documented and available. The methods and activities are mostly known individually but an alliance comparison would be both useful and would generate discussion of the utility of certain actions. There are suggestions for the exchange of information. It should be possible to make a connection between special information on health risks and the individual military health record.

5) Information and activities on protection during deployment (function or task).

   Presentations on: protection activities on deployments and during a special function, protection strategies.

   Methods and systems of protection are known and exchangeable. Information should be available about the way protection has been, and should be available for the medical health record system.

6) Information about and activities on detection of health problems.

   Presentations on: use of national morbidity and mortality databases, new technologies (computerized databases) for health surveillance (EPINATO), questionnaires, etc.

   Methods of health questionnaires are not everywhere the same (more or less out reaching). Technically automated health record systems can be used to monitor information at a macro level. In different countries there are different policies on health questionnaires. This information can not always be put together, for instance because of privacy laws. It might be worthwhile to use some of the presentations in the symposium in HUNGARY (HFM 108/RSY-013: NATO Medical surveillance and response: research & technology opportunities and options) in April 2004 to discuss these issues.

7) Information of health care system during deployment, post deployment and during veteran period.

   Presentations on: information on health system and new solutions, system of follow up of deployed personnel, care and cure systems, financial compensation, veteran system, integration of psychosocial problems.

   The cure and care systems (and the technical solutions) of different countries are not the same. In NATO one is trying to agree upon certain levels of care. Information about the health care system (what kind of doctors were available) should be available for the individual health record. It should be possible to get a view of things that happened during a deployment/function, that has influence on the health.

8) Comprehensive interaction of all systems.

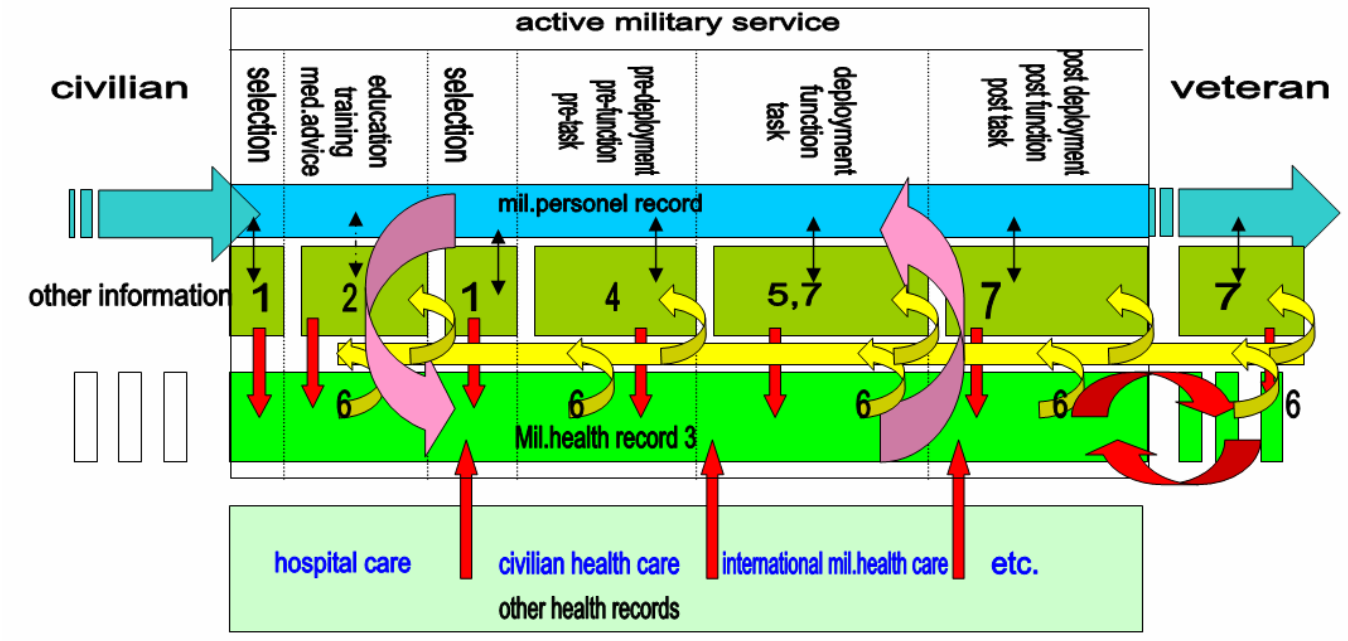
   Presentations on: civilian health care system, policies, international and joint operations, future, problems, connected databases, information systems, legal and national problems, policies on veterans.

   Only some presentations have a comprehensive, macro view. The need for a comprehensive health "system" is broadly agreed on. In that system is should be possible, that different items concerning health of a military can be related to each other. That doesn't mean, that one "physical system" is needed, but that it should be possible to connect and relate different aspects (or databases). National civilian health care systems and national policies and law are sometimes leading.

Reviewing these presentations some gaps can be identified in the activities and knowledge on this subject:

- There is not yet an international approved and scientific (evidence) based screening system.
- There is often a problem in the interaction which personnel information, the information on health promotion and the information on specific health risks (in the things that are done to protect the military as much as possible). Because of that a scientific relation is not easy to make.
- The military medical (cure) system is not always based on the epidemiology and health risks.
- There is a problem in exchange of information in international (joint) settings and in relation to civilian health care, which is not much addressed.
- The (information of) problems in the veteran period are not always connected smoothly to the information in the active duty period. Therefore there is not enough information on problems in the veteran period in relation to the deployment.
- The use (and questions) of health questionnaires are not synchronized. There is not yet a golden standard.
- In some nations the activities and information on psychosocial problems are not integrated in the medical system. The psycho-social network is not connected to the medical network.

ILLUSTRATION OF EXCHANGE OF HEALTH RELATED ACTIVITIES ACCORDING THE PRESENTATIONS



= Personel information system

= Individual military health information system

= Health related information (systems)

= Other health record systems than the national military system

= Information that can be put into the individual health record

= individual health monitor system used for individual feed back, and epidemiology/macro health reports (used for evaluation and better protection and care system).

= Information from and to personel system and medical system (deployments, functions, sick leave, etc..

In the presentations isolated institutes sometimes appear to be working on the same problem(s). Mostly national solutions are worked on. During the preparation and the communications for the evaluation it has been found, that within NATO different bodies tackle these same problems, sometimes without knowing the results from another institute in another NATO country.

There is a specific relation of the results of this symposium and the different working groups of COMEDS (WG on Emergency Medicine, WG on Military Preventive Medicine, WG on Military Psychiatry, WG on Food Hygiene, Technology and Veterinary Services, WG on Military Medical Structures, Operations and Procedures, WG on Medical Training, WG on Medical Information Management systems). But there is also a relation to the Working Groups of the NATO Standardization Agency (General Medical WG, NBC Medical WG).

Different STANAGS are focused on this way of looking at health and protection. For instance: "pre- & post deployment health assessment" (STANAG 2235), "Medical information collection and reporting" (STANAG 2481) and "Medical preventive and protective measures associated with missile operations" (STANAG 2219) or about the medical record (for instance STANAG 2132, 2347).

CONCLUSIONS

- Different institutes and organizations are working on the same problems.
- Some institutes and organizations only focus on a part of the health problem or health protection problem.
- There is some lack of an integrated vision of these issues for the alliance.
- Some (results of) scientific work do not have a relation with the military rules and protocols or operational practice.
- It seems to be difficult to integrate the physical (medical) and psychological health problems.
- The theme of "pre-deployment screening" was not much addressed. There is a need for scientifically based protocols for pre-deployment health screening.
- There are formal and practical problems in the exchange and use of health risk information, health information and cure systems. In the international setting this should be one of the purposes of HFM Panel and the operational NATO Medical bodies.
- The separation between active duty and the veteran population is a problem for continuity of health information and care. Depending on the national rules and laws these problems are small or large.
- Seeing the presentations and the above conclusions it can be said, that interaction and communication on a HFM panel-symposium would have been worthwhile.

RECOMMENDATIONS

1) The publication of the presentations should be sent to a wide audience working in the scientific, operational and management field of the NATO military medical services. This can contribute to the lack of interaction due to the cancellation of the symposium.

2) Further action should be taken to integrate work on this theme that is done around various countries. Especially the NATO/COMEDS working groups and NATO/NAS should be informed, to make it possible to change NATO procedures.

3) Use of the symposium in HUNGARY (HFM 108/RSY-013: NATO Medical surveillance and response: research & technology opportunities and options) in April 2004 in some aspects as a continuation on this symposium.

REFERENCES

- STANAG 2235: Pre- & post-deployment health assessment.
- STANAG 2481: Medical information collection and reporting.
- STANAG 2219: Medical preventive and protective measures associated with missile operations.
- STANAG 2347: Medical warning Tag.
- STANAG 2132: Documentation relative to medical evacuation treatment and cause of death of patients.
- Received Symposium Presentations 1 t/m 41.

Tools and Techniques for Comprehensive Occupational, Environmental, and Health Surveillance in Deployed Settings

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SUMMARY

For centuries, various soldiers returning from serving their countries in diverse environments have reported unusual illness patterns that have defied characterization and explanation by medical experts. Many of the soldiers' concerns center on unusual exposures that may have occurred while they were deployed. In order to address these concerns, there must be detailed information about any exposures that occur and subsequent health events, both in the near- and long-term. To this end, the American Department of Defense has established rigorous surveillance systems that cover critical phases of a soldier's career, starting before a deployment, then covering the actual deployment period, and finishing with the postdeployment phase (which actually extends forward in time to encompass additional deployments, occupations, and new exposures). The overall surveillance system encompasses many databases, including self-assessment health and exposure questionnaires, a serum repository, electronic medical records for health encounters while deployed, inpatient and outpatient diagnostic records for in-garrison health care, and a mortality registry. Close analysis of these data sources over time may lead to answers for many of these soldiers' concerns.

INTRODUCTION

American service members have reported unusual patterns of illness that they associated with various exposures occurring during their military service since the American Civil War. Health care providers and researchers have struggled, and failed, to define any unique syndromes or any common cause of the many illness patterns. Veterans strongly voiced their concerns following the Gulf War in 1991 and presented for evaluation of chronic fatigue, assorted joint and muscle pains, fibromyalgia, multiple chemical sensitivities, and many other ailments. While investigating these concerns, it became clear that the U.S. government could not answer all of the veterans' questions because there were gaps in the available data. Many veterans raised concerns about having received anthrax vaccinations, pyridostigmine bromide tablets to minimize the effects of chemical warfare agents, prophylactic antibiotics, or having been exposed to the combustion products of burning oil wells. Unfortunately, data about such exposures was often incomplete or inaccurate. For instance, although the military tracks the locations of military units closely, there is less precision in the data about exactly where a given service member might have been on any given day and what the occupational or environmental conditions were like for that same service member. Although epidemiologic studies to date had not revealed unusual rates of illness among American Gulf War veterans, it remained important to establish more effective ways to collect and analyze environmental exposure data compared to health events among service members. This resulted in a Presidential Review Directive (PRD-5) in 1995.

Paper prepared for the RTO HFM Symposium on "NATO Force Health Protection Requirements from Pre- to Post-Deployment: Population Health for the Military", which was to have been held in Antalya, Turkey, 7-9 April 2003, and is now published in RTO-MP-109.

PRD-5 directed the Departments of Defense and Veterans' Affairs ". . . to create a Force Health Protection Program. Every soldier, sailor, airman, and marine will have a comprehensive, life-long, medical record of all illnesses and injuries they suffer, the care and inoculations they receive, and their exposures to different hazards. These records will help us prevent illness, and identify and cure those that occur." This directive applies to all service members throughout their military careers, beginning with recruit training and ending with death (years after separating or retiring from military service, one hopes). Between these two extreme points, the member alternates between the garrison setting (permanent military installations, primarily, but not exclusively, within the continental United States) and deployed settings (temporary locations as part of humanitarian assistance, wartime, or other military operations). Although similar, the deployed setting presents many more surveillance challenges due to the more austere conditions, lack of supporting agencies, frequent absence of a robust information management infrastructure, unusual diseases not routinely seen by U.S. military physicians, and less information about surrounding environmental conditions.

The obvious goal of Force Health Protection is to maintain a fit, fighting force that enables commanders to accomplish their missions while simultaneously minimizing any risk to the service members from the standpoint of illness, injury, disease, disability, or death – both in the short- and long-term. We want to:

- Protect the health of deployed troops
- Spot potential attacks involving biological or chemical agents at the earliest possible time
- Identify and characterize any biological agents used against military troops
- Improve the diagnosis and treatment of ailments suffered during or after deployed operations
- Maximize military readiness and mission effectiveness

In order to reach these goals, we will need:

- Real-time global health and exposure surveillance analysis systems
- Accurate, systematic and thorough data collection processes
- Integration with personnel, and medical command and control systems
- Electronic medical records that follow a mobile population throughout a decades long career and beyond
- Long-term epidemiological analyses

METHODS

The U.S. Department of Defense (DoD) has adopted a tripartite approach to Force Health Protection. The three parts are 1) predeployment health surveillance, 2) intradeployment health surveillance, and 3) postdeployment surveillance. Predeployment and postdeployment health surveillance occur in the garrison setting and provide the foundation of all other Force Health Protection actions. After a synopsis of these components, the remainder of the article will focus on the challenges of intradeployment health surveillance.

Predeployment health surveillance consists of those ongoing preventive medicine and public health techniques that promote overall health and fitness as well as protecting the service member from specific, likely health threats in certain common contingency environments. There is an annual screening process called a preventive health assessment that ensures that each service member completes a brief health survey. Then the medical

staff reviews the survey and all available medical records to determine what additional tests, exams, and counseling are appropriate for each individual. This process ensures that immunizations, DNA samples, blood type, occupational monitoring, and any other requirements are accomplished each year. The ultimate outcome is a medical recommendation regarding the suitability of the individual for continued worldwide duty. Just prior to any actual deployment, the service member completes another short questionnaire to make sure that there haven't been any significant medical events since the most recent preventive health assessment. Beginning in 1985, the DoD established a serum repository to hold all remaining serum from mandatory HIV testing samples. Later, additional samples were obtained from each service member prior to deploying to certain areas, such as Southwest Asia. This has grown into the largest serum repository in the world with 30 million samples for 7.5 million individuals. The availability of these serial serologic specimens combined with relevant demographic, occupational, and medical information affords significant contributions to clinical and seroepidemiologic investigations.

Postdeployment health surveillance occurs after the service member has returned to the garrison setting. It begins with a questionnaire asking about any health events or known exposures that occurred during deployed operational support. Medical staff members review the form and then answer questions, schedule consultative appointments, administer tests, and provide any indicated treatment. For instance, this encounter allows determination of whether terminal prophylaxis after returning from a malarious region is appropriate and ensures the individual receives the medication, associated blood tests, and all follow-up evaluations. There are also diseases with long incubation periods, such as leishmaniasis, that might not have appeared by the time the service member returned home. For these, the services monitor reportable medical events, outpatient discharge diagnoses, and inpatient hospitalizations to identify any such cases. This facilitates the identification of other unit members who might be at similar risk and helps to evaluate the effectiveness of existing preventive medicine procedures. Finally, the USAF established a mortality registry in 1997 to capture the causes of death for service members who die while on active duty, retirees, and various other beneficiary categories. This repository will allow analysis of the causes of death for groups of people who deployed to a given site or worked in a certain occupation. The DoD is creating a similar mortality registry to encompass all of the services.

Intradeployment health surveillance consists primarily of collecting data about health events occurring in the field, though there have been recent changes to promote the collection of various types of exposure data. Field medics assign each initial health event to an appropriate disease, non-battle injury (DNBI) category (as defined by the DoD Joint Chiefs of Staff, see Table 1). For instance, an upper respiratory infection would be counted as a respiratory event. Field staff monitor their local events and situation constantly in order to have the earliest possible warning of an emerging infectious disease outbreak. These events are also summarized for each DNBI category and forwarded at least weekly to theater preventive medicine offices and to the U.S. Air Force surveillance hub (AFIERA) in San Antonio, Texas for additional statistical analysis. AFIERA analyzes the data and forwards site-specific reports to forward-deployed medical staff officers and regional reports to the medical staff officers at various higher headquarters. If there is evidence of a possible outbreak, AFIERA contacts the forward-deployed medical staff to ensure that they are aware of the situation, to offer consultative support, and to gather any additional information to include in the summary reports. The Army Medical Surveillance Activity is the long-term archive for all DoD deployment health surveillance data, setting the stage for long-term, retrospective studies.

Table 1: Joint Chiefs of Staff (JCS) Deployment Health Surveillance Categories and Examples

JCS Deployment Health Surveillance Category	Examples
Combat/Operational Stress Reactions	Acute debilitating mental, behavioral, or somatic symptoms not explained by physical disease or injury
Dermatological	Heat rash, acne, fungal, cellulitis, blisters, sunburn
Gastrointestinal, Infectious	Diarrhea, nausea & vomiting, hepatitis (not ulcers)
Gynecological	Menstrual irregularity, vaginitis (not pregnancy)
Heat/Cold Injuries	Hypothermia, frostbite, trench foot, heat stroke
Injuries, Recreational/Sports	Injuries from informal pursuit of personal or unit fitness
Injuries, Motor Vehicle Accidents	Direct consequence of motorized vehicular accidents
Injury, Work/Training	On-the-job injuries or formal unit physical fitness training
Injury, Other	All other injuries
Ophthalmologic	Conjunctivitis, foreign body, corneal abrasion, iritis
Psychiatric, Mental Disorders	All except combat/operational stress reactions
Respiratory	Bronchitis, pneumonia, asthma, sinusitis, otitis, flu, cold
Sexually Transmitted Diseases	All sexually transmitted infections (chlamydia, HIV, etc.)
Fever, Unexplained	Temperature $\geq$100.5, at least 24 hours, diagnosis unclear
All Other, Medical/Surgical	Any other initial visit not encompassed above
Dental	Any disease of the teeth, gums, and/or oral cavity
Miscellaneous/Administrative/Follow-up	Modified duty reevaluations (profiles), pregnancy, immunizations, medicine refills, routine physical exams

Traditionally, medics recorded this data on aggregate tally sheets with neither individual diagnoses nor any individual identifying information. To meet the short- and long-term requirements outlined in PRD-5, analysts must know who was sick and what the specific illness was, not just the category. Since final diagnoses often require laboratory test results, some of which require days to complete, signs and symptoms data would allow syndromic analysis as one way to provide an early warning of an attack using biological agents. Finally, all of this data would be needed on a daily basis, maybe several times a day, rather than weekly. This is often referred to as "real-time" surveillance. To accomplish these goals, the U.S. Air Force created the Global Expeditionary Medical System (GEMS).

GEMS is a stand-alone software system that allows medical staff to record clinical information obtained during individual patient encounters. It runs on a laptop or across a small local area network. There is a version available for hand-held personal digital assistants so that data can be entered anywhere, rather than only in the traditional clinic setting. GEMS is a customized Microsoft Access® database with several modules that are described below:

- Patient Encounter Module (PEM): This is the heart of the system. Staff enter the service member's identifying information, chief complaint, and vital signs. The attending provider then captures an appropriate review of systems, physical examination, results of any tests performed, and documents

the working diagnosis, treatment plan, and disposition. The result is an electronic record of each medical encounter.

- Theater Epidemiology Module (TEM): The TEM is an analysis module. It provides both summary text reports and graphs of current disease and injury rates. Long-term trend graphs and reports are available. There are also rudimentary syndromic filters to identify patterns that might be consistent with biological attacks, such as influenza-like illnesses based on a temperature >38.5 °C and with either a productive cough or a sore throat. The TEM then generates alarms when the local data exceeds pre-defined thresholds, which the local staff can modify based on their own experience at the site. Analysts can create their own ad hoc queries for other syndromes of interest, based on the local medical threats. The TEM can analyze data at any level, focusing on a specific clinic or aggregating all clinics at a given installation or across a geographic region.
- Theater Occupational Module (TOM): Within the TOM, local staff enter information about local environmental and occupational hazards into an Environmental Baseline Survey. The staff use this data to perform operational risk assessments and to produce appropriate occupational and environmental sampling plans for ongoing monitoring.
- Other modules under development include one for public health assessments covering medical entomology, food inspections, public facility evaluations and another for tracking medical evacuations.

Forward deployed U.S. AF public health officers and flight surgeons monitor their site-specific data at least daily. They also forward their newly collected data to AFIERA for additional analyses every few days. This serves several purposes. First, AFIERA serves as a backup to the forward medic who may be hard-pressed to devote a significant amount of time to data analysis, given their other duties. AFIERA also performs different types of statistical analyses. The threshold alarms in GEMS are based on measures of central tendency as derived from normally distributed data. In other words, it alarms if the observed counts or rates are more than two or three standard deviations from the mean. However, health event data are actually rare events and are not usually normally distributed. AFIERA analysts employ Poisson statistics and convert the observed/expected data to a z-score. This process standardizes the scale for all of the DNBI categories while comparing the current week's data with the previous four weeks of data for each DNBI category. This facilitates at-a-glance reports containing all 15 DNBI categories on a single graph that is easy to read and interpret (Fig. 1 contains an example report graph). It also creates contemporary site-specific thresholds, which are more meaningful for comparison purposes. The z-score alarm thresholds are set at the $p<.01$ level. An additional benefit is that it can be used with raw count data whenever exact troop strength data are unavailable. AFIERA expects to begin receiving environmental sampling data in the near future. This will allow correlation between such things as the results of respirable particulate matter levels and respiratory illnesses, possibly identifying areas where the service members require additional protection from the elements.

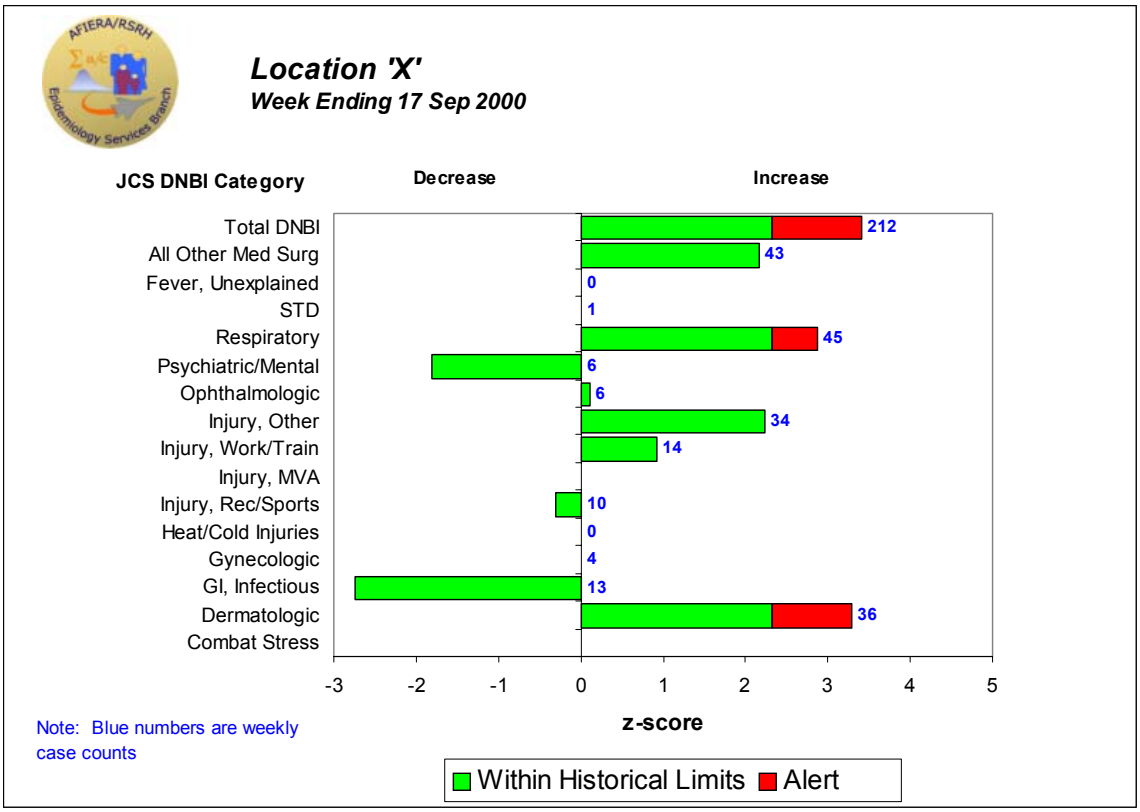

Figure 1: Example Current/Past Experience Chart of DNBI Categories. Red alert bar indicates p<0.01.

DISCUSSION

GEMS is a unique system that holds great promise. It can provide data that may help answer many questions about possible relationships between health outcomes and various exposures. However, there are still some challenges to meet and some limitations to acknowledge:

- Although GEMS is an electronic system, human factors still enter the equation. The output will only be as good as the quality of the data in the system. This means that the staff must enter data completely, promptly, and accurately. This is not always possible in deployed settings, especially when the bullets are flying and the bombs are dropping. Automating the data collection process as much as possible will help. For example, GEMS is now able to accept input from the local personnel database. This minimizes the amount of time spent manually keying in personal identifying information.
- No single statistical approach is a perfect solution. The z-score analysis process is highly dependent on a continuous, uninterrupted data stream. It is also sensitive to both population size and population fluctuations. An exact method is available to use when the expected numbers are small.
- GEMS must continue to evolve in order to meet the needs of the frontline medics. Adding new functionality, such as the ability to differentiate battle-related injuries from other injuries and to differentiate elective vs. trauma surgeries would provide additional insight. Integrating GEMS with

local computerized laboratory equipment would allow for the electronic transfer of all lab results to the patient record.

- GEMS only addresses the deployed surveillance requirements of PRD-5. In-garrison surveillance is equally important in order to observe any long-term health consequences of exposures that occur during deployed operations. There are several gaps in these existing surveillance systems. Three that should be addressed promptly are reproductive health (fertility, miscarriages, and birth anomalies), systematic cancer events surveillance, and accurate personnel data archives.
- Other promising research areas include the growing field of biomonitoring. Such tests may provide evidence of sub-clinical threshold exposure and effect. However, it is critical that each test be fully validated and characterized prior to general use. Too often, there is such wide variability in the test results, both intra-person and inter-person, that there are more questions than answers – a risk communication nightmare.
- The value and return on investment of real-time surveillance is unclear. Cost/benefit analyses should be done, though they are difficult to accomplish and often unable to reach clear conclusions.

CONCLUSION

The Presidential Review Directive, PRD-5, established a national obligation to protect the health of all American military members, veterans, and their families. The Gulf War highlighted America's ability to prosecute a war with few casualties, but we learned that we were not fully prepared to prevent or deal with the many health concerns that surfaced after the war.

Building on the lessons learned from deployments to Southwest Asia, Bosnia, Somalia, Haiti, and elsewhere, we established rigorous screening and health surveillance systems that encompass pre and postdeployment phases as well as the events occurring during the actual deployment itself – for each individual service member.

The USAF developed GEMS as a software tool to simplify the work needed to systematically collect extensive exposure and health outcome data. GEMS sets the stage for the most timely and comprehensive deployment medical surveillance in the history of the DoD. Real-time health surveillance as a preventive medicine and public health tool is available for the first time, including application as an early warning system for attacks using biological agents. The goal now is to continue refining and improving the system over the coming years.

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Military Health Care Policies in The Netherlands

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SUMMARY

The interpretation of health care data is not possible without knowing what health care policy factors will influence them. Also the effect of the implementation of interventions depends on health care policies. This study looks at 4 factors of the civilian health care system that have influence on the outcome of data: the social security system, the responsibility of the employer, the law on medical care/personnel and the disaster management system in a country.

The data of (the outcome of) military health care depends on the organization of the military health care. Examples are given. To understand the data of the several Dutch experiences and studies a short description is given of important parameters of the military health care system in The Netherlands, as part of the civilian health care system. At the end some universal and general conclusions are given that are applicable to the problems in all countries.

PREFACE

When we look at the results of the interventions in scientific studies to protect the health of the military we are sometimes impressed. But, as in most public health studies, it is not possible to compare the "population health effects" right away to other populations.

Health effects depend also on several other elements in the health care system. So one has to know, what health care system is applicable on the population on which you did the trial.

For military you not only have to know how the military health care system is organized, but you even have to know how the civilian health care system in the country is organized. Certain aspects of the military system are based on the local civilian rules and habits.

For instance:

If one compares the results of a certain prevention activity (or a new medicine to cure patients) you can look at the percentage of discharge of the military service ("unfit for duty").

But, the method for leading an "unfit soldiers" to a formal "discharge" in the several countries is very different. It is not only depending on the military health care system, but also on the military social security system, and even the civilian social security system. In the Netherlands navy for instance everything shall be

Paper prepared for the RTO HFM Symposium on "NATO Force Health Protection Requirements from Pre- to Post-Deployment: Population Health for the Military", which was to have been held in Antalya, Turkey, 7-9 April 2003, and is now published in RTO-MP-109.

done to keep the men or women in the military service, maybe in an other function, and maybe with a special schooling (sometimes paid by the civilian social security system….!), but there are a lot of possibilities to prevent discharge. That is the civilian law in The Netherlands. The discharge percentage will differ in a country that has other (more strict) rules for "fit for duty".

What health care policy factors will influence scientific data or the effect of the implementation of interventions?

In this paper I will present some essential factors that are important to know, and to understand the effects of interventions. Those factors are important in (I think) every study you will see on this subject. So this paper gives a cadre around every population effect study. I first will give examples of essential factors in the civilian health care system, which have an effect on the interpretation of health effects.

Then I will focus on the essential factors in our military health care system that will affect health out come. I will give a short overflow of the UN missions, in which we took. At the end I conclude and give an insight in the ongoing struggle to do things better.

CIVILIAN HEALTH CARE SYSTEM

In the civilian health care system there are 4 subjects I want to talk about. All those topics are important to understand the way the military health care system is organized and all have there effects on the health parameters.

1) social security system
2) responsibility employer
3) law on medical care/personnel
4) disaster management system

The social security system can be divided in the health care insurance system and the social insurance system.

The first system gives us information about the way civilians in a country can get certain forms of health care, and the way this had to be paid. There are a lot of systems. They range from: everyone has to pay for what he wants to consume (with or without a private insurance), via standard packages one can get from his boss (as part of his income), till base packages guaranteed by the government for everyone (paid via the tax system). And of course there are all kind of combinations. One of the questions is, if preventive medicine is also paid for in the system.

All this information can give us understanding about people going to their doctor easily or not. Or, people taking pills or not. And, if military get discharged: are they able to go to their civilian doctor without a financial problem or not. Central question is also: can military have their own insurance system in the civilian system?

The same important knowledge we can get from information about the second system. If there is in a country a very organized social security system, that gives every civilian a minimum income when he is ill or without work, he won't fight so heavy to prove that the cause of this situation lies in his work. When one counts the claims for sickness because of unhealthy work, the numbers of the countries will differ from each other because difference in income security.

The way that the responsibility of the employer is organized in a certain country will explain, why in one country the employer does everything to prevent illness, and to cure the employee, where in another country he is "just" interested, but doesn't have a active role in the medical interventions. It tells us also something about the possibilities of the employer to order protection measurements.

In many countries the employer has the duty to prevent illness. If he isn't successful he has to pay (compensate) the worsening of health. Sometimes there is a system of illnesses on a list, and a standard compensation. But in some countries the employee has to claim, and sometimes goes to court to receive money.

Sometimes there are rules for the employer, that he cannot fire a sick employer, but he has to give him another function. These career obligations have effect on the way he will act in possible unhealthy work surroundings, or on the way he will label a problem as a health problem.

It is important to know, what the law in a country says about the delivering of health care, and about the health care workers. For instance:

A strict privacy law makes it less possible for an employer to get information about the health status of his employees. So he won't be able to do the same actions as when he knows exactly, what the medical problems are. When he tries to prevent medical problems by ordering health questionnaires, the employees can refuse.

In some countries, there is a certain separation between the curing health care system, the occupational health care system, the preventive medicine system, and the health insurance system. The patient can prevent that information is going from one doctor to the other.

There are sometimes special laws in a country on health surveys and examinations: it is not always possible for a doctor to do any investigation. His actions have to be "evidence based", and he has to inform and ask his patients.

Some countries have a very strict law on health care workers, their education, certification and "permanent education". That makes it sometimes difficult to give health care "qua patet orbis" (all over the world), in circumstances, that are not comparable to the home country. A good protection (immunization) is not allowed to be given, if there is no medical doctor.

The civilian "disaster management system" in a country often is the "golden standard". If military prepare and organize their health care system for deployment (in which the disaster component always plays an important role) it is good to know, what the standards in that country are and how it is organized. Do military medical personnel play a role in this system (also training)? Does this system differ a lot of the military system? Is there a system for psychosocial problems (afterwards) included? Are there "centers of excellence" on the subject of health care problems because of disasters, and is there a connection with the military health care system?

MILITARY HEALTH CARE SYSTEM

If we know more about the civilian health care system in a country, one can better understand the military health care system. One can judge if the military health care system before, during and after deployments is synchronized with the latest knowledge in a country. But if one wants to make conclusions out of scientific surveys on health or differences in health parameters one has also to know how the military system and military health care system is organized.

For instance:

What are the contracts; is there still a conscription; if a contract ends, how is the social security organized. Is there an own social security and insurance system for the military? If one becomes a veteran (what is the definition?), is there still a relation with MOD; how is the health information then organized? Is there a (standard) compensation system for veterans with medical problems? Is the military health care system getting all the information of active duty personnel; are they obligated to come to the military doctor?

Has the military medical system influence on the operational cell (J3); are the medical issues involved in the decisions for an deployment (risk assessment, preventive advises, greater health care system)? What is the health care philosophy on responsibility; are the military themselves responsible or (also) their doctor; are all military screened every month (on what items?); What if they are unfit for duty? Is there an automated information system for the health items. Is this only as "patient record" or also for "public health information".

MILITARY HEALTH CARE SYSTEM IN THE NETHERLANDS

When we look at the situation in The Netherlands, and we keep in mind the papers that will be presented on this symposium, we can detect some essential background information:

1) There is no conscription anymore: military contracts can range from 4 years till 58 year. There are 50,000 active military. Every year 6000 persons become the status of veteran.
2) There is a strong civilian social security system, and above that there is an extra military compensation system.
3) The first medical echelon of Army, Air Force and Navy are separated, there is a joint medical staff on MOD level. They are in every deployment part of the decision process in the Joint Operational Center.
4) Health surveillance can be done in the Navy [1], but the system is not the same for Army or Air Force.
5) There is a military (obliged) health care insurance system for active duty [2].
6) Veterans are not in a obliged military insurance system. They can ask to get some facilities.
7) There is no standard pre-deployment health screening. There is to less "evidence based" proof that the doctor really can (is allowed to) screen on health parameters. The regular contacts with the military health care system will bring potential problems in the doctor's view [3].

EXPERIENCE IN THE NETHERLANDS AND EFFECT ON THE HEALTH CARE POLICY

How did The Netherlands get its experience?

<u>Going operations:</u> SFOR/ KFOR: 1500 ISAF : 900

The Netherlands took their part in several closed missions. The list of the most important deployments is:

Past operations in which The Netherlands took part

2001: UNMEE

2001: Apache-detachement Djibouti

2001: Macedonië: Essential Harvest, Task Force Harvest

1998-2001: Cyprus: United Nations Force in Cyprus (UNFICYP)

1997-2001: Albanië: Multinational Advisory Police Element (MAPE)

1995-1996: Israël/Syrië: United Nations Disengagement Observer Force (UNDOF)

1994-1996: v/m Joegoslavië: Task Force Mostar (WEU)

1994-1996: v/m Joegoslavië: International Conference on Former Yugoslavia (ICFY)

1994-1996: Georgië: CVSE/OVSE

1993-1996: Haïti: United Nations Mission in Haïti (UNMIH)

1993-1994: Rwanda: (UNOMUR, UNAMIR, Provide Care)

1993-1995: Mozambique: United Nations Operation in Mozambique (UNOMOZ)

1993: Zuid Afrika: United Nations Observer Mission in South Africa (UNOMSA)

1992-2000: Cambodja: UNAMIC, UNTAC, CMAC, UNDP

1991-1999: Angola: UNAVEM, CMATS, UNOPS

1991-1998: Irak: United nations Special Commission (UNSCOM)

1990-1991: Irak: Koeweit: Tweede Golfoorlog

1989-1990: Namibië: United Nations Transition Assistance Group (UNTAG)

1987-1989: Irak – Iran: Eerste Golfoorlog

1982-1995: Sinaï: Multinational Force and Observers (MFO)

1979-1985: Libanon: U.N. Interim Force in Lebanon (UNIFIL)

1965-1966: India/Pakistan: United Nations Observation Mission (UNIPOM)

1963-1964: Jemen: United Nations Yemen Observation Mission (UNYOM)

1960-1963: Kongo: United Nations Operation in the Congo (UNOC)

1958: Libanon: United Nations Observer Group in Lebanon (UNOGIL)

1956: Israël/Egypte: First United Nations Emergency Force (UNEF-I)

1950-1954: Korea: Nederlands VN-Detachement Korea

1947-1951: Griekenland: UNSCOB

The Netherlands took part in the Golf war, but the people that came back didn't have many complains. It was the first big "exercise" for the medical service to set up a system for health care. UNTAC (Cambodia) was very successful, but it became our "Waterloo": a certain amount of military got unexplainable complains [4]. The doctors and other professionals could not react adequately on these complains, and the "group of 27" organized and took attention [5]. Even the state secretary, politicians and media got involved. Some thing had to be done. Several University studies were set up, and several suggestions were given and actions taken to give better care [6]. There came guidelines for pre-, during en post-care [7]. One of the suggestions was to make also a post surveillance health monitor instrument [8]. MOD gave initiative to set up centers of excellence (on disaster medicine) and the Veteran Institute [9]. There were (coincidentally) a few civilian disasters, where the problems were the same as MOD had experienced. We share information [10] about the problems and possible solutions.

CONCLUSION

We don't have solutions, we still struggle and find ourselves confronted with several dilemmas:

- There is the dilemma of politics versus science. The results of the scientists are now always easy to explain to the politicians who want answers and solutions. The scientists have to look at ways to give the right message to the leaders of the organizations and the country.
- There is the dilemma of statistics versus the individual. Scientists give statistical answers, but when there is a patient in front of you on the other side of the desk, this answer is not applicable. Scientists have to look at ways to give the right message to the practitioner.
- There is the dilemma of theory versus practice. There are sometimes several theories about the mechanism of health effects, but it is difficult to implement those theories. There have to be people who can translate scientific knowledge to practical applicable activities.
- There is the dilemma of state of the art versus reality. Even if there is concrete knowledge the reality of the day is sometimes, that there is no money. Scientist have to realize that the results of their study will be prioritized to many other problems in the community.
- There is the dilemma of risks versus needed action. It is difficult to explain, that not all the risks in life should or could be prevented.

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L'intégration de la gestion des risques de santé dans le processus de planification opérationnelle, la doctrine belge

(Health Risks Management during the Operational Planning Process: The Belgian Doctrine)

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INTRODUCTION

De tout temps, les problèmes sanitaires auxquels ont été confrontées les forces armées ont bien souvent été déterminants dans l'issue des conflits. Longtemps négligées, les maladies et blessures non dues aux actions de combat ont conditionné la réussite ou l'échec des campagnes militaires.

L'Histoire est émaillée de ces déroutes humaines principalement dues aux négligences des commandements et des commandants dans l'approche et la gestion de la santé de leurs troupes, dans l'acception la plus large du mot « santé », telle que définie par l'Organisation Mondiale de la Santé: « La santé est un état de complet bien-être physique, mental et social, et ne consiste pas seulement en une absence de maladie ou d'infirmité ».

METHODE DE TRAVAIL

Dans ce document, nous allons envisager les différentes phases d'une stratégie de gestion des risques de santé, ainsi que les différentes étapes du processus de planification opérationnelle (Operational Planning Process, OPP) en vigueur dans l'Organisation du Traité de l'Atlantique Nord.

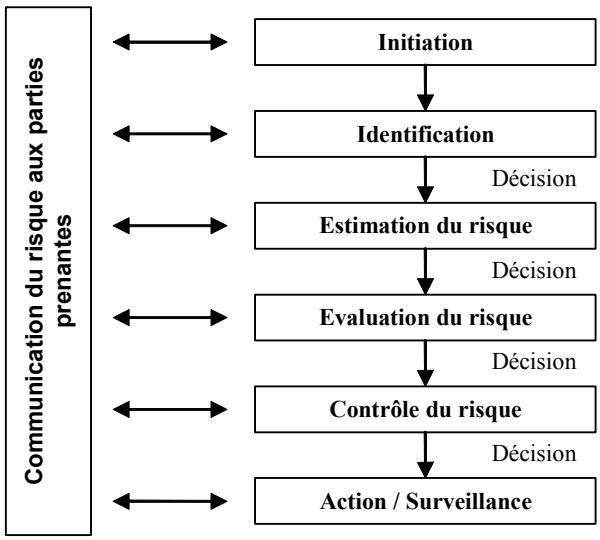
Après avoir décrit brièvement ces différentes étapes, nous proposerons une matrice d'intégration des actions sanitaires à entreprendre. Enfin, nous définirons les différents niveaux de responsabilités des intervenants au sein de l'Etat-major de la Défense belge.

LA STRATEGIE DE GESTION DES RISQUES SANITAIRES [1]

Le choix d'une stratégie de gestion des risques s'est fondé sur, d'une part, la stratégie existante décrite dans le « Concepts des Forces Armées belges pour les Opérations de Soutien de la Paix : la gestion des risques en opération, Ordres Permanents Série 30, Dossiers JSO-P/Ops du 01 août 2000 », et d'autre part, sur une analyse des modèles les plus couramment utilisés dans des institutions universitaires ou gouvernementales.

Communication publiée dans RTO-MP-109, initialement destinée au Symposium RTO HFM sur « Les besoins des forces de l'OTAN en matière de soins de santé, du prédéploiement jusqu'au post-déploiement : la santé des populations pour les militaires » qui aurait dû être organisé à Antalya, en Turquie, du 7 au 9 avril 2003.

Le choix d'un modèle de stratégie de gestion des risques s'est porté sur le modèle canadien suivant :



1) **La phase d'initiation du processus** définit le cadre et la structure organisationnels. Les objectifs poursuivis sont d'identifier et de formuler les problèmes de santé environnementale causés par une source de danger potentiel, de placer cette problématique dans le processus décisionnel, de définir les différents intervenants, de définir les niveaux de responsabilité des décideurs et de préciser les moyens à mettre en œuvre et les priorités pour l'analyse.

2) **La phase d'identification des dangers** comporte les activités qui ont pour but de détecter les dangers potentiels et ensuite de les classer selon la probabilité de leurs propriétés dangereuses. Les sources de renseignements scientifiques proviennent soit d'études toxicologiques sur des animaux de laboratoire, soit d'études épidémiologiques qui mesurent l'apparition de maladies dans une population humaine accidentellement exposée à tel contaminant environnemental, ou encore, de la collecte et analyse d'échantillons. Il faut donc réunir les études nécessaires, analyser et interpréter ces données sur base de critères qualitatifs précis afin d'établir une classification des dangers potentiels, fondée sur les « évidences scientifiques » qui découlent de ces études.

3) **La phase d'estimation des risques** est une étude qui tente de prédire les impacts du risque sur la santé et de déterminer la dangerosité résultant d'un certain niveau d'exposition à un agent, ainsi que l'estimation des effets sur les populations après une exposition. Enfin, une analyse qualitative et quantitative complète cette phase, afin de déterminer la probabilité des effets nocifs dans une fourchette de niveaux d'exposition, eux-mêmes dans un certain nombre de scénarios. Les étapes en sont : la définition de la relation « dose-effet » et la définition du degré d'exposition humaine en durée, fréquence et intensité, dans les différentes situations environnementales (contamination de l'air, de l'eau, du sol et de la nourriture). Cette phase se termine par l'établissement **des caractéristiques des risques.**

4) **La phase d'évaluation du risque** comprend une analyse qui tient compte des facteurs sociaux, économiques, politiques et légaux des différentes stratégies et options de contrôle des risques qui viennent d'être définis. Ces considérations dépassent alors la vision « objective scientifique » et touchent plutôt les aspects économiques et sociaux, où la notion de « valeurs » intervient grandement pour définir ce que la société considèrera comme « **risque acceptable** ». Entre ici en ligne de compte le coût de la maîtrise du risque comparé aux bénéfices en termes de santé. Deux grands thèmes sont ici évoqués: d'une part, **l'aspect économique** où l'on considère les

bénéfices en termes de santé et les coûts financiers engendrés par les mesures de contrôle des risques (analyses coûts-bénéfices, coûts-efficacité, risque-bénéfices et impacts socio-économiques), et d'autre part **l'aspect sociétal** où les valeurs interviennent pour définir ce qui est considéré comme « acceptable » (comme la justice et l'équité face au risque, les perceptions de la société, le seuil de sensibilité de la société par rapport au risque encouru, etc.). L'objectif de cette phase est de déterminer si un danger représente un niveau de risque pour la santé plus grand que ce que peut accepter la société.

5) **La phase de contrôle du risque** se focalise sur les différentes mesures à prendre afin soit « de prévenir » ou soit « de remédier » au risque rencontré. Le spectre de ces mesures peut être large et cette phase doit se conclure par une analyse exhaustive des options possibles proposées par tous les intervenants au processus de gestion du risque. Les objectifs de cette phase sont de développer les actions visant à la diminution du risque et de sélectionner les mesures efficaces et réalisables pour réduire ou éliminer ce risque. Il est ici fait appel aux notions de « meilleure technique de contrôle disponible » ("Best Available Control Technology" BACT) et de « meilleure technique de contrôle réalisable » ("Best Practicable Control Technology" BPCT). Ces deux notions délimitent le spectre dans lequel le choix final devra s'effectuer, les options de contrôle idéales étant celles qui coûtent le moins cher et qui procurent la plus grande réduction des risques et le moins d'effets secondaires sur la santé mais aussi sur l'aspect économique et sociétal.

   Pour chacune des options envisagées, une comparaison doit être faite entre les mesures proposées pour le contrôle d'un risque déterminé et d'autres risques. Cette analyse « risque-risque » peut se réaliser selon trois manières évoquées ci-dessous :

   - On compare le risque de base en condition normale et le risque d'une exposition au danger identifié, par exemple la prévalence de leucémie dans la population générale par rapport à la prévalence de leucémie chez les travailleurs exposés à une substance chimique ou ionisante particulière (**principe du risque de base**).
   - On prend en compte le risque d'un danger comparable considéré comme normalement accepté, par exemple le risque d'être victime d'un accident de roulage en zone d'opération comparé au même risque en garnison (**principe du risque comparable**).
   - On compare le bénéfice de la diminution d'un risque obtenue par une mesure de contrôle avec les effets néfastes que cette mesure peut comporter elle-même, par exemple le risque de réaction allergique majeure (choc anaphylactique) à la suite d'une vaccination contre une maladie infectieuse (**principe du risque de substitution**).

6) **La phase de mise en œuvre et de surveillance** (monitoring) constitue l'étape active dans la rédaction d'un plan d'action, de son application et du contrôle de son exécution. Les rôles et responsabilités de chacun et les moyens à mettre en œuvre sont identifiés et décrits, les mesures à prendre sont détaillées dans le temps (quand) et dans la manière (comment), et enfin, les paramètres de mesure de leur efficacité sont déterminés.

7) **Le processus de communication**, qui se retrouve à chaque étape évoquée ci-dessus, est la clé de voûte indispensable au fonctionnement optimal de tout le processus décisionnel. Cette communication « à double sens » vise une transparence maximale entre toutes les parties prenantes pour chacune des phases du cycle et garantit une compréhension mutuelle.

8) **Les points de décision** sont identifiés après chacune des étapes 2 à 6 : ceci permet que la ou les décisions, partielles ou définitives, soient revues à la lumière de nouveaux éléments apparus ultérieurement dans le processus.

LES ETAPES DU PROCESSUS DE PLANIFICATION OPERATIONNELLE AU SEIN DE L'ALLIANCE [2]

1) La phase d'Initiation

Dans cette phase le commandement donne l'autorisation de débuter une série d'activités de planification pour un ou plusieurs scénarios possibles. Y sont décrits de manière générale une revue de la situation géopolitique de la zone concernée, les objectifs stratégiques à atteindre (end-state), les limitations et contraintes politiques et militaires, les hypothèses de base, les missions stratégiques, les tâches des niveaux subordonnés ainsi que certaines mesures de coordination tels les délais, les règles d'engagement, etc.

2) La phase d'Orientation

Durant cette étape, l'autorité déterminera exactement ce qui doit être fait. L'analyse approfondie de la mission fixera le cadre de référence dans lequel les opérations futures seront exécutées. On se penchera principalement sur une revue de la situation, sur les intentions de l'échelon supérieur, sur les limitations (contraintes qui doivent être respectées, limites à ne pas franchir et pré-conditions de succès), sur les hypothèses permettant de poursuivre la planification, sur les forces et faiblesses amies et ennemies, sur les facteurs temps-espace-environnement, sur les « centres de gravité » amis et ennemis (c'est-à-dire les points forts depuis lesquels toute puissance tire sa raison d'être et qui sous-tendent sa raison de combattre), sur les tâches, sur les objectifs et sur l'état final souhaité après les opérations. A l'issue de cette phase, l'autorité définit ses directives pour la planification future et exprime ses intentions (Commander's Planning Guidance and Commander's Intent).

3) La phase de Développement du Concept d'Opération

Sur base de la phase d'orientation, l'état-major va poursuivre son travail d'analyse afin de développer une série de « modes d'actions » (Courses of Action, COA) qui sont autant d'options possibles proposées au commandant pour remplir sa mission. Il s'agit ici des réponses aux questions : Qui ? Quoi ? Quand ? Où ? Comment ? et Pourquoi ? Ce « Concept d'Opération » (Concept of Operation, CONOPS) se compose d'une analyse plus détaillée, du développement de plusieurs modes d'action et de leur comparaison, ainsi que de « la Proposition de Décision » (Decision Brief). A l'issue de cette phase, le commandant va prendre sa décision en choisissant une des options proposées : ce sera « ce » mode d'action que l'état-major va devoir maintenant finaliser.

4) La phase de Développement du Plan

Le mode d'action sélectionné par l'autorité va faire l'objet d'une préparation et d'une coordination du « plan final », d'une demande d'approbation par l'autorité ayant initié la mission et enfin, la rédaction soit d'un « Plan de contingence, Contingency Plan, COP » ou d'un « Plan d'opération, Operation Plan, OPLAN ».

5) Les phases de Révision du Plan et d'exécution

Durant cette étape, deux tâches principales attendent l'état-major : d'une part la révision du plan et d'autre part l'évaluation de celui-ci. Les activités de révision et d'évaluation se déroulent « en continu », dans le déroulement de l'opération, afin de pouvoir adapter les décisions prises en fonction de l'évolution de la situation. Lorsque celle-ci l'impose, une mise à jour est effectuée et les actions sont adaptées.

MATRICE D'INTEGRATION DES ACTIVITES DE GESTION DES RISQUES ET DE PLANIFICATION OPERATIONNELLE

Afin de réussir l'intégration de ces deux techniques de planification, il est proposé de suivre la matrice suivante afin de réaliser de manière concomitante les activités de l'une et de l'autre :

Gestion Risques / OPP	IDENTIFICATION Dangers	ESTIMATION Caractérisation	EVALUATION Acceptabilité	CONTROLE Mesures	EXECUTION Suivi	COMMUNICATION
INITIATION	x	x				x
ORIENTATION	x	x				x
CONCEPT OPERATION	(x)	(x)	x	x		x
DEVELOPPEMENT	(x)	(x)	(x)	x		x
REVISION DU PLAN	(x)	(x)	(x)	(x)	x	x
EXECUTION	(x)	(x)	(x)	(x)	x	x
	(x) : ces étapes de la gestion des risques peuvent être reprises dans les phases successives de l'OPP, selon les informations ou renseignements complémentaires reçus en cours de planification ou d'exécution de la mission					

LES DIFFERENTES DISCIPLINES CONCERNEES PAR LA GESTION DES RISQUES DE SANTE

La surveillance médicale est la collection régulière, l'analyse et la diffusion de l'information sanitaire afin de surveiller la santé d'une population et d'intervenir à temps si nécessaire. Cette surveillance est indispensable à la planification, à la mise en œuvre et à l'évaluation des pratiques et politiques de santé publique.

La médecine préventive militaire comporte les actions proactives, la prédiction, l'identification, la prévention et le contrôle des maladies et des blessures que l'on peut éviter, causées par l'exposition à des menaces biologiques, chimiques, physique ou psychologiques liées au déploiement opérationnel. L'épidémiologie, la médecine (préventive et clinique) humaine et vétérinaire, la médecine du travail, l'hygiène, la prévention sur les lieux de travail, les sciences environnementales, la santé publique, la santé mentale, l'entomologie, la toxicologie, la promotion à la santé et au Bien-être et les sciences associées (microbiologie, techniques de laboratoire, etc.) sont les disciplines-clé de la médecine préventive militaire.

La gestion de la santé incombe non seulement aux techniciens médicaux mais aussi à un ensemble de personnes non issues du monde médical. Ceci se traduit par la nécessité d'une « réorganisation » des compétences, d'une redéfinition de la place des différents intervenants ainsi que de leurs attributions dans la stratégie multidisciplinaire de gestion des risques.

LA REPARTITION DES TACHES ET RESPONSABILITES AU SEIN DE L'ETAT-MAJOR DE LA DEFENSE BELGE

Outre les diverses activités devant se dérouler en parallèle, il semble primordial de fixer les tâches et responsabilités de chacun des intervenants, selon l'évolution de la structure de l'état-major de Défense.

La structure de l'état-major intégré, d'application depuis le 01 janvier 2002, prévoit que le Chef d'état-major Adjoint au Bien-être (ACOS Well Being, WB) est chargé de conseiller le Chef de la Défense (CHOD) en cette matière. Il dispose entre autres du Service Interne de Prévention et Protection au Travail

(SIPPT), légalement chargé d'assister l'employeur, la hiérarchie et les travailleurs pour l'application des dispositions légales et réglementaires relatives au bien-être des travailleurs lors de l'exécution de leur travail ainsi que toutes les autres mesures et activités de prévention. Le service de Médecine du Travail et les spécialistes, experts et chercheurs tant du monde médical que du domaine technique et les laboratoires non-cliniques (non compris les laboratoires d'analyses purement médicales) y sont attachés.

D'autre part, la Composante Médicale, aux ordres du Chef d'état-major Adjoint Opérations et Entraînement (ACOS Ops&Trg), regroupe entre autre les techniciens de santé du monde médical curatif, tant médecins que vétérinaires, dentistes, pharmaciens et paramédicaux. De plus, au sein de diverses cellules de l'état-major de l'ACOS Ops&Trg, se trouvent une série d'officiers chargés d'analyser les aspects médicaux dans le travail de leur cellule respective. Cette nouvelle « complexité » ne facilite pas l'intégration et mérite une définition claire des attributions.

Pour préparer les opérations, ces différents éléments se doivent de produire un résultat exploitable par toutes les sections de l'état-major de l'ACOS Ops&Trg, tant en termes de suivis des opérations, que de planification des activités à court, moyen ou long terme. Afin de tisser les liens fonctionnels devant être mis en place entre tous les intervenants pour qu'une intégration de la gestion des risques se déroule de manière optimale, une synthèse des activités et les différents intervenants dans chacune des phases est présentée ci-dessous.

La phase d'initiation du processus

Dans cette phase sont fixés les structures organisationnelles, les intervenants, les responsables décisionnels et le déroulement de tout le cycle. Cette initiation est donc une prérogative des plus hautes autorités du Département de la Défense, mais au vu de la systématique des processus de l'organisation militaire, il ne semble pas nécessaire de redéfinir ces paramètres à chaque nouveau cycle. Cependant, il reste à fixer dans la structure le niveau responsable de la gestion de tout le processus. La structure ACOS Ops&Trg est compétente pour générer le cycle, une fois reçu l'ordre des autorités politiques et du Chef de la Défense de planifier un déploiement. En effet, c'est au sein de cette structure que se prendront les décisions et que seront écrits les ordres d'opérations (intégrés et au sein de chaque composante Air, Terre, Mer et Médicale). De plus, s'y exécutera le suivi des opérations, en tant qu'échelon hiérarchique direct des unités déployées.

Une cellule d'intégration des divers éléments de la gestion des risques sanitaires au sein de cet ACOS Ops&Trg doit se trouver sous la direction du chef de la Composante médicale, chargé de planifier, d'exécuter, de coordonner l'appui médical au personnel et d'assurer le suivi médical de la santé du personnel du point de vue clinique. Pour la planification des opérations, il reste le conseiller médical (Medical Advisor) des autorités du Département.

La phase d'identification des dangers

Cette phase, sous l'égide du Chef d'Etat-major Adjoint au Bien-être (ACOS WB), comporte deux étapes principales: d'une part les activités de recherches AVANT l'envoi des équipes d'évaluation et d'autre part les activités faisant suite à la reconnaissance effectuée sur place lorsque la situation opérationnelle en zone de déploiement le permet. Ces deux étapes gardent cependant des objectifs similaires, à savoir la collecte des informations utiles dans les domaines suivants : les aspects médicaux, sociaux, environnementaux et industriels et les aspects de promotion à la santé et du Bien-être. L'ACOS Intelligence & Security doit être étroitement associé à cette phase.

Cette première analyse « à distance » des dangers doit se conclure par une définition précise de la composition « ad hoc » et des missions des équipes d'évaluation qui seront envoyées dans la zone de

déploiement, si la situation sur place le permet. Dans le cas contraire, ces renseignements devront parvenir au plus vite lors du déploiement du premier contingent.

L'ACOS WB définit la composition, les missions et les tâches de ces équipes d'évaluation, qui complétera l'équipe d'officiers de l'ACOS Ops&Trg chargée d'analyser les aspects opérationnels et tactiques de la zone considérée.

Pour ce qui concerne les missions de ces équipes d'évaluation, dans les domaines respectifs des spécialités mentionnées ci-dessus, l'accent doit être mis sur :

- La confirmation et le complément d'informations concernant les données issues de l'analyse à distance.
- Le dépistage de nouveaux dangers sur place.
- Une analyse exhaustive de tous les aspects de santé dans l'environnement de l'opération.
- Le prélèvement d'échantillons de quelque nature que ce soit (de l'air, des sols et de l'eau) principalement aux alentours des cantonnements envisagés par les responsables tactiques, ainsi que près et aux environs des sites identifiés présentant un danger potentiel.

Les prélèvements et les analyses de ces échantillons constituent en soi une problématique qui n'est pas dénuée de risques. Tant les techniques employées que les méthodes d'acheminement vers les laboratoires d'analyse sont des thèmes qu'il est nécessaire d'étudier de manière spécifique. Toute cette problématique de l'échantillonnage relève de la compétence de l'ACOS WB.

La phase d'estimation des risques

Cette phase, à visée exclusivement scientifique, comporte les analyses des données recueillies dans la phase d'identification des dangers et a pour objectifs de tenter de prédire les degrés du risque sur la santé, d'en estimer la dangerosité et d'estimer leur impact sur les troupes déployées en cas d'exposition en termes de durée, de fréquence et d'intensité ou de dose. Pour cette partie du cycle qui incombe principalement aux experts de l'ACOS WB, les études et les revues de la littérature, le recueil des résultats des prélèvements, et toutes les considérations analytiques doivent permettre de produire une **liste des risques estimés et leurs caractéristiques spécifiques**. Si des hypothèses non vérifiées persistent encore, différents scénarios doivent être étudiés en particulier, pour l'ensemble des risques ou pour certains d'entre eux seulement. Au sortir de cette étape d'analyse, certaines propositions de décisions partielles ou définitives doivent être communiquées aux différents partenaires ainsi qu'en amont et en aval de la chaîne hiérarchique, même si la décision à ce stade du processus est de « ne pas encore décider » ! L'important sera, très tôt, de distinguer les « fausses alertes » des « vrais événements dangereux ».

La phase d'évaluation des risques

Les analyses des données recueillies dans la phase précédente sont alors analysées à la lumière de considérations plutôt orientées sur les aspects politico-militaires. De cette étape ressortira une **liste des « risques acceptables »** pour lesquels des mesures de contrôle seront envisagées. Si des troupes belges déployées devaient se trouver confrontées à un danger « inacceptable », soit du point de vue politique, soit du point de vue de ses impacts tellement négatifs, une recommandation aux autorités pourrait être simplement de déconseiller d'effectuer la mission dans un tel environnement. Ici aussi, cette phase doit se conclure par une ou des décisions partielles ainsi que par une transmission de l'information à tous les participants au processus de planification opérationnelle. Cette phase concerne principalement l'ACOS Ops&Trg, sur base des recommandations de l'ACOS WB, des considérations politico-militaires, voire des avis de la Direction Générale en charge des Matières Juridiques.

La phase de contrôle des risques

Les options décidées dans la phase précédente sont alors analysées en termes de « définition des solutions possibles », c'est-à-dire les mesures de contrôle à mettre en œuvre pour diminuer, voire supprimer les dangers ou les risques identifiés. Pour chacune des mesures envisagées, l'analyse « risque-risque » (principe du risque de base, ou principe du risque comparable ou principe du risque de substitution, Cfr. supra p. 2) définira enfin la priorité des actions à entreprendre durant phase de préparation à la mission ou en zone d'opération. Cette phase, qui incombe tant à l'ACOS WB qu'à l'ACOS Ops&Trg, se termine dans la phase suivante, par la communication des décisions prises par le biais de l'ordre d'opération (ACOS Ops&Trg), et en particulier dans l'appendice « médicale » de l'annexe logistique de cet ordre, mais aussi dans d'autres annexes, comme par exemple, celle que recommande le STANAG 7041 [3], dédiée à la problématique de l'environnement.

La phase de mise en œuvre et de suivi

Cette phase incombe principalement à l'ACOS Ops&Trg pour la mise en œuvre et le suivi des mesures prescrites durant la phase de préparation et tout au long de la mission. Tout élément nouveau ou toute modification dans les scénarios envisagés durant la préparation nécessitera une reprise du cycle de réflexion, à l'une ou l'autre des étapes précitées, afin de définir de nouvelles mesures. Les exemples suivants illustrent le besoin d'une analyse nouvelle ou complémentaire : la découverte d'un nouveau site suspect, la modification des conditions météorologiques et le maintien de la chaîne du froid de la nourriture, l'introduction de risques sanitaires complémentaires à la suite d'un afflux de nouveaux réfugiés, voire toute modification ou emploi d'armement nouveau par une des parties au conflit, etc. Le suivi de la santé des individus au retour et après la mission reste cependant une responsabilité de l'ACOS WB.

Le processus de communication

Comme déjà souligné, des actions d'information sont primordiales. Mais celles dirigées vers les militaires désignés pour l'exécution de la mission sont d'une importance capitale pour la réussite de l'ensemble du processus de gestion des risques. Dans le cadre de la préparation et de la mise en condition préalable au départ, il est indispensable que chaque intervenant comprenne l'importance de se conformer aux règles.

EN SYNTHESE …

La nouvelle structure des Forces Armées belges impose le besoin d'une répartition claire des attributions. Aucun élément de cette structure ne peut prétendre couvrir à lui seul le spectre complet des activités de gestion des risques sanitaires. Dans une vision orientée sur la théorie de la « **Gestion par les processus** » [4], il importe plus de définir le déroulement d'une activité globale et d'en identifier les sous-étapes, les intervenants « responsables » et les intervenants « de soutien », que de vouloir à tout prix « structurer et hiérarchiser » le processus en lui-même. Dès lors, il nous a semblé primordial de décortiquer la stratégie de gestion des risques sanitaires en attribuant à chaque étape, le responsable du sous-processus et les principaux collaborateurs dont le rôle est d'apporter informations et appui pour la réalisation de ces tâches. Ce schéma figure ci-dessous et synthétise les activités décrites en détail dans les sections précédentes. Sur base de ce schéma, on peut envisager une stratégie globale de gestion des risques de santé au sein des Forces Armées belges, malgré la complexité des sous-étapes et du grand nombre d'intervenants impliqués.

LES DIFFERENTES ETAPES ET DISCIPLINES CONCERNEES PAR LA GESTION DES RISQUES DE SANTE ET L'OPP

De la définition « globalisante » de la notion de santé issue de l'OMS, il ressort que les intervenants « responsables » sont nombreux et englobent des disciplines variées dépassant les classiques prérogatives du seul monde médical et qui sortent parfois aussi de l'enceinte militaire. Ceci étant établi, il importe de veiller à l'intégration des résultats des diverses analyses réalisées au sein de ces disciplines.

Le Processus de Planification Opérationnelle se doit d'être complété par l'analyse exhaustive des risques de santé de la zone d'opération. Aucun de nos responsables politiques ou militaires ne peut accepter de négliger le versant « sanitaire » de l'appréciation d'état-major à la base de tout processus décisionnel. Dès lors, l'intégration de cette stratégie spécifique dans la planification opérationnelle est inéluctable. Il faut cependant réussir à bien en identifier les étapes et leurs différents responsables.

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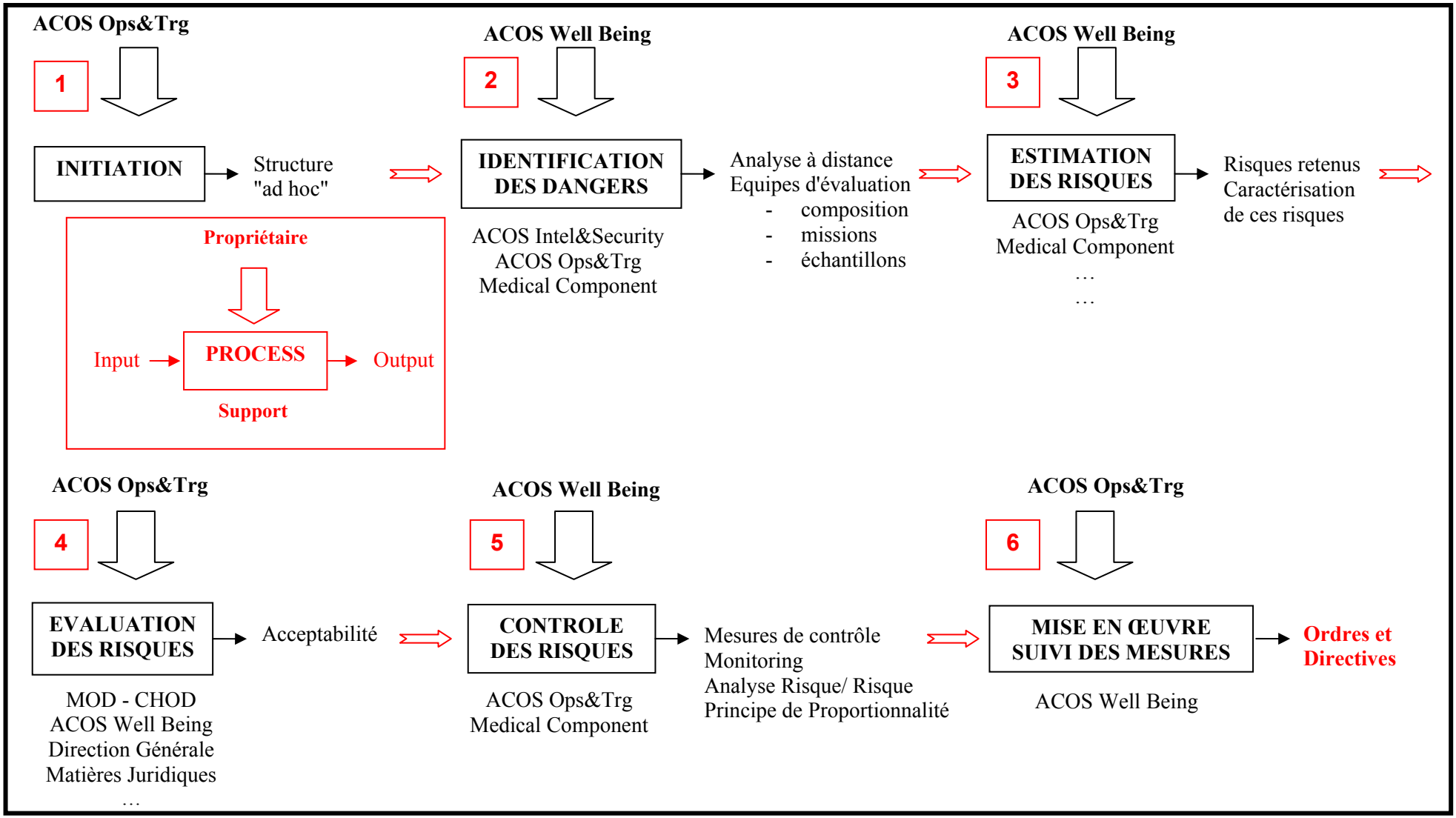
PROCESSUS DE GESTION DES RISQUES SANITAIRES AU SEIN DE L'ETAT-MAJOR DE DEFENSE BELGE



Health Surveillance Mechanisms Used by Armed Forces Worldwide

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SUMMARY

Health surveillance is an essential tool to monitor health in an armed force and to help protect the health of service personnel. This study used a literature search and direct contacts with individual countries to identify and evaluate health surveillance mechanisms used by armed forces worldwide. The study identified several different health surveillance mechanisms ranging from simple periodic health assessments of personnel, to complex databases of medical data linked to demographic and other supporting data. Essential elements of an effective health surveillance system are outlined, including that systems are adequately supported and that they allow the on-going and routine monitoring of health at the population level, consistently throughout an armed force and consistently during times of peace and during operations. Areas for further research and development identified include adequate linking of data on hazardous exposures, jobs or tasks performed and the locations of personnel with medical data, and the follow-up of personnel beyond their military service.

INTRODUCTION

Health surveillance and health screening, for which there is evidence of benefit, form an integral part of any effective health care system and should allow "... the routine, systematic collection, analysis, interpretation and reporting of standardised, population based data for the purposes of characterising and countering threats to a population's health, well-being and performance." (Bricknell, 1999). This needs to be closely integrated with the timely dissemination of these data to those who need to know and, to be effective, must be directly linked to preventive action (Baker & Mattee, 1994).

Paper prepared for the RTO HFM Symposium on "NATO Force Health Protection Requirements from Pre- to Post-Deployment: Population Health for the Military", which was to have been held in Antalya, Turkey, 7-9 April 2003, and is now published in RTO-MP-109.

In civilian industry, health surveillance programmes play an important role in monitoring trends in illness, injury, or exposure to workplace hazards, and in helping to identify areas where preventive action can help reduce the impact of disease. Health surveillance in the military setting poses particular challenges, including a large mobile workforce, differences in operational practices between services, and a broad range of hazards to which personnel may be exposed. Developing an effective military health surveillance system requires multidisciplinary involvement not only of medical sections, but also other areas, such as occupational health and personnel. This multidisciplinary involvement is necessary in order to collect, collate and organise the required data, which, as well as medically related data, include data that identify locations and jobs or tasks of individuals, and exposure of personnel to occupational and environmental health hazards.

In recent years, the challenge of developing a comprehensive military health surveillance system has begun to be addressed by several armed forces worldwide, particularly in light of experiences following the Gulf conflict and operations in the former Republic of Yugoslavia, where inadequate health and associated records hampered the investigation of health concerns following these operations (Board of Inquiry – Croatia, 2000; Shaheen, 2000). As part of a wider research programme on health surveillance, the UK Defence Science and Technology Laboratory commissioned a review of health surveillance mechanisms used by armed forces worldwide (IEH, 2002), with a view to learning from the experience of other armed forces in order to inform the development of the UK Defence Medical Service's health surveillance capability. The aim of the project was to identify and compare health surveillance mechanisms, processes and methodologies, existing or planned, in armed forces worldwide and to evaluate their effectiveness and suitability for adoption or modification and incorporation by the UK Armed Forces. This paper summarises the types of mechanisms identified from the review and discusses the common elements necessary for an effective military health surveillance system.

STUDY DESIGN

Information about the health surveillance systems used by armed forces worldwide was collected using a detailed literature search and direct approaches to relevant individuals in particular countries. The literature search consisted of a search of 12 on-line databases of published literature to identify references concerning health surveillance mechanisms used in different armed forces. It was conducted in May 2001 and updated in December 2001, and restricted to references published in the last ten years for which an English title or abstract was available. Additional references were obtained through the review of the reference lists of those papers obtained, ad hoc searches of the Internet, and from the countries contacted.

In addition to the literature search, direct contact was made with a number of non-UK armed forces to request unpublished material about each country's health surveillance system and to administer a questionnaire. The questionnaire was developed based on guidelines from the Centers for Disease Control and Prevention (Centers for Disease Control and Prevention, 2001) and experience of using it in a short pilot study within the UK Armed Forces. Relevant and appropriate contacts in non-UK countries were identified from lists of senior medical personnel provided by the UK Surgeon General's Department, through professional contacts and from suggestions made by those contacted.

In total, 31 countries or organisations were approached to be involved in the study between May 2001 and February 2002. Of these, 13 responded and were able to provide information about their health surveillance system and/or complete the questionnaire. An additional 6 countries responded but for a number of reasons information was not obtained (for example, a nominated point of contact did not respond or contact was lost with the point of contact due to changes of post). Twelve countries or organisations made no response. One country and one organisation for which published information was available were not contacted due to lack of suitable contact details. Table 1 summarises the information obtained.

A summary of the health surveillance system used in each country was produced and returned to the country concerned in order to ensure their system had been accurately portrayed and that the evaluation was appropriate. The information gathered from the literature search, from individual countries and from the questionnaire were used to develop an overall understanding of the health surveillance systems used by armed forces worldwide and to critically evaluate approaches used for military health surveillance.

Table 1: Summary of Responses from Participating Countries and Organisations

Country/organisation	Published information obtained	Point of contact established	Unpublished material obtained	Questionnaire completed
Australia	✓	✓	✓	✓
Belgium		✓	✓*	✓
Canada	✓	✓	✓	✓
France	✓*	✓	✓*	✓
Germany		✓	✓*	
Hungary		✓		✓
Israel		✓		✓
Malaysia		✓		✓
NATO	✓	✓	✓	
Netherlands	✓*	✓	✓*	✓
New Zealand		✓	✓	
Russia	✓*	–		
Sri Lanka		✓		✓
United Nations	✓	–		
US Armed Forces	✓	✓	✓	
US Coast Guard	✓	✓	✓	✓

NATO, North Atlantic Treaty Organisation; US, United States
– Suitable contact details not available/provided
* Available/provided in a language other than English

RESULTS

The literature search and direct approaches to individual countries identified several different health surveillance mechanisms used to varying extents by different armed forces. The health surveillance mechanisms identified have been categorised here into 'short-term' and 'long-term' health surveillance mechanisms. 'Short-term' health surveillance mechanisms are classed as those designed to identify short-term changes in the health of individuals or a population that may impact on manpower; 'long-term' health surveillance mechanisms are those which enable more comprehensive health surveillance of a population over a longer time period. A number of countries operated more than one of these health surveillance mechanisms which, combined, compromised their armed forces health surveillance system. The various mechanisms identified are described below and summarised in Table 2.

'Short-Term' Health Surveillance Mechanisms

Periodic Medical Assessments

Most armed forces reported carrying out a pre-recruitment and/or initial medical examination and periodic medical examinations thereafter. The interval between the examinations and the reason for them varied

according to service, job or task being undertaken, potential exposures and the age of personnel. These examinations were mainly used as medical screening tools to ensure personnel were fit for duty and to detect any health problems at an early stage. No armed forces reported routinely analysing these data at the population level to identify population health trends, although the pre-recruitment or periodic medical examination data have the potential to be used to provide a baseline with which to compare any subsequent changes in health.

Notifiable Disease and Condition Reporting

Many of the countries contacted had a notifiable disease and condition reporting system to identify cases of diseases or medical events of particular concern and to act as a trigger to implement preventive action. The systems identified were often based on, or closely linked to, national requirements for reporting notifiable diseases and conditions, with notifiable events often being reported to both civilian and military authorities. The majority of systems were used both during operations and during peacetime.

An example of a notifiable disease and condition reporting system is the Notifiable Condition Reporting System of the Australian Defence Force (ADF; ADF, 2001). The system applies to all ADF personnel during peacetime, operational deployments or while overseas and is based on a list of nationally notifiable diseases, with some additional ADF-specific notifiable conditions. When a case of a notifiable condition is identified it is reported to the civilian authorities as well as to the Defence Health Services Branch (DHSB). On receipt, the DHSB enter the data into a database and use the data to monitor trends of notifiable conditions within the ADF, identify public health issues, define health priorities and verify health threat assessments. Quarterly summaries of the data are disseminated to all ADF health care facilities and senior commanders via the ADF Quarterly Health Surveillance Report. Quarterly totals of notifiable disease reports are also used to update the Australian Disease and Environmental Alert Reporting System – a web-based system that provides assessments of health threats in areas of operational importance (ADF, 2000).

Pre- and Post-Deployment Health Assessments

In addition to periodic medical examinations, many armed forces carry out pre- and post-deployment health assessments. These vary from a full medical examination, such as those carried out in the Belgian Armed Forces, to a short questionnaire, like that administered in the US Armed Forces. The purpose of these assessments is to ensure personnel are fit to deploy, and to provide baseline data with which to compare post-deployment health status. The majority of the armed forces contacted appear not to have used pre- and post-deployment health assessment data to assess changes in health at the population level. Indeed, only one published analysis at a population level was identified, which was of pre- and post-deployment health assessment forms from US service members (Silverberg, 2002). This analysis looked at 55 085 service members who had completed both a pre- and post-deployment health assessment from between 01 January 2000 and 31 May 2002. The analysis found that the majority of those deploying (61.7%) reported the same health status on their pre-deployment health assessment from as on their post-deployment health assessment form. Of the remainder, almost identical proportions reported an improvement or decline in health status. As a result, the overall change in health was neutral. Additionally, about 4% of personnel indicated concerns about possible hazardous exposures. The US Institute of Medicine, when assessing strategies to protect the health of US Armed Forces, recommended that, unless necessary for military purposes, pre- and post-deployment health assessments should be replaced by a regularly administered health questionnaire (Institute of Medicine, 1999). One armed force, the New Zealand Defence Force, has decided to replace its pre- and post-deployment health assessments with an annual questionnaire and discretionary examination, partly due to the difficulty in defining what constitutes a deployment.

Disease and Non-Battle Injury Reporting

Disease and non-battle injury (DNBI) reporting systems record data on a service member's first and subsequent attendance to a medical treatment facility, their diagnosis and the subsequent impact on manpower. Recording of DNBI events appears to be the most widely used health surveillance tool among the countries contacted. The systems used for recording DNBI included the British Army's J97 system, EPINATO, the Joint Chiefs of Staff DNBI Report, or a modified variant of one of these systems. Most of the armed forces contacted used a DNBI reporting system while on deployments or operations requiring its implementation, such as NATO operations, as a means of assessing the impact of DNBI on manpower. However, the armed services of several countries, such as the British Army, Royal New Zealand Navy and Malaysian Armed Forces, also use such a system during peacetime.

Disease and non-battle injury reporting systems have been successfully implemented during operations in the former Republic of Yugoslavia (McKee *et* al., 1998; Owen & MacMillian, 1998; Pascal *et al.*, 1998) and during a United Nations mission in Haiti (Gambel *et al.,* 1999). The systems were found to be easy to use, unobtrusive and readily accepted by medical personnel and were able to show that operations, such as Joint Endeavour and Joint Guard in the former Republic of Yugoslavia, were relatively safe and healthy operations (McKee *et al.*, 1998). Experience of using DNBI reporting systems has identified a number of limitations of the systems. In particular, the health event categories used (e.g. 'Intestinal Infectious Diseases' or 'Dermatological Conditions') are broad and do not readily facilitate identification of the initiatives required to tackle the health problems. In addition, a high percentage of health events may be recorded in categories such as 'Injuries – Other', thus limiting the usefulness of a large proportion of the data collected. For example, between July 1996 and January 1997, 39.9% of days lost for the Implementation Force in the former Republic of Yugoslavia were recorded as 'Injuries – Other' or 'Diseases – Other' (Pascal *et al.,* 1998). Data are also reported as aggregated returns and are not differentiated according to sex, age, job or task, or other factors; this limits the identification of population sub-groups more at risk from specific health events and, in turn, may limit the ready identification of courses of mitigating action. Nevertheless, DNBI reporting is the only example of a system that has been used in joint forces operations, such as NATO operations, and that allows direct DNBI rate comparisons between armed forces from different countries.

'Long-Term' Health Surveillance Mechanisms

Health Surveillance from Electronic Medical Records

The most advanced and complex systems identified were those based on electronic medical records. These sought to link medical data with other databases, such as personnel or exposure databases, to create a comprehensive database for health surveillance. Only two armed forces were identified (the Netherlands Armed Forces and the US Armed Forces) that have such a system in place, although such systems are planned or are being implemented in the Australian, Canadian and British Armed Forces.

The most well developed medical record based health surveillance system was the Defense Medical Surveillance System (DMSS) of the US Armed Forces. This system receives and integrates data from many sources and includes personnel data, medical data, serological data and deployment data from all US armed services into one database. The system captures both primary and secondary health care data from both military treatment facilities and US non-military facilities at which service personnel are treated. Data capture from the latter is successful partly because the US health care system is insurance based and the process of payment by the Department of Defense (DoD) ensures that information on each hospital event is obtained. With such a large system there are some gaps in coverage and completeness of the records. For example, data are not captured from US Naval hospital ships or from US service members treated at non-US military treatment facilities. However, these gaps have been acknowledged and there are plans to remedy some of them in the future.

Important considerations in the use of such health surveillance systems include the accuracy of the data entered and the ease with which data can be analysed. However, none of the armed forces with, or implementing, an electronic medical record based health surveillance system had procedures for validating the data being entered into the systems. The ease of analysis of the data has been addressed in the US with the development of the Defense Medical Epidemiology Database. This is a data analysis tool that enables users to analyse a subset of the data within DMSS with respect to disease, injury, occupation, location and time period and is readily accessible over the Internet. Conversely, lack of ease of analysis has been reported to have limited the utility of the Royal Netherlands Navy electronic medical record system, GIFKOM, for health surveillance, as separate programmes have to be written each time an analysis is required.

Health Questionnaires

Another health surveillance tool used by several armed forces is the periodic health questionnaire. These allow the on-going, routine and systematic collection of health related data in a relatively cost-effective and efficient manner. Armed forces in which health questionnaires were being used or were planned to be used included Canada, New Zealand and the US Armed Forces. Only the US Armed Forces have published an analysis of the results from a routine questionnaire at the population level: the DoD Survey of Health Related Behaviors (Bray *et al.*, 1999). This questionnaire has proved effective in providing information on indicators of health and less well-defined health outcomes, such as mental health and stress, and has informed decision- and policy-making. Important considerations when using questionnaires for health surveillance are that the questionnaires need to be adequately validated and that good use needs to be made of the resulting data at a population level, rather than solely for individuals.

Disease and Death Registries

Several countries have developed registries for the purpose of conducting surveillance on specific health end-points and, although few reported it as a health surveillance mechanism as such, many countries maintain data on active duty deaths. The US has several registries of particular interest, these being the DoD Birth and Infant Health Registry and the DoD Medical Mortality Registry. The Birth and Infant Health Registry aims to provide systematic surveillance of births to DoD healthcare beneficiaries and to estimate the prevalence of birth defects (Ryan *et al.*, 2001). The registry has been validated and shown to be capturing the majority of defects occurring in births to service members on active duty and their dependants and to retirees and their dependants. Initial analyses have indicated a DoD-wide birth defect prevalence of 4.4% (Pershyn-Kisor *et al*., 2000). Although many armed forces collect data on active duty deaths, principally for administrative purposes, the DoD Medical Mortality Register attempts to be much more comprehensive by obtaining complete medical and circumstantial information on every military active duty death (Gardner *et al*., 2000). The aim of the system is to use the information to prevent deaths through the identification of medical and circumstantial factors associated with deaths in particular situations.

Follow-Up of Personnel Beyond Military Service

Follow-up of personnel after they leave the armed services was also investigated. No country contacted had a comprehensive *routine* method for following up personnel after they had left the armed forces. However, several countries are following-up cohorts of particular interest, such as the cohorts of veterans of the Gulf conflict, being studied by the Canadian and UK Armed Forces. The US Armed Forces have begun to address the issue in several ways. In particular, they are developing the Federal Health Information Exchange, which will facilitate transfer of medical information between the DoD and the Department of Veterans Affairs, thereby facilitating monitoring of health beyond military service. The US Armed Forces have also begun the prospective follow-up of 140 000 personnel, as part of the Millennium Cohort study, with the aim of evaluating the influence of military service on the health of service

personnel over a period of up to 21 years (Chesbrough *et al*., 2002). The study will provide a basis for comparing health status between deployed and non-deployed personnel and will provide a foundation upon which other routinely captured medical and deployment data may be added to answer future health-related questions.

Policy and Organisation

Although primarily about health surveillance mechanisms, this project also made several observations about the policy and organisation of health surveillance within armed forces. A common element identified within nations that appear to have an effective population-based military health surveillance system is that they generally have well-developed and defined policy and lines of responsibility for health surveillance that are supported at senior command levels, and are adequately resourced. For example, the US Armed Forces have, in recent years, made a considerable commitment to developing a comprehensive health surveillance system. Much of the effort and impetus to establish such a system originated from commitments made by President Clinton, following investigations into Gulf War veterans' illnesses, that: "Every soldier, sailor, airman and marine will have a comprehensive, life-long medical record of all illnesses and injuries they suffer, and the care and inoculations they receive and their exposure to different hazards." (The White House, Office of the Press Secretary, 1997). This has been implemented with well-defined policy and responsibilities for health surveillance and supported with considerable resources. Similarly, smaller armed forces, such as the ADF, have health surveillance policies and responsibilities that are clearly defined. These are set out in ADF Health Policy Directives that are mandated by the Director-General Defence Health Services. The ADF has also resourced a dedicated Health Surveillance Cell within the DHSB that can take a lead on health surveillance issues, and coordinates and supports the implementation and development of health surveillance policy.

Table 2: Summary of Health Surveillance Mechanisms Used by Armed Forces Worldwide[1]

Country/ Organisation	Periodic medical assessments	Notifiable disease/ illness reporting	Pre- and post-deployment health assessments	Disease and non-battle injury reporting	Electronic medical record based health surveillance	Health surveillance registries	Periodic health questionnaires	Post-service follow up of personnel
Australian Defence Force		Yes		Mainly deployments	Being implemented	Yes (deaths)		
Belgian Armed Forces			Yes	Deployments only				
Canadian Forces	Yes	Yes	Yes	Deployments only	Planned		Yes, current and planned	Gulf Veterans only
French Armed Forces		Yes	Yes					
Germany	Yes		Yes					
Hungarian Defence Force		Yes		NATO operations only				
Israel Defense Force		Yes						
Malaysia				Yes				
Netherlands Armed Forces	Yes			NATO operations only	Limited, being enhanced			
New Zealand Defence Force	Yes		Yes, but to be replaced	Navy only			Planned	
Sri Lanka	Yes	Army only						
US Armed Forces		Yes	Yes	Deployments only	Yes	Yes (births and deaths)	Yes	Millennium Cohort Study
US Coast Guard	Yes							
ABCA Armies			Yes	Deployments only				
NATO Forces			Yes	Deployments only				
UK Armed Forces	Yes			Army and NATO operations only	Planned	Yes (deaths)		Gulf Veterans only

ABCA, American, British, Canadian and Australian; NATO, North Atlantic Treaty Organisation

[1] This table was complied on the basis of information supplied by the armed forces concerned. As a result, the absence of an entry in a particular cell does not necessarily indicate that the armed force concerned does not use such a health surveillance mechanism, but rather that no information concerning such mechanisms were received from the country concerned

DISCUSSION

Health surveillance is an essential tool for monitoring ill health in an armed force and to help protect the health of service personnel. A variety of mechanisms have been identified for health surveillance in armed forces worldwide. From these, a number of essential elements have been identified that contribute to an effective health surveillance system, including that:

- the system should be well supported at senior command levels and should be under-pinned with well-defined policy and objectives, clear lines of responsibility and with adequate resources;
- the system should facilitate the routine monitoring of health at the population level;
- the systems should be implemented and applied consistently throughout the services within the armed force concerned, both in peacetime and during operations and deployments;
- the system should have adequate linkages to data on the demographic characteristics of the population concerned, and to information on their location, jobs or tasks and exposures to potential hazards;
- the systems should be extended beyond military service to receive data on the health outcomes of ex-service members;
- the systems should be supported and coordinated by dedicated and appropriately qualified staff;
- the data collected should be analysed on a routine basis and reported in an appropriate format both to senior commanders and to those collecting the data; and
- the outcomes of the health surveillance system should be used to inform policy and, where appropriate, lead to action to prevent further ill health.

A number of the systems identified fulfil, or have made some progress towards fulfilling, some of these elements. For example, in several armed forces, such as the ADF and the US Armed Forces, there is high-level commitment to health surveillance, with some clear policy and lines of responsibility that have resulted in health surveillance systems that appear relatively successful. The elements of an effective system are probably most successfully addressed in electronic medical record based health surveillance systems, such as DMSS, where ready access to medical data, and some corresponding demographic data, facilitate analysis of the data, which are subsequently reported and distributed throughout the US Armed Forces.

None of the systems identified met all the suggested elements of an ideal system. In particular, for several of the mechanisms identified, such as periodic health screening and some pre- and post-deployment health assessment systems, there was no analysis of the data at a population level. Although useful at the individual level, the lack of population level statistics limits the interpretation and use of the data. However, in forces without a centrally linked electronic medical record, the practicalities of collating such data may be prohibitive.

So far, no systems identified have comprehensively addressed the issue of adequately linking health data with other information such as exposure data, job or task information and location data. The linkage of health data with data on demographics, exposures, jobs or tasks carried out and location, for example, is essential in order that groups experiencing higher incidence and/or prevalence of particular health outcomes and factors that are associated with particular health outcomes can be identified, thus facilitating the implementation of preventive measures. None of the systems have managed to link comprehensively all this data, although some systems, such as DMSS, have made considerable progress, particularly in linking data such as demographic and medical data. This is an area requiring further research and development.

The follow-up of service personnel beyond their military service also remains an area for further research and development. This is important as some health end-points may only become manifest after a service member has left the forces and, for some health end-points e.g. cancers, only after many years following the causative exposure(s). The Millennium Cohort Study is an initiative that should help address some of these questions. However, the development of methodology for *routine* follow-up of service personnel is still needed.

CONCLUSIONS

Health surveillance among armed forces worldwide has received much attention over the past decade. As a result, a number of systems have been developed to monitor the health of service personnel and to limit the impact of ill health. These vary considerably in their scope and complexity, but nonetheless have proven useful in better understanding and protecting the health of armed forces. The use of systems based on electronic medical records has demonstrated some of the potential such approaches hold for future military health surveillance. Development of and experience of using such systems should bring further enhancements to the health surveillance capabilities and ultimately the health of armed forces worldwide.

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Achieving Force Health Protection, Now and for the Future

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SUMMARY

The nineties brought to the forefront the challenge of providing health protection for the Canadian military, and the medical branch found themselves stretched to achieve their support requirements let alone expand capabilities or look to future strategies. The Force Health Protection Program was developed to address these challenges at home and abroad. This paper will discuss the implementation plan of the program and the strategies proposed to strengthen our near and far future competencies. By integrating the information gained from the concurrent activities of applied assessments and reliance on R&D to identify and fill the capability gaps, additional strategies and technologies will be provided to identify, monitor, diagnose and predict health outcomes. This paper will also discuss the specific Military Operational Medicine projects that will aid the Canadian medical services capability to support and enhance our operational capability, while maintaining the goal of assuring force health protection.

INTRODUCTION

The nineties brought to the forefront the challenge of providing health protection for the Canadian military. With a decade of increased operational commitments and concurrent decreases in personnel, the medical branch was stretched to achieve their support requirements let alone expand capabilities or look to future strategies. Progress has been made. In response to several reports detailing recommendations to remedy these shortfalls, the Force Health Protection Program was established under the RX2000 Health Care Reform Project to address the development and implementation of health promotion, prevention and protection programs to promote wellness and mitigate illnesses and injuries at home and abroad.

The Force Health Protection directorate of the Canadian Forces Health Services was officially established in September 2001 with the aim to prevent or reduce negative effects of operations on the health of Canadian Forces members and enhancing health wellness. To accomplish the goal five interrelated sections have been stood up, Epidemiology, Occupational and Environmental Health, Communicable Disease, Health Promotion, and Operational Medicine, providing health force protection through the continuum of in-garrison care to pre-deployment assessment, through to deployment monitoring and diagnosing, prevention and protection, to post deployment surveillance.

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CURRENT APPLIED CAPABILITY

To achieve and maintain force health protection we must learn from our past accomplishments and experiences, but as well, we need to have a situational awareness of the health threats that may currently be present. Through hazard detection and monitoring within environments unique to the military we can assess the risks of exposure during operations and within occupations, identifying both the acute and chronic risks so that pre-emptive remedies can be taken to protect our members. In addition to program and policy development initiated by Force Health Protection, occupational health expertise has been expanded to directly aid operations with a Deployable Health Hazards Assessment Team (DHHAT) that is capable of sampling, analyzing and interpreting air, water and soil conditions for any Canadian Forces deployed operation. The intent of the team is to enhance our capability to assess the health hazards arising from both environmental and industrial hazards and public health concerns, and to mitigate their affect by communicating the risks to field commanders.

Ensuring the ongoing health and well being of deployed Canadian Forces members, while not conflicting with operational requirements, is achieved by employing an environmental and industrial health risk management plan that encompasses the continued support from the CF health care system throughout the career of Canadian Forces, soldiers, airmen and sailors. Prior to any new deployment information is retrieved on known health threats and an on-site assessment is performed, identifying and quantifying the potential chemical, biological and physical threats that may be present. From this, recommendations for protective and control strategies are provided to both the commanders and follow on medical personnel. Ongoing environmental and industrial surveys are performed during deployment, in concert with health monitoring of personnel. Close out assessments are also completed on each CF mission, with the collected data analyzed by experts following closeout to monitor health effects.

NEAR FUTURE DEVELOPMENTS

However, to strengthen health protection capabilities against the environmental, industrial and occupational threats that may exist within operational platforms now and in the future, there is a necessity to identify and fill the capability gaps. This can be achieved in part by maintaining currency with the latest detecting and monitoring technology and collecting and collating operational exposure and health risk data in order to improve medical surveillance and risk assessment capabilities.

With the growth of toxicological detection technology the future will see small, lightweight, real-time personal exposure monitoring capability, targeted to specific environmental contaminants. Today the deployment teams have the capability of collecting samples on a wide range of contaminants, and are quickly moving towards a complete real-time monitoring capability on the full-spectrum of contaminants. Efforts are currently ongoing to ensure sample collection and analysis methods are as precise as possible, and instrumentation selection is able to withstand the sometimes-harsh conditions of the environment (including temperature, humidity, particulates) so that data interpretation is accurate and reliable and provides a true indication of risk. Selection of a gas chromatograph capable of detecting volatile organic compounds and an infra-red analyzer capable of continuous detection and monitoring of 120 compounds are part of the capabilities that are truly portable, lightweight and sensitive, providing the CF with an advanced laboratory capability to austere third world environments. Efforts have been directed at developing a database that incorporates both exposure data from all missions and personnel medical data to provide more efficient and detailed medical surveillance capabilities. The CF is also examining the application of exposure standards that are based on a more representative deployed military exposure of twenty-four hours, maximum exposure guidelines (MEGs).

R&D DEVELOPMENTS

But for those deficiencies that cannot be remedied by current capabilities, there is a necessity to draw upon R&D activities to develop novel strategies and technologies. It is the merging of the information gained from assessing deployments and research that will ensure advancement of competencies. During a baseline air quality assessment of Canada's newly acquired Victoria class submarines biological exposure of the crew to Volatile Organic Compounds will be measured with a newly developed breath sampler coupled with the application of advanced analytical capabilities. This merging of a research opportunity with an applied necessity will identify the uptake, accumulation and elimination patterns to a compound that is commonly found in diesel fuels, solvents and lubricants, which to date does not have a convenient or accurate method for measuring personal exposure. The information gained from this trial will provide guidance on the best strategies for personal monitoring, as well as, ways to prevent exposure. The result from these efforts will be the development of a non-invasive breath sampling capability that is simpler, sensitive and a reliable biological monitoring method.

By assessing the short and long-term exposures to operational health hazards the biological effects of exposures can be identified. Research is currently ongoing to identify the mechanisms of action and site of injury of health threats, specifically that of chemical mixtures that may be commonly found on military missions. Toxicity for the most part are known for single chemicals, however, the combined effect of mixtures is not. Research thus far has identified promising early warning diagnostics to operational toxic exposure in both blood products and lung enzymes. This knowledge can then be applied to further advance our understanding of physiological effects and allow the identification of specific biological indicators that will be able to both measure and forecast individual operational exposure. With the development of a portable early warning personal detection device the future will be able to provide a capability to detect the effects of exposure long before clinical manifestations of toxicity and disease.

Advancement of current capabilities is also proceeding in the field of medical monitoring and diagnosing capabilities. With the current advances in non-invasive monitoring and diagnosing technologies we can envisage a comprehensive front line assessment and casualty care utilizing a portable system, small enough to be carried by a soldier. The system will provide a three dimensional ultrasound capability, a vital signs monitoring of heart rate, blood pressure and oxygen, but also the system will have the capability of performing onsite electrocardiograms and electroencephalograms. Over and above near front line medical care the diagnostic system will also provide a preventive health monitoring of troops through brain core temperature detection via a helmet-mounted sensor.

Monitoring and diagnostic capabilities will also be further enhanced with the future development of an electronic health record. Individual health records, epidemiological information, and individual risk factors will be available to medical staff in theatre, and the concurrent development of an exposure medical surveillance database will provide access to environmental health information from industrial and environmental hazards specific to the deployment. With the additional capacity to connect to experts when needed via a telehealth linkage, medical staff will have the resources needed to guide them in complex or unfamiliar situations. Whether the need arises during the predeployment recce or during deployment, direct guidance can be sought in the identification of health threats or additional advise in diagnosis so that we may better protect and prevent. By exploiting technological advancements the CF will provide the means for the most efficient use of available personnel and assures medical support is provided both at home and abroad to health challenges.

FUTURE EXPECTATIONS

The Force Health Protection Program will change and evolve in the coming years. With the development of technology and advancement of scientific strategies commanders will be provided with the information needed to guard against those threats that may impact a mission. The forthcoming Global positioning system (GPS) linkage to commanders will ensure commanders will be able to receive pertinent information of the environmental threats and the most effective protection against the identified hazards in a timely manner. It also ensures an ongoing linkage with the medical authorities, providing updated knowledge of the potential health risks and individual susceptibilities, no matter where the troops are located. With the additional access and guidance from health protection policies and standards, commanders will be provided with a complete situational awareness of the troops capabilities for the strategic planning of operations.

R&D is also progressing in the delivery of prophylactics to aid in the protection and prevention of heath threats that may be encompassed by troops during deployment. To improve the delivery and performance of pharmaceuticals drugs can be encapsulated in liposomes, a naturally occurring microcapsule that can be prepared artificially. They are ideal as an assistance mechanism for delivery in that as they occur naturally, they are biocompatible and biodegradable, and they are also capable of being physically altered in their size and flexible in their contents. They thus have the potential for many applications.

With the experimental evidence that has already been developed, liposomes will become a normal delivery method of pharmaceuticals in the near future. Pharmaceutical agents will be placed inside and targeting agents will be attached externally. Research has already laid out the foundation for delivery of liposomes containing antibiotics, analgesics and antioxidants. But with a detailed understanding of how the body works, how illness and disease develop and how the body repairs itself, the use of liposomes in the future will be target specific, delivering and releasing agents where needed.

The future will see liposomes derived: as vaccinations that can be given orally and survive the digestive system; as treatments such as antifungal, antiviral and anticancer agents where uptake into the cell is critical; and, as medications that are targeted to bind and inactivate blood-borne toxins. This method of delivery is advantageous, as toxic side effects to medication will be minimized, as therapeutics will be site-specifically targeted. It is also envisioned that the future will see liposomes that will be used to prevent and repair disease through the use of therapeutic genes that initiate cell replacement and repair.

Thus, by integrating factors such as occupational and environmental exposure hazards; personal risk factors; and, pathogenic mechanisms, additional strategies will be provided to identify, monitor, diagnose and predict health outcomes. This is not to say the intent and potential of Force Health Protection is not realized, but with the aid of R&D activities our capability to protect and prevent will only improve. It is with these collective activities that the Canadian Forces will achieve the goal to support and enhance the operational capability of a modern military force, while maintaining the goal of assuring force health protection.

Medical Threats to Expeditionary Forces

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SUMMARY

This paper will commence with a review of the role of United Kingdom military in humanitarian and peacekeeping operations. The expeditionary nature of the work will be emphasised. Then there will be discussions on how United Kingdom forces coped in three Balkan theatres: Bosnia, Kosovo and Macedonia. A comparison of the field conditions encountered will be made and an epidemiological snapshot of the morbidity will be presented. The lessons learned from these operations and the possible progress for the future will be discussed in an attempt to determine how we can ensure that we remain fit to fight in the field.

INTRODUCTION

An Expeditionary Force

The Strategic Defence Review stated that the UK Armed Forces must be expeditionary and "a force for good in the world". It would no longer be acceptable to wait in our citadels for conflict, we must "fire-fight crises before they come to us". In Annex A to British Defence Doctrine the importance of sustainability is emphasised. Sustainability is the key to success if the "means to fight and win is not to be lost". Deployments can comprise of two broad groups of personnel: formed unit and non-formed unit personnel. Formed units deploy with personnel who train together and take their own equipment with them when they deploy. Examples of formed units within the Royal Air Force include the RAF Regiment, Tactical Communications Wing and the Support Helicopter Force. Non-formed unit personnel are a disparate group of people assembled together in order to make up a particular package. They have not trained together and rely heavily upon the assets that have been put into theatre for them. Three Balkan theatres will be considered: Bosnia, Macedonia and Kosovo.

METHOD

Statistics relating to primary health care consultations were collated using the Epi-NATO categories. The most common disease categories recorded were then used to compare one theatre with another. The data was collated on a weekly basis. To allow direct comparisons the figures were then standardised by converting the consultation rates into consultation rates per 1000 personnel. Clearly some conditions required more than one consultation in a week and this would be recorded as such. Whilst this may artificially raise the apparent prevalence of a condition it was considered a valid method to look at workforce effectiveness. The rationale

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behind this was that a further consultation denoted continued morbidity and therefore the potential inability to undertake a full range of duties.

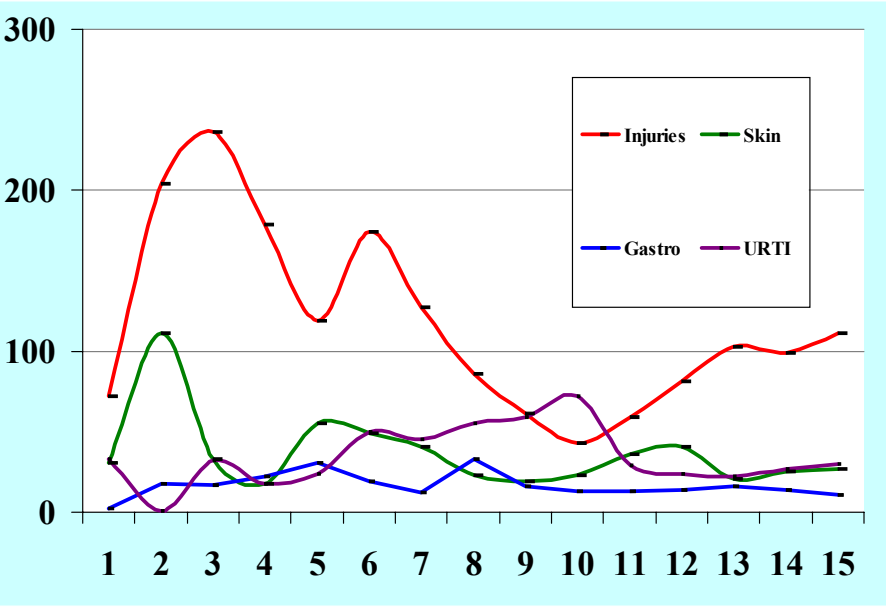
RESULTS

Bosnia (Sipovo 1996 to 1997)

The camp was set up in an old factory using tents and temporary hardened accommodation (Portacabins). The Army Royal Engineers had constructed toilets and shower blocks. Host Nation support was provided in the form of a laundry service and refuse collection. Potable water was provided in bottles.

The commonest diseases encountered were injuries and dermatological complaints. The injuries primarily comprised of accidents whilst at work, sporting injuries and road traffic accidents. There was a background incidence of gastroenteritis and upper respiratory tract infections (URTI). The consultation rates per thousand personnel per week were as follows:

Bosnia (Sipovo) 1996 – 1997															
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Consultations per week per thousand personnel															
Injuries	72	204	236	179	119	174	127	86	61	43	59	81	103	99	111
Dermatology	31	111	33	18	55	49	41	23	19	23	36	41	21	25	27
Gastroenteritis	2	18	17	22	31	19	12	33	16	13	13	14	16	14	11
URTI	33	1	32	18	24	50	45	55	59	72	29	24	22	27	30



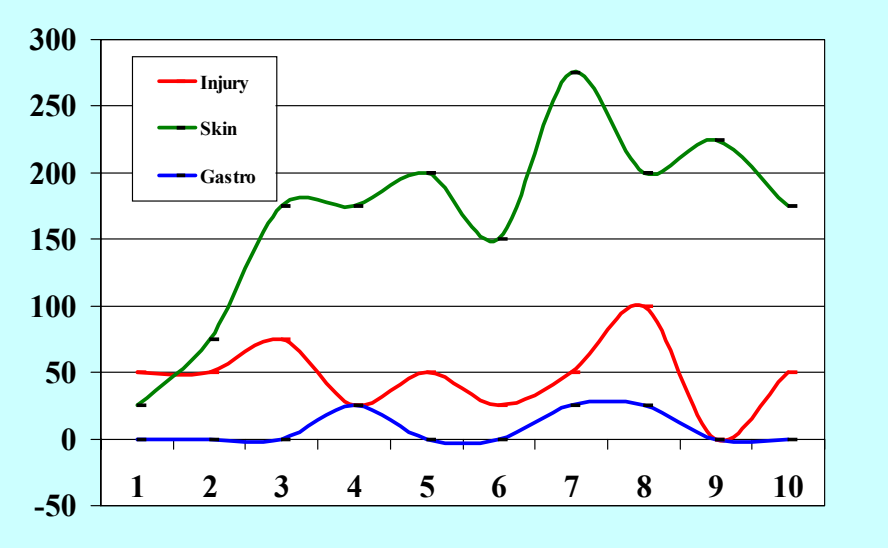
Consultation Rates per 1000 Personnel per Week Recorded Over a 15 Week Period.

Macedonia (Skopje 1999)

The camp was set up adjacent to the runway at Skopje airport by the Support Helicopter Force; a formed unit. Accommodation was in tents. Host Nation support comprised of mobile temporary toilets (Portaloos) and a local contractor was employed to empty them on a regular basis. There was also a refuse collection service. Hot water was generated by "Lazyman" boilers and clothes had to be washed by hand. Potable water was provided via bowsers and chlorinated by the Environmental Health Technicians prior to use.

The diseases encountered were markedly different to the Bosnia deployment. The figures are shown in the table below. Dermatological complaints were very common. This was in part due to the fact that it was summer and also due to the fact that personnel had to make an effort to maintain their personal hygiene. Washing involved obtaining hot water from the boilers and then taking the bowl to a tent for some privacy. The laundering of clothes tended to be postponed for as long as possible as everything was washed by hand. The main areas of skin affected were the groin, feet, buttocks and axillae. Skin complaints, whilst medically trivial, can cause incapacity and loss of full effectiveness in manpower quite out of proportion to their severity. Upper respiratory tract infections were very uncommon and this probably reflected the fact that it was summer. It is interesting to note from the Air Publication 1269B; Handbook of Preventive Medicine (1957 Second Edition) that during the Great War 1914 – 1918 the ratio of illness and disease to wounded was in the order of 27:1. Similar patterns can be observed with these low levels of injuries relative to other illnesses.

Macedonia (Skopje) 1999										
Week	1	2	3	4	5	6	7	8	9	10
Consultations per week per thousand personnel										
Injuries	50	50	75	25	50	25	50	100	0	50
Dermatology	25	75	175	175	200	150	275	200	225	175
Gastroenteritis	0	0	0	25	0	0	25	25	0	0



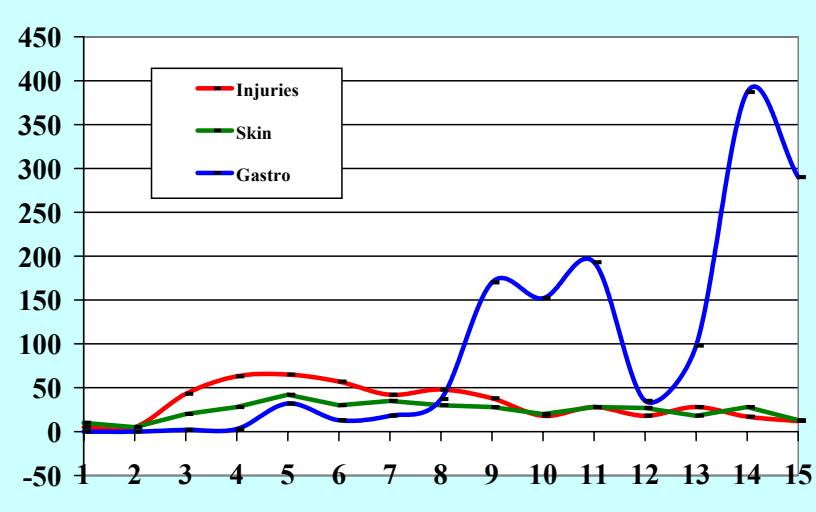
Consultation Rates per 1000 Personnel per Week Recorded Over a 10 Week Period.

Kosovo (Pristina 1999)

The camp was set up at Pristina Airport and in the early weeks comprised of specialist enabling and formed unit personnel who were used to living in field conditions. These personnel were then augmented by hundreds of other servicemen from a wide variety of backgrounds, trades and locations. Accommodation was in tents. There was no Host Nation support at this time. Field toilets were used. After a couple of weeks a limited number of mobile temporary toilets (Portaloos) were obtained; however, due to an unreliable contractor the emptying of these toilets was sporadic. There were limited washing facilities with bowls of cold water and solar showers. For the first ten weeks there was no laundry service and personnel had to hand wash their clothes. Refuse was burnt in a self-dug pit.

An initial task was to clean up the terminal building and prepare it for the reception of passengers. This involved clearing a lot of debris and broken glass. Lacerations from the glass and other relatively minor musculoskeletal injuries were common. There was no specific personal protective equipment available for these tasks other than the standard items of uniform that are issued. The table below shows the relative prevalence of health problems and demonstrates how the injury rates fell once the initial clearance of the terminal building was complete. There was a background level of skin complaints each week. There were two outbreaks of gastrointestinal disease. The first was a viral gastroenteritis followed by an outbreak of shigella dysentery. Nearly a third of all personnel were affected with the typical time off work being 2 – 5 days. In Burma during World War II an outbreak of dysentery was considered notable when an incidence of 80 men per 1000 per week was recorded. The Pristina outbreak was four times that rate.

Kosovo (Pristina) 1999															
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Consultations per week per thousand personnel															
Injuries	5	5	43	63	65	57	42	48	38	18	28	18	28	17	12
Dermatology	10	5	20	28	42	30	35	30	28	20	28	27	18	28	17
Gastroenteritis	0	0	2	3	32	13	18	37	170	152	193	35	98	387	290



Consultation Rates per 1000 Personnel per Week Recorded Over a 15 Week Period.

DISCUSSION

Disease and morbidity for the armed forces when deploying overseas is not new. However, when manpower is at a premium we must send out the essentials for daily living at the beginning of a deployment. This needs particular attention when personnel from non-formed units deploy. Personnel must be trained to look after themselves. This is discussed in Air Publication 1269B when it says that "we must stimulate the lazy and instruct the ignorant of all ages". The importance of training is also stressed in the Joint Warfare Publication entitled "Peace Support Operations Manual". Formed units do train together and then deploy with their own equipment. They appear to be better prepared. Pre-deployment field training is essential in these times of expeditionary operations. Living in field conditions takes time, effort and planning. Commanders must think about the basic equipment that their personnel require and must ensure that there is time within the daily routine to wash, clean and tidy themselves and the camp.

Our expeditionary role is set to increase. Disease rates have, at times, been comparable to those encountered during the Great War and the Second World War. Commanders can easily overlook this and may not appreciate the situation until it is too late. Equipment and training needs to be given a high priority. At present we can severely reduce our operational effectiveness, not through enemy action but through ourselves. In the Royal Air Force this has been addressed by the introduction of "Individual Deployment Training". It will be interesting to see whether this enables us to learn the lesson of history and reduce our incidence of disease.

Any views expressed are those of the author and do not necessarily represent those of the UK MOD.

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Open-Source, English Language, Medical Intelligence Available on the World Wide Web – An Invaluable Aid to Pre-Deployment Preparation

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Adequate medical preparation for troop deployments to unfamiliar territories is of paramount importance to military medical personnel. By providing troops' basic health needs and planning for contingencies, medical personnel allow military commanders to perform their missions with a healthy, fit force. History provides many examples where ignoring the basic tenets of disease prevention and sanitation has led to defeat. First in the mind of the medical planner should be the gathering of information related to the disease threats and sanitary conditions in the area of operations. In the past, vast brick and mortar libraries were necessary to provide the background medical information necessary for preparation. The information often lagged real world situations by years, leading to unpleasant surprises when troops arrived.

The World Wide Web (WWW) provides an information distribution platform that has greatly simplified and accelerated the process of collecting relevant medical intelligence. It has also augmented the amount of available data. This proliferation of data allows planners to acquire multiple different perspectives on an area of operation, but, unfortunately, it can lead to data overload. In this presentation, we will review several websites that can be accessed world wide to provide detailed medical information about virtually any location. All sites are open-source, with many provided by United States governmental agencies. The information on these sites is regularly updated and relatively abridged, providing planners with a concise base of information to use in preparation for deployments.

An excellent starting point for the exploration of the WWW is the Well Digger's Workstation, http://www.txdirect.net/users/jeturner/, a private site which has several useful functions:

1) It provides advice regarding the collection and presentation of medical intelligence.
2) It provides links to various useful sites.
3) It provides a "panic button" which will help you acquire the basic medical intelligence necessary to brief your superiors in roughly one hour's time.
4) It provides various teaching materials should you want to practice acquiring medical intelligence or perhaps, teach others how to approach this problem.

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The first page on this website displays the entry link, in addition to links to advice on teaching and an explanation of several aspects of logical argument. Once you enter the workstation, you will see a display of several links. I will start with the description of the panic button as this, to me, is the most useful. You will find that much of the information contained in this section of the website is written specifically for United States Air Force (USAF) officers, but although the structure in your military may be different, the information provided is basic enough to provide useful instruction. For instance, in the introduction, the first step includes the instruction to call your medical intelligence officer or non-commissioned officer. You may not be blessed with such a person, or, if you do, they may not be available when you need them. Visiting this site before you need the information, however, may prompt you to start collecting data before it is actually necessary. I find the "Well Digger's Mantra: Write on Rumor" [1] to be a good guide. It translates to collecting medical intelligence on areas of the world to which you might go, even if it is only a rumor at the time. This leads to better preparation, and less of a need to panic when you are emergently called upon.

After the introduction, the site goes on to give savvy advice regarding what you need to get a quick view of a region. The first advice given is to get a map and the site provided is an online map library at the University of Texas, http://www.lib.utexas.edu/maps/. This site provides free maps, mostly in jpeg format that will give you a general idea of the location. The site, for example, provides well over 100 maps of Afghanistan, divided into groups: country, city, detailed, thematic, and historical. Detailed maps provided include topographical and tactical pilotage maps, and thematic maps include ethnoliguistic groups.

The next step is to get an idea of the social/political situation in the region and the site listed for this is the United States Central Intelligence Agency – World Factbook website, http://www.odci.gov/cia/publications/pubs.html. The Factbook is set up so you can easily pick a country, click on the link and get a set of pages with information. Each country has a dedicated page that begins with an introduction and proceeds to detail geography, people, government, economy, communications, transportation, military and transnational issues. Below is an excerpt from the "economy" section of the page on Laos:

> "The government of Laos – one of the few remaining official Communist states – began decentralizing control and encouraging private enterprise in 1986. The results, starting from an extremely low base, were striking – growth averaged 7% in 1988-2001 except during the short-lived drop caused by the Asian financial crisis beginning in 1997. Despite this high growth rate, Laos remains a country with a primitive infrastructure; it has no railroads, a rudimentary road system, and limited external and internal telecommunications. Electricity is available in only a few urban areas. Subsistence agriculture accounts for half of GDP and provides 80% of total employment. The economy will continue to benefit from aid from the IMF and other international sources and from new foreign investment in food-processing and mining." [2]

The next step is to get the most up-to-date information on the political situation in the region and the site given for this is the United States Department of State (USDS), Travel Warnings and Consular Information Sheets website, http://travel.state.gov/travel_warnings.html. Again, this information is provided for United States of America citizens, and might not apply directly to you, but it will give you some background information on current events in the region. The sheets are divided into headings such as: country description, entry requirements, safety and security, crime, medical facilities and traffic safety/road conditions. If recent events have warranted the Department of State to issue travel warnings, the Public Announcements will be listed under the country name. Below is a recent Public Announcement posted by the USDS regarding Argentina, given here as an example of what is available on the site:

> "December 19-20, 2002, marks the one-year anniversary of the deadly riots and demonstrations that led to the downfall of the De la Rua administration. A number of groups have announced plans to hold

non-violent marches and demonstrations in and around downtown Buenos Aires to mark this anniversary and to protest issues related to the ongoing political and economic crisis in Argentina. This Public Announcement will expire on January 31, 2003.

American citizens are urged to avoid downtown Buenos Aires on Thursday, December 19, and Friday, December 20. Visitors should monitor local media broadcasts for information on the location of demonstrations which may cause disruptions to traffic and public transportation. While recent demonstrations have largely been non-violent, American citizens are urged to avoid large crowds and demonstrations, particularly between now and the end of the year, due to the potential for violence." [3]

The next step is to actually get to the medical intelligence available on the net. The site to start with is the United States Centers for Disease Control and Prevention (CDC), Traveler's Health site, http://www.cdc.gov/travel/destinat.htm. The information provided in this section of the CDC website is primarily aimed at the lay public, but also contains pertinent information for the professional. The National Center for Infectious Diseases (NCID) runs this site, so its focus is information on the infectious diseases of various regions. The NCID divides the world up into 17 regions, and then follows a format to provide information. The first information provided is a rough map of the region detailing which countries are included in the section, followed by links to any notices of outbreaks or USDS travel warnings that currently apply to the region. The major infectious disease threats are then listed with general comments on regional problems, recommendations on how to avoid acquiring the diseases and appropriate chemoprophylactic regimens. The next section details the vaccinations that the CDC deems prudent to have prior to travel to the region. After this, the site provides a list of things to do to stay healthy and avoid sickness in the region – most of the advice centers on common public health tenets, such as hand washing, drinking bottled water (depending on the region), proper dress (long sleeves for malarious areas, etc) and sunscreen. The final sections give advice on what to bring to the region to stay healthy and what web sites to visit for more information. As an example, the following is part of the page on Central America:

"Food and waterborne diseases are the number one cause of illness in travelers. **Travelers' diarrhea** can be caused by viruses, bacteria, or parasites, which are found throughout the region and can contaminate food or water. Infections may cause diarrhea and vomiting (*E. coli*, *Salmonella*, cholera, and parasites), fever (typhoid fever and toxoplasmosis), or liver damage (hepatitis). Make sure your food and drinking water are safe. (See below.)

Malaria is a preventable infection that can be fatal if left untreated. Prevent infection by taking prescription antimalarial drugs and protecting yourself against mosquito bites (see below). Malaria risk exists in some parts of Mexico and Central America. Travelers to malaria-risk areas in Mexico and Central America, including the Bocas del Toro Province of Panama, should take chloroquine as their antimalarial drug. Travelers to Panama in the Darien and San Blas provinces (including the San Blas Islands) should take one of the following antimalarial drugs: (mefloquine, doxycycline, or Malarone™). See, **Malaria in Central America and Mexico,** for additional information on malaria risk and prevention." [4]

All of the underlined words or phrases are links to other pages on the website, which provide more detail on each particular topic.

The CDC website also has an online "Yellow Book", which presents similar information in a different form. Using this link, you can type in the specific country which you will be visiting and the relevant information will be presented. You can also search for short descriptions of specific diseases. This information is aimed more at the medical practitioner, so may be more appropriate for your needs. This site also contains

information on current worldwide outbreaks and a separate section on vaccinations. I present an example below from a search on Guatemala:

> "**Mexico and Central America** (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama) ranges from the deserts of the north to the tropical rain forests of the southeast.
>
> Of the *arthropod-borne diseases*, malaria and cutaneous and mucocutaneous leishmaniasis occur in all eight countries. Visceral leishmaniasis occurs in El Salvador, Guatemala, Honduras, Mexico, nd Nicaragua. Onchocerciasis (river blindness) is found in two small foci in the south of Mexico and four dispersed foci in Guatemala. Chagas' disease (American trypanosomiasis) has been reported to occur in localized foci in rural areas in all eight countries. Bancroftian filariasis is present in Costa Rica. Dengue fever and Venezuelan equine encephalitis can occur in all countries." [5]

And a second example from a search for Rift Valley Fever:

> **Description**
>
> Rift Valley fever (RVF) is a viral disease that affects primarily livestock and people. It is transmitted by several means, including the bites of mosquitoes and other biting insects, and percutaneous inoculation or inhalation of aerosols from contaminated blood or fluids of infected animals.
>
> **Occurrence**
>
> Occasionally, outbreaks occur involving large numbers of human cases, for example, in the Nile Delta, Egypt (1978 and 1993), and the lower Senegal River basin of Mauritania (1987). A large epidemic also occurred in Kenya and Tanzania in 1997 and 1998. A recent outbreak (2000) of RVF occurred in southwestern Saudi Arabia and Yemen with a strain of RVF closely related to that of the 1997-1998 strain. This represented the first spread of the virus outside Africa, demonstrating its potential for spread to unaffected regions elsewhere in the tropics." [5]

As you can see, this website provides an exceptional overview of regional medical threats in addition to solid information on prevention. It is well worth your time to become familiar with its offerings.

The Well Digger's Workstation then goes on to list many more helpful links which I recommend that you explore on your own.

One of the sites that I find especially useful to visit on a daily basis is ProMED-mail, http://www.promedmail.org/pls/askus/f?p=2400:1000, a site sponsored by the International Society for Infectious Diseases. This service, managed by Harvard University in Massachusetts is a "global electronic reporting system for outbreaks of emerging infectious diseases and toxins, open to all sources." [6] The service collects information sent in from around the world on outbreaks, critically reviews it, organizes it and posts it on its website or sends it on a daily basis to any email address. It works as a forum for professionals in the health sciences to pass on local information to the larger community. The site also offers a function to search its postings. This is a good way to update your knowledge of outbreaks in a region prior to deployment. As an example, I searched for the country "Kenya" over the past year and was provided the following information [7]:

03-NOV-02	PRO/AH> Rinderpest – Kenya: background	20021103.5707
01-NOV-02	PRO/AH> Rinderpest – Kenya: OIE, suspected	20021101.5682

12-SEP-02	PRO/AH/EDR> Foot & mouth disease – Kenya	20020912.5288
26-AUG-02	PRO> Dracunculiasis – Kenya: re-emergence (02)	20020826.5156
25-AUG-02	PRO/EDR> Dracunculiasis – Kenya: re-emergence	20020825.5149
10-JUL-02	PRO/EDR> Malaria, highland – Kenya	20020710.4718
13-JUN-02	PRO/AH/EDR> Rabies, humans, dogs – Kenya	20020613.4485
12-JUN-02	PRO/AH/EDR> Rabies, human – Kenya: alert	20020612.4472
24-MAY-02	PRO/EDR> Typhoid, prisoners – Kenya (Mombasa)	
27-MAR-02	PRO> Poisoning, cassava – Kenya ex Uganda	20020327.3830
25-MAR-02	PRO/EDR> Poisoning, cassava – Kenya ex Uganda	20020325.3819
1-11		

As with other sites, every underlined posting is linked to the full article.

The last source that I will review is not open source nor web-based currently, but is available on CD to military members. In the future, an unclassified version may be available on the WWW. The product is called MEDIC (Medical Environmental Disease Intelligence and Countermeasure), which is a CD produced yearly by the United States Armed Forces Medical Intelligence Center at Fort Detrick, Maryland. This CD reviews six categories of intelligence for any country. The categories are: environmental health, infectious disease, force health protection, disease vector profile, medical capabilities and locator. This CD has two advantages over the other sources:

1) It is produced by the military, for the military, and thus, provides most of the information you need in a concise package.
2) It is easy to carry and does not require an internet connection, only a computer with a CD-ROM drive.

The disadvantage is that the by the time the disc is released, it is already out of date and it cannot be updated. To request a CD, email afmicops@afmic.detrick.army.mil, or call USA (301) 619-2181.

Conserving the health of troops is a goal for all of the countries of NATO, and the world wide web is an ever-expanding tool for medics to use to better prepare for deployments. The benefits of the web are myriad: relatively easy access, constantly updated information and access to multiple sources, to name a few. Obviously, this is not a comprehensive review of all useful sites for medical intelligence on the internet, but hopefully it provides a solid base from which to begin your exploration. Furthermore, it is recommended that you access multiple sites to gather a more complete picture of the intended deployment site. Finally, the procedures outlined in this paper are not endorsed by the USAF for use prior to deployment.

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Evaluation of a Health Screening Programme for the British Military: Case Identification and the Effect of the Length of the Questionnaire

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SUMMARY

This paper provides an overview of responses to a full and an abridged version of a health screening questionnaire. Yield of cases for referral to a doctor according to number and severity of symptoms, GHQ 12, PTSD checklist and AUDIT scores and self reported general health perception are given. The distribution of scores for each item are described. Association between caseness and the five referral criteria and risk factors for caseness according to symptoms and GHQ score are given for the full questionnaire.

ABSTRACT

Background and aims *– Screening for health vulnerability has been suggested for tackling the high prevalence of perceived ill health in the British Armed Forces. The purpose would be to detect service personnel with poor health and refer them for assessment and treatment, if appropriate. The aim of this presentation is to give results on the response rate to questionnaires, the yield of cases and the distribution of health scores in a pragmatic study to assess the value of a health screening programme.*

Methods *– Two random samples stratified by service strength were sent a full (50%) or an abridged (50%) health questionnaire. Altogether 4496 questionnaires were distributed.*

Results *– The response rate adjusted for active refusal, discharge from the services and return to sender was 76.2%, slightly higher for the abridged questionnaire than the full questionnaire. More than 26% of the servicemen have a score above the threshold for referral. The main contributors for referral for the full questionnaire were symptoms, GHQ-12 and excessive alcohol intake. Score on a shortened GHQ accounted for the majority of referrals from the abridged questionnaire. The distribution in all the multi item health dimensions showed gradually decreasing prevalence with increasing scores. There was a moderate correlation between scales, the highest being between GHQ-12 and symptoms. This explains*

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why many servicemen were above the threshold for several criteria of health, and also explains the independent contribution of each of the scales, except the PTSD scale. There were differences in the profile of risk factors related to each threshold criterion.

Conclusion *– This study demonstrates that if a screening programme were implemented a large number of servicemen would be referred in the first cycle of the programme. The full questionnaire seems to cater better than the abridged questionnaire for the range of factors which may have an impact on health well-being. Such a programme should not be implemented without demonstrating a high validity of the questionnaire and effectiveness in the management of the conditions detected by the programme.*

INTRODUCTION

A revival of the discussion about the merits of screening for health vulnerability within the Allied Armed Forces was triggered in the aftermath of the Gulf war. This may have been enhanced by the increasing prevalence of servicemen who felt that their health status was worse than those who were not deployed in the Gulf war [1]. In 1998 the Department of Defence of the US implemented a force health protection scheme that included pre and post-deployment health assessment and released standardised questionnaires [2]. These questionnaires, in practice, represented a health screening approach, because a referral option was included in both forms. Only a process evaluation of the surveillance aspect of this programme has been reported so far [3].

In Britain, the Health Surveillance Steering Group (HSSG), answerable to the Surgeon General's Department, supported a formal evaluation of a health screening programme for the Armed Forces. The purpose of it was to carry out a pragmatic exercise, as realistic as possible, of the conditions in which it would operate if the screening programme were to be implemented. The evaluative programme was conceived as a regular event that would be unrelated to any specific deployment, but it would incorporate information on deployments. This approach was decided because: pre and post-deployment periods are times of intense preparation when extra-activities are unwelcome or difficult to fit in, the process of being deployed could colour the responses to the questionnaire [4], medical resources at the time of deployment are constrained and the time for reaching resolution too short, and the number of deployments may be many over a relatively short period of time.

In a health screening questionnaire the threshold for the identification of cases in respect to each dimension of health is of great importance. The prevalences of unexplained and psychological symptoms have been found high in most studies [1,3]. Thus the threshold for referral is of critical importance in a screening programme. Too low a threshold could drain medical resources beyond availability. On the other hand too high a threshold could miss a large number of servicemen who potentially could benefit from a medical referral. In our study we used five criteria of referral: number and severity of symptoms based on symptoms used in a previous study [1], the General Health Questionnaire 12 (GHQ-12) [5,6], PTSD checklist [7], a single question on general health perception from the SF-36 [8] and excessive or problematic alcohol intake [9]. Consistent guidance on PTSD scores denoting caseness is available [7]. With regard to GHQ and number of symptoms, cut-off points of vulnerability are less consistent [10].

The aims of the overall project were to assess the response rate to an invitation to complete a questionnaire according to the length of the instrument, the number of cases that needed referral to a doctor in a medical centre according to the criteria of caseness, the validity of the questionnaires, using as gold standard the examining general practitioners views of each referral, and the level of agreement between the views of the servicemen and the practitioners about the existence of a health problem and its management if any was required. The study design needed to be robust to allow an assessment of effectiveness of the screening programme for a follow up stage should a high participation rate and high validity of the questionnaires have been demonstrated.

The fieldwork for the study started in May 2002 and the data collection is planned to finish by April 2003. In this presentation we report results on response rate to the health screening questionnaires, the differences in the prevalence of cases by length of the questionnaire, the distribution by criteria of assessment in the longer questionnaire, and selected results on the prevalence of cases according to the criteria for referral to a doctor.

METHODS

Sample

Three groups were randomly selected for the study: group 1 received the full questionnaire, group 2 received an abridged questionnaire and group 3 did not receive any questionnaires. For the purpose of this presentation only groups 1 and 2 are relevant. Sampling was carried out in two stages, firstly selection of units in the three services and secondly, random selection of 45 servicemen in each unit. Officers and other ranks were amalgamated in a single database for randomisation. All selected individuals in one unit received the same length questionnaire. A total sample of 4,500 individuals was obtained. Each Service contributed in approximate proportion to its strength so that 2,160 (48.0%) men were obtained from the Army, 1,080 (24.0%) from the Royal Navy (RN) and 1,260 (28.0%) from the Royal Air Force (RAF). Half of the selected individuals in each Service were sent the full questionnaire and the rest the abridged questionnaire. The questionnaire was posted up to three times to individuals to ensure maximal response rate. Altogether ten units were replaced because they were too small for the purpose of the study (four), for security reasons (two) or not found on the Armed Forces Personnel databases (four). The size of the samples was based on estimates needed to answer all the questions of the study. Servicemen received a letter explaining the study, reassured them of the confidentiality of their responses, and indicated that their participation was voluntary. The Defence Medical Services Clinical Research Committee Scientific and Ethics Committee approved the study.

The Questionnaires

For the purpose of this report the following variables were obtained from the questionnaires: gender, age, deployments in the last five years, and the time needed to complete the questionnaire. In the full questionnaire we included fifteen symptoms previously used [1]. The symptoms were selected from the original list to represent those with high, middle and low prevalence and omitting those included in other parts of the questionnaire. Servicemen needed to indicate whether the symptom, if present, was perceived as mild, moderate or severe and whether the symptom was already being treated. As many of the symptoms can be explained by recent cold or flu, food poisoning or recent intense physical activity participants were asked to indicate symptoms for which there was such an explanation. In the abridged questionnaire only five symptoms were included. Only symptoms for which no treatment or explanations were given contributed to assessment of caseness.

The GHQ-12 [5,6] was used in the full questionnaire and a shorter four items version was used in the abridged questionnaire based on Jacobsen and colleagues' recommendations [11]. A post-traumatic stress disorder scale (PTSD-CL) based on 17 items, already validated, was used in the full questionnaire [7]. A shorter version of 14 items was used in the abridged questionnaire. We used questions 1, 2 and 10 of the WHO Audit with the addition of extra categories to question 2 [10]. A question on general health perception categorised into excellent, very good, good, fair and poor was included in both questionnaires.

The criteria of caseness are given in Table 1.

Table 1: Criteria for Referral to the Medical Centres According to Length of the Questionnaire

Criteria	Full questionnaire	Abridged questionnaire
Symptoms	≥ 5 mild or combinations of mild and moderate; ≥ 3 moderate; at least 1 severe symptom	At least 3 mild or moderate symptoms or at least 1 severe symptom
GHQ	GHQ-12 score 4/5	GHQ-4 score 1/2
PTSD	17 items score of 50 or more	14 items score > 40
Health status	Poor	Poor
Alcohol intake	Combinations of questions giving 40+ units a week in males and 30+ in females, or if somebody expressed concern with serviceman's drinking in past year	Not applicable

Analysis

In this analysis standard parametric and non-parametric statistical methods available in STATA 7 were used [12].

RESULTS

Response Rate

The response rate adjusting for active refusal, discharge from Armed Forces and return to sender (RTS) was 76.2%, slightly higher in the abridged questionnaire than the full questionnaire (Table 2). The adjusted response rate was higher for the RAF (80.2%) than the RN (74.3%) and the Army (74.8%). Randomisation was successful and was not affected by response rate because the distribution of individuals by gender, age, number of deployment and service was similar regardless of type of questionnaire (not shown). 92% of the participants were males and the mean age of participants 32.4 years.

Table 2: Response Rate by Length of the Questionnaire

Response type	Full questionnaire N = 2246	Abridged questionnaire N = 2250	Total N = 4496
Questionnaire completed	61.5%	66.3%	63.9%
Active refusal	8.2%	8.1%	8.2%
Discharged	2.7%	2.5%	2.6%
Return to sender	1.2%	1.7%	1.5%
Adjusted response rate	73.7%	78.7%	76.2%
No response	26.3%	21.3%	23.8%

Prevalence of Caseness According to Predetermined Criteria

Table 3 gives the prevalence of cases according to criteria of referral and type of questionnaire. There was a higher prevalence of cases referred when the full questionnaire (31.8%) was used in comparison to the abridged questionnaire (22.5%). The difference was mainly due to absence of items related to alcohol intake in the abridged questionnaire. The GHQ questionnaire was by far the main dimension for referral in the abridged questionnaire while symptoms, GHQ and alcohol intake (unavailable in the abridged questionnaire) were equally important for triggering a referral in those receiving the full questionnaire. Very few participants were referred solely because of their high PTSD score or because of their perception of poor health.

Table 3: Prevalence (Percentage) of Cases by Criterion of Referral and Length of the Questionnaire

Criteria	Full questionnaire N = 1382	Abridged questionnaire N = 1491	Total N = 2874
GHQ			
- Only	88 (6.4)	224 (15.0)	312 (10.9)
- Co-morbidity	117 (8.5)	72 (4.8)	189 (6.6)
Symptoms			
- Only	94 (6.8)	23 (1.5)	117 (4.1)
- Co-morbidity	117 (8.5)	36 (2.4)	153 (5.3)
PTSD			
- Only	4 (0.3)	6 (0.4)	10 (0.3)
- Co-morbidity	29 (2.1)	35 (2.3)	64 (2.2)
Health perception			
- Only	2 (0.1)	7 (0.5)	9 (0.3)
- Co-morbidity	21 (1.5)	18 (1.2)	39 (1.4)
Alcohol			
- Only	104 (7.5)	N/A	N/A
- Co-morbidity	68 (4.9)	N/A	N/A
Total No cases	439 (31.8)	335 (22.5)	774 (26.9)

Comparison by Type of Questionnaire

Based on the five symptoms common to both questionnaires there was a significant increase in the number of cases in the full questionnaire (Table 4). Participants given many options tended to provide an excess of symptoms in comparison to the rest, and this phenomenon would have a sizeable effect on the number of referrals. Such a difference was not seen in relation to the PTSD-CL and the health perception question in which the number of items was similar in the two questionnaires. With regard to the GHQ there was an increase of cases in the full questionnaire, but the difference was not statistically significant.

Table 4: Prevalence (Percentage) of Cases Restricted to Common Items in the Full and Abridged Questionnaires

Criteria	Full questionnaire N = 1382	Abridged questionnaire N = 1491	P-value
Symptoms	107 (7.7)	59 (4.0)	< 0.001
GHQ	294 (21.3)	296 (19.9)	0.35
PTSD	41 (3.0)	41 (2.7)	0.73
Health perception	23 (1.7)	25 (1.7)	0.98

Distributions Based on the Full Questionnaire

Most of the symptoms were mild or moderate. However, approximately 10% of the servicemen perceived one of the symptoms to be severe. The prevalence of symptoms regardless of severity decreased gradually throughout the range (Figure 1). Likewise the frequency of positive answers to the GHQ-12 decreased gradually throughout the range (Figure 2). The same characteristic can be seen in the PTSD distribution of scores, but the prevalence of scores defined as cases for referral was lower (Figure 3). The distribution of alcohol intake in units shows a large number of servicemen consuming 40 units or more. The area without cases, between 50 and 60 units, was associated with the lack of options in the questionnaire to cover that range of consumption when using the product of frequency and quantity to estimate consumption (Figure 4). Only 1.7% perceived themselves as having poor health.

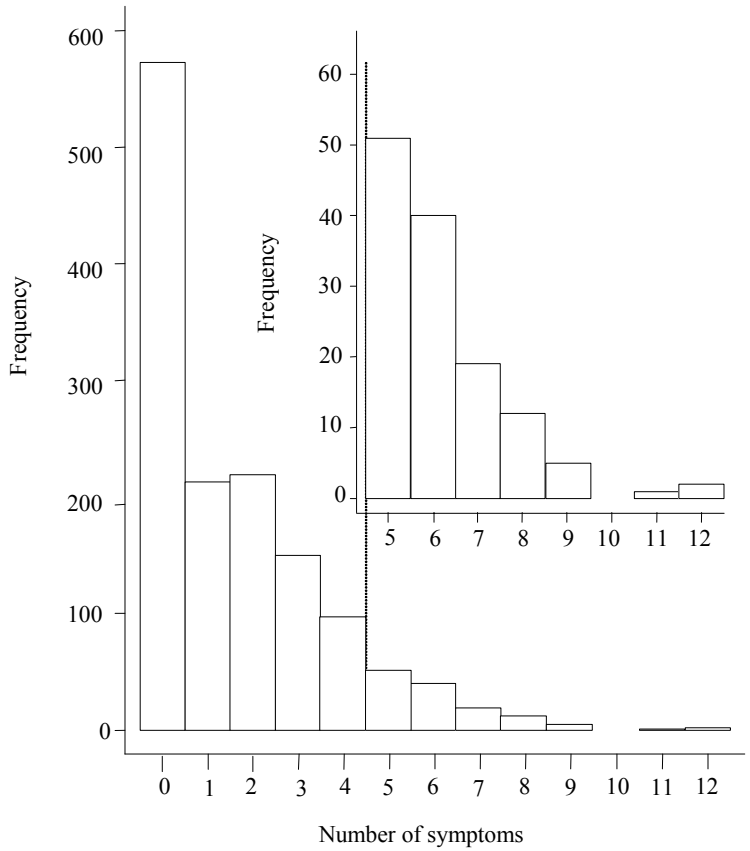

Figure 1: Distribution of Number of Symptoms in the Full Questionnaire. Insert gives distribution of number of symptoms among cases.

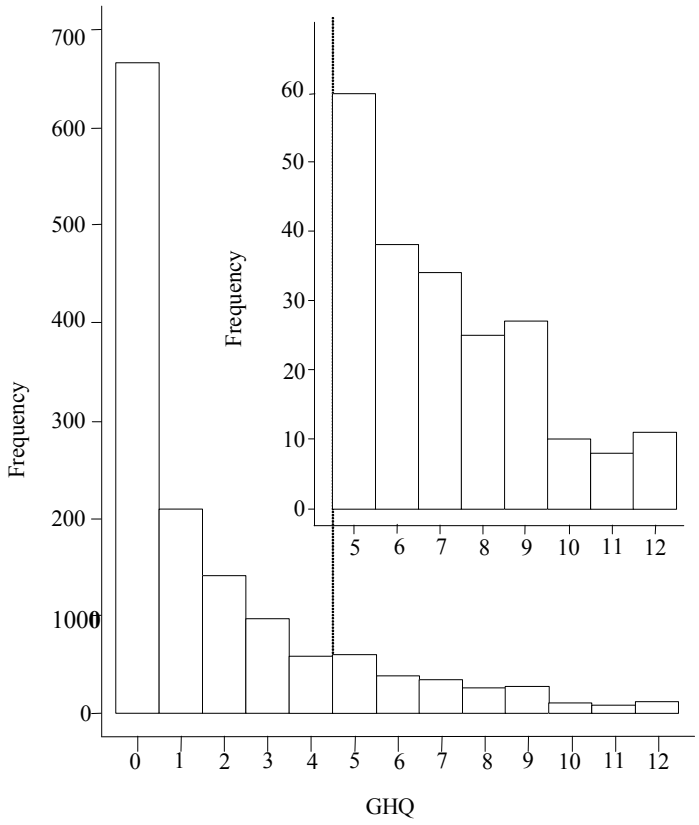

**Figure 2: Distribution of GHQ-12 Scores in the Full Questionnaire.
Insert gives the distribution of scores of cases.**

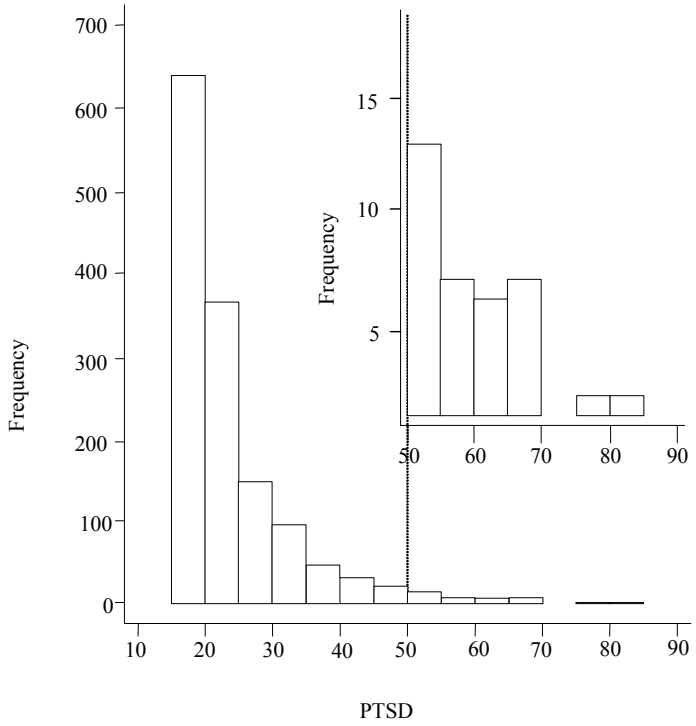

**Figure 3: Distribution of PTSD Checklist Scores in the Full Questionnaire.
Insert gives the distribution of scores among cases.**

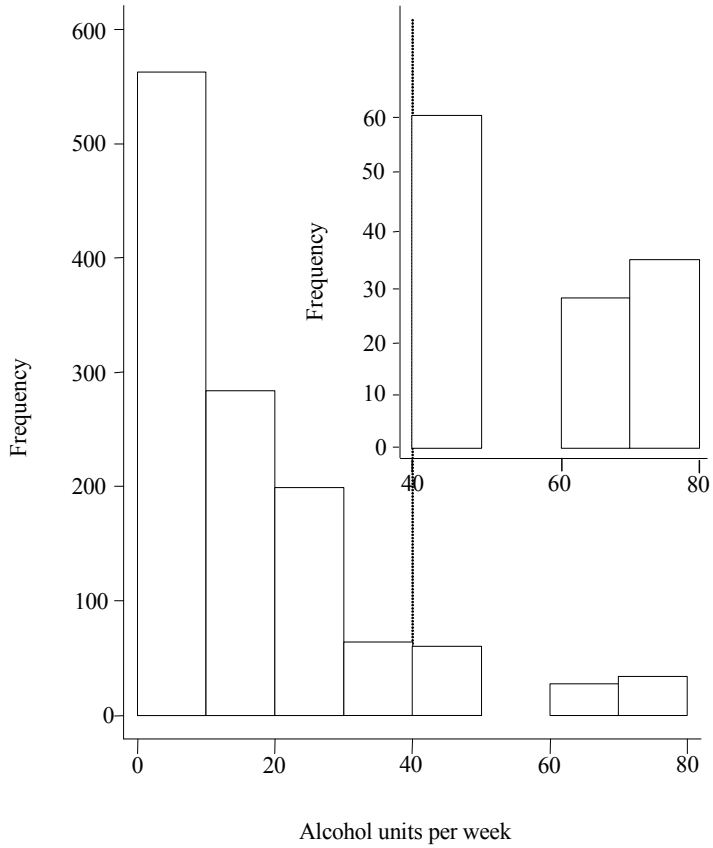

Figure 4: Distribution of Units of Alcohol Intake in Males in the Full Questionnaire. Insert gives the distribution of alcohol intake among cases.

Association Between Criteria of Caseness

Table 5 gives the correlations between the five criteria of caseness given as Kendall's tau-b. There was a moderate association between dimensions, especially between symptoms and GHQ. Caseness related to alcohol drinking was related to all other criteria, but the association tended to be low.

Table 5: Association Between Caseness and the Five Criteria for Referral Based on the Full Questionnaire (values shown are Kendall's tau-b; all associations had P<0.05).

	Symptoms	GHQ	PTSD	Health Perception
GHQ	0.34			
PTSD	0.21	0.28		
Health perception	0.21	0.20	0.20	
Alcohol	0.10	0.08	0.08	0.05

Factors Associated With Caseness

Table 6 shows the factors related to symptoms and GHQ-12 in the full questionnaire. The four risk factors in the analysis were associated with symptoms, albeit gender was just above P<0.05. Cases were more likely to correspond to the Army, older servicemen and those who have been involved in deployment activities. There was no difference in odds ratio between participation in one or more than one

deployment. Only gender was associated with GHQ-12. Females had an odds ratio of 2.2 to be a case in comparison to males.

Table 6: Risk Factors for Caseness Using the Criteria Symptoms and GHQ from the Full Questionnaire (Multiple Logistic Regression)

	Adjusted Odds Ratio	95% Confidence interval	P-value
Symptoms			
Service			0.014
- Army	1.00		
- RN	0.82	0.54 – 1.23	
- RAF	0.55	0.37 – 0.82	
Sex			0.073
- Male	1.00		
- Female	1.63	0.96 – 2.77	
Age			0.006
- per 10 years	1.3	1.09 – 1.64	
Deployments since 1998			0.004
- None	1.00		
- 1 country	1.73	1.19 – 2.53	
- >1 country	1.80	1.22 – 2.66	
GHQ			
Service			0.37
- Army	1.00		
- RN	0.80	0.53 – 1.21	
- RAF	0.78	0.53 – 1.14	
Sex			0.001
- Male	1.00		
- Female	2.24	1.40 – 3.58	
Age			0.59
- per 10 years	0.94	0.77 – 1.16	
Deployment since 1998			0.78
- None	1.00		
- 1 country	1.11	0.77 – 1.61	
- >1 country	0.97	0.65 – 1.45	

Excessive drinking was more frequent in males, younger servicemen and those participating in deployment, especially if involved in more than one deployment (Table 7). There was not a relationship between caseness related to drinking and Service.

Table 7: Risk Factors for Caseness Related to Excessive Drinking (Results of Multiple Logistic Regression)

	Adjusted Odds Ratio	95% Confidence interval	P-value
Service			0.49
- Army	1.00		
- RN	0.90	0.56 – 1.45	
- RAF	0.76	0.48 – 1.19	
Sex			0.003
- Male	1.00		
- Female	0.29	0.13 – 0.66	
Age			<0.001
- Per 10 years	0.31	0.23 – 0.41	
Deployment since 1999			0.004
- None	1.00		
- 1 country	1.34	0.87 – 2.06	
- >1 country	2.11	1.35 – 3.28	

Salient Findings

In this report only the prevalence of the conditions has been analysed. In the discussion that follows it is important to stress that for implementation of a screening programme the validity of the questionnaire, the effectiveness of the intervention, the organisational issues and resource implications related to the programme have to be considered. None of these issues have been tackled in this paper.

There was a reasonably high response rate to the questionnaires, but a sizeable minority of servicemen may not wish to participate, either actively or passively, in a health screening scheme. A high percentage of servicemen had levels equal to or above the threshold of caseness decided a priori in this study. If a screening programme were operating using the criteria for referral in this study, approximately 25% of the UK Armed Forces would have been referred to a medical centre in the first screening cycle. It should be stressed that the threshold criteria for referral in this study were purposefully high to reduce the number of referrals. In our estimates based on the sample studied by Unwin and colleagues [1] we were aiming for approximately 15% of referrals, aware of the fact that a higher percentage of referrals would put excessive pressure on current Defence Medical Services (DMS) and might compromise normal activities, preparedness and readiness of the Armed Forces.

In the full questionnaire symptoms, GHQ-12 and excessive alcohol intake contributed to a referral while in the abridged questionnaire the major proportion of cases were due to a high GHQ-4 score. This would suggest that the abridged questionnaire is no better for identifying cases than a stand-alone GHQ scale. The PTSD scale did not contribute to identifying cases on its own. Thus the only purpose for using a PTSD instrument within a health screening programme would be to emphasise the importance of a high score in any of the other dimensions of the questionnaire. In terms of prevalences, symptoms and psychological distress are greater problems than PTSD within the Armed Forces. In an eventual screening programme these would be the conditions most frequently encountered while PTSD would be a relatively infrequent event. Excessive alcohol intake, 40 units or more in males, or 30 or more in women, was an important contributor to caseness in this study. The problem is more marked in young servicemen and

those who have experience of more than one deployment. Although excessive drinking may be a problem deserving attention, it does not follow that a medical approach would be effective given the prevailing culture in the Services that cannot be separated from culture and peer pressure of youngsters in British society as a whole. Thus if the problem were to be tackled a consistent approach by the Armed Forces would be required.

In the comparisons between the common parts of the full and abridged questionnaires our results were counter-intuitive. In relation to symptoms scores were higher when the common questions were embedded in the larger questionnaire than when standing on their own. Our results were unexpected because another report showed that the same questions embedded in a larger questionnaire gave a lower score in relation to the GHQ (13). Our findings were restricted to symptoms and could not be corroborated for the GHQ although a tendency towards a greater percentage of caseness was also observed in the GHQ. The main differential characteristic between studies is that ours was a population study while the other was based on patients. The net effect of our findings would result in a marginally higher percentage of referral when using the full questionnaire. If the recommendation from van Hemert and colleagues (13) were taken on board the referral rate would increase even further.

The association between health dimensions in the study was moderate. This explains the independent contribution to referrals of unexplained symptoms, GHQ-12 and alcohol intake in the full questionnaire. It would be interesting to assess whether the GHQ-12 scores of PTSD cases were markedly higher compared to those with a lower PTSD score. If this were the case it would be appropriate to use the PTSD scale subsequently in a subsection of those above the threshold for GHQ.

Our study demonstrated that medical services in the Army would be under more strain than the other two services if a screening programme were implemented because the prevalence for each criterion was higher. The frequency of health problems would be affected by gender, age and number of deployment experiences. In our analyses each criterion of referral was related to a different set of risk factors. The assessment of the impact of each risk factor is important because it can help to estimate what groups would be more likely to be referred in a screening programme. From this point of view the full questionnaire would cater more suitably for the diversity in the Armed Forces.

This report illustrates that the magnitude of the problem in a representative sample of the total British Armed Forces is high. It would need corroboration from MOs/GPs and from qualitative approaches that the cases referred in this study are of a serious nature and that they would have been identified if the DMS rather than an outside body had administered the system. Demonstration that the screening programme is effective would also be required.

ACKNOWLEDGEMENT

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Health Surveillance among Dutch Military Personnel during the United Nations Mission in Eritrea and Ethiopia

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SUMMARY

Dutch troops participated in the United Nations Mission in Eritrea and Ethiopia from December 2000 until June 2001. All personnel (1089) received information on health risks, with emphasis on anti-mosquito personal protective measures. Malaria chemoprophylaxis comprised weekly mefloquine or daily doxycycline. Immunisations included meningitis A+C and yellow fever. When necessary boosters for diphtheria, tetanus and poliomyelitis (DTP), hepatitis A+B and typhoid were administered. During deployment the health surveillance showed a mean non-availability of 0.41 %. The mean consultation incidence was 18.6 per 1000 men days. The main diagnostic groups included: orthopaedics & injuries (24.9 %), dermatology (22.3 %) and miscellaneous (20.6 %). Two cases of p.f. malaria were diagnosed; 1 year after return 5 cases of plasmodium vivax malaria had shown up. In a post deployment questionnaire 76.6 % indicated consistent use of malaria chemoprophylaxis, 15.4 % inconsistent use, while 2.8 % never used at all. The use of bed nets scored: 31.6 % always, 42.8% irregular and 25.8 % never. About 30 % of the bed nets and 10 % of the uniforms proved to be impregnated. Consistent use of DEET was reported by 1.5 %, inconsistent use by 36.9 % and no use 61.6 %. Overall the non-availability remained very low but compliance to personal protective measures needs continuous attention.

INTRODUCTION

A Dutch military battalion participated in the United Nations Mission in Eritrea and Ethiopia (UNMEE) from December 2000 until June 2001. Because of possible health risks the troops were routinely monitored during and after deployment. Moreover it follows the recommendations of several political and scientific reports based on the experience with post deployment complaints among Dutch troops after several operational deployments. This study presents the results of the health surveillance during the mission and the outcomes of a post deployment questionnaire.

STUDY POPULATION AND METHODS

Study Population

The Dutch troops were part of a combined Dutch Canadian Battalion (NECBAT, n=1643) and were stationed in five campsite locations divided over the central part of Southern Eritrea (4) and Northern Ethiopia (1).

Paper prepared for the RTO HFM Symposium on "NATO Force Health Protection Requirements from Pre- to Post-Deployment: Population Health for the Military", which was to have been held in Antalya, Turkey, 7-9 April 2003, and is now published in RTO-MP-109.

Dutch troops comprised 1089 personnel (38 females) with a mean age of 28.4 years who stayed in theatre from 171200 until 030601. On departure all personnel were fit for duty.

Preventive Measures

All personnel received oral and written information on health risks several weeks before departure. Additional attention was paid to personal protective anti-mosquito measures such as use of long sleeves and trousers between sunset and dawn, insect repellent (diethylmethyltoluamide: DEET 30 %), and permethrine impregnated uniforms and bed nets. On this latter it should be mentioned that this was the first approved impregnation of uniforms in Dutch troops. Due to national legislation permission was required from the Ministry of Agriculture, which was granted a few days before departure only. Therefore it could not be applied until arrival in theatre. Specific immunisations included meningitis A+C and yellow fever. When necessary booster vaccinations were administered for diphtheria, tetanus and poliomyelitis (DTP), typhoid, hepatitis A and B. First choice for malaria chemoprophylaxis consisted of weekly mefloquine (250 mg), alternatively daily doxycycline (100 mg) was offered for those who had experienced (possible) mefloquine adverse events during previous deployments. After return the troops received a personal medical check-up, including testing on tuberculosis.

Living Conditions

Troops stayed in tents on five campsite locations divided over the central part of Southern Eritrea (4) and Northern Ethiopia (1). The altitude of the campsites varied between 1500-2200 meters above sea level. Much attention was paid to hygiene such as prefab showers, toilets and dining facilities. During deployment food and bottled potable water were required from approved distributors. All had a 2-week midterm rest and recreation leave which was spent in The Netherlands. One or two supervised day-breaks were organised locally.

Medical Support

The medical support plan was based on a paper risk assessment and a pre-deployment fact finding mission in Eritrea. Medical facilities in theatre included first line sickbays (BME) and one centrally located second echelon field hospital (FDS) offering surgical, X-ray, ward and additional laboratory facilities. Medical personnel received specific training in tropical medicine. In addition to ground ambulance support dedicated helicopter capacity for medical evacuation was available in theatre. The Royal Netherlands Airforce provided out of theatre medical evacuation. A preventive medicine team performed regular hygienic controls and occupational health expertise was available on call in The Netherlands.

Health Surveillance

Data collection was performed in several ways. During deployment all consultations, diagnoses and lost working days were entered into the international EPINATO system. This widely used basic database divides all consultations over some 24 diagnostic groups. Data were collected on all campsite locations on a weekly base. After initial scanning on site by the chief medical officer, monthly figures were sent to the Netherlands for further examination. Due to restrictions of EPINATO some outcomes, such as non-availability and consultation rate had to be derived. However in addition to EPINATO, the national naval database on disease and injury registration (GIFKOM) was used. This “on line” system provided more accurate information, but for this study it was used as control system only. Finally the personnel office (J-1) provided valuable information on the daily number of soldiers on site and repatriation figures.

About 14 days after return to the Netherlands all participants had an individual medical check up by a doctor. Before this examination troops were asked to fill in a post deployment questionnaire containing questions on their health and compliance to preventive medical policies.

Statistical Analysis

This study is restricted to the registration data only. The incidences are expressed per 1,000 person-days. Lost men days are expressed as a percentage of the total observation days. Post deployment questionnaires were analysed with SPSS.

RESULTS

Health Surveillance

The mean number of personnel in Eritrea and Ethiopia was 915 (range 759 – 1089). A total of 148,841 person-days in theatre were registered. The mean non-availability due to medical reasons was 0.41% of the total population (range 0.22 – 0.64%). The mean overall consultation incidence was 18.6 (range 13.8 – 21). Additionally the consultation rates, indicating the percentage of the study population that consulted the medical system per month, were derived. From the GIFKOM-database we learned that there was an average of 1.2 consultations per diagnosis. Based on the EPINATO results this indicated that some 39% of the study population visited the local sickbays at least once every month.

In EPINATO all consultations were divided into several diagnostic groups. By the end of the mission the top 3 consisted out of “Orthopaedics & Injuries” (24.9%), “Dermatology” (22.3%) and “Miscellaneous” (20.6%). During the deployment one case of malaria falciparum was diagnosed. After return in The Netherlands another case of *p.f.* malaria was diagnosed (5 days after return) and up to one year after return 5 cases of *plasmodium vivax* malaria could be attributed to the participation in UNMEE.

Finally a total number of 25 repatriations to The Netherlands for medical reasons were registered. The main reasons for repatriation were 12 “orthopaedics & Injuries (48%) and 7 “mental disorders” (28%). Seven out of the 12 repatriations for orthopaedics & injuries returned to Eritrea before the end of the mission. None of the mental disorders returned to Africa, however by the end of the mission 6 were serving again on a different location.

Post Deployment Questionnaire

From the 982 troops that returned to the Netherlands 776 (755 males and 21 females) could be seen for a post deployment medical check up 14 days after return in the Marine Barracks in Doorn, The Netherlands. Before troops were seen by a doctor on an individual base they filled in a post deployment questionnaire, which was used as guideline for the medical check-up. In this questionnaire 76.7 % indicated consistent use of malaria chemoprophylaxis, 15.4 % reported inconsistent use, while 2.8 % never used at all. Concerning bed nets: 31.6 % always used a bed net, 18.2 % mostly. 24.4 % sometimes and 25.8 % indicated non use. About 30% of the bed nets and 10 % of the uniforms proved to be impregnated. Consistent use of DEET was reported by 1.5%, inconsistent use by 36.9% and 61.6% indicated no use at all.

DISCUSSION

The main outcomes of this study show that the collective non-availability remained very low and no serious diseases occurred during deployment. The type of study and the restrictions in registration do not allow clear explanations, however we believe that the adequate individual and collective preparations, such as infrastructure and hygienic and preventive medical measures contributed to this result. Furthermore the altitude of the campsites must have minimised the (nocturnal) risk for tropical infections. From anecdotal reports we learned that troops were more concerned about their cold weather sleeping bags than the consistent use of impregnated bed nets. This may well have influenced the poor results on the use of personal protective measures.

In this respect it is remarkable that we found such a high score on consistent malaria chemoprophylaxis. Based on previous experiences with reluctance to mefloquine we decided to offer troops different options. Mefloquine was the first option but doxycycline could be used as an alternative. Much attention was paid to information on the malaria chemoprophylaxis and this could well explain why the majority chose for mefloquine.

The registration findings over the different diagnostic groups were in line with other studies on health surveillance during peace support operations. Most musculoskeletal disorders were related to working conditions and physical training. Because of strict traffic rules the number of road accidents remained very low. The daytime tropical conditions explained the high number of skin disorders. The only tropical related infections we experienced were individual cases of traveller's diarrhoea. The number of dental complaints remained very low. We attribute this to a consistent preventive dental policy in the Dutch Navy.

The finding on poor compliance to personal protective measures are reason for concern. We already mentioned the altitude of the campsites as one of the possible explanations for this result. Furthermore this was the first mission which allowed the impregnation of bed nets and uniforms. The strict legal rules and late permission must have influenced the low scores.

In conclusion, despite numerous health risks, this part of Africa remained very benign to the Dutch troops. Health monitoring will remain a integral part of the medical support plan for military missions, however the registration methods need further refinement.

Canadian Forces Deployable Health Hazard Assessment Team: The DHHAT Concept

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SUMMARY

Canada has an international reputation as a leader in providing support to Peacekeeping operations. In the past decade thousands of Canadian troops have been deployed throughout the world in a wide variety of missions. The Force Health Protection directorate of the Canadian Forces Health Services has established a new capability to identify, quantify and assess the health risks faced by our soldiers from Non-Battlefield disease and injury (NBDI). This capability will enhance our existing Preventive Medicine program and will ensure that the living and working conditions Canadian soldiers enjoy in Canada can be maintained on deployment. Deployable Health Hazard Assessment Teams (DHHAT) will gather a wide range of Public Health and Occupational Hygiene data that will allow field commanders to better understand the health risks from NBDI that they face on operations. These teams will conduct comprehensive surveys of environmental, occupational and public health threats prior to all new deployments, as well as, providing a consultancy for operational and domestic acute situations. This paper will discuss the rationale behind setting up these teams, the methods used by the team to measure exposure to these threats and future directions in this area.

INTRODUCTION

Canada has an international reputation as a leader in providing support to Peacekeeping operations. Today, more than 2,500 Canadian soldiers, sailors and Air Force personnel are deployed overseas on operational missions. This volume from a total regular force of less than 55,000. On any given day, almost 8,000 Canadian Forces members – one third of our deployable force – are preparing for, engaged in or returning from an overseas mission. Since 1947, the Canadian Forces (CF) has completed 72 international operations with the pace of our commitments ever increasing. That figure does not include the eleven current international operations, or the many domestic operations carried out within Canada.

The Force Health Protection directorate of the Canadian Forces Health Services has recently completed a project to support the health of our members both on domestic and deployed operations. Force Health Protection has established a new capability to identify, quantify and assess the health risks faced by our soldiers from Non-Battlefield disease and injury on these missions. This capability will enhance our existing Preventive Medicine program and will ensure that the living and working conditions Canadian soldiers enjoy in Canada can be maintained on deployment.

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Deployable Health Hazard Assessment Teams will assess the full range of Environmental / Industrial Health Hazards and Public Health Concerns. They will then use a standardized risk assessment framework to communicate these risks to field commanders and military staffs. These teams will be able to provide real-time, accurate, precise information that enables military commanders to consider health threats from Non-Battlefield disease and injury when planning and conducting military operations.

THE NEED

Military Commanders have always recognized that they need healthy and highly fit combatants to attain high level of performance in combat and other operations. To reach optimum performance, soldiers need to protect their health against preventable illnesses, diseases and injuries. The rate of Diseases and Non-Battle Injuries (DNBI) which, historically, cause much more losses than military actions (ratio ranging from 3 to 1 to more than 6 to 1 [1]) must therefore be reduced. DNBI accounted for 95.4%, 82.4% and 62.4% of all hospital admissions in WWII, Korea War, and Vietnam War respectively. In contrast to the rate of 917 per 1,000 hospital admissions attributable to disease in the Middle East Theatre during WWII, the rate of admissions due to illness during the 1991 Operation Desert Storm was reported to be less that 50 per 1,000. This significantly lowered rate has been attributed to pre-deployment education of troops on ways to prevent DNBI, and to the application of preventive medicine measures in theatre [2]. In modern peacekeeping, battle injuries among CF members are exceptionally rare. Except for mishaps with unexploded ordinance, deaths have generally resulted from traffic accidents or suicide. Loss of combat power results from troops being unable to complete the mission due to injury, musculoskeletal problems, and communicable disease, in that order of frequency.

In 1992, the Canadian government agreed to participate in a United Nations peacekeeping mission in the Former Republic of Yugoslavia. “OPERATION HARMONY” was Canada’s commitment to the United Nations Protection Force (UNPROFOR) consisting of two contingents, each similar to a standard Canadian infantry battalion in strength and structure. Thousands of Canadians serving with the Canadian Forces took part in Operation Harmony over its three-year duration.

Canada’s participation in the UNPROFOR highlighted some serious gaps in the Canadian Forces ability to protect soldier’s health from Disease and Non-Battle field Injury. The Canadian Forces Health Services was undergoing a complete reorganization brought on by large cuts in the overall size of Canada’s military. The Canadian Forces went from a total strength of 125,000 in 1989 to only 55,000 in 1998. At the same time overseas missions increased from one or two a year to over 10 per year with a 10 fold increase in troops deployed at any given time.

In September 1993, troops filling sand bags for bunker construction began to be concerned over using a red soil from a quarry near an abandoned aluminum oxide plant in Obravac, Croatia. Medical support on the ground requested an investigation be conducted to determine the actual health risks. Unfortunately, no standardized procedures for dealing with this type of health concern existed and no uniformed resources existed to conduct this type of evaluation. A subsequent investigation of the incident revealed a number of discrepancies that lead to the formation of the Force Health Protection directorate.

The final requirement for the Deployable Health Hazard Assessment Teams relates directly to Canadian Federal Legislation. The Canada Labour Code -part II is the primary occupational safety and health law that governs federally regulated workplaces. This law applies to employers and workplaces under federal jurisdiction including the entire Federal Public Service and Department of National Defense employees.

This legislation also applies to military personnel responsible for the supervision of civilian personnel [3]. Furthermore, it is DND/CF policy to have its military components comply with the CLC, Part II and Regulations, when these requirements do not place a serious limitation on the capability to fulfill CF operational commitments.

So in summary, the need for a military team capable of assessing and recommending controls for Environmental and Industrial Health Hazards has been driven by three forces; federal legislation, military necessity to maintain combat power and the need to ensure past mistakes are not repeated when Canadian troops encounter unknown health threats.

Meeting the Need

Concerns among CF members and in the media about exposures to environmental and industrial hazards have become increasingly prominent given the frequency and locations of recent deployments. Environmental and Industrial health hazards need to be promptly evaluated and their risk communicated to the chain of command to reduce the likelihood of negative health impacts and stress-induced illnesses. To deal with this wide spectrum of threats, the Canadian Forces Health Services has established the Directorate of Force Health Protection. This directorate consists of;

a) Epidemiology – conducting evidence-based studies pertaining to operational, occupational and clinical medicine; disease and injury surveillance globally; investigations of outbreaks within the CF community; and maintenance of morbidity and mortality databases.

b) Operational Medicine – comprised of medical intelligence; casualty prevention and management; medical aspects of conventional, nuclear, chemical and biological (NBC), and directed energy weapons; aerospace medicine; and diving medicine. There is a significant synergy with Occupational and Environmental Health with respect to issues concerning radiological, biological, and chemical hazards.

c) Occupational and Environmental Health – deals with issues related to environmental and occupational health hazards, and toxicology. Includes the Deployable Health Hazard Assessment teams (DHHAT).

d) Communicable Disease Control – Developing policies and programs for; hygiene and sanitation; pest control programs; travel hazards; and legal obligations related to “reportable diseases”.

e) Health Promotion – aimed at enhancing wellness and reducing or eliminating high-risk behaviours. Health Promotion covers issues related to stress management, addictions (e.g. alcohol, smoking, gambling), positive lifestyle (e.g. nutrition, exercise), and injury prevention.

Force Health Protection has become the focal point for all inquiries and policy related to Environmental and Industrial Health Hazards as well as a recognized source of support to preventive medicine technicians. These technicians and the general practitioners they work for, must contend with the full spectrum of Occupational Health and Safety issues for up to several thousand people. All Canadian Forces units deploying overseas have an integral Occupational/Public Health resource in the form of the Preventive Medicine technician. These non-commissioned Officers are trained to provide first-line support to field commanders to identify and control health threats on an ongoing basis. These technicians provide a high level of knowledge and skill in the maintenance of healthy living and working conditions for troops on deployment. However, as these technicians are integral to the operational unit they do not have the resources to conduct pre- and post deployment surveillance. This gap in capability has lead to Canadian soldiers living and working in potentially contaminated buildings prior to any health professional having any input to the situation.

The Croatia board of Inquiry identified the Canadian Forces inability to assess Environmental/Industrial Health Hazards and Public Health Concerns (EIHH/PHC) prior to the main body of troops arriving in theatre as a serious gap in capability leading to a potential health risk. The Preventive Medicine Technician's primary duty is to care for their own troops, the ability to conduct field investigations into incidents that may have happened in the past or to peripheral locations simply does not exist.

The role of the DHHAT is to fill these gaps in knowledge and act as a resource for the Preventive Medicine technician and the Field Commander to increase mission effectiveness. DHHATs are available to participate in four basic mission types; Strategic reconnaissance of new mission areas, baseline assessments for new and existing bed-down locations, mission close-out surveys and acute emergency response where no integral resources are available. Each of these missions is designed to provide the Preventive Medicine technician at the unit and his Commander a more detailed picture of the health threats encountered on a given mission. It also provides them the tools to reduce the impact that DNBI have on the mission and soldiers health.

The Engineering Paradigm

Following the Croatia incident, the responsibility for environmental assessment on deployed operations was given to the military engineering branch. The engineers had an existing requirement to analyse soil and water prior to construction of any new camp locations. While this capability had primarily an environmental protection focus, the data collected could be used for limited health risk assessment as well. The Canadian Forces Health Services did not possess the ability to conduct Occupational Health investigations in theatre at that time other than the limited scope of the Preventive Medicine Technician.

The engineering paradigm focuses on providing a snapshot of environmental conditions, as they exist at the time of the sample collection. Air, water and soil samples are collected and analyzed following primarily environmental protection methodologies. Most sampling is intended to determine the presence or absence of the contaminant in the matrix tested. While this system has met the CF requirement to follow Canadian legislative guidelines for environmental protection, the samples collected do not fully characterise the occupational environment. Furthermore, the engineering methodology does not fully communicate to commanders the relevant health effects that may impact their troops. In effect, there is only a weak link made to soldier's health, the focus being the environment itself. This discrepancy has lead to a merging of engineering and medical expertise to form the Deployable Health Hazard Assessment teams and the capability to capture health threats related to environmental conditions.

The Health Paradigm

The Canadian Forces Health Service will take over responsibility from the engineering branch for health hazard assessment in 2003. This shift in responsibilities will gradually refocus the efforts of these teams from caring for the environment to caring for the soldier. The DHHAT will provide a complete picture of the EIHH/PHC threats in the theatre of operations and provide Commanders with a risk assessment of how these threats may impact on the mission.

The risk assessment methodology to be followed begins with a thorough review of the available medical intelligence. Pertinent information gathered on the mission area is currently provided by the United States Air Force Medical Intelligence Center where Force Health Protection will soon contribute a Canadian desk officer. This officer's primary role is to support deployed operations and provide current information on all possible health threats. Once the mission parameters are known and all available data reviewed an initial reconnaissance of the mission area may be conducted by FHP. In general this is done by an Occupational

Health trained Medical Officer who can perform a basic assessment of likely hazards and update the intelligence information. If so indicated, limited air and water sampling may be conducted if time permits to gain a clearer understanding of the more obvious health concerns.

The first opportunity the DHHAT will have to gather data will be during the Theatre Activation phase. In this short time frame the teams will determine the presence or absence of contaminants in the air, soil or water and gather a complete picture of the conditions to be found at each bed down location. In a matter of a few days they must identify the health risks present, quantify them wherever possible, identify those soldiers most at risk and communicate those health risks to the chain of command. Their final task will be to assist the commander in devising control strategies to mitigate these risks. One of the most important control strategies will be information passage and training of the integral Preventive Medicine technicians that will relieve the team in theatre so that information gained is not lost.

Ongoing Environmental baseline surveys and steady state monitoring as well as close out assessments will also be the domain of the DHHAT but the actual maintenance of health risks in theatre will be left integral unit Preventive Medicine technicians. By inserting the DHHAT at various points throughout a given mission, Force Health Protection has ensured that the data collected is provided to the Health Surveillance experts and long-term health threats can be tracked.

Team Composition

The DHHAT consists of three permanent team members with additional team members being added as the mission dictates. The teams are lead by an Occupational Hygienist. These officers are trained at the Master's degree level to anticipate, quantify and control heath hazards before they can impact soldiers' health. These officers are primarily responsible for the development of sampling plans, oversight of the sampling mission, and risk communication. When not deployed, team leads are employed in positions that allow them to maintain their skills and provide consultancy services to garrison Preventive Medicine technicians. Tasks may include conducting quantitative assessments of weapons platforms,(e.g. Submarines, Armoured vehicles, aircraft) or providing recommendations on policies to ensure compliance with the Canada Labour Code or health and safety policies.

In addition to the team leader, two senior Preventive Medicine technicians form the core of the capability. They are in turn supported by a Water, Fuels and Environment Technician to perform soil sampling and a Radiation Safety Officer to conduct radiation surveys when required.

The senior Preventive Medicine technician is a public health specialist trained to provide expert guidance in the identification, quantification and control of health threats resulting from food, water, and vector borne agents. This individual is primarily responsible for the assessment of Public Health Concerns in the mission area. Extensive training and experience in this domain is a must, with certification as a Canadian Public Health Inspector achievable soon after joining the teams.

The second Preventive Medicine technician is primarily responsible for gathering data on Occupational Health threats and is fully versed on all of the sampling/monitoring equipment used on deployment. This experienced technician receives training in all of the instrumentation required to monitor occupational heath hazards with certification as a Registered Occupational Health technician the ultimate goal.

Although the DHHAT is an extremely small team, it has unique features that make it of high value to Force Health Protection. These include:

1) Uniformed personnel that can conduct surveys in high risk or sensitive locations.
2) 48-hour standby for deployment means team members are available to the chain of Command to conduct investigations whenever and wherever required.
3) Ability to perform real-time assessments on an ever increasing range of possible contaminants.
4) Ability to quantify the full spectrum of Chemical, Biological and Physical health threats.
5) Ability to communicate the risks to human health that these threats pose in a manner that Commanders can use to make decisions on mitigating these threats.

The Future

Currently, two teams are available for deployment with a third team available by September 2003. With the stand-up of the third team, Force Health Protection can provide support for any international deployment at a moment's notice.

Today's teams posses the capability to collect samples on wide range of health hazards using traditional Occupational Hygiene techniques. We are moving rapidly towards the use of real-time monitoring instruments to provide commanders the information they need in a timely fashion. The future goal of the DHHAT is to conduct real-time analysis on wider spectrum of heath hazards and provide risk information to commanders prior to the teams departure from theatre.

The DHHAT has been conceived and developed to support deployed operations. With three teams in place, it is expected that the scope of these teams will expand to better support our domestic commitments as well. By pre-positioning the teams across Canada when not on deployment, they will better placed for responding to acute Occupational Health situations that strain the resources of our current system.

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Mistral: A New Concept of Medical Platform for Tri-Service Long Lasting Deployment

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SUMMARY

Level 3 primary casualty receiving ships are rare and valued among allied navy. Long lasting deployment of maritime expeditionary force, close to remote crisis region are more frequent and are requiring such medical capacities.

Mistral and Tonnerre, the new force projection and command ships known as BPC (Bâtiments de Projection et de Commandement), will be commissioned in 2005 and 2006. These vessels will offer a unique design with level 3 medical capability as well as amphibious, airmobile and command and control functions. To ensure best value for money they are designed and built according to merchant marine standards.

The authors are weighing this maritime platform against other medical means (land, air and sea) available to support a military deployment. They present the innovative designs that were implemented, both in ship construction and medical engineering including digital radiology, CT scan, telemedicine, sterilization, medical waste treatment, optimized casualty routing, modular surgical, intensive care and bunk capabilities.

These ships, with upgraded aviation, amphibious, command and medical facilities, that will support a maritime expeditionary force with medical capability up to level 3, will be the backbone for future extended deployment and may represent an affordable and reliable sea basing alternative to ashore primary casualty facilities from level 2 to 3.

INTRODUCTION

Medical support of military operations is affected by new operational concepts developed to deal with the emergence of numerous regional threats. In these operations where situations develop rapidly with little warning time, deployment of expeditionary forces bring the issue of immediate medical coverage. Level 1 and 2 are usually provided by these flexible, multi-role joint forces. Level 1 involves medical personnel at

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the unit level who performs first aid and emergency care, whereas level 2 services include resuscitative treatment, emergency surgical procedures, usually done in surgical support companies and amphibious landing platform helicopters. Then early medical evacuation is conducted toward combat zone hospital, sometime run by an allied nation, or hospital ships for a level 3 support or directly back home for a level 4 take over. Level 3 facilities perform more specialized surgical procedures and definitive treatments than level 2. High-level and specialized surgery is relevant to level 4 structures. It is interesting to note that half of the admissions to level 2 and 3 facilities do not require further treatment at a higher level [1].

Due to the sudden and unpredictable outcome of operations other than war, it is difficult to tailor the medical means, especially when the setting is remote. For example eleven critically injured sailors from U.S.S. Cole in the port of Aden, Yemen, in 2000, were initially flown to the French military hospital in Djibouti before the MEDEVAC to Germany [2]. But regional facilities are not always available. After this terrorism attack, CAPT Monestersky, USNR, proposed different solutions for level 3 medical support [3]. They included : engagement with hospitals of host nations in the area (whenever available and politically possible), pre-deployed supplies in host nations, secure working agreements with local medical facilities, incorporate host nation into medical contingency plans, develop a regional MEDEVAC capability. Médecin en chef Tymen also suggested to pool military medical resources between allies [4].

Therefore the perfect medical structure should provide support from first to last day, with tailored and flexible capabilities, which means adapted medical resource allocation without engaging too much of the assets when not needed. Such structure does not currently exist and all military solutions to cover level 3 of care needs bring their flaw.

MILITARY MEDICAL PLATFORMS FOR LEVEL 3 LEVEL OF CARE

Level 3 field hospital deployed close to the combat zone cannot offer medical coverage on first day and implies important air or sea lift to build up when military transportation capability is critical for operations. To operate they need local support including power supply, food services, transportation (these services are provided aboard ships). Also a stationary medical facility set ashore is more vulnerable than a mobile at sea hospital; it requires clearance from the host nation and when operating it cannot be moved rapidly. Protection against terrorism or chemical/biological warfare, a critical issue nowadays, is almost impossible to guarantee ashore whereas at sea hospitals are less vulnerable. Large MEDEVAC to bypass level 3 structure is often not realistic when crisis area are very remote from level 4 structures.

Hospital ships, recognized by international organizations such as the International Committee of the Red Cross, offer usually outstanding mobile medical and surgical capacities. They can operate at sea in international waters and can be pre-deployed to be ready on the first day. The USN Mercy, a former 70,000 t tanker, converted in a 1,000 beds hospital, illustrates this type of ship, which is so expensive to maintain and operate that very few country can afford it. Also the controversial concept of “Red Cross protection”, do not counter balance it’s vulnerability, poor maneuverability, limited helicopter landing capability and lack of well dock to receive mass casualties by landing crafts.

To overcome some of these defects, the concept of primary casualty receiving ships (PCRS) was developed, illustrated by RFA Argus, also a merchant marine ship (roll-on/roll-off container ship) converted for the Royal Navy to act as an aviation training ship (with a large flight deck convenient for medical airlift) and a PCRS. With these two non antagonistic missions, Argus is a multirole vessel (MRV), whose versatility ensures best value for money.

Several navies have launched programs for MRV that can combine patrol, presence , projection, command and medical capabilities. The German MEKO 200 MRV, a 3,900 t vessel project will be optimized for humanitarian aid and disaster relief and will carry a flexible on-board hospital composed of 20 or more

containers that are carried on deck. The Royal Danish Navy ordered in 2001 two 6,300 t MRV. This roll-on/roll-off cargo ship will provide sealift for up to 200 troops and their vehicles, with amphibious and airlift capabilities and an on board hospital that can accommodate 40 casualties and manage 10 surgical operations per day. The Netherlands ordered a new 16,000 t LPD, Johan de Witt, which is to enter service by 2007. This MRV will be fitted with a hospital complex and will be able to deploy a fully-equipped Marine battalion or to carry a 400-strong headquarters. Most medical facilities of these MRV are designed for a level 2 medical support.

The US Navy with the new LPD –17, San Antonio, will have a 25,000 t force projection ship. While most MRV designs are based on merchant marine standards which are lighter and cheaper, USN San Antonio is a combat ship, highly survivable and warfare capable. A hospital version of this LPD, for 800 M$, could provide 6 operation rooms, 50 intensive care beds and 250 casualty beds.

For 628 M€, the French navy will commission in 2005 and 2006 two 21,300 t force projection and command ships, **BPC** (Bâtiments de Projection et de Commandement), Mistral and Tonnerre. Although these ships will not have the military power as a LPD 17, their self defense systems will allow them to cope with residual threat, whereas MRV are more vulnerable.

BPC MISTRAL PLATFORM

BPC offer an interesting ratio cost/efficiency like MRV, but with a better cost/vulnerability balance. To ensure best value for money, they are built according to commercial ship building standards. Among the merchant marine features that were adopted, the all-electric propulsion, based on 2 podded propulsors aft and one bow propulsor, offers better maneuverability and less maintenance.

Key missions for these vessels include:

- Prepositioning forces in potential crisis area for long period (up to one year). To do so, maintenance at sea is optimized and quality of life for crew and troops is improved. The 2 BPC combined with 2 others French 12,000 t LPD can sustain a lightly-armored joint force of 1,400 personnel. Each BPC, manned by an optimized crew of 160 sailors, can carry 450 to 500 troops.
- Projection force from the sea via amphibious or airmobile means. The well deck can accommodate 4 Landing Crafts Vehicle (LCV) or 2 Landing Craft Air Cushion (LCAC). The 5,200 m^2 flight deck allows simultaneous operation by 6 helicopters. The 1,800 m^2 below deck provides space for up to 16 helicopters. And the transport decks accommodate up to 60 vehicles.
- Hosting on 800 m^2 of dedicated space an operational-level headquarters afloat.
- Providing an embarked level 2 and 3 hospital.
- Conducting strategic sea lift.
- Supporting a humanitarian aid and disaster relief mission.

Level 3 medical coverage and command and control missions can be simultaneously conducted, and for a long period. Instead of deploying large, heavy, vulnerable structure ashore, whenever it is possible, it is easier, more flexible to conduct these support missions from autonomous mobile platform at sea. This **sea basing concept** is congruent with BPC built-in capabilities:

- Airmobile and amphibious means on the same platform.
- Telecommunications, command and medical synergy.

- Integrated supply and support (berthing, food and mess area…).
- Self defense capability.
- Ship technical readiness (over 350 days per year).
- Flexible capabilities with optional embarked technical containers.

BPC MISTRAL INNOVATIVE HOSPITAL FACILITIES

Hospital facilities, measuring 900 m^2, are located on 4 decks. They are displayed on figure 1. They provide 8 resuscitation beds (including a wet zone designed to manage soiled patient), 7 intensive care beds, including 3 beds dedicated to burned patients, 2 beds for isolated patients, 12 surgical/medical beds completed by 48 dual occupancy beds. Innovations that upgrade this embarked level 3 hospital include:

- **Casualty handling and circulation**. Casualties may arrive or leave either by air (helicopter), sea (LCV or LCAC) or road (ambulance) when the ship is in a port. A multipurpose triage area at the flight deck level, conveniently located near the BCW decontamination zone and the stretcher elevator, is pre-fitted with resuscitation equipments. All the access are optimized to limit the needs for stretcher carriers. All the decks are connected by a specific elevator that can lift a stretcher and accompanying medical staff. Each casualty can be wheeled to the hospital, on a customized intensive care stretcher, by only one person. Inside the hospital the patient can be wheeled from resuscitation area toward X-ray, surgery, intensive care or hospital ward still in the same standardized stretcher (X-ray translucent) limiting unnecessary handling, therefore improving comfort and enhancing mass casualty management.
- **Flexibility**. The 2 operating rooms and 7 intensive care beds can be completed by up to 8 specialized containers, set up in the hangar bay and connected directly to the triage and resuscitation room. There are different type of containers (operating room, intensive care, X-ray, laboratory…) that can be mixed at will, depending on the medical needs. The 48 dual occupancy beds are designed to accommodate casualties (large sanitary, oxygen outlet, emergency call…) but when the hospital is not activated, they are housing marines. The X-ray room which provides digital radiography and ultrasonography can be fitted with a mobile CT scanner. The choice of a mobile instead of fixed CT-scan allows to own a limited number of machine that can be deployed on any BPC, LPD or aircraft carrier (usually on the ship currently used as level 3 hospital) as well as in a combat hospital ashore.
- **Maintenance**. Hospital and sick bay are collocated. But hospital ward can be isolated when not activated, which facilitates maintenance. Also, according to current surgical design recommendations, floors, walls and ceilings are smooth, easy to disinfect. The mobile digital radiography and CT-scan can be easily disembarked for major maintenance procedures.
- **Sterilization and infectious waste** management is optimized, integrating state of the art technique and implementing current rules and recommendations.
- **Built-in telemedicine**. The strategically localized telemedicine room (set between the 2 operating rooms and the X-ray room) will allow transfer of medical data to level 4 medical facilities. Tele-assistance for surgeons will be available with surgical lights fitted with built-in video camera. This function will help surgeon to get very specialized advices during procedures like neurosurgery, E.N.T., etc.

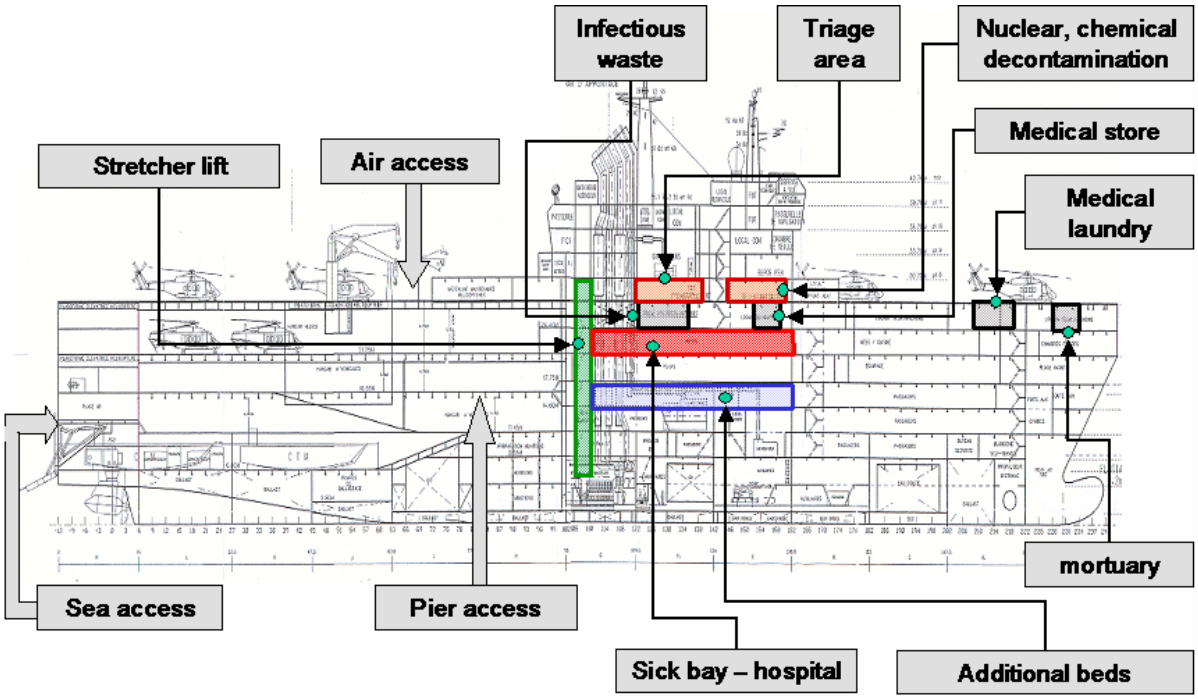

Figure 1: BPC Hospital Facilities.

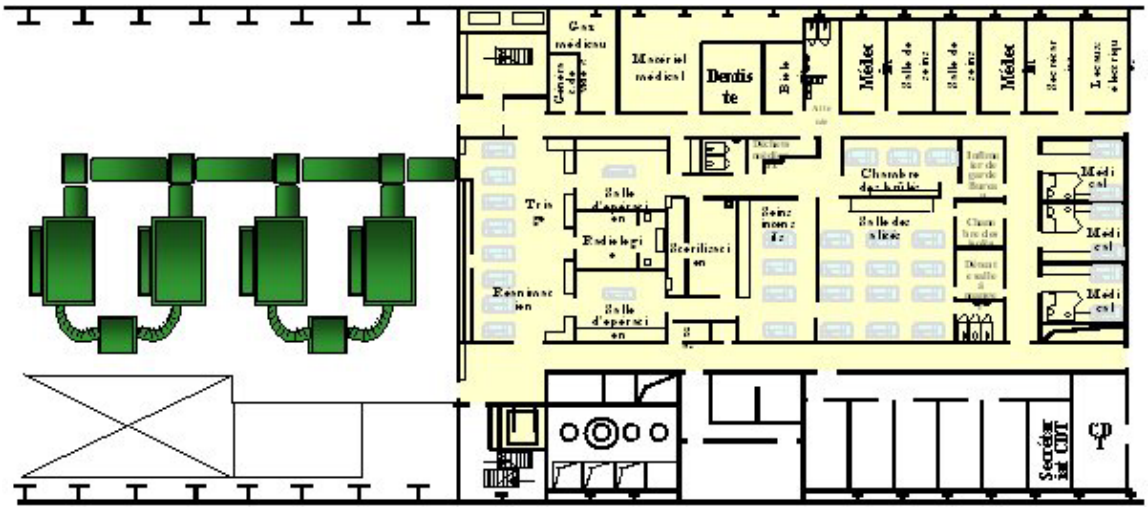

Figure 2: 4 to 8 Hospital Containers Set in the Hangar Bay can be Connected to BPC Hospital.

CONCLUSIONS

The BPC will be able to support a maritime expeditionary force in a residual threat environment, with medical capability up to level 3 of care, providing a realistic sea basing support. Built according to commercial ship building standards, like other multirole vessels currently under development, they provide a very cost effective alternative to ashore field hospital or hospital ships and even MRV, which are more vulnerable. Pre-positioned near crisis region for months, these ships with their built-in flexible hospital can be activated with a very short notice, and the medical staff be completed by adapted specialist teams that can be fly in.

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Development of an Integrated Toxicity Assessment System for Use in Operational Deployment and Materials Development

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SUMMARY

Rapid assessment of chemical hazards and potential toxicity are serious concerns for the modern battlefield commander before and following deployment. Whether it is considered during the design and development of a weapon system, or in the fielding of that system, the effects of chemicals used in operational settings have the potential to cause mission degradation, morbidity and mortality. In addition to NBC concerns, there are issues in many current military settings for exposures to toxic industrial chemicals or materials (TICs or TIMs). Significant health issues caused by use of legacy chemicals have emphasized the need for more effective prediction of chemical toxicity. This paper discusses issues relating to toxicity predictions and the development of an integrated computational system for the assessment of chemical toxicity. This novel system is designed to incorporate diverse data types. Hazardous agent sensor data, literature or database information, biotechnology data, in vitro/in vivo toxicity assessments, and computational chemistry parameters will be used in evaluating the possible level of chemical toxicity risk associated with operational use. The system design is comprised of a series of modules each dedicated to addressing specific areas of concern, e.g. exposure scenarios and chemical property predictions. The integrated toxicity assessment system (ITAS) is serving as a model for other industrial applications and has the potential to assist in both mission planning and materials development.

1.0 INTRODUCTION

In the interest of protecting the men and women who serve in the armed forces, it is important to effectively assess the potential hazards associated with chemical/material exposures. Chemicals are used throughout many fields of expertise and are not limited to maintenance or deployment situations. The purpose of this paper is three-fold: 1) Address the need for evaluation of chemical hazards in operational situations, 2) Discuss the current and emerging technologies available for toxicity prediction, and 3) Present the details of the Integrated Toxicity Assessment System (ITAS) approach.

2.0 THE NEED FOR CHEMICAL HAZARD EVALUATION

Military operations place individuals in contact with chemicals and materials that may be different from those in their normal base settings (Kirkpatrick et al., 2002). Additionally, the exposure durations and levels may vary. Even in modern operations that utilize high-production volume chemicals, some toxicity questions still

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exist (Urbansky, 2002). So, it is important to have access to a sufficient amount of toxicity information before individuals are exposed to suspect compounds. One primary driver for this effort is to avoid the necessity for after-action responses to chemical hazards (Kramarova, 1998).

There are no "unmanned" weapon systems. Chemical exposures may occur during the manufacture, fielding, maintenance, or operation of a weapon system. Significant consequences may arise from ineffective assessment of chemical toxicity from those systems or from environments into which personnel are placed. Real-time, military operations may be restricted, in response to unforeseen chemical hazards, which may or may not be mitigated. The concerns do not end with cessation of operations, but follow-on issues may arise from after-action health impacts (Knudson, 2002).

US Air Force concerns relate to both general occupational health as well as specific scenarios in deployed operations. Operational TIC/TIM exposures in deployed settings may occur with chemicals not held in the current military inventory, but are strictly industrial in nature. Obviously, these concerns go beyond those involved with a typical weapons systems life cycle (Aizenberg, 2000).

There are three basic areas where chemical/material toxicity should be assessed: 1) Materials development, 2) Weapon system integration, and 3) Deployed operations.

2.1 Materials Development

Chemicals and materials are designed by engineers and scientists to perform certain functions. These functions are characterized by various physical/chemical properties. For instance, a fuel must provide a certain amount of energy upon oxidation. Biological properties of chemicals are just as intrinsic as their physical/chemical properties. Therefore, while certain performance characteristics are selected for, so can minimizing potential toxic effects. As part of the development of a chemical/material, the potential impact on the military users must be considered. Effective up-front toxicity evaluations may help in avoiding legacy problems with chemicals. It is important to understand that toxicity evaluations at this juncture should not be considered "testing", but that these assessments are a fundamental part of the materials development process.

2.2 Weapon System Integration

Although chemical toxicity should be considered in the material development process, it is likely that chemicals selected for particular engineering solutions may still carry hazards that would be of concern. In a sense, toxicology is not a "gatekeeper", but a guide. Yet, it is important to have useful toxicity information in hand when weapon systems are designed and built. Engineers must consider the potential for human exposure to materials used in those systems. The outcome of proper precautions is the maximizing of weapon system performance while preventing mission degradation from chemical exposures during system operations.

2.3 Deployed Operations

The ubiquitous nature of chemicals requires that occupational health precautions do not cease during deployed operations. Appropriate consideration of potential chemical exposures increases mission planning effectiveness. Effective planning allows for more effective handling of hazardous materials.

3.0 CURRENT AND EMERGING TECHNOLOGIES

The technologies available for toxicity assessments focus on three general areas: toxicity databases, quantitative structure activity relationships (QSARs), and expert systems. Although significant effort has been

put into development of toxicity prediction tools, there are a number of unmet challenges. For instance, good tools for metabolism prediction are just now coming of age. For many software packages, especially QSAR-based approaches, there is little useful information that the user can obtain that provides insight into mechanisms of action. Often, a tool is required for providing insight to hypothesis generation concerning the toxicity mechanisms of a chemical.

3.1 Databases

Various U.S. and international groups maintain databases of chemical toxicity information (Felsot, 2002; Winter, 2002; Wolfgang and Johnson, 2002). With current technology, many of these can be accessed via the Internet and may not require a fee-based subscription. Some databases have comprehensive toxicity information, while others focus on single endpoints, e.g. carcinogenic potential. However, there is one glaring problem, a unified query tool is lacking that would provide access to all of these disparate repositories. Of note among these databases are: IRIS (www.epa.gov/iris), primarily a human health risk database, IUCLID (ecb.ei.jrc.it/IUCLID), an EU sponsored effort covering the >2000 high production volume chemicals, and RTECS (www.cdc.gov/niosh/rtecs.html), which covers >150,000 chemicals. One emerging database project is called DSSTox, a distributed structure-searchable toxicity public database network. This is an effort lead by the US EPA (Richard and Williams, 2002). Finally, various consortia have formed, which are addressing the issue of genomic and proteomic data.

3.2 Structure-Activity Relationships (SARs)

SARs are mathematical models describing the correlation of biological activity of a chemical to its descriptors (i.e. properties). They may be quantitative in nature (hence the term Q-SAR) or simply descriptive. These models generally describe a single toxicity endpoint, e.g. carcinogenicity or skin sensitivity. Often, very good correlations (>0.95) can be identified between these endpoints and certain chemical descriptors, e.g. molecular orbital energy (Geiss and Frazier, 2001). However, single QSARs do not solve many problems and the highly specific nature basically prevents them from being applied to other endpoints of interest. Significant drawbacks are associated with QSARs: 1) Operational chemicals are often outside of the predictive space of these highly specific models, 2) Many QSARs are built from large pharmaceutical chemical databases, 3) Correlative QSARs provide little mechanistic insight required for risk assessment.

3.3 Expert Systems

Some rules-based applications exist for chemical toxicity evaluation. Their utility for toxicity “prediction” is limited, since the systems are generated upon previously identified toxicity identifiers. Some of the expert systems are useful because their rule-sets may be updated to reflect more current toxicity knowledge (Viswanadhan et al., 2002).

3.4 Metabolism

Although this paper has apparently focused on the potential toxicity of a particular operational chemical, it is important to understand that in a biological system, a chemical (the parent) may undergo modification or metabolism (Ekins et al., 2002). It may be the metabolite that is actually the culprit that interacts with biomolecules to cause the toxicological effect. Hence, for effective toxicity evaluations, the professional toxicologist must consider the production and activity of potential metabolites. Commercial computational tools are even more lacking in the area of metabolism prediction. Most of the software packages have models based on non-mammalian systems. Only one is known to have a significant complement of human metabolic information.

4.0 THE INTEGRATED TOXICITY ASSESSMENT SYSTEM (ITAS) APPROACH

The basic approach of ITAS is to take advantage of diverse, multi-media toxicity information available from internal or external databases and maximize the leverage that can be gained from commercial computational solutions. ITAS is an integrated software tool that incorporates elements of artificial intelligence and rules-based decision-making approaches to arrive at toxicity predictions with certain estimates of confidence. A far-reaching goal is to have the ability to integrate exposure and toxicity to predict occupational scenario-specific outcomes.

4.1 Biomolecular Profiling and Toxicity Fingerprinting

With the advent of genomic, proteomic, and metabonomic (GPM) techniques, the contemporary toxicologist has the potential to gain valuable insight into the mechanisms of chemical toxicity. However, the tools for dealing with this GPM information have not kept pace with the production of the information. Bioinformatics is key for distilling out the pertinent elements of the molecular response to toxic exposures. The molecular response must be considered in light of other toxicity information, e.g. cellular status and dose-response relationships. These basic pieces of toxicity data comprise the “toxicity fingerprints” that are linked to the biomolecular profile based on GPM data.

4.2 ITAS Design

4.2.1 Toxicity Evaluation Module (TEM)

The TEM is the core of the ITAS system. One of the primary roles of this module is to interface with the user. The TEM will accept the chemical queries for the compounds/materials of interest and parse the toxicology questions. The TEM will act as a governor to determine the relevant databases to be accessed for data. The data from external sources, as well as experimental and computational information will be used for the assessment of toxicity potential. The TEM will provide the confidence levels associated with the toxicity reports. The toxicity reports will identify the pertinent endpoints of interest, e.g. single dose acute toxicity, skin irritation, or target organ toxicity.

4.2.2 Database Module (DM)

The DM will maintain the list of data sources, both internal and external. The DM tools will be able to automatically collect data from desired locations. The collected information will be condensed for transfer to the TEM for analysis by processing to a standard ITAS data format.

4.2.3 Computational Module (CM)

Many physical/chemical properties can be accessed from databases. However, in the event that a property, e.g. a lipid partition coefficient, is unavailable, the property will have to be calculated. This will occur in the CM. The CM will also analyze chemical structures to identify “related” chemicals that can be used as surrogates in toxicity profiling. In addition, the CM will identify chemical moieties that are related with particular types of toxic mechanisms.

4.2.4 Predictive Module (PM)

The PM is the module that will link with available computational toxicology tools and predictive models. QSAR data is catalogued in various locations and may be accessed for incorporation into ITAS predictions. Furthermore, the estimates of the kinetic, e.g. organ distribution, of the chemical will be performed in the PM.

4.2.5 Site-Specific Exposure Estimator Module (SSEEM)

Functions of the SSEEM include the evaluation of the dispersal of chemicals in the environment, behavioral patterns of target populations, and providing exposure estimates for target populations given specific operational scenarios.

4.3 Science and Technology Challenges

During the development of the ITAS product there are a number of scientific and technical challenges that must be addressed. Given the potential that many of the query chemicals may belong to unique classes of chemicals, it may be difficult to identify related compounds. Additionally, how one defines similarity can impact the usefulness of the flagged surrogates. Although computational chemistry has advanced significantly over recent years, the development of chemical descriptors has not focused on identification of those that are most related to toxicological activity. This has been left primarily for the toxicologists to accomplish. The toxicology knowledge base is a very fluid entity. Constantly, new information is gained concerning the toxicity of a chemical or class of chemicals. It is important for the ITAS system to be able to take advantage of the most current information. The behavior of chemicals in a biological system, e.g. its biokinetic behavior, remains an important element of the toxicity evaluation of a chemical. One must determine the metabolism and target organ dosimetry in order to perform effective risk assessments. A significant, but mostly neglected, factor of human toxicity is the potential for genetic variation among a population that results in a segment of the population being more or less susceptible to experiencing toxic effects from a particular chemical. This inter-individual variability is a major factor when extrapolating from animal-based toxicity information to human risk assessment (Lamba et al., 2002).

5.0 CONCLUSION

The integrated toxicity assessment system (ITAS) serves as a model for other industrial applications and has the potential to assist in both mission planning and materials development. In the development process, ITAS can assist in “smart” chemical design. Comprehensive chemical toxicity assessments can aid in the engineering of weapons systems and establishment of personal exposure standards for operational environments. Finally, chemical/material toxicity information may be used in mission planning to aid in mission degradation avoidance and reduction of the potential for after-action health concerns.

6.0 ACKNOWLEDGEMENTS

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Psychological Support Pre- During and Post-Deployment

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SUMMARY

From the early nineties until now over 35.000 servicemen were send abroad for their term. The Division of Ambulant Psychotherapy of the Royal Netherlands Land Army developed a comprehensive set of measures. A policy to secure maximum deployability and minimise the (long)lasting effects of stressful encounters during these operations. In this paper ten steps are presented which comprises this policy for psychological support pre- during and post deployment. One step of this policy, the after care questionnaire, will be presented in more detail.

INTRODUCTION

The psychological effects of war and peacekeeping upon soldiers are very well known. They comprise all problems from maladaptation after return, up to and including fullblown post traumatic stress disorders.

The Netherlands, although being a small country, has a large history of involvement in (UN) peacekeeping operations. It started with a peacekeeping operation in Albania in 1913, through Korea 1950, to Lebanon 1979-1985. In this last operation, UNIFIL, 8000 men and women from the Royal Netherlands Land Army (RNLA) served, of whom 9 were killed.

Some figures: Operations started in 1991 in Saudi Arabia and Iraq (with the Gulf war and later Provide Comfort), then Cambodia, Haiti, Angola, operations in 15 countries in all. From the RNLA about 20.000 served in the former Yugoslavia. At the moment about 1200 men and women serve in Bosnia, 650 in Afghanistan and about 200 in 10 other UN/NATO or EC-missions.

All together about 35.000 men and women, regular as well as –until 1996- conscript soldiers, were and are involved, since Lebanon until now.

Neither the UN, NATO nor the WEU have a doctrine or clear policy on psychological support before, during and after operations. Each participating country has it own responsibility in this matter.

The RNLA developed a comprehensive policy to secure maximum deployability and minimise the (long)lasting effects of stressful encounters during operations. This policy focuses upon the armed forces, before, during, and after missions of soldiers during peacekeeping operations, starting with initial psychological selection, up to and including veteran care, and thus set the stage in which all aspects of

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welfare during peace keeping operations fit very well. In more detail some results are given from the structural questionnaire surveys as an essential part of this policy.

Two final remarks. There is no UN policy, nor a policy in NATO or WEU concerning psychological support. It is a national responsibility, and the remainder of this paper is based on the policy of the Royal Netherlands Land Army and the Royal Marechausee (or military police). The two other forces of the Netherlands; the Air Force and the Navy (including the Marines) implemented a similar policy, that differs in detail depending for example on the nature of the mission and their own health care system.

Secondly: Not only the NATO, the WEU, or the UN, but also the so called Non Governmental Organisations, like the Red Cross or Medicin sans Frontieres consider people in need, their responsibility. Apart from those two important organisations, the World Health Organisation knows over 450 non-governmental bodies with their own policies regarding psychological support.

CONTRIBUTIONS OF MILITARY PSYCHOLOGY TO UN-OPERATIONS, PRINCIPLES

A lot is learned from literature and personal contacts with colleagues from other countries; for example the experience of colleagues in Israel, the United States, especially after Vietnam, and Norway (the UNIFIL-study).

But of course there are our own experiences, with for example the veterans from the political conflicts in the former Dutch Indies 50 years ago, but still a current topic. Then Korea, and later Lebanon (1979-1985) where we had over 8000 men. After that operation three major studies into the problems of these UNIFIL-veterans (1980, 1987, 1989) were conducted. To give only one of the research results: in 1987 about 10 percent of our Lebanon-veterans still suffered from problems related to their mission: from maladaptation to PTSD. In those days however, hardly support was given by behavioural scientists or psychotherapists, mainly because there were only a few of them at that moment, and psychological support was not so well accepted as it is nowadays.

Research and the experiences of therapists have shown that soldiers who have problems coping with their experiences resulting from a mission, frequently withdraw from social contacts, feel themselves misunderstood and often deny that they have any psychological problem. These symptoms mean that military personnel with psychological problems will very difficult get in touch with a social worker or a therapist, on their own initiative.

Based upon four guidelines the Division of Ambulant Psychotherapy of the RNLA has developed a comprehensive set of measures to break down barriers between soldier and therapist in order to make professional help approachable for the soldier in need. All this is done, not to stigmatize the soldier in having psychological problems, but to offer help as soon is possible for the soldier in need and his homefront. These guidelines follow ‘normal’ military principles; like good leadership, group cohesion, and so on. These four guidelines are:

- stable individuals,
- homefront care,
- stress as a normal reaction, and
- the Salmon principles.

POLICY OF THE ROYAL NETHERLANDS LAND ARMY ON PSYCHOLOGICAL SUPPORT BY OPERATIONS ABROAD

This policy comprises 10 'steps':

Step 1: Initial or intake selection for regular soldiers:

By means of among other things personality tests and an interview, aimed at the deployability abroad and psychological fitness, we assess psychological stability and try to filter out the high risk groups.

Step 2: Education and counselling on stress and social support, preferably by the psychologist who will accompany the unit as a field psychologist when the unit is send abroad. In this process of counselling we also incorporate the homefront. The education consists of training and lessons on stress and especially for key personnel training in debriefing techniques, to apply after calamities have happened and the field psychologist is, for example due to large distances, not available immediately.

Step 3: Support by a field clinical psychologist in the area of operations.

Each unit of battalion size has a so called social coordinating committee, already in the barracks in Holland. This committee comprises the unit medical doctor, the chaplain, the welfare officer, the personnel officer (S1), and when the unit is assigned abroad, a field clinical psychologist. The latter has three tasks: he is an advisor to the commander; he supports the key personnel; and he acts as a counsellor or therapists when necessary.

Step 4: Family support or homefront care.

The RNLA facilitates the establishment of and guides the so called 'homefront committees'. They comprise partners or parents of soldiers deployed in UN operations, and help each other in difficult times, in meetings and through so called telephone circles.

Of course a sitcen – a situation centre at the Army Headquarters – is available on a 24 hour basis for the family that needs information on the whereabouts of their relatives. Although the RNLA takes initiatives and facilitates with financial help, personnel and so on, it is, and will stay, the responsibility of the partners and parents if they themselves will join the committee of the unit the soldier belongs to.

Step 5: Psychological debriefing.

Of course, after each serious incident, the clinical psychologist or the key functionary in the unit will conduct a debriefing. Moreover, a psychological debriefing takes place before the personnel return home after their duty abroad. This is normally done in the area of operations and in the units, but if necessary, with personnel deployed individually as UN monitors for example, debriefing will be done immediately after return to the Netherlands as well.

Eventually, when a clinical psychologist is needed, but is not available in the area of operations (for example because the unit was too small to assign one to) a psychologist or a team will be flown into the area.

During these debriefing meetings written material is handed out on possible delayed effects and how to act if problems arise.

Step 6: Reintegration meetings.

8 weeks after returning to the Netherlands the soldiers are invited to take part in a reintegration meeting guided by the social service of the army. This is done in units preferably, but here too

individual personnel, again the UN monitors for example, can join these meetings as well. During these meetings the soldiers discuss their adaptation to normal life, in work and family, the so called reintegration process, and the problems they are confronted with. Together they try to find solutions.

Step 7: In an active, personal approach, personnel who have been deployed are sent an 'aftercare questionnaire', approximately 9 months following their return. The home front of the servicemen or women also receives a questionnaire. In more detail this step in psychological support will be discussed later on.

Step 8: Veteran Care.

Four basic principles guide the policy of the RNLA concerning veterans from operations abroad:

1) Veteran care is the responsibility of the army, even though the veterans are no longer part of that army.
2) There should be an active approach, an outreach to the veterans, to survey possible problems and to offer help.
3) The help offered by the army is as accessible as possible. That is, there are no barriers. A veteran in need of support can approach his own psychotherapist, the officer-clinical psychologist who he served with during his duty, even if the veteran has left the army already.
4) There is a good collaboration between the military mental health services, the veteran's organisations, and the specialised civilian mental health centres. The Veteran Institute has a central coordinating role in these activities.

Important to mention is the fact that in the Netherlands a veteran is a serviceman who left the army and has been abroad for his term. Other papers on this symposium will give more detailed information about the activities of the veterans care.

Step 9: All lessons learned are collected by a special office of the chief of army staff. This relates not only to the experiences in our branch, but also in operations, logistics and so on. Behavioural scientists help to structure the way the information is compiled, and to analyse the data and draw conclusions.

Step 10: Last, but not at least, there is the systematic evaluation of all steps mentioned above.

AFTERCARE QUESTIONNAIRE

As mentioned earlier, research and the experiences of therapists identified soldiers with problems resulting from experiences of a mission. Withdrawal from social contacts, misunderstanding and denial that they have any problem led to psychological problems in which the soldier will not get in touch with a therapist, on their own initiative.

This is why it is necessary for each individual serviceman or woman to be contacted, to determine whether they are encountering problems as a result of their assignment, and to offer them help if they need it.

Against this background, personnel who have been deployed are sent an 'aftercare questionnaire', approximately 9 months following their return. The home front of the servicemen or women also receives a questionnaire. The main purpose of these questionnaires is to offer (after)care to (former) servicemen and women, and their home front. This psychological care will be offered by the Division of Ambulant Psychotherapy.

This active, personal approach is also called **outreach**. Outreach can prevent military personnel having to battle with problems for years, before they finally seek help. It is our experience that the likelihood of successful treatment is greatly enhanced if the symptoms are spotted in time.

This questionnaire includes items regarding to the stressors military personnel experience during their term; a PTSD-survey concerning intrusion, avoidance and hyperarousal experiences; items about mental and physical changes since the mission and adjustments to life at work and at home in the Netherlands; two SCL-90 dimensions; and so on.

In the mid-nineties the Division of Ambulant Psychotherapy has started with this active approach. On this moment almost 30.000 questionnaires has been send out to all servicemen and their home front, started with Provide Comfort in Iraq in the early nineties until now. Table 1 gives some interesting results about this retrospective surveys.

Table 1: Comparison Between Different Periods [1,2].

	Period 1991 – 1996	Period 1996 – 1998	Period 1998 – 1999	Period 1999 – 2000
Surveys returned	N=5035	N=2158	N=1517	N=2029
Response	46%	42%	38%	36%
Most reported serious events:				
- Witnessing human suffering	74.4%	50.9%	44.0%	57,5%
- Shootings (not aimed at the soldier)	79.2%	38.6%	25.6%	38,9%
- Witnessing death/wounded locals	51.8%	22.2%	13.8%	26,9%
- Rejection by local people	47.3%	28.5%	28.4%	25,4%
- Personal danger	43.7%	18.7%	15.2%	16,5%
Readjustment problems:				
- Partial PTSD	20.4%	14.7%	14.0%	16,1%
- Full blown PTSD	4.3%	2.6%	2.0%	2,6%
- Sleep disturbances (SCL-90)	15.6%	12.6%	11.9%	12,2%
- Somatic disturbances (SCL-90)	12.4%	9.8%	7.6%	10,5%
Care:				
- Contacted by telephone	27.0%	16.0%	14.6%	14,0%
- Accepted help	8.0%	3.5%	2.3%	3,1%
- Already treated	2.0%	2.3%	2.1%	2,5%
- Already treated elsewhere	1.2%	1.6%	1.8%	2,5%

Period 1991-1996: Provide Comfort - ICFY - UNPROFOR - (DI t/m III) - UNTAC - UNAVEM - WEU - etc.
Period 1996-1998: IFOR2 - SFOR1-2 - MAPE - etc.
Period 1998-1999: SFOR 3-4-5 - MAPE - UNIPTF - UNFICYP - etc.
Period 1999-2000: SFOR 6-7 -KFOR1-2 - MAPE - UNIPTF - UNFICYP - etc.

There are high incidences of reported events and readjustment problems for the period 1991-1996. It is the period in which we had to deal with the war in Yugoslavia (e.g. Srebrenica) and Rwanda. 4.3% of the respondents were diagnosed as having PTSD and for 27% of the respondents there was an indication for problems due to their term abroad.

Reasons for inviting someone for care were:

- reported stressful encounters during operations,
- reported physical or mental changes,
- welfare or complaints of the partner,
- the respondent asked for an interview with a therapist.

The second and third period gives a decrease in reported serious events, readjustment problems and care. It is the last period 1999-2000 which give rise to all above. A further decline is curved upward, mostly due to the experiences of the Kosovo-conflict.

Over the years we can see a slight decline in response. This is troublesome. In 1999 a non response survey [3] indicated, fortunately, that the main reason for not responding was mostly due to not having problems. Nevertheless, non response is a pity and for the future we must be creative in our efforts how to deal with this negative development.

It became clear from several aftercare studies that military personnel experiencing psychological problems as a result of a mission can indeed be traced by means of the questionnaire and the majority of respondents considered this active approach to be a positive development.

In 1998 a study was conducted by TNO, the Netherlands [4], concerning the physical complaints from servicemen situated in Lukavac in the mid-nineties. From this study it was recommended that every soldier must be monitored psychological as well physical.

Right on this moment efforts are made between physicians and psychologists in sending out a combined questionnaire for signalling medical and psychological problems by servicemen after their return from an operation [5].

SOME CONCLUDING REMARKS

An overview of a policy including ten separate steps in which therapists can contribute to peace keeping operations has been presented. This policy, adopted by the RNLA, seems to be effective. There is a decrease in problems, and those psychological problems can be treated at an earlier stage and thus resolved easier, quicker and thoroughly. Above that there is a greater acceptance of the contribution of psychologists in the army. The fact that soldiers too have emotions and can have emotional problems that can be discussed and treated is now a fact of life in the army.

For a better monitoring of the servicemen, efforts are made between physicians and therapists, in sending out a combined questionnaire for detecting medical and psychological problems in an early stage. Future is promising for a better health care system for the servicemen of the Royal Netherlands Land Army.

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Mental Health Care in the Netherlands Armed Forces: Remarks on Policy and Facts

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SUMMARY

During the past decades, more than 80.000 military personnel of the Netherlands Armed Forces participated in international peacekeeping operations. In caring for them in a professional way, many lessons have been learnt and personnel policy has been strongly improved. In this paper this personnel policy is being examined, especially in the research that is being done among military personnel after deployment. In particular the non-response in survey-research among them will be discussed as well as self-harm and violence after deployment. Recommendations are made for further improvements of policy on mental health care of military personnel and veterans.

INTRODUCTION

From 1979 on, the Netherlands Armed Forces participated in the United Nations Interim Forces in Lebanon (UNIFIL) for a period of six years. This UNIFIL deployment was the start of a new era, after the departure of Netherlands Armed Force from New Guinea in 1962. In between, Netherlands Armed Forces had only been training for a large scale conflict with the Warsaw Pact Forces.

In this paper we will review the policy and facts on care of military personnel after deployments from UNIFIL on. We will focus on the subjects of response in mental health surveys and reunions. In combination with the phenomenon of overt violence, self-harm and suicide after deployment, we will draw conclusions about the lack of information on military mental health after deployment. We will end our paper with recommendations on countering non-response in surveys and reunions, collecting data on military mental health after deployment and care for veterans in general.

In this paper veterans are defined as military personnel that has been deployed in active service and has left the active service. Figure 1 shows the difference in definition between veterans and non-veterans.

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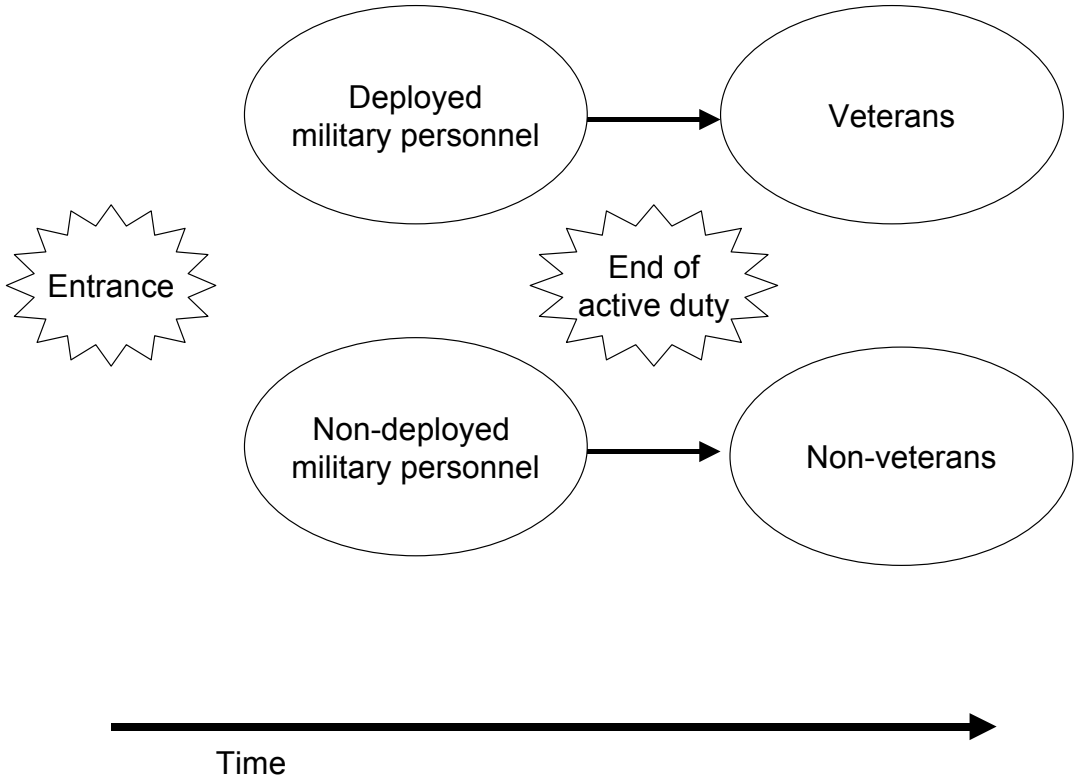

**Figure 1: The Netherlands Definition of Veterans:
Military Personnel Deployed and Out of Active Duty.**

From figure 1 it appears that deployment is the distinct feature of veterans. Deployments enclose warfare, service in warlike circumstances and participation in peace-operations. This raises the question about the differences between waging war and participating in peacekeeping or peace-enforcing operations, especially in the context of the psychological aspects of war and peace-operations.

At first glimpse, war has a far more violent character. Often the goals in war are more distinct and more clearly national interests are at stake. From a psychological point of view, these characteristics might have a more profound impact on human behavior.

However, violence during war is most of the time well planned and in accordance with the goals to be reached. This might reduce the psychological impact of war both in attack and defense in comparison to peace-operations, in which violence is always unforeseen and takes place suddenly and unexpected. The violent stages in a war also present an outlet to the psychological arousal of soldiers, while in peace operations military personnel is aroused without the opportunity of expressing this arousal in violent behavior.

Secondly, the observation that goals in a war are more clearly defined than in peace-operations can also explain a reduction of the psychological burden of waging war. Especially when land or sea areas have been conquered or enemy positions have been destroyed, there is an overt reward of military behavior. In peace-operations there is no such reward. Furthermore, when rules of engagement specifically forbid to be violent, there is no reward of military behavior at all, with a far greater chance of frustration and all kinds of psychological injuries.

In the third place, in waging war often more clear national interests are at stake than in peace-operations, fostering commitment among national military personnel and probably making them less vulnerable to

psychological injuries. In sustaining the war and also in recuperation after a war these national interests also will contribute to societal esteem for veterans who have been in charge of these national interests.

The three remarks as discussed before, do not lead to the conclusion that the psychological impact of waging war is the same as the psychological impact of participating in a peace-operation. Many authors already stated that peace-operations have their own specific stressors, like vulnerability and helplessness (Schoeman 1996, Extra 1998). However, we do conclude that participating in peace-operations has its psychological burden as well, so veterans of these operations deserve care and attention as well as war-veterans. Experiences both from war and peace-operations affect the lives of veterans in the post-deployment period, long after the actual departure from the theatre. Last but not least, we note that from the perspective of psychosocial care it does not make sense to weigh the burden of experiences or loss, but that all of them need their own kind of attention.

DEVELOPMENTS IN THE POPULATION OF VETERANS

After the Second World War the Netherlands government had to reduce the armed forces with large numbers of personnel. That became the offspring of large amounts of veterans. The deployments of Netherlands armed forces between 1947 and 1962 in the East Indies, Korea and the former Netherlands New Guinea enlarged this legion of veterans again with large numbers. The veterans from this era are called ‘old veterans’.

The veterans from UNIFIL and latter operations are called ‘young veterans’. However, a New Guinea veteran who has been deployed at the age of 18 in 1962 is called an old veteran but can be younger than a UNIFIL veteran who has been deployed in 1978 at the age of 48. More important, the genuine contact with an old veteran of 86 can even be impaired by calling him old. Figure 2 shows the estimated numbers of old and young veterans from 1990 to 2004.

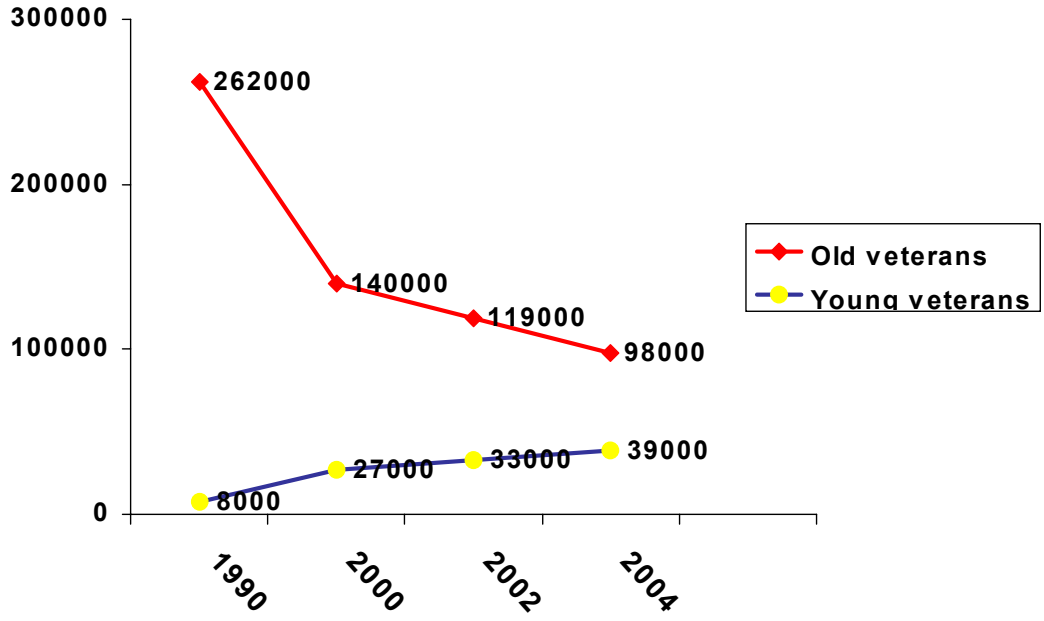

Figure 2: Estimates of the Total Numbers of Old and Young Veterans from 1990 to 2004.

From figure 2 it appears that the number of old veterans is decreasing and the number of young veterans is increasing. It is expected that in 2010 they will reach a break-even point. These developments imply a change of focus from primarily old veterans to young veterans. This shift in focus does not imply that the

old veterans are not being cared for, respected or appreciated anymore. For their bravery, courage and their successful efforts to survive and cope with their experiences in the rest of their lives, they deserve all the respect they can get. However, in this paper we will focus on young veterans.

POLICY ON MILITARY MENTAL HEALTH CARE AFTER DEPLOYMENT

From approximately 1980 on, the Department of Defense (DOD) in the Netherlands has been trying to increase the mental health care for military personnel during deployments and in the pre- and post-deployment period. Already during UNIFIL social workers have been deployed with the deployed unit and in the post-deployment period mental health was cared for by military psychologists, both in therapy and research. From the UNIFIL timeframe it appeared that a minority of the deployed personnel suffered from Post Traumatic Stress Disorder (PTSD), sometimes even followed by a compassionate leave of the deployment. Especially Netherlands and Norwegian military personnel appeared to develop psychiatric complaints during UNIFIL (Weisaeth, 1994). In the years to come, the DoD increased its activities in mental health care, including a pre-deployment briefing on the effects of stress, the presence of mental health workers during deployment and debriefing, homecoming interviews and mental health surveys in the post-deployment period. The DoD also offers facilities for reunions of the deployed unit, with a reunion every five years of deployed marine corps units. Figure 3 shows these activities of military mental health care during preparation, deployment and return.

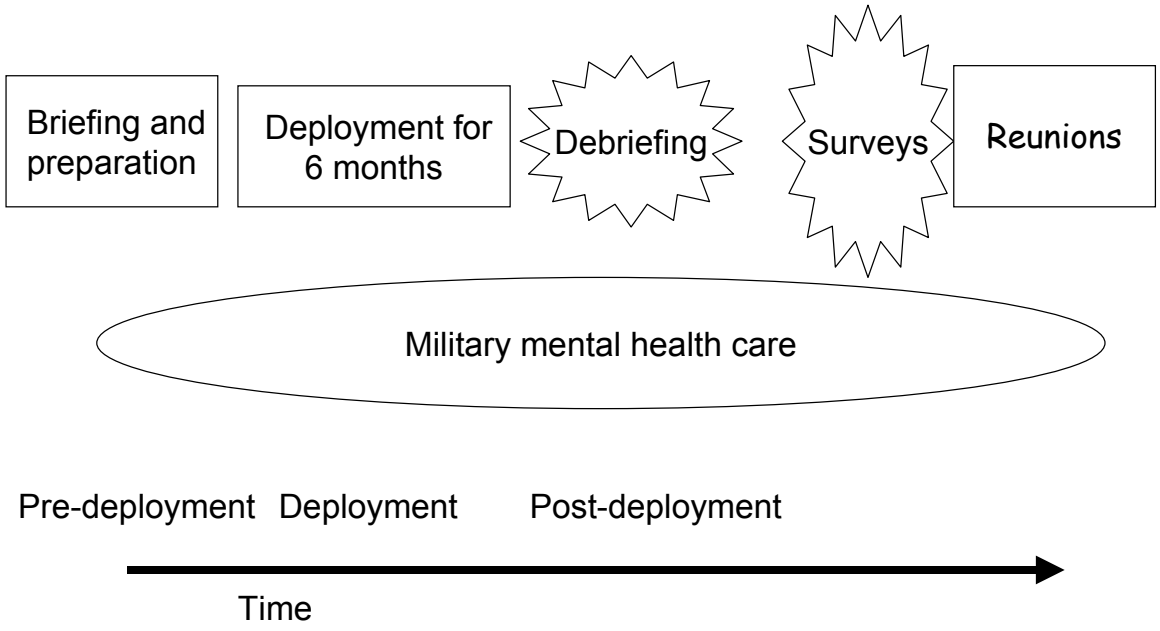

Figure 3: Activities of Military Mental Health Care During the Stages of Pre-Deployment, Deployment and Post-Deployment.

From figure 3 it appears that nowadays a lot of activities of military mental health care are common practice. As a matter of fact, they emerged against all odds, after a long struggle to overcome the military masculinity culture, in which mental health care is still a Fremdkörper. In our opinion, a discussion about debriefing as published in The Lancet in September 2002 (Emmerik et al, 2002) can easily lead to a loss of such practices. In another paper we will review on goals of debriefing and the designs of research on debriefing (Meijer and Weerts, 2003). In the remaining part of this paper we will reveal some facts about the other activities, as observed form the point of view of the Veterans Institute in the Netherlands. In figure 4 the partner-organizations which are contributing to this institute are shown.

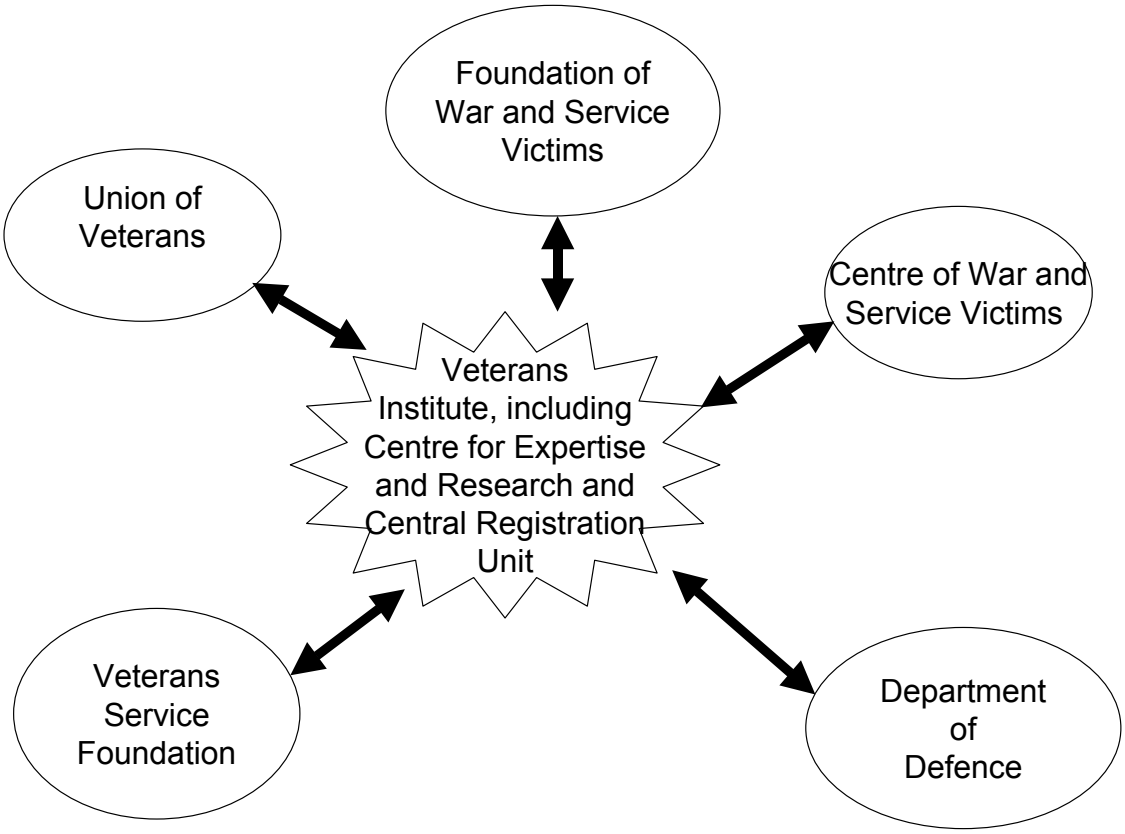

Figure 4: Five Partner-Organizations Contributing to the Veterans Institute.

From figure 4 it appears that five partner-organizations are contributing to the Veterans Institute. Especially the participation of organizations like the Veterans Union and the Foundation of War and Service Victims creates the possibility to supervise and criticize the DoD, whenever that is needed. This kind of co-operation between organizations with apparently different interests is quite common in the Netherlands and has been called the 'polder-model'. We have been using this model for collecting facts about military mental health care, coming from DoD as well as veterans organizations. We will focus on response in surveys on mental health care, reunions, the quality of mental health care and the self-harm among veterans.

RESPONSE IN SURVEYS AND REUNIONS AND THE QUALITY OF MENTAL HEALTH CARE

The DoD sends a mental health survey to the deployed military personnel 6 to 9 months after the end of the deployment. The survey consists of more than 250 items and focuses on traumatic events both in deployment and private life. The survey has been sent to 4 marine corps units of approximately 200 members each, that have been deployed in Bosnia and Haïti in 1995 and 1996. A reunion for these units has been held in 2001. Both in survey and reunion the overall response was 40 %. However, the analysis of this response revealed remarkable differences between the response in the survey and the response in the reunion (Meijer, Wokke and Weerts 2002). Figure 5 shows the response on the mental health survey and the reunion, divided into officers, non-commissioned officers and marines and the presence of these categories in the strength of the deployed units.

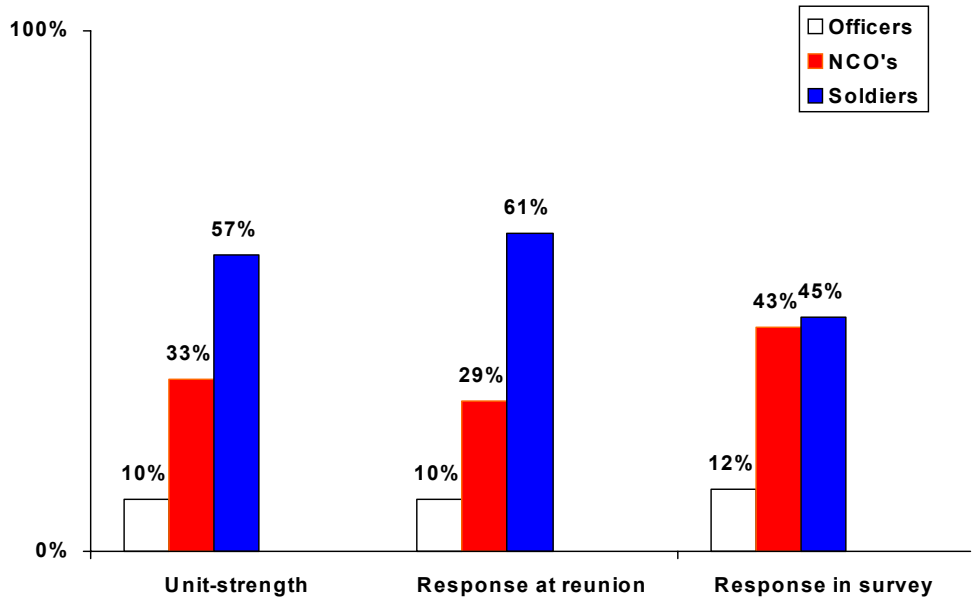

Figure 5: Percentages of Officers, NCO's and Soldiers in Unit Strength, Reunions and Surveys Among Marines Corps Units, Deployed in Bosnia and Haiti in 1995 en 1996.

From figure 5 it appears that there is an over-representation of NCO's and an under-representation of soldiers in the survey. The response in reunions is more similar to the unit strength. However, policy on mental health care is only based on the surveys, which appeared to be biased by rank. From other research it appeared that soldiers differ form NCO's in deployment experiences and in need for mental health care (Mulder and Reijneveld 1999, 2003). Therefore, it is needed that mental health care policy and the evaluation of this policy is not solely based upon mental health surveys.

The Social Work Branch of the Dod (Meijer, 2001) and Veterans Institute (Meijer, Wokke and Weerts, 2002) have studied the quality of social work for personnel of the armed forces, the marine corps and veterans. In figure 6 this quality is rated on a scale from 1, very poor, to 10, excellent. These ratings have also been obtained for meeting colleagues of the deployed unit during a reunion.

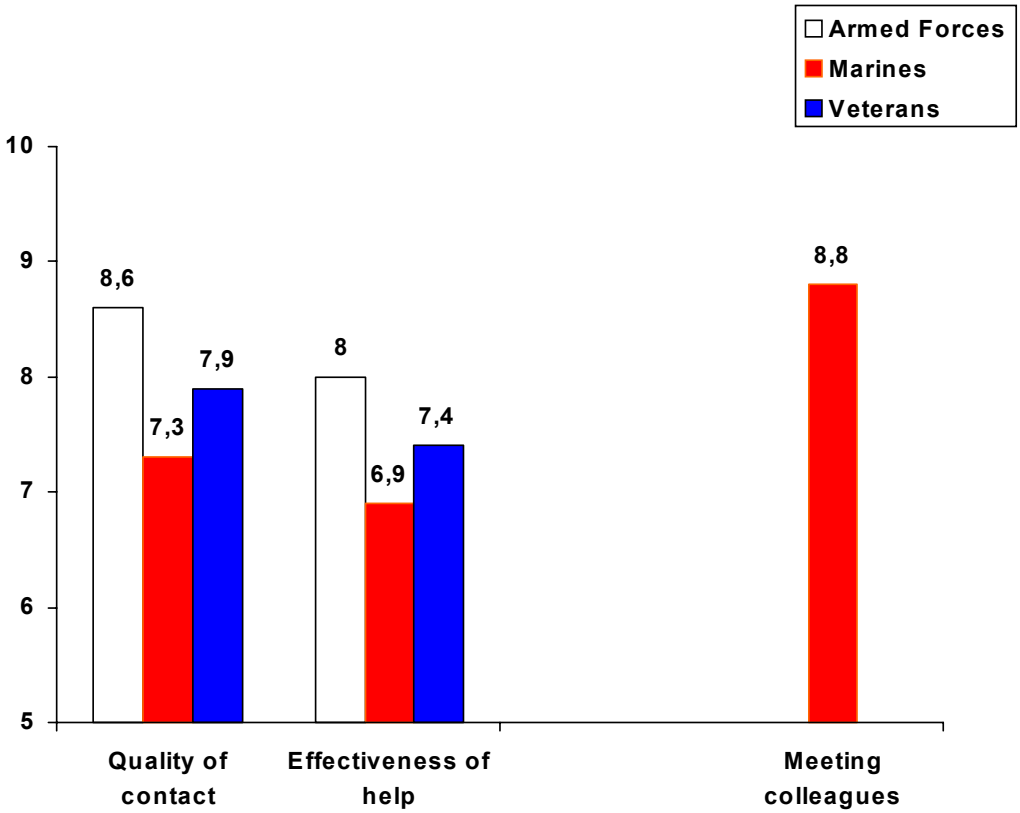

Figure 6: Ratings of Quality of Contact, Effectiveness of Help and Meeting of Colleagues Among Armed Forces Personnel, Marines and Veterans (1=Very Poor, 10=Excellent).

From figure 6 it appears that the quality of contact is rated higher than its effectiveness. The quality of social work for the marine corps can be slightly improved. However, on both aspects of the quality of social work the ratings are quite satisfactory. Meeting colleagues of the deployed unit at a reunion is rated even better. For the policy on mental health care these results indicate that contact between member of the deployed unit should be fostered. In measuring this need for contact, the need for sharing positive experiences of the deployment appears to be the strongest predictor of this need for contact (Mouthaan, Eeuwema and Weerts, 2002).

SELF-HARM AND VIOLENCE IN THE POST-DEPLOYMENT PERIOD. WHEN DOES THE WAR STOP?

In 1975, the United States of America ended their war in Vietnam. More than 3 million American soldiers served in Vietnam mostly for a tour of duty of one year (Shephard, 2001, p. 340). Of these soldiers approximately 57.000 were killed in action, a much larger number was wounded in action and an unknown number is still missing in action. Many stayed physically impaired, due to their injuries. In the years after 1975, a still unknown number committed suicide, or was killed in violent deaths.

Box 1

The aftermath of Vietnam first really claimed public attention on the 30th of April 1970, the day that Sergeant Johnson was shot.

In Vietnam, Sergeant Dwight Johnson had won the Medal of Honor, the United States' highest decoration for valor, for single-handed knocking out twenty enemy soldiers during a raid on his position. He had then served with distinction for another two years, but on returning home, found difficulty in readjusting to civilian life. He became convinced that the Army exploited all black soldiers and made no effort to help them afterwards: Army psychiatrists did not change this view. His frustration grew until he decided to deploy in his rundown Chicago neighborhood skills he had shown in Vietnam. He was robbing a liquor store when he was killed (Shephard, 2001, p.357).

In the case of Sergeant Johnson, courage in action is accompanied by an overt act of cowardice after return in civilian life. Less overt or even strictly hidden are some psychosocial aspects of the after deployment life. Not all behaviors from the deployment period as committing war-crimes, atrocities or the mere survival of the deployment are public knowledge. Hendin and Pollinger-Haas (1991) conclude in their research on suicide among Vietnam veterans that especially feelings of guilt, coming from surviving beloved comrades as well as from killing defenseless people like prisoners of war, elderly people, women and children, are the main reason for suicide. Killing out of fear or rage has the most distinct relation with suicide. Attacking enemy villages by order, in which also many civilians were killed, is less strongly related with guilt and suicide. They also found out that Vietnam veterans are between 11% to 65 % more likely to commit suicide than non-veterans. Their conclusion that feelings of guilt are the most powerful predictors of suicide resembles findings from research among veterans of the Second World War. The strong benefit of their study is that feelings of guilt appear to be intermediate between having killed people and suicide: these feelings were not identified as such in former research. Especially in psychotherapy for veterans these feelings of guilt have to be worked through, in spite of shame and hesitation of mentioning them. Until very recent, this shame and the importance of guilt do not receive the attention they deserve, and are also likely to be taboo (Meijer and Weerts, 2001).

BEHAVIOR IN THE BATTLEFIELD: FILTERS, ERRORS OF OMISSION AND ERRORS OF COMMISSION

From research among veterans it appears that in the battlefield situation, a change of mind occurs. When decisions of life and death are at stake the consciousness gets purified. Every distraction is filtered out and the mere survival of the battlefield demands full attention and utmost concentration. In such a state of mind, sensory perception is working at a maximum, encoding a lot of information from the battlefield together with a huge amount of sensory information. In meetings with veterans this aspects deserves full attention, once and again. The huge responsibility, coming from the 'life and death' decisionmaking, might even decrease the value of everything else in life. In returning from an 18 month deployment in the Far East, a Dutch veteran at the age of 22 concluded: "In the rest of my life, there won't be anything more significant than what I have been through in the last one and half year". The documentary "First Kill" of Coco Schreiber even shows veterans addicted to the power of deciding over life and death (Algra and Meijer, 2002).

An important aspect of this change of mind is the filtering of information. In bombarding Baghdad during the first stage of operation Desert Storm in the Gulf War in 1991, a fighter pilot declared in a CNN interview, right after return on his airbase: Baghdad lit up like a Christmas tree, it looked like the fireworks at the Fourth of July´. There is no need for interviewing citizens of Baghdad to conclude that his information has been filtered. On the other hand, this filtering of information is necessary to perform and survive. Therefore, in preparation for war, the mindset of military personnel is being cleared in very

simple schemes. The enemy is dehumanized, nicknamed and brought back to distinct features, which contributes to a mindset that allows to kill them in large numbers and with the use all of the human intellect in torture and suppression. In the post-deployment period, careful attention should be paid to these filtering mechanisms, in which step by step the filtered view can be enriched by more accurate information. In meeting veterans and therapy for veterans the errors of omission, coming forth from this filtering, can be worked through by paying attention to all sensations of the battlefield. Also the mere asking of the simple question: "Is that all, you want to share with me?" can reduce the errors of omission (Van Dam, 1991). By debriefing events and operations group-wise, errors of commission (Van Dam, 1991) might be prevented quite easily too. Especially when there is a dominant culture of masculinity, in which performance and pride are being emphasized, the seduction to remember bravery that never took place can hardly be withstood. In the documentary Crazy from Heddy Honigmann the masculinity culture of performance and pride is creatively encountered by asking veterans for their memories of the music they often heard when the were in action. A more complete recollection of the situation and a more extended processing of all kinds of reactions is possible then, which is rewarding for both veterans, their therapists and researchers.

PSYCHOSOCIAL ASPECTS OF THE POSTDEPLOYMENT PERIOD: UNEMPLOYMENT, DIVORCE, POSTTRAUMATIC STRESS AND SUICIDE

Kramer et al (1992) included into the subject of suicide also life-threatening behaviours, like motor accidents, shootings alike in box 1 and overdoses of alcohol and drugs. They also included thoughts of death and dying into their research. Figure 7 shows some of their findings about thoughts of death and dying and thoughts of suicide among non-patients, a therapy-group of veterans and an outreach group of veterans.

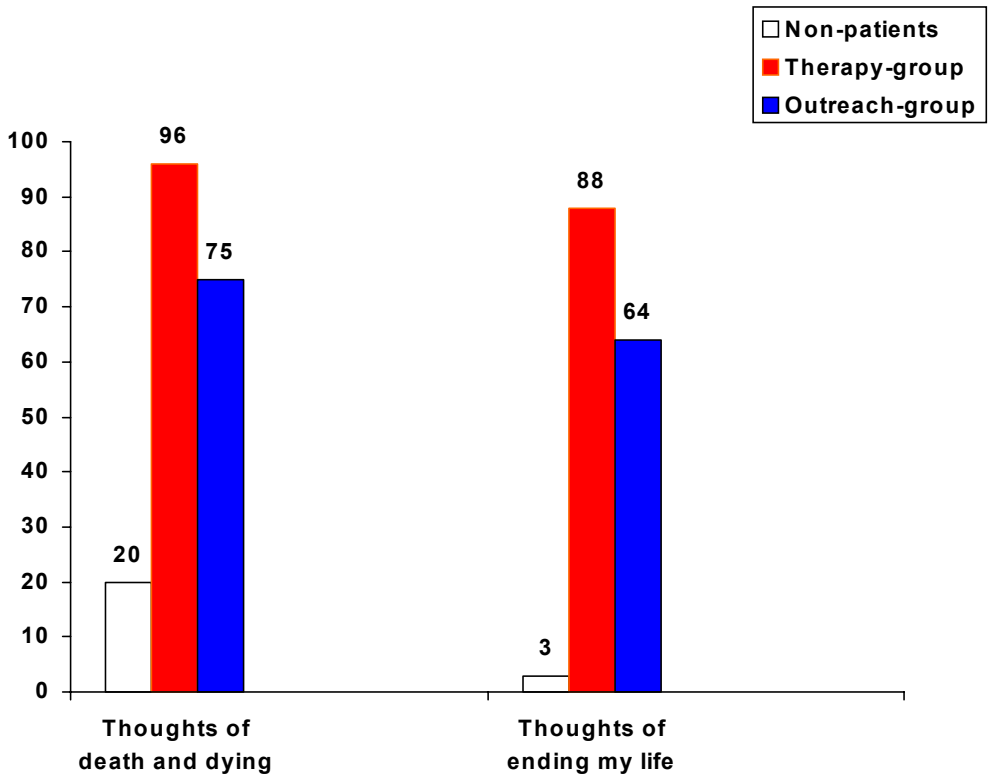

Figure 7: Thoughts of Death and Dying and Thoughts on Ending My Life Among Non-Patients, Veterans in Therapy and an Outreach Group of Veterans (Kramer et al. 1992, P.66).

From figure 7 it appears that veterans in therapy think most of death and dying and suicide. Remarkably, the outreach-group has the strongest psychosocial problems, like unemployment and divorces, as shown in figure 8.

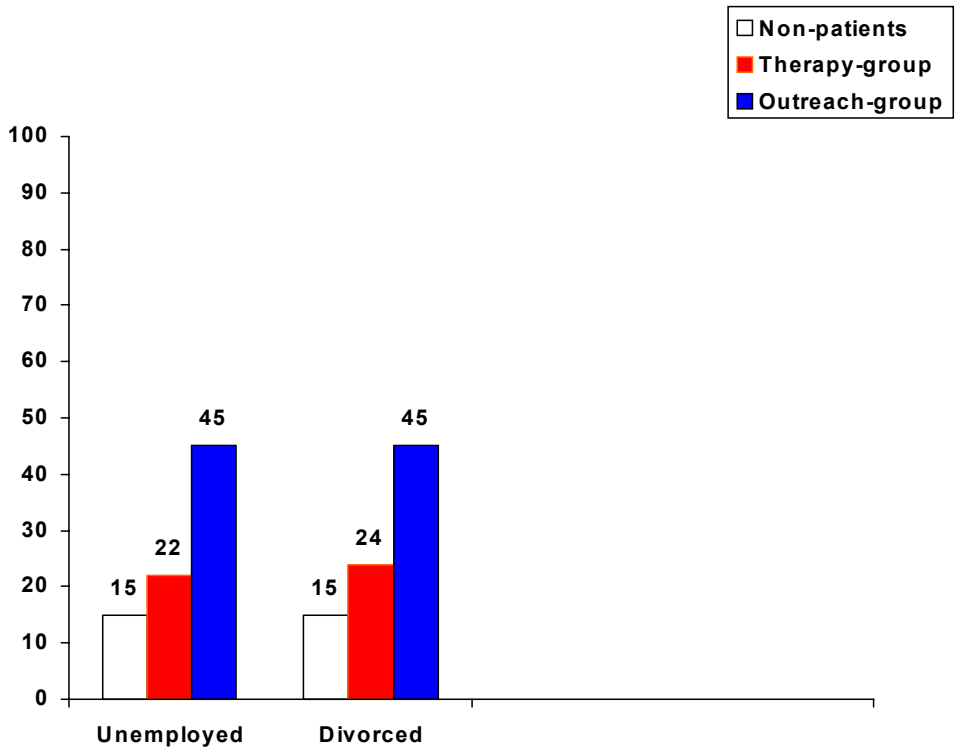

Figure 8: Percentages of People Unemployed or Divorced Among Non-Patients, Veterans in Therapy and an Outreach Group of Veterans (Kramer et al. 1992, P. 62).

Kramer et al. do not offer an explanation for the differences between psychological and psychosocial problems among these groups. Probably the fact that in therapy there is much focus on trauma, events in which death often plays an important role, can explain why the in group in therapy reports more thoughts of death, dying and suicide. The outreach-group can have more severe psychosocial problems, because in many cases partners or colleagues of veterans stimulate veterans to go in therapy. Once these partners have been lost by divorce or loss of employment, veterans will not reach therapy. At the end of the day, both figures demonstrate very clearly that veterans in therapy and the outreach group have severe psychological and psychosocial problems. At the end of last year, also in Great Britain signs have been seen that homelessness and 'rough sleeping' are bitter reality for ex-serviceman (Satchell, 2002).

Wang et al. (1996) describe the cyclical process of Post Traumatic Stress Disorder (PTSD). This psychiatric disorder follows a traumatic event and consists of intrusion of memories of the event, avoidance of triggers related to the event and a high level of arousal, often leading to overt aggression and hostility, even to relatives and friends. In their model Wang et al. connect PTSD with the stages of grief and mourning as described by Horowitz (1978). These stages are emotional outcry, denial, oscillation between reacting and numbing, acceptance and solution (Horowitz, 1978). In these stages, the oscillation between reacting and numbing seems to be most beneficial for reaching the final stage of solution (Epstein, 1989). Meijer and De Vries (2001) concluded on their help to veterans that especially very opposite reactions on very different aspects of a situation have to be discovered and worked through. For instance, veterans who survived an air-raid in their Mitchell B-25 during the Second World War have to experience the relief of survival (aspect 1), next to the fear of almost being killed (aspect 2) and the

grief of losing so many comrades (aspect 3) whom have been less lucky (Meijer and Weerts, 2002). Figure 9 shows these connections between aspects of events and the reactions of veterans, divided into observations, behavior and feelings.

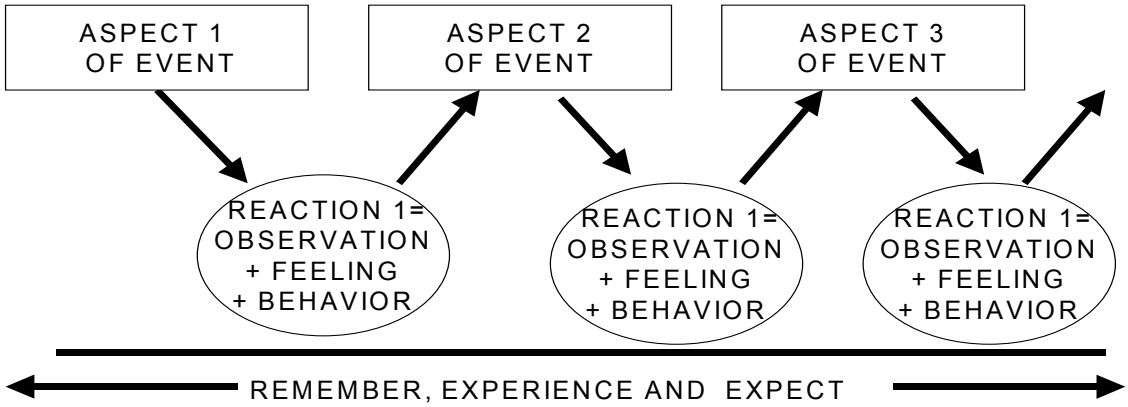

Figure 9: Connections Between Aspects of Events and Reactions, Which Consist of Observations, Feelings and Behaviors (Meijer and De Vries, 2001).

The model for encountering experiences of veterans in meetings and therapy in figure 9 reveals the fruitful connection of facts at the upper level and feelings at the lower level. Both facts, feelings and behaviors deserve attention in care and recognition for veterans.

LONG TERM ASPECTS OF THE POST-DEPLOYMENT PERIOD: RUNS, BUNKERS, VIOLENCE AND PRISON

Wang et al. (1996) found out that in more long-term life-stages, adaptation to demands of every day life can be followed by a stage of surviving, in which general functioning is being impaired. In crossing the threshold to decompensation, veterans loose their jobs and divorce, due to behaviors that vary between utmost excitement (runs) and total isolation (bunker), in which every perspective of the future is being lost. The next and last stage is regrouping or getting lost. Veterans regard this last stage to be very similar to the stage after the battle in a combat zone, in which comrades are being found or lost. In addition to the immense feelings of relief and grief from their past experiences, also the run and bunker behaviors add strong feelings of guilt and shame from their present behaviors. In that stage, for many veterans death by suicide or violent behavior seems the only way out. We strongly agree with the authors that this cyclical character needs attention in both therapy and research. The authors also note that medication only offers a temporary solution and that the majority of Vietnam veterans has strong relational problems and up to 70 % of them has been divorced (Kulka et al, 1990). Therefore we invite other researchers to do more research on long-term effects of PTSD.

From research of the bureau of Justice Statistics in the United States it appears that veterans are in prison for violent offences more often than non-veterans are in prison (Mumola, 2000). Figure 10 shows the percentages of offences of veterans and non-veterans in State prisons in 1997.

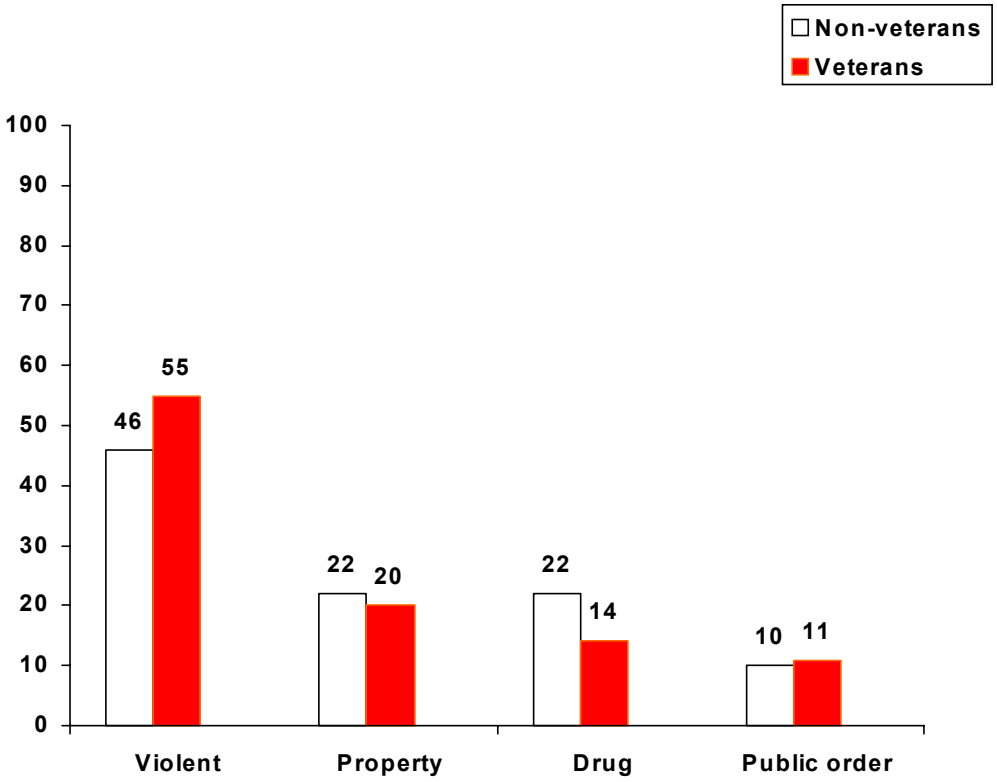

Figure 10: Percentages of Offences of Veterans and Non-Veterans in State Prisons in 1997. Source: Bureau of Justice Statistics, January 2000.

From figure 10 it appears that 55 % of the veterans in State prisons have been sentenced for violent offences, compared to 46 % of non-veterans. About 35 % of veterans in State prisons were convicted of homicide or sexual assault, compared to 20 % of non-veterans. Among violent State prisoners, the averaged sentence of veterans was 50 months longer than the averaged sentence of non-veterans (Mumola, 2000). The increased arousal among veterans, as part of PTSD, can explain this more violent character of some veterans. It is also possible that they are more apt to the use of weapons as a violent solution to conflicts, coming from their war-experiences. Box 2 shows a sad example of such violence and self-harm.

Box 2

Self-harm and violence after deployment in the war on terrorism in Afghanistan.

On June 10 2002, Sergeant First Class Rigoberto Nieves, a member of the Third Special Forces Group who had returned from Afghanistan two days earlier, shot his wife and then himself. He had requested leave from duty in Afghanistan to resolve personal problems.

On June 29 2002, the wife of Master Sergeant William Wright of the 96th Civil Affairs Battalion, a Special Forces Unit, was strangled. Wright, who had been back from Afghanistan about a month, was charged with murder.

On July 19, Sergeant First Class Brandon Floyd killed his wife and then himself, according to investigators. Floyd was identified as a member of the Delta Force, a crack anti-terrorism unit, whose existence is not officially acknowledged.

Washington Post, July 27, 2002, page A03.

Wong et al. (2001) conclude on their research among Canadian veterans of UN-peacekeeping operations that these veterans are not more likely to commit suicide than other Canadians of the same age. In our opinion, they ignore the fact that military personnel are selected upon physical and psychological health. Therefore, their research hypothesis should predict less suicide among military personnel than among civilians. Upon this hypothesis their results support the conclusion that participation in peacekeeping operations increases the likeliness of suicide. It is a pity that the authors ignore this 'healthy worker effect'. They do conclude that the likeliness of suicide increases among airforce personnel that have been participating in peacekeeping operations. Airforce personnel are being rotated very frequently and often on an individual rotation-schedule. Further on, there are indications that some of the Canadian military personnel participate in peacekeeping operations as often as possible, because of the rewards and bonuses upon their normal wages, which can be interpreted as risk-taking behaviors. These indications need more careful investigation.

DISCUSSION

From the psychosocial and behavioral aspects of the post-deployment period as described above, it can be concluded that for some veterans a war never stops, not even after it is over. The experiences are of such impressiveness, that they affect a lot of the life in the post-deployment period. In the Netherlands armed forces, a lot of activities of mental health care have been developed. However, the response on these activities has to be improved, including feedback on these activities to the participants. On the results of research among UNIFIL veterans and Vietnam veterans we conclude that these deployments increase psychosocial and psychological problems, especially among outreach-groups of these veterans. Therefore, it is recommended to optimize mental health care, both during deployments and in the pre- and post-deployment period.

However, a vast majority of veterans copes with everyday life excellently. Not all of these experiences are that negative and even a lot of negative experiences are being coped with in an excellent way. People can even grow and mature from their experiences in war: they have learnt to risk their lives and survive in very difficult and threatening situations. They have been connected to their comrades in a very intimate manner and share a lot of unique experiences. They often benefit from their war experiences and are very successful in everyday life. One of the former Prime Ministers of the Netherlands is a veteran, who has been commanding officer of a submarine during the Second World War.

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Evaluation of Individual Readiness of Georgian Military Personnel for Military Operations Using the "Theory of Predisposition" by Georgian Psychologist Dimitri Uznadze (1889-1950)

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INTRODUCTION

Georgian Armed Forces is been forming now. One the main problem of reformation process is soldier selection for the different military tasks. Recruiting is usually very difficult problem in Obligatory Military Service. Many young men escape this service. Absence of military service motivation is the main cause of this problem. Why does it exist in Georgia? Historically, Georgian people are very patriot, brave and the whole history of nation is overcharged by the wars for independence and territorial integrity. By our mind this problem is the product of last period of Georgian history: 200 years of Russian annexation and Soviet period. In addition, there is one particular Georgian character: attachment of young men to his parents and home situation. Recruiting and separation from one's family changes the lifestyle of young man: his being, environment, physical activity etc. These changes seriously influence on his psychic: on conscious as well as on under-conscious level. That may involve different problems of recruit's adaptation to Army life.

Participation in military operations is potentially harmful to the mental health. There may be hard psychological stress, moreover in the country such as Georgia: with conflict zones, strained political situation and decreased social level.

To avoid or reduce psychological and physical injuries caused by military service and military operations, first of all, it is very important to select soldiers correctly for military tasks and certain operations. Military personnel's adaptation is based on person's psychological and physical adaptation capacities. Each person has "**individual readiness**" to concrete military operation, as well as to common military service. We have dared to unite two concepts under this term: ***Psychological Readiness*** and ***Physical Readiness***.

Paper prepared for the RTO HFM Symposium on "NATO Force Health Protection Requirements from Pre- to Post-Deployment: Population Health for the Military", which was to have been held in Antalya, Turkey, 7-9 April 2003, and is now published in RTO-MP-109.

This phenomenon determines process of personal adaptation.

Study of Mechanisms of persons' **Psychological Adaptation** to environment is the main problem of "Theory of Disposition" by D. Uznadze.

Psychological adaptation is based on the structural characteristics of a person. Each person who has his own particular requirements, psychic processes and functions, has its own particular attitude to environment. This is the basic personal characteristic. Comprehension of psychological stresses, their force and characteristics, is also strongly individual.

The environment doesn't cause directly the action of a person. It influences on the personal requirement complex and provokes its total modification, according to the environmental situation and creates determined **actual disposition**. Thus, the action of person is determined by integrity of his actual requirements and by the situation – according to this requirement. "**Disposition**" by Uznadze is the so-called "interim link" between **stimulus** and **reaction**. It always passes ahead of action. Disposition is the determinant of each personal activity, as a specific dynamic position. Disposition is the persons' under-conscious psychical condition that determines his conscience during the whole life.

The main phenomenon in the Theory of Uznadze is the concept of "**Fixed Disposition**". This phenomenon is also known as "**Effect of Uznadze**".

In the processes of studying person's structural characteristic the main thing is determination of dynamics of its psychological status and emotional-effective sphere.

The Recruiting means very important change of young men's usual life style. Each of them comprehends these processes differently according to his personal characteristics. Thus, their reaction is different.

For one group this is a hard stress and for adaptation they need to make great efforts.

Some activities of military service demands quick reactions from a soldier. It depends on his personal characteristics. These difficulties may reduce team effectiveness in military operations, that's why psychological study by testing in advance gives us the possibility to create the recommendations for realization each soldier's ability correctly.

Physiological Adaptation is based on **Physical Fitness** of person. That indicates physiological readiness of any type of activity. One of the basic components of physical fitness is Aerobic Fitness. It plays a decisive role in the performance of aerobic activities, such as running and long marches. The most common measurement of aerobic fitness is maximum oxygen consumption (VO_{2max}): function of both maximum delivery and utilization of oxygen. This is still the most widely used parameter of aerobic fitness. Measurement of provides an indirect assessment of the capacity for energy generation. Untrained individuals have a threshold on exercise intensity of about 50% of VO_{2max}.

While highly trained endurance athletes will have thresholds of about 70% to 90% VO_{2max}. Aerobic exercise training can increase the subjects VO_{2max} substantially, and it can also result in a higher anaerobic threshold. Due to training, generally increases 10%-20%.

Some factors influence aerobic fitness, such as age, gender, initial fitness level and heredity. It is very intriguing topic influence of genetically determined personal characters on the aerobic fitness, individual's adaptation to aerobic fitness training. This idea was the source of our research. We try to find any relations between individual's "disposition" and physiological adaptation to certain activities.

Materials

It was investigated 60 healthy, non smoker men, aged 18-25 years. This group was chosen in the Battalion "Commandos" (Georgian Armed Forces), in which physical training program is adequate, according NATO standards, there is used basically aerobic training: running, cycling, marching, swimming, etc.

This group was investigated in three steps:

1) Soon after recruiting;
2) 3 month later recruiting;
3) 6 month later recruiting.

Study was not finished. We are going to continue it in the period of a year and then compare the data from different military tasks.

Methods

1) **Anthropometry**: some standard parameters were measured: height, weight, chest perimeter, weight/height ratio, % ideal body weight, % usual body weight, arm circumference, % standard arm circumference, triceps skinfold, % standard triceps skinfold, arm muscle circumference, % standard arm muscle circumference.

2) **Investigation of cardiovascular system function: HR, T/A, EKG, Echocardiography.**

3) **Aerobic fitness study was conducted using Veloergometer "cardiolife-98", VO_{2max} was evaluated.**

4) **Clinical conversation using psycho-social individual questionnaires**, with help of these it is possible to determinate:
   a) Hereditary susceptibility to illness;
   b) Attitude, or devotion (adherence) to the pernicious habits;
   c) Personal characteristics, dominant strains;
   d) Hobbies; etc.

   With help of these investigations were chosen the homogeny group, as it was possible.

5) **Study of "Fixed Disposition" by Uznadze ("Uznadze's Effect")**:

   Above mentioned group was evaluated with this method and divided into some psychological types.

   The method of fixed disposition studies the particularities of persons' psychic adaptation. The classic "method of fixed disposition" is based on the possibility to make occur perception's illusions in haptic sphere (e.g. in the sphere of tactile determination of sings' volumes) in investigated person. There exist three types of disposition (depending on illusions' character, origin and disappearing, according to the persons' capacity to release himself from illusions and releases him fluently or not): dynamic, static and variable.

   - Persons with **dynamic** disposition have the adequate psychological adaptation to environment. They are sociable, energetic persons, who adapt easily to life conditions.
   - Persons with **static** disposition are conflict able, they have difficulties to adaptation.
   - **Variable** type of person is impulsive. It reacts differently on the same irritants and stimulus. He is overcharged by realized dispositions and modifications.

Besides that there exist the following parameters of fixed disposition: **plasticity, stability, lability**.

- **Cruel (or hard)**: includes elements of conflict ability in the form of personal **rigidity, dominancy**.
- **Plasticity** is the opposite personal quality, which assures more successive psychological adaptation.
- **Stability-lability** corresponds to steadiness of disposition in the time.

Each type of character corresponds to exact personal characteristics.

Types of Fixed Disposition by Uznadze

1) Dynamic-plastic;
2) Cruel-dinamic;
3) Plastic-static;
4) Cruel-static;
5) Variable-labil;
6) Variable-stable;
7) Zero-type.

Abridged (adapted) method was used, that takes only 2 days; it was realized in two stages:

1) **Dispositional experience**: two globes of same weights and of different sizes were used: (d=85mm) and small (d=55mm). This stage serves for reproduction and actualization of the disposition.
2) **Critical experience**: serves for production of a new disposition on the base of existing ones. In case of 5 perceptions of "equality", this experience finishes.

By the abridged variant of experience was determinate minimum and optimum of disposition. Next day was determinated investigated dispositions' stability and its constancy.

Lusher's Test of Color Priority

Was used for study of emotional-affective sphere. It gives the opportunity to evaluate **actual emotional condition** of investigated person. To state the correlation between the emotional statement, external and internal activities and dynamics of personal manifestation: self-evolution, interpersonal comprehension. Lusher's method is based on the Color Symbolic. The simple variant of this method carry out by using 8 color quadrates. Each color symbolizes the particular character:

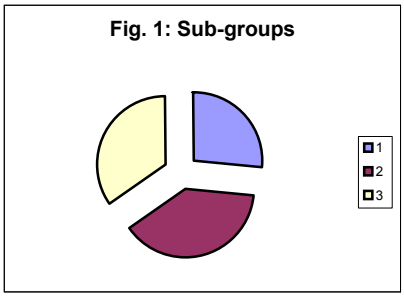
- **Blue:** peace, relaxation, meditation. If investigated person chooses this color, it seems that he needs peace and rest. If person ignores it, he escapes relaxation. In case of tendency to diseases blue colors' demand increases.
- **Green:** contains latent energy, reflects the will efforts' degree. Persons choosing the green color strive for self-confidence. Persons with physical and psychical exhaustion (emaciation), extravagant and eccentric persons, who get their goals by emotional explosions, usually ignore green color.
- **Red:** symbolizes excitation, energy; symbol of erotic. Persons with physical and psychical exhaustion (emaciation) usually ignore red color. It is preferable for teenagers and young men.
- **Yellow:** tenseness, expectation for relaxation and unloading.
- **Violet:** symbolizes infantilism and suggestibility, support need. Ignorable for intellectually developed persons and artists; preferable for teenagers.

- **Brown:** symbol of primitivism. It is well known that drug abusers prefer brown.
- **Black**: symbolizes depressive condition, aggressive attitude to whole world and himself. Normally black is ignorable color.
- **Gray**: Neutrality, border between person and feelings, emotional experiences. No psychological tendencies. Preferable for overtired persons.

Method is compact, takes a few minutes only. Express-analyze is easy for doctors.

Results

Conducted study showed, that on the base of Fixed Disposition Study investigated group was divided into the following sub-groups: On the basis of results were stated the disposition types of investigated persons:



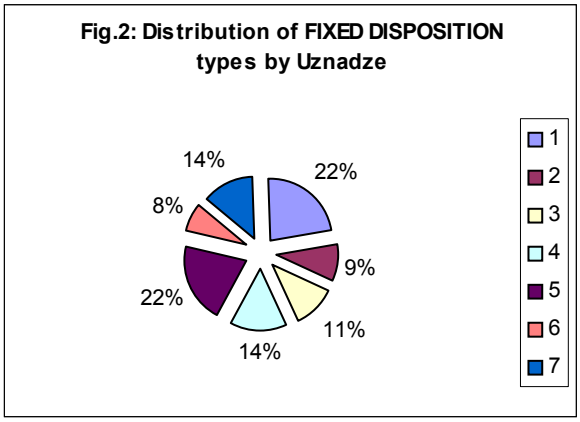
1) **16** persons with **static** disposition (**26.3%**);
2) **23** persons with **variable** disposition (**38.3%**);
3) **21** persons with **dynamic** disposition (**35.4%**).

Just as we have expected, the conformable personal characteristics – Parameters of Fixed Disposition were prevailed in each type:

- With **dynamic** types: ***plasticity*** and ***stability;***
- With **static** types: ***cruelty, personal rigidity, dominancy*** and ***stability;***
- With **variable** types: ***excitability*** and ***lability.***

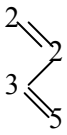
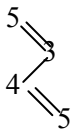
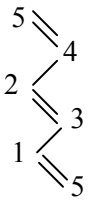
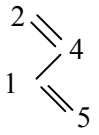
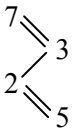
"Fixed Disposition Types" were distributed by following ratio:

1) Dynamic-plastic: 15persons;
2) Cruel-dynamic: 6 persons;
3) Plastic-static: 7 persons;
4) Cruel-static: 9 persons;
5) Variable-labil: 14 persons;
6) Variable-stable: 5 persons;
7) Zero-type: 9 persons.



Types of Fixed Disposition

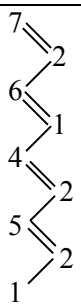
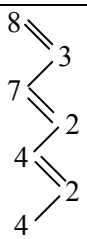
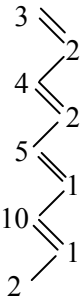
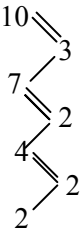
1) Dynamic-Plastic

I day			II day	III day
Optimum			Stability	Constancy
3	10	15		
				

2) Cruel-Dynamic Stable Type

I day			II day	II day
Optimum			Stability	Constancy
3	10	15		
				

3) Plastic-Static Type

I day			II day	II day
Optimum			Stability	Constancy
3	10	15		
				

4) Cruel-Static Stable Disposition

I day			II day	II day
Optimum			Stability	Constancy
3	10	15		
	30			30

5) Variable-Labil Disposition

I day			II day	II day
Optimum			Stability	Constancy
3	10	15		
2 ⟍ 5	3 ⟍ 3 2 ⟍ 5	4 ⟍ 3 5 ⟍ 3	= 5	6 ⟍ 3 5 ⟍ 2 6 ⟍ 3 5

6) Variable-Stable Type

I day			II day	II day
Optimum			Stability	Constancy
3	10	15		
5 ⟍ 5	7 ⟍ 4 5 ⟍ 4 3 ⟍ 2 5	12 ⟍ 5	8 ⟍ 5	15 ⟍ 5

7) Zero Disposition

I day			II day	II day
Optimum			Stability	Constancy
3	10	15		
= 5	= 5	= 5	= 5	= 5

1) On the 1st step of investigation (soon after recruiting): the results turned out showed that in these three subgroups the basic aerobic fitness level was not evidently different. The mean quantity of VO_{2max} was 11.5±1.4 MET (Metabolic Unit). But slight tendency to lower indices was appear with variable type group.
2) Groups' investigation 3 month later after recruiting was shown that VO_{2max} was increased but not evidently. However it was possible to detect some tendencies (Fig. 3):
   - VO_{2max} was improved much more better with Dynamic-plastic, plastic-static and zero-types;
   - VO_{2max} was not improved significantly with cruel-static and variable-stable types but it was detected some tendency to this direction;
   - With variable-labil and cruel-dynamic types generally was not improved and there were detected some cases of indices decreasing.

	I Step	II Step	III Step
1. Dynamic-plastic	11.6±1.2	13.4±1.4	15.1±0.7
2. Cruel-dinamic	10.8±2.1	11.1±0.9	12.7±1.4
3. Plastic-static	11.2±1.6	12.8±0.9	14.1±1.1
4. Cruel-static	10.2±1.8	11.2±1.2	12.6±0.6
5. Variable-labil	11.1±2.8	10.2±2.0	14.5±0.9
6. Variable-stable	12.4±1.4	13.0±1.3	15.0±0.6
7. Zero-type	11.7±1.3	13.1±0.8	14.2±1.3

Figure 3

3) On the base of 6 month later investigation data we may detected:
   - The significant improvement of VO_{2max} with dynamic-plastic, plastic-static and cruel-dynamic group;
   - Variable-labil and Cruel-dynamic types improve their aerobic fitness more better than cruel static and variable-stable types.

CONCLUSIONS

1) Given complex of investigation has some priority:
   - For doctors: it is easy for conduct, informative, cheap;
   - For investigated person: easily comprehensible;
   - Takes no long time;
   - Possibility to conduct them at the place of Military tasks dislocation, as a screening method.

2) According this data, we may suppose, that personal disposition determines psychological readiness to action and adaptation process. At the same time it influences significantly on physiological adaptation processes.

3) After wands, the complex of recommendations were worked out for each psychological type and if needed the plan of psychotherapeutic work with them.

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Analyse de la mortalité chez les militaires belges déployés dans les Balkans

(Analysis of the Mortality among Belgian Military Deployed in the Balkans)

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RESUME

Dans le cadre de la recherche de l'existence d'une morbidité spécifique liée aux missions dans les Balkans, nous avons émis l'hypothèse que cette morbidité éventuelle pouvait avoir un impact sur la mortalité chez les militaires partis en mission en ex-Yougoslavie. L'incidence de la mortalité des 14851 militaires belges partis en mission de maintien de la paix dans les Balkans durant la période 1993-2000 a été analysée et comparée avec celle des 4071 militaires ayant participé à d'autres missions comparables mais en dehors des Balkans. Une comparaison a également été faite avec 45651 militaires non-déployés. Résultats : dans le groupe Balkans, 91 personnes sont décédées durant la période considérée, 45 dans le groupe déployé hors des Balkans et 793 pour les militaires non déployés. Après ajustement pour l'âge, les taux de mortalité standardisés, en prenant comme référence la population belge, sont de 56 (Intervalle de confiance [IC] 95% 46-69) pour le groupe Balkans, de 75 (CI 95% 70-80) pour les militaires non partis en mission et de 87 (CI 95% 65-116) pour les militaires déployés hors Yougoslavie. Conclusion: Nous n'avons pas observé d'augmentation de la mortalité dans la cohorte de militaires belges déployés en ex-Yougoslavie

1.0 INTRODUCTION

Dans le cadre de la recherche de l'existence d'une morbidité spécifique liée aux missions dans les Balkans, nous avons émis l'hypothèse que cette morbidité éventuelle pouvait avoir un impact sur la mortalité chez les militaires partis en mission en ex-Yougoslavie. C'est la raison pour laquelle nous avons entrepris une étude de mortalité.

2.0 MATERIEL ET METHODES

Trois cohortes ont été définies : le groupe d'observation et deux groupes contrôle :

- les militaires partis en mission dans les Balkans avec comme point d'entrée dans la cohorte l'année de la première mission (groupe cible = groupe Balkans – 14.851 personnes)
- les militaires partis en mission hors Balkans avec comme point d'entrée l'année de la première mission (groupe non-Balkans – 4.071 personnes)

Communication publiée dans RTO-MP-109, initialement destinée au Symposium RTO HFM sur « Les besoins des forces de l'OTAN en matière de soins de santé, du prédéploiement jusqu'au post-déploiement : la santé des populations pour les militaires » qui aurait dû être organisé à Antalya, en Turquie, du 7 au 9 avril 2003.

- les militaires non-déployés avec comme point d'entrée 1993 pour les sujets qui étaient déjà militaires en 1993 et l'année de l'engagement militaire pour les sujets engagés après 1993 (groupe non-déployé – 45.651 personnes)

La cohorte Balkans a été construite de la manière suivante : une liste du personnel militaire parti en mission dans les Balkans est constituée et maintenue à jour par le Centre Opérationnel de la Force Terrestre (COFT). Cette liste est établie sur base des militaires qui transitent par l'aéroport militaire de Melsbroek vers les Balkans ou de retour des Balkans. Cette liste comprenait 15207 personnes au 31 décembre 2000. Parmi celles-ci, 14851 avaient des données administratives suffisantes pour pouvoir les inclure dans la présente étude. La liste du COFT peut être considérée comme exacte à 90-95%. En dehors de cette liste, 613 personnes, non reprises dans la liste du COFT et au courant de l'étude Balkans se sont manifestées spontanément en envoyant un questionnaire concernant leurs plaintes éventuelles dans le cadre d'une autre étude. Pour ne pas introduire de biais, ces 613 personnes – toutes vivantes – ne sont pas incluses dans l'étude de mortalité. 14851 personnes sur les 15820 participants connus sont donc incluses dans la présente étude.

Le choix des deux groupes contrôle militaires est justifié pour la raison suivante :

Le groupe de militaires non-déployés constitue un groupe important avec près de 45000 personnes depuis 1993. Cependant étant donné que les militaires partant en mission sont sélectionnés parce qu'ils sont en bonne santé (healthy warrior effect), nous avons également analysé la mortalité des militaires partis en mission hors Balkans. Il s'agit surtout de para-commandos qui ont été déployés en Afrique (Rwanda, Somalie, Congo) et dont le niveau de santé est en principe le meilleur.

Comme référence externe, nous avons utilisé les statistiques nationales belges de mortalité (année 1995 / sexe masculin). [1]

La mortalité a été étudiée sur base du Registre National pour la période s'étalant de Janvier 93 à Décembre 2000. Pour chaque décès a été notée la date de décès. Ont été exclus de l'étude les personnes décédées de mort violente en mission (« Killed in Action – KIA » et « Non-Battle Injuries – NBI »).

Les personnes étaient considérées à risque depuis leur entrée dans la cohorte jusqu'à la fin de l'observation (fin 2000). Nous avons ainsi établi année par année et pour les différentes catégories d'âge, quelle était la population à risque et le nombre de personnes décédées. En additionnant les personnes à risque pour les différentes années entre 93 et 200, nous obtenons par catégorie d'âge, le nombre de personnes-années à risque (Tableau 1).

Tableau 1 : Nombre de personnes-années à risque par catégorie d'âge pour la période 1993-2000

Age	Ops Balkans	Ops non Balkans	Non Ops
10-19	137	29	3,329
20-29	24,972	5,794	79,689
30-39	36,817	8,112	126,339
40-49	13,195	4,128	76,351
50-59	3,375	1,908	45,269
60-69	108	128	6,476
70-79	0	0	24
TOTAL	**78,604**	**20,099**	**337,477**

Ces données (nombre de décès et population à risque) ont permis de calculer le taux de mortalité et de comparer le taux de mortalité des militaires dans les Balkans avec les groupes contrôle de militaires ainsi qu'avec la population belge. Sur base de ces données nous avons déterminé un taux de décès annuel moyen pour chaque catégorie d'âge (taux annuel moyen de mortalité) et un SMR (Standardized Mortality Ratio). Pour ce dernier, il s'agit du nombre de décès observés rapporté au nombre de décès attendus sur base des taux de mortalité par âge de la population belge masculine de même âge. Un nombre plus petit que 100 signifie donc que le nombre de décès observé est inférieur à ce qui serait attendu si le taux de mortalité au niveau national était observé dans le groupe étudié.

L'identification des causes de décès s'est effectuée par enquête interne du Service Médical essentiellement ciblée sur les cancers et les causes de décès médicales.

Un certain nombre de causes de décès nous ont également été communiquées plus récemment par les services régionaux de la Santé Publique (Région Flamande et Région Wallonne) chargés de l'analyse des certificats de décès. Parmi ceux-ci les décès de tous les militaires décédés entre 1993 et 1999 en région flamande ont pu être analysés.

3.0 RESULTATS

Parmi les 14.851 participants aux missions dans les Balkans (78604 personnes-années), nous avons relevé 91 décès. Dans le groupe non-Balkans, le nombre de décès était de 45 (sur 4.071 personnes et 20099 personnes-années). Dans le troisième groupe, nous avons relevé 793 décès (sur 45.651 personnes et 337.477 personnes-années).

Pour chaque catégorie d'âge le taux annuel moyen de décès observés dans le groupe Balkans pour la période 1993-2000 est inférieur à celui de la population belge ainsi qu'à celui des militaires qui ne sont jamais partis en mission (Tableau 2).

Tableau 2 : Taux annuel moyen de mortalité par âge pour la période 1993-2000 et nombre absolu de décès

Age (ans)	**Groupe Balkans** Taux* – *(Nb décès)*	**Groupe non-Balkans** Taux* – *(Nb décès)*	**Non Déployés** Taux* – *(Nb décès)*	**Population Belge** Taux*
10-19	0	0	120 *(4)*	48
20-29	116 *(29)*	345 *(20)*	191 *(152)*	122
30-39	98 *(36)*	210 *(17)*	145 *(183)*	156
40-49	136 *(18)*	121 *(5)*	241 *(184)*	338
50-59	237 *(8)*	157 *(3)*	501 *(227)*	812
60-69	0	0	664 *(43)*	2089

* nombre de décès/100.000 personnes-années

Par rapport aux militaires ayant participé à des missions hors des Balkans, ce taux de mortalité est inférieur entre 20 et 40 ans. Au-delà de 40 ans, il y a une incidence légèrement augmentée, mais de manière non significative à cause de la taille trop limitée du groupe non-Balkans. La mortalité totale du groupe Balkans est cependant inférieure à ce groupe de contrôle.

Nous n'avons examiné s'il y avait une tendance à l'augmentation du taux de mortalité depuis 1993 (Fig. 1). A l'exception de l'année 1997, ce taux varie autour de 100 décès pour 100.000 personnes-années et est relativement stable en ce qui concerne le groupe Balkans. Ce taux reste également inférieur à celui des militaires partis en opérations en dehors des Balkans.

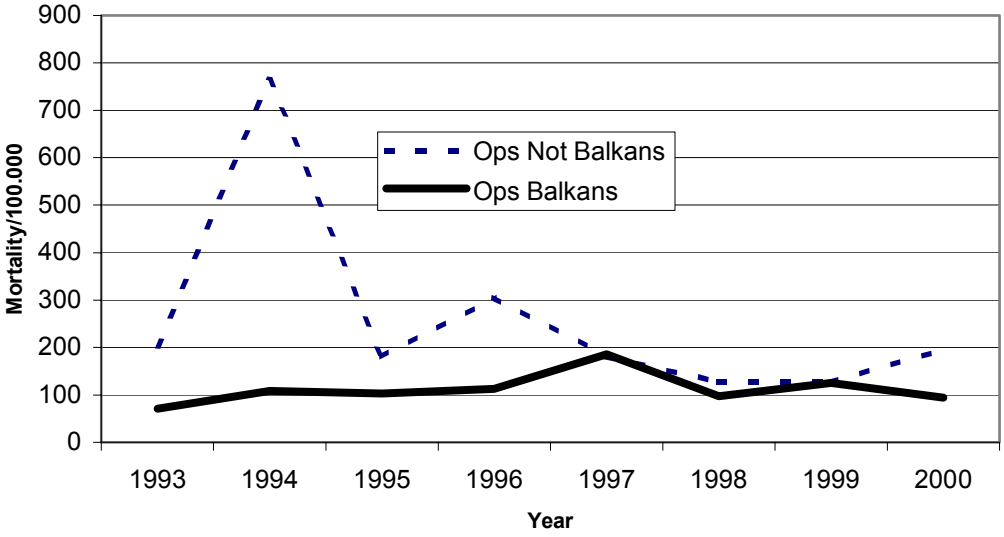

Figure 1: Evolution of Mortality Rate of Military Personnel (Death/100.000).

	1993	1994	1995	1996	1997	1998	1999	2000
Nb deaths								
Balkans	3	7	8	11	20	11	17	14
Not Balkans	2	12	3	6	5	4	5	8
Pop. at risk*								
Balkans	4194	6456	7793	9710	10746	11311	13543	14851
Not Balkans	988	1571	1664	1961	2758	3160	3926	4071

* personnes-années

Le SMR de chacun des trois groupes militaires en prenant comme référence la population belge est respectivement de 56 (Intervalle de confiance [CI] 95% 46-69) pour le groupe Balkans, de 75 (CI 95% 70-80) pour les militaires non partis en mission et de 87 (CI 95% 65-116) pour les militaires déployés hors Yougoslavie. Le taux de mortalité global du groupe Balkans exprimé par le SMR est le plus bas des trois groupes militaires.

Il est à noter que les morts violentes en mission (KIA et NBI) ont été plus fréquentes lors des missions effectuées hors des Balkans. Les opérations au Rwanda et en Somalie ont coûté la vie à 16 de nos militaires. Ce chiffre est à comparer aux 5 morts violentes en ex-Yougoslavie pour un groupe 3 fois plus important.

Concernant les causes de décès (hors KIA et NBI) chez les militaires revenus des Balkans, nous avons pu identifier la cause de décès chez 40 des 91 personnes décédées. Celles-ci se répartissent comme suit :

Tableau 3 : Causes de décès identifiées chez les militaires revenus des Balkans

Cause	Nb	%
Causes accidentelles	23	58%
Cancer	10	25%
Autres causes médicales	7	18%
Total	**40**	**100%**

Les causes accidentelles reprennent les accidents de circulation, les suicides et d'autres causes accidentelles. Les cancers proviennent d'organes divers : bronches, voies biliaires, colon, peau, testicule, sang. Parmi les causes médicales de décès, hors cancer, nous trouvons des étiologies diverses : sclérose en plaques, arrêt cardiaque, hémorragie sub-arachnoïdienne, anoxie cérébrale, décès accidentel lors d'un effort physique, effet secondaire de médicament.

4.0 DISCUSSION

Dans quelle mesure les causes connues de décès sont elles représentatives de l'ensemble des décès ? Peut-on s'attendre à une image différente pour les 51 décès non expliqués. L'analyse systématique des certificats de décès de la région flamande (1993-1999) nous apporte des éléments de réponse.

Les causes de décès de ce groupe de se répartissent comme suit :

Tableau 4 : Causes de décès pour les militaires Balkans en région flamande 1993-1999

Cause	Nb	%
Causes Accidentelles	18	72%
Accident circulation	*11*	*44%*
Autres accidents	*1*	*4%*
Suicide	*6*	*24%*
Causes médicales	7	28%
Cancer	*5*	*20%*
Autres causes médicales	*2*	*8%*
Total	**25**	**100%**

Par rapport à la population générale, la proportion d'accidents de la circulation mortels est plus importante (44% des décès vs 31% – pop. male 1995 région flamande – âge 15-44 ans). Cette augmentation des accidents de circulation après le retour de mission a également été observée chez les vétérans américains après la guerre du Golfe [4]. La proportion élevée de suicides (24%) ne se démarque pourtant pas de ce qu'on trouve dans la population générale (22% – pop. male 1995 région flamande – âge 15-44 ans).

Parmi ces 25 décès, nous observons 20% de cancer vs 31% dans la population flamande de 15 à 44 ans [1].

Nous avons pu constater que les cinq cas de cancers nous étaient déjà connus antérieurement par l'enquête effectuée par le Service Médical. Ceci tend à montrer que l'enquête du SM sur les cancers a été efficace et qu'on ne doit pas s'attendre à un grand nombre de cancers chez les 51 personnes pour lesquelles nous ignorons encore la cause de décès. En revanche la plupart des morts accidentelles nous étaient inconnues. Celles-ci devraient constituer une part plus importante parmi ces 51 décès non élucidés.

5.0 CONCLUSIONS

Chez nos vétérans, les chiffres de mortalité obtenus pour les militaires du groupe Balkans ne montrent pas un taux de décès supérieur à celui du groupe contrôle non déployé ni à celui de la population belge.

En ce qui concerne les causes de décès, nous n'avons pas trouvé, hormis les accidents de circulation, de cause de décès plus fréquente que dans la population belge. Une meilleure connaissance des causes de

décès encore inconnues nous paraît cependant indispensable, mais celle-ci se heurte à la confidentialité des registres de décès reprenant la cause de décès. Compte tenu de la latence possible de certaines affections, nous avons entrepris un programme pour continuer à monitorer les décès dans les années à venir. Des contacts ont été pris avec le registre national des décès et le registre du cancer dans ce sens.

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Health Monitor Instrument Six Month Post Deployment

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05062003 DEVELOPMENT OF A HEALTH MONITORING INSTRUMENT

ABSTRACT

In order to gain more insight in the prevention of health complaints of military personnel after deployment, the Dutch Ministry of Defense has appointed the Prevention and Health Department of the Netherlands Organization for Applied Scientific Research (TNO) to develop a new Health Monitoring Instrument (HMI). The aim is to draft a compact questionnaire, which should provide an indication of the general health condition of the individual soldier. By using the HMI exactly 6 months after the end of the deployment and by editing some questions explicitly about the deployment, it should be possible to use the questionnaire for monitoring both the general health condition and possible problems related to the deployment. Individual health profiles and derived group tables can be generated automatically by using the SPSS program. It is possible to draw up general health profiles with accessory risk profile. In case individual soldier scores a 4 or higher, it is advisable to investigate if special care, or intensifying present care, is desirable.

INTRODUCTION

In order to gain more insight in the prevention of health complaints of military personnel after deployment, the Dutch Ministry of Defense has appointed the Prevention and Health Department of the Netherlands Organization for Applied Scientific Research (TNO) to develop a new Health Monitoring Instrument (HMI). This instrument should preferable be used together with the already existing psychosocial questionnaire.

The urge to do more on health monitoring was originated on the several complains after the UN missions in Cambodia, Uganda en Bosnia in the nineties of last century. The minister of Defense installed several commissions (Mrs. Thiesinga was chairman in several of this commissions) to advise about improvements

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in the post deployment care. Since then a better structure for care for veterans was organized in the Netherlands, for instance a separated Institute for veterans. One of the advices was also to make a HMI.

GOALS

There were 3 goals formulated for the project. The first was to make a monitoring instrument in the form of a small questionnaire of no more than 10 pages. The maximum of pages was necessary because the questionnaire should be combined with the existing psychosocial questionnaire and too much paperwork could result in a too big non response.

The instrument was meant to be used to monitor the total health situation of every military post deployment.

The second goal was to develop an individual scoring system on which base for every single military a short health profile could be made. If a too high health risk profile is scored, the person can be invited for a further consult to determine if more or specific health care is necessary and / or wanted.

The third goal was to make a standard rapport in which on group level the health situation is described. This rapport can be used to compare different deployments or other parameters (like age and other personnel parameters).

THE WAY OF WORKING

To make a new questionnaire an inventory was made of information on health of military and the way that screenings instruments were used to get that information. A selection was made to get only those questionnaires, which could or should predict health problems in the post deployment situation caused by the deployment. The literature recherché was validated with the opinion of the defense public health experts.

Literature was also found in the special health problem investigations that followed specific deployments (Cambodia and UNPROFOR), and done by university institutes or TNO. The post deployment medical en social rapport's of the Royal Netherlands Navy and Royal Netherlands Army were used and the advice and suggestions that were given in the past to develop a generic health monitor instrument.

It appeared to be necessary to get more information on screening and on detection of health care problems. So, a Medline-search focused on health of military, Gulf War Syndrome, Chronic Fatigue Syndrome and generic instruments to monitor the health situation of groups of employers. On base of this information it was decided which indicators were the most appropriate to monitor the health situation of military. Baseline for the development of the HMI-instrument was to use as much as possible the standard scales and questionnaires, that are used in the civil community or in the military.

This makes it better possible to use the results of the questionnaires and compare them to the standards. The following surveys and questionnaires are (for instance) used for selection:

- The Veteran survey that was done by order of the Ministry of Defense (Bramsen et al, 1997),
- The post-deployment survey of the psychological department of the army (AIH) (Flach & Zijlmans, 1998),
- The Cambodia complain study (De Vries et al, 1998; 2000),
- The periodic health surveys that are used by the occupational health department of the army.

Because of the specific target of the HMI-instrument questions are added to gain insight in the different health risks during deployment, that can have influence on the health perception of a military. The different civilian health questionnaires and the selected instruments, with their possibilities and problems are discussed in the original rapport (TNO, 2003).

THE HMI-QUESTIONNAIRE

The Netherlands Defense organization wanted to have an instrument, which could give as well individual information as information on group level. On both levels there should be insight in:

- Prevalence of health problems post deployment;
- Changing in (number and sort) health problems post deployment;
- (Experienced) exposure to risk factors (not only focused on stress or psychological factors, but all factors that can potential influence health);
- The (social medical) health care needs, that are related to this.

The instrument had to be as compact as possible, to make it easier to combine the existing psychosocial questionnaire and keep the non-response as low as possible. The combination should not exceed 10 pages.

In the psychosocial questionnaire several items are asked, which are also necessary for the interpretation of the health situation. That is the case not only for name, addresses, demographic and background variables, but also the PTSD-list and exposing experiences. Those items are also part of the HMI results.

All those considerations were part of the discussion and at the end a selection was made in 10 clusters for the HMI:

- General health situation (inclusive functional disorders)
- Experienced heath and experienced relation to deployment
- Diseases and long-lasting health problems
- Acute health problems and infectious diseases
- Non-specific complains/post deployment complains
- Fatigue
- Sleeping problems
- PTSD
- Functional disorders
- Extra load (burden) factors

These ten clusters are related to health and possible exposure of risks. Above that some questions concern the use of healthcare and the need for healthcare.

In the original rapport the considerations are explained around the decision to involve certain questions or not. In every cluster there was a decision about the most appropriate questionnaire. If this was a general (civilian) questionnaire there was a discussion if this instrument was also applicable in the military setting. If necessary there were made some adjustments to make in better usable in the military setting, but without changing the original formulation so much that the results are not anymore to compare with the standards.

THE INDIVIDUAL HEALTH PROFILE

In table 1 is written which scores are used as normal in the different clusters. The following starting points per cluster are used for the score:

- First the scores are used on base of references in articles. As much as possible the official and standard scores in the literature is used, if possible based on a military population.
- Above that per cluster a second score is made based on remarks with respect on content (unless there was no real reason to detect).
- If the score exceeds the lowest point it's called "a risk factor". If the highest point is exceed there is "a signal".
- If there is no reasonable theoretical base for the threshold for "risk factor" or "signal" (for instance: there is no or not yet information about references) the threshold is decided on by the experts committee using the references in the pilot.
- If there was no usable external norm for a separate indicator it was decided, that in the pilot no more than 20% should exceed the threshold point. It was kept in mind, that the pilot population had a quiet "normal" deployment without special risks or expected health problems.
- Although the scores for the threshold points were scientifically based, the criteria are adjusted on base of the results in the pilot. This is applicable for the individual clusters of questions and scales but also the combinations.

Table 1

Cluster	Criteria	Eventual extra condition(s)
Cluster 1A: Physical health general (SF-12)		
Criteria risk factor	PCS < 50	
Criteria signal	Non	
Cluster 1B: Mental health general (SF-12)		
Criteria risk factor	MCS < 50	
Criteria signal	Non	
Cluster 2: Experienced health		
Criteria risk factor	Experienced health rather bad or bad OR score now < 6: OR diminishment of score between 'pre deployment' and 'during or after deployment' >=1.5: Or diminishment score between 'pre deployment' and 'contemporary score' >= 1.5	- Only if the diminishment of > 1.5 point is possible caused by the deployment.
Criteria signal	Experienced health rather bad or bad	
Cluster 3: Long-lasting health problems		
Criteria risk factor	Minimum of 1 long-lasting or heavy complain in last year, which:	- Still is there and - If no medical doctor is consulted for that in the last year.
Criteria signal	Minimum of 1 long-lasting or heavy complain in last year, which:	- Still is there and - If no medical doctor is consulted for that in the last year. - Was not there in the year before deployment.
Cluster 4: Infectious diseases		
Criteria risk factor	Often (3 times a year or more) of 1 of the 4 health problems and also:	- If no medical doctor is consulted for that; - If the problem is post deployment more often than before.
Criteria signal	Non	

Cluster 5: Non- specific illness complains		
Criteria risk factor	If since the departure to the past deployment there were a minimum of 3 complains (disregard the situation before)	
Criteria signal	If since the departure to the past deployment there were often a minimum of 3 complains (disregard the situation before), if:	- Minimum of 2 complains of these we not regular existing before deployment; - Or if the problem was more often there in the last year than in the year before deployment. (in the case of infectious diseases).
Cluster 6: Fatigue		
Criteria risk factor	Score >= 32 on 8 items from the CIS-Fatigue	
Criteria signal	Score >= 37 on 8 items from the CIS-Fatigue	
Cluster 7: SCL-90 Sleeping problems		
Criteria risk factor	Norm score of SCL-90 (3 items >= 6 (m) or 7 (f)	- If there was also a regular sleeping problem during or post deployment.
Criteria signal	Non	
Cluster 8: PTSD		
Criteria risk factor	Definition of partial PTSD: Score >= 1 on re-experiencing or Score >= 3 on Avoidance or Score >= 2 on Hyper arousal.	
Criteria signal	Definition of full blown PTSD: Score >= 1 on re-experiencing and Score >= 3 on Avoidance and Score >= 2 on Hyper arousal.	
Cluster 9: Functional disorders		
Criteria risk factor	Post deployment functional disorders (regardless of sort or how bad) in regular work	
Criteria signal	Post deployment functional disorders (regardless of sort or how bad) in not to heavy work	
Cluster 10A: Experienced physical burden and bother during employment		
Criteria risk factor	During deployment inconvenience caused by 3 or more named factors (physical strain, climate, exposure to chemicals).	- If minimum of 1 of these had influence on the health.
Criteria signal	During deployment regularly inconvenience caused by 3 or more named factors (physical strain, climate, exposure to chemicals).	- If minimum of 1 of these has (according to the person) still influence on the health.
Cluster 10B: experienced mental stress during deployment		
Criteria risk factor	If the deployment was experienced as “rather or very” thrilling, threatening, or powerless	- If this was the case in minimum 1 of 3 questions.
Criteria signal	Non	
Cluster 10C: experienced mental stress, Life Events		
Criteria risk factor	More than 1 rather touching to very touching situation in the period around the deployment.	- Without life event related to own health.
Criteria signal	Non	

For the amount of exceeding of the thresholds (“risk” and “signal”) a score can be counted per person. In the expert group a decision is made on the preferable action that should follow than. Till now the opinion is, that in such a case the professional (doctor or psychologist) will make contact by telephone. In the conversation both can agree upon the need for further contact with a special medical doctor or psychologist. Before this call is made there is tuning between medical and psychological expertise.

The results of those calls can be used in the evaluation of the HMI and decisions about adjustment of the thresholds.

To calculate the individual score the following principles were used:

- Score = 1 if the "risk threshold is passed, but not the "signal" point.
- Score = 2 if the "signal" point is passed.
- Every cluster gets because of that the score 0 (no exceeding of any threshold), 1 (passing risk-border) or 2 (passing signal border).
- All the clusters are counted together and that is the total score.

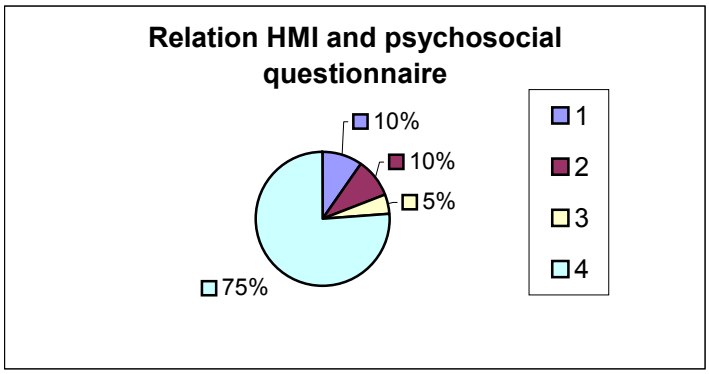
If the total is higher than 4 the military are qualified for follow-up. This is the case if:

- Minimum of 2 signals; or
- Minimum 1 signal in combination with a minimum of 2 risk factors or,
- Minimum 4 risk factors without any signal.

On base of the references it can be concluded, that cumulating of health problems is a better predictor for post deployment complains than the existence of a specific health problem. In the present way of counting it is assumed, that problems only need more active care, if more clusters are involved. If a lower threshold is used the group of "high health risks" will be too big, and the possibility of coincidence (for instance because a temporary problem like the flu) will be too great.

RELATION BETWEEN HMI AND PSYCHOSOCIAL QUESTIONNAIRE

In the graphic (Figure 1) is shown what the relation is between the original psychosocial questionnaire and the new HMI. The relation between both post-deployment healthcare indicators is substantial and significant ($p<.001$). This is also caused because some psychosocial indicators were used in the HMI. Also in general, it is known, that there is always found a substantial correlation between psychological and other health indicators in surveys like this (Wessely, 2001; De Vries, 2001; Mulder & Reijneveld, 1999).



1 = positive score only in HMI

2 = positive score in HMI and in Psychosocial questionnaire

3 = positive score only in Psychosocial questionnaire

4 =negative score in both HMI and Psychosocial questionnaire

Figure 1

In the graphic it can be seen, that of the 50 persons who have a positive indicator for further suggestion for the post-deployment healthcare on base of the HMI-algorithm exact the half (25 persons) will also be positive on base of the interpretation of the psychosocial questionnaire.

The agreement on the group for which no further post deployment healthcare is necessary is much larger. On base of the HMI-protocol 209 of the 259 persons (80,7%) have so low amount of health problems reported, that they don't need further contact. In almost 95% of the cases, the psychological opinion is the same: no further healthcare proposal is needed for them. In 5% of the cases (12 persons) the psychologist, decided on base of the different answers on the list, that a telephonic contact was needed.

When the 2 adjustments are compared, the conclusion can be made that the introduction of the HMI in the Defense post deployment period will lead to more military, for whom there is an (possible) indication for post deployment (health) care. To conclude if that is really the case other investigations are necessary.

THE GROUP MONITORING

The rapport about the results on group level is made in the format of a compact monitoring rapport. The information (graphics and tables) are generated right away from the statistic software that is used for the data-analyses (SPSS 11.0). That is the reason that in short time it is possible the produce a basis monitoring rapport. This is done to give quick insight in the most important health relevant characteristics of the deployed population. On this way it is possible to decide if (and if so: on which specific part) further investigation or healthcare is necessary. In every page, a health cluster is discussed. First, there is a short introduction in the items in the cluster. Than a table is shown in which the prevalence of health problems in that cluster is given. This is combined with the percentage of the deployed population in which the criteria are exceeded. To get insight in the differences between subgroups 4 relevant background variables are divided: age (in 3 groups), rank (soldier, NCO, officer), type of contract (fixed short contract versus lifetime employment) and if the contemporary deployment was the first deployment of those military. These differences between the subgroups are validated on significance.

A problem for further divergence is that in the small amount of people in the subgroups no validated conclusions can than be thrown.

Reporting of other items like adjustment problems and adaptation problems and opinion on preparation and post deployment care and items related on the home front are no subject of the group monitoring rapport if the HMI, but are the responsibility of the department, that deliver the psychosocial questionnaires.

PILOT

In the summer of 2002 there was a pilot of the combined questionnaire (the regular psychosocial questionnaire and the new HMI). This was a group of 855 military who were deployed in a peacekeeping mission SFOR (roulation 10) in 2001 to Bosnia. This group military consisted mostly of Army (90%) together with some of the Royal Military Police (10%). They got the questionnaire a half year after they had returned.

Because the pilot was taken in a rather difficult period (summertime) the group that didn't react got a new second chance. The response was 35%. Both questionnaires were put in the computer at the psychological department of the Army. Both parts of the questionnaire got a unique identifier, via which combination of the two parts was possible. The anonymous HMI-information, together with some special psychosocial items (which were important to make an interpretation for the HMI) were given to TNO-PG. TNO made the analyze and rapport of the information. In the future, this work can be dome in the Defense organization without TNO.

CONCLUSIONS

From the pilot the conclusion can be made, that the HMI in general has met the demands. Because the obliged maximum of pages (6 pages) there were some concessions in the possibility to ask more questions on certain health aspects. Some questions seemed to give only a little extra information. If questions add only a prevalence of less than a few percent it can be decided to skip those questions if a more compact questionnaire is necessary, unless the question is integral part of a validated questionnaire. The contemporary HMI-list has to be seen as a prototype. Not only will changing the psychosocial list change the HMI but also should special risks during deployment have influence on the actual questionnaire. Moreover, not in the least: the results of scientific work and experiences with the list should develop the instrument.

Also a further integration of psychosocial questions and health questions is necessary to minimalism the overlap, as it is necessary to harmonize the work of the psychosocial and (social) medical departments.

It can already be advised, that 2 questions should be added, which are concentrated on the concept of 'Un-Met Needs'. This is the need for help or care, although this help or care is not in fact asked by the person. The questions about this are formulated in the Nemesis Survey (Bijl en Ravelli,1998).

Evaluation of the made norm score of 4 points is necessary. It seems to give a good criteria for the decision to suggest more "care" to the military. This can better be validated if a randomized trial is made of selected people who got more care and (if possible) a selection of persons who didn't get a suggestions of more care.

If the HMI questionnaire is used on an other moment than 6 months post deployment, the profiles (scores) and questions have to be adjusted. On this moment in some questions the period of the validated questions happens to be synchronized with the 6 month deployment and the 6 month post deployment period (for instance long-lasting health problems, use of healthcare system, un-met-needs).

It is necessary to try to optimize the response. In the pilot the response was only 35%. The low, and sometimes selected response has consequences for the conclusions the can be made over the health situation of the total group. The conclusions (and the suggestion to give more health care) for the individual respondent is in fact to trust. But still it has to be taken in account, that a substantial part of the deployed group does not in the same ratio take part in this health care monitor. This is especially the case with those with a higher risk for health problems (low rank, low educated and young military with a short time contract).

May be the wish to give optimal individual healthcare (for which the personal identity is necessary) conflicts with the wish to get an objective insight in the mental and physical health of the deployed military. Possible a "non response evaluation" can give more information about the background. Also can be thought about the possibility to give feed-back about the (eventually anonymous) results and advises of the questionnaire.

From the perspective of individual healthcare seems the relative low response not a very great problem, because everyone who wants the join, can join. However, the problem to keep in mind is, that the non-response group exists especially from people with a higher amount of complains.

The data from the questionnaires of different deployments should be put in a databank to get a military reference. Than it will be possible to compare different deployments and different (sub-) groups. Then it will be possible to detect patrons and signals in health complains in time.

The questionnaire and the results of the pilot are available (in Dutch) via the authors.

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International Medical Training Opportunities at the United States Air Force School of Aerospace Medicine

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SUMMARY

The United States Air Force School of Aerospace Medicine (USAFSAM) is a world-renowned international center for aeromedical education, research, training, and consultation. The school provides in garrison and contingency support in hyperbaric medicine, human performance, clinical and dental investigations, environmental and occupational health, expeditionary medical support, and aeromedical evacuation.

This presentation outlines the many courses that are now available to our NATO allies and other coalition partners. These courses, of both primary and advanced studies, allow professionals to delve deeper into many of the force health protection topics covered at the NATO symposium. The following courses will be highlighted; Aerospace Medicine Primary (AMP) Course, Advanced Aerospace Medicine for International Medical Officers (AAMIMO) Course, Aerospace Physiology for International Physiologists Course, Flight Nurse Course, Contingency Public Health Operations Course (CONOPS), Critical Care Aeromedical Transport Team (CCATT) Course, Expeditionary Medical Support (EMEDS) Course, and the Bioenvironmental Engineering Officer's Course. Over 83 countries have already trained personnel at USAFSAM and many graduates have gone on to become senior leaders in their nations. The purpose, content, prerequisites, length, and enrollment procedures for each course will be addressed. Public Health, Occupational and Environmental Health, and Military Health professionals from around the world will discuss strategies and technologies available for NATO force health protection at the HFM Symposium. This presentation will offer these professionals future opportunities to share expertise and explore critical NATO issues further through courses available to international students at USAFSAM.

AEROSPACE MEDICINE PRIMARY COURSE (NON-DEPARTMENT OF DEFENSE)

Course ID: B3OBY48G1 010
MASL: D1750002
PDS Code: WSU
Duration: 30 Days

Course Director Contact Info:
PH. DSN 240-3571 COMM (210) 536-3571
FAX. DSN 240-2017 COMM (210) 536-2017

Paper prepared for the RTO HFM Symposium on "NATO Force Health Protection Requirements from Pre- to Post-Deployment: Population Health for the Military", which was to have been held in Antalya, Turkey, 7-9 April 2003, and is now published in RTO-MP-109.

Course Description

Trains medical officers to perform duties as flight surgeons and to accomplish the objectives of the USAF Aerospace Medicine Program. The course provides the student with the knowledge and skills required for the treatment and proper administrative disposition of aircrew members and for assuming the responsibilities of a general preventive medical member of the bioenvironmental engineering, occupational medicine, and military public health teams. Includes review of the clinical medical topics important in aerospace medicine; i.e., otolaryngology, audiology, ophthalmology, internal medicine, neurology, psychiatry, etc., with emphasis on particular applications of these specialty areas in aerospace medicine; instruction and experience in the physiology of altitude and acceleration; employment of survival/life support principles and equipment; instruction in aircraft accident investigation; the administrative requirements of aeromedical services and in the application of physical standards to the patient population for which the flight surgeon is responsible. Orientation to flying in a current inventory trainer aircraft and training in the human centrifuge are also provided when equipment is available.

Prerequisites

Applicants must meet flying class II physical standards and be willing to engage in frequent and regular aerial flights. Air Force-sponsored medical students must have completed SAM II training or an approved Air Force survival course. An English competency level (ECL) of 80 SA or higher is required. Completion of Commissioned Officer Training (COT) School, Air Force Reserve COT, ROTC, AF Academy or Uniformed Services University of the Health Sciences (USUHS) is required prior to attending this course. (Written request for waiver to this policy must be submitted to Chair, Department of Aerospace Education and Training, USAFSAM, NLT 60 days prior to course start date.) US/Department of Defense (DoD) AMP applicants must have a SECRET-level clearance prior to arriving for AMP.

ADVANCED AEROSPACE MEDICINE FOR INTERNATIONAL MEDICAL OFFICERS

Course ID: B3FAY48G4 000
MASL: D175062
PDS Code: WSQ
Duration: 23 Weeks

Course Director Contact Info:
PH. DSN 240-2269 COMM (210) 536-2269
FAX. DSN 240-5920 COMM (210) 536-5920

Course Description

Designed for international flight medical officers/flight surgeons who have completed the Aerospace Medicine Primary Course (B30BY48G1-000) or a USAFSAM approved equivalent course in aerospace medicine and have served at least 2 years as operational flight surgeons at base or squadron level. Not intended for those who have already completed advanced training or residency training in aerospace medicine and are working as specialists in the field. The course emphasizes military aerospace medicine. It also provides exposure to a wide range of aerospace medical topics, including civil aviation medicine and space medicine. It enables students to address clinical aerospace, hyperbaric, and global preventive medicine problems; to evaluate and control or resolve operational aerospace medical problems; to perform the aeromedical/human factors aspects of aircraft mishap investigations and prevention, and to assume higher levels of responsibility in their aerospace medicine careers. Formal training in Hyperbaric Medicine, as well as Occupational Medicine, will also be completed. Elective learning opportunities will be available to each student to pursue and present scientific projects pertinent to his or her Air Force. Oral presentations will be

given by each student on his or her Aerospace Medicine system and a clinical aeromedical case presentation. The USAFSAM Department of Graduate Medical Education at Brooks AFB will approve admission of all applicants based on their academic and physical qualifications and following recommendation of their respective government or air force.

Prerequisites

Sponsorship by the sending nation's military or government; satisfactory completion of course B3OBY48G1 000, Aerospace Medicine Primary Course or a USAFSAM approved equivalent course (for approved equivalent please contact the course supervisor), followed by a minimum of 2 years of professional work experience in operational aerospace medicine after completion of initial training; a reading, writing, and speaking knowledge of the English language, including aeromedical terminology and demonstrated by achievement of an ECL of 80 or above; an oral proficiency of 2/2 or above is highly recommended since the course requires students to give oral presentations and to participate in oral discussions with US classmates in portions of the course; a certificate that the applicant is physically qualified for USAF flying class II or equivalent. Applicants must be willing to engage in aerial flights and centrifuge, spatial disorientation, and altitude chamber training. It is important that students be neither over-qualified nor under-qualified for the course to benefit from this training. Questions about an applicant's background should be discussed in advance with USAFSAM international training personnel who can be reached at 210-536-2269 or DSN 240-2269.

AEROSPACE PHYSIOLOGIST (NON-USAF)

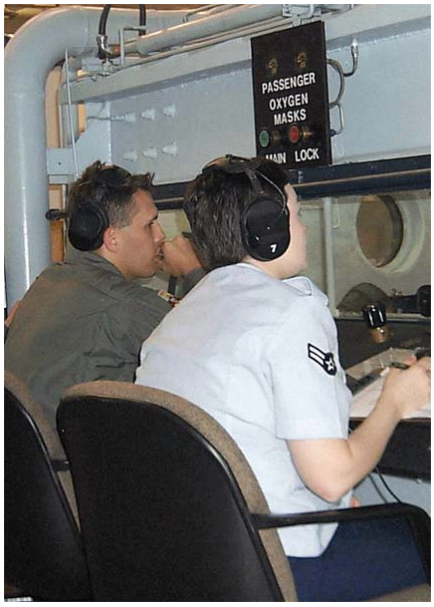
Course ID: B3FBY43A1 010
MASL: D175066
PDS Code: 20C
Duration: 24 Days

Course Director Contact Info:
PH. DSN 240-2844 COMM (210) 536-2844
FAX. DSN 240-2017 COMM (210) 536-2017

Course Description

Runs in conjunction with B3OBY43A1 001, Aerospace Physiologist (USAF), and provides the knowledge to perform basic duties as an aerospace physiologist. The course includes principles and application of aviation physiology, science of the earth's atmosphere, introduction to human factors, and aircraft accident

investigation techniques. Instruction in the use of the ejection seat trainer, night vision trainer, barony chair and applicable aircrew life support equipment is necessary to expose physiologists to the flying stresses experienced by aircrews. Familiarizes students with operation and maintenance of low-pressure chambers and associated equipment used in career field. Students undergo low-pressure chamber, ejection seat, centrifuge, and advanced spatial disorientation demonstrator training. Students will also perform duties at each crew position on the low-pressure chamber.



Prerequisites

None

FLIGHT NURSE COURSE (NON-DOD)

Course ID: B3OZY46F1 010
MASL: D175017
PDS Code: JRI
Duration: 4 Weeks

Course Director Contact Info:
PH. DSN 240-3571 COMM (210) 536-3571
FAX. DSN 240-2017 COMM (210) 536-2017

Course Description

Prepares international degreed nurses for medical flight crew duties in aeromedical evacuation. This course enables graduates to perform the following duties: care of patients evacuated by air and preparation of aircraft to receive patients; direct/assist in patient enplaning/deplaning procedures; use of approved medical equipment for in-flight patient care. One will be able to direct/supervise the patient in-flight management in a peacetime and contingency environment, accomplish aeromedical evacuation administrative and operational procedures, and employ survival and life support principles, procedures, equipment, and techniques. The USAFSAM website will provide more guidance to potential international applicants as well as class dates.

Prerequisites

Applicants must have sponsorship by the sending nation's military or government. Applicants must be qualified for flying and physically competent to fulfill Aeromedical Evacuation related duties. SICLEDEX exam is required for perspective students of identified high-risk groups due to altitude chamber flights conducted during course under conditions of less than 1 atmosphere. A general review of medical/surgical nursing basics prior to course is highly recommended. Applicants must have reading, writing and speaking knowledge of the English language, including medical terminology. Achievement of an ECL of 80 or above is required. Oral proficiency of 2/2 or above is highly recommended since the course requires students to perform simulated crew duties where verbal dialogue is applied. Questions about an applicant's background should be discussed in advance with USAFSAM international training personnel who can be reached at (210) 536-2646 or DSN 240-2646.

CONTINGENCY OPERATIONS (CONOPS)

Course ID: B3OZYCONOP 000
MASL: D175137
PDS Code: XRT
Duration: 10 Days

Course Director Contact Info:
PH. DSN 240-3571 COMM (210) 536-3571
FAX. DSN 240-2017 COMM (210) 536-2017

Course Description

The Contingency Operations Course provides training to personnel who have preventive medicine missions during wartime contingencies, operations other than war (OOTW), and/or natural disaster relief operations. The target audiences for the CONOPS course are mid-level managers with little or no deployment experience and new members of preventive medicine deployment teams (Unit Type Codes). Training is accomplished through real world, peacetime and wartime, situational contingencies scenarios. Some of the training includes:

a) Mobilization Planning: Current world threats; medical readiness update; joint operations planning; EMEDs concepts/equipment; medical intelligence; deployment medical surveillance; arthropod-borne diseases of military significance; dangerous flora and fauna; characteristics of nuclear, biological, and chemical weapons; and contingency contracting.

b) Deployment Planning: Site selection considerations; field hygiene and sanitation; field drinking water theory and laboratory; force health protection; food and water vulnerability assessments; field subsistence considerations; and vector surveillance during deployment.

c) Sustainment Planning: Outbreak investigations; current/future biological agent detection capabilities; heat stress measurement devices; recreational facility field water; environmental health assessments;

public health implications of domestic disaster response; complex humanitarian emergency response and complex humanitarian provisions.

d) Post Deployment Planning: Retrograde cargo inspections and after action reporting.

Prerequisites

Enlisted: The course is open to Air Force enlisted personnel with Air Force Specialty Codes (AFSCs) of 4E0X1, 4B0X1, 4N0X1 (SEI 496), 4N0X1 (who hold a squadron medical element billet) and international health specialists. Enlisted personnel must be at least a 5-skill level. Officers: The course is open to Air Force officers, ranks O-1 through O-4, with AFSCs 41A3, 43E3, 43H3, 43M3, 43G3, 48A3, 48E3, 48P3. Officers must have at least one year of service. Others: Additionally, this training is available to preventive medicine international equivalents, as well as any DoD medical specialty involved in preventive medicine duties; pending training need and seat availability.

CRITICAL CARE AIR TRANSPORT TEAM (CCATT) COURSE

Course ID: B3OZYCCATT 000
MASL: D175141
PDS Code: 5RE
Duration: 12 Days

Course Director Contact Info:
PH. DSN 240-3571 COMM (210) 536-3571
FAX. DSN 240-2017 COMM (210) 536-2017

Course Description

The Critical Care Air Transport Team Course is a 12 day course which is designed to prepare Active Duty (AD), Air National Guard (ANG) or Air Force Reserves (AFRES) commissioned officers and enlisted personnel performing duty in AFSC 46XX, 45XX, 44XX, and 4H0X1 and assigned to Critical Care Air Transport Team Unit Type Codes to meet wartime mission of caring for critically ill and injured patients in the aeromedical evacuation environment.

The Office of the Surgeon General, United States Air Force, designates this educational activity for a maximum of 76.0 hours in category 1 credit towards the American Medical Association (AMA) Physician's Recognition Award. Each physician should claim only those hours of credit that he/she actually spent in the educational activity.

Prerequisites

All personnel must present a valid Operational Support Flying physical (or equivalent) on the first day of training. All perspective students must meet the following requirements to enroll:

Physicians: (1) Be current in Advanced Cardiac Life Support (ACLS); (2) Intensivist (meet one of the following criteria) (a) Emergency medicine physician, (b) Anesthesiologist, (c) Fellowship trained Critical Care Medicine (CCM) physician (such as pulmonary-CM and surgery CCM); (3) Non-intensivist (meets one of the following criteria) (a) Credentialed in a special care unit, (b) Work in Level II or higher emergency department, (c) Work in post anesthesia care unit or operating room environment; (4) Advanced Trauma Life Support (ATLS) is highly encouraged, but not required.

Nurses: (1) Be current in Advanced Cardiac Life Support (ACLS); (2) Worked in critical care or special care unit, emergency department, or post anesthesia care unit within 2 years of course start date; (3) Must have

worked for a minimum of 1 year in one of the above areas; (4) Trauma Nursing Core Course (TNCC) is highly encouraged, but not required.

Technicians: (1) Attended Advance Cardiac Life Support (ACLS); (2) Must have 1 year critical care experience; (3) Receive annual training in an intensive care unit; (4) Worked with ventilator patients within 1 year of course start date.

EXPEDITIONARY MEDICAL SUPPORT (EMEDS) BASIC COURSE

Course ID: B3OZYEMEDS 000
MASL: D175155
PDS Code: EXO
Duration: 5 Days

Course Director Contact Info:
PH. DSN 240-3571 COMM (210) 536-3571
FAX. DSN 240-2017 COMM (210) 536-2017

Course Description

This 5 day course is designed to provide field operational training for commissioned officers and enlisted personnel assigned to the EMEDS Unit Type Codes. Students must have knowledge of and be skilled in their Air Force specialty code (AFSC) core competencies. This course teaches and evaluates corps specific field situations, as well as offering updates in Air Force Medical Service (AFMS) concept of operations and doctrine. The course promotes team performance, cohesion, and cross-training/utilization of all deployed team personnel. It also teaches setup/packing out of a field EMEDS compound, deployed operations (wartime and humanitarian), field medical, nursing and operational support equipment proficiency, and field exercises to both emphasize and evaluate learning of concepts taught.

Prerequisites

Applicants must be assigned to an EMEDS unit training code (UTC).

BIOENVIRONMENTAL ENGINEERING COURSE

Course ID: B3OBY43E1 010
MASL: D175073
PDS Code: HIJ
Duration: 78 Days

Course Director Contact Info:
PH. DSN 240-2844 COMM (210) 536-2844
FAX. DSN 240-2017 COMM (210) 536-2017

Course Description

Supercedes Course B3OBY43E1-000. Prepares newly commissioned bioenvironmental engineers to manage base-level bioenvironmental engineering (BEE) programs in support of the USAF Aerospace Medicine Program. Major emphasis of the course deals with the protection of Air Force personnel in the environment of chemical, radiological, and physical hazards in both peacetime and wartime situations. Students develop skills in anticipating and recognizing hazards and environmental problems, evaluating the effects, and designing control measures. Training is in mission support and interface, core sciences (such as physiology, chemistry, toxicology and medical readiness indoctrination), hazardous materials and emergency response, recognizing potential occupational and environmental hazards, Occupational Safety and Health Administration (OSHA) programs and Air Force implementation, chemical hazards (such as chemical exposure evaluation, ventilation, respiratory protection, and personal protective equipment), physical hazards (such as ergonomics, heat and cold stress, noise, and radiation), activity surveillance and risk management, incident response operations – peacetime nuclear weapons accidents, community health (such as solid and hazardous waste, air pollution, radon, lead, asbestos, water pollution and potable water), environmental restoration, environmental planning, USAF environmental protection programs, contingency operations, and management principles. Additionally, completion of this course after 1 Jan 99 certifies that students have met all the requirements of the Bioenvironmental Engineering Nuclear, Biological and Chemical Operations Course (B3AZY4B0X1 017).

Prerequisites

Academic prerequisites vary depending upon one's specialty. A baccalaureate degree in an engineering discipline is required unless waived by the Air Force Surgeon General's Office. The officer must be presently performing duties as an active duty, Air Reserve Force or Air National Guard bioenvironmental engineer with a 43E1 AFSC. Civilian students serving as industrial hygienists (civilian series 0690, minimum GS-9) at active duty installations, Guard, and Reserve bases are also eligible to attend with prior approval of USAFSAM/BE and USAFSAM/EA. All students must be in active duty status to attend this course. International students must have approval from USAFSAM/EA, an engineering degree, and an ECL 80 SA before entry into the class. Completion of Commissioned Officer Training (COT) School or Air Force Reserve COT or ROTC or OTS or USAF Academy is required prior to attending this course. (Written request for waiver to this policy must be submitted to Chair, Department of Aerospace Education and Training, USAFSAM, NLT 60 days prior to course start date.)

STEPS FOR INTERNATIONAL STUDENTS TO ATTEND COURSES

The Security Assistance Training Program (SATP) provides professional, flying, and technical training for international military trainees. Requests for training are made through the Security Assistance Officer (SAO) at the US Embassy (in most cases) in the applicant's home country. Requests should be initiated at least 12 months prior to desired course entry to ensure there is sufficient time for accomplishment and coordination of a Letter of Offer and Acceptance (LOA) between the US and the sending country (a shorter interval may be

possible if the country has a blanket order training case in effect). The SAO requests a course quota through Air Force Security Assistance Training Squadron (AFSAT) at Randolph Air Force Base, Texas. AFSAT, in turn, requests a quota through USAFSAM/EAM. Once a quota is received, SAOs must provide AFSAT sufficient documentation to demonstrate the student has met the course prerequisites (including the curriculum of the student's basic aerospace medicine course if they are not a graduate of the USAFSAM Aerospace Medicine Primary Course). AFSAT forwards the documentation to USAFSAM/GE for approval of the student's application no later than 90 days prior to the class start date. Prior to departure, the SAO must ensure the student is briefed on the special requirements for the course (including uniforms). International trainees are required to have in their possession, or have made arrangements for acquiring, all season and special items of clothing listed in their specific course announcements. All USAFSAM courses require an English Comprehension Level (ECL) of 80. International trainees must meet all mandatory course prerequisites including equivalent U.S. military grade (except that international officers may be permitted to attend Air Force enlisted courses).

The inclusion of a course description in this paper does not constitute a guarantee of releasability or availability. SAOs must coordinate with AFSAT for a Foreign Disclosure review before a student is allowed to attend a USAFSAM course. Furthermore, availability of any course is subject to standard quota controls and the training needs of the United States Air Force.

DISTANCE LEARNING OPPORTUNITIES

International students are asked to contact their SAO to obtain USAFSAM Advanced Distributed Learning (ADL) course material.

USAFSAM currently offers distributed learning courses using several different methods. To enroll in a CD-ROM course, contact the USAFSAM ADL office to find out enrollment procedures. Some of the CD-ROM courses are distributed to students from USAFSAM, but two of the CD-ROM courses are currently managed and distributed by the Air Force Institute for Advanced Distributed Learning (AFIADL). One of the ADL staff will be happy to assist you in contacting the appropriate course director or provide you directions for CD-ROM course enrollment procedures.

To enroll in LearnLinc, virtual classroom synchronous training courses, personnel will need to log-on to the LearnLinc site and register per instructions. Course directors and supervisors will provide course dates and times to authorized students. All personnel desiring to take Distance Learning courses on-line will register when they initially log in. The information from the on-line registration will link with the school registrar's information allowing enrollment.

USAFSAM ADL staff may be reached by logging on to our Web-site at http://wwwsam.brooks.af.mil/web/DLIT/Index.htm. If you are unable to access the Web-site you can reach the ADL office at (210) 536-8850 or by emailing: talk2afsam@msn.com.

USEFUL WEB SITES

ETCA – https://etca.randolph.af.mil/listcourse.asp

Distance Learning – https://wwwsam.brooks.af.mil/web/DLIT/index.htm

USAFSAM Home Page – https://wwwsam.brooks.af.mil

Brooks Home Page – https://www.brooks.af.mil

International Training – http://wwwsam.brooks.af.mil/web/af/samit.htm

Interested students should contact your US Embassy, Security Assistance Officer.

ACKNOWLEDGEMENTS/REFERENCES

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Prevention of Zoonose Infections Before the Joint Military Exercises of NATO and Partner Countries

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INTRODUCTION

Georgia is NATO partner country. It takes part in NATO program "Partnership for Peace". On the meeting in December 2002 held in Prague between NATO member countries, President of Georgia expressed the will of Georgian people and made an advertisement for Georgia to become the NATO member.

Every year, international exercises are held in Georgia named "Partnership for Peace", in which the military contingent of NATO and partner countries takes part.

There are natural foci of particularly dangerous infections in Georgia. The reservoirs and vectors of these diseases are wild and sinanthrop rodents, insects, ticks, etc. Diseases can reduce the fighting efficiency and moral statement of military contingent and need quite expensive treatment.

In 2002 a case of viral hemorrhagic fever in Georgian military contingent was registered near village Asureti in Tetritskaro region. With the help of NCDC and Ministry of Defence specialists, these territories and military contingent diployment and training ground areas were studied by epizootological and epidemiological methods, Infection reservoirs and vectors were investigated, complex laboratory investigation of blood samples of affected (bitten, etc) soldiers and patients was carried out. Antigenes to causative agents of Q fever, tick-born encephalitis and West Nile Fever antigens were found during our investigation.

Paper prepared for the RTO HFM Symposium on "NATO Force Health Protection Requirements from Pre- to Post-Deployment: Population Health for the Military", which was to have been held in Antalya, Turkey, 7-9 April 2003, and is now published in RTO-MP-109.

Serological analysis showed existence of antigens to Hemorrhagic Fever with Renal Syndrome, Q fever and tick-born Borreliosis. The patients had evidently shown clinical symptoms of these diseases. Bactereologists isolated *Salmonella Typhimurium*.

It must be mentioned that oil pipeline "Baku-Tbilisi-Jeikhan" crosses Georgian territory, soon the gas pipeline "Baku-Tbilisi-Erzrum" will be built and launched. Building pipelines can cause changes in activity of natural foci of particularly dangerous infections: adaptation of reservoirs and vectors to new situations can proceed in different ways.

Security of oil and gas pipelines is one of the main purposes of the American military mission in Georgia. This problem is subjected in NATO modern society problem committee (NATO-CCMS) and in programs of Euro-Atlantic Partnership Council as well.

In 2002 American military base was located near Rustavi. In the scope of "Partnership for Peace" program Georgia was donated 64 million USD in 2002. This partnership will enlarge in future between NATO and Georgian ministry of defence.

According to all above mentioned it's very important to prevent spread of infectious diseases among Georgian and foreign military contingent based in Georgia.

PROBLEM STATEMENT

In Georgia very often military bases and training grounds are located in places were rodents – reservoirs and vectors are in great number. During decades specialists from NCDC carry out surveillance on natural foci of plague, tularemia, Hemorrhagic Fever with Renal Syndrome, rickettsiosis, brucellosis and leptospirosis exist in east and south Georgia, in Shida Kartli and Kvemo Kartly regions. Anthrax is wide spread on the whole Georgia. Foci of visceral leishmaniosis are located in the eastern part of Georgia (from Khashuri to Lagodekhi).

Local malaria cases are still registered on Georgian territory after 26 years of having no cases.

The reservoirs and vectors of these infections are: rodents, insects and ticks.

According to all above mentioned, the goal of our research is to investigate Vaziani military base and training ground where international military training "Best Effort" will be held in order to assess epizootological situation and the risk for the military contingent.

GOALS AND TASKS

- Establishing species of rodents;
- Finding epizooties among rodents;
- Establishing types of vectors;
- Evaluation of the epidemic danger;
- Analysis.

MATERIALS AND METHODS

Zoologists and parazitologists have carried out the epizootological study of territory including field material collection:

1) Catching of rodents;
2) Digging out burrows of rodents;
3) Collecting ecto-parasites at the holes and burrows of rodents;
4) Collecting ticks from the surface of the ground as well as from the agricultural animals;
5) Collecting excrements of birds.

Afterwards complex study of collected material is fulfilled:

- Bacteriological study,
- Biological study,
- Serological study,
- Virological study,
- Molecular-epidemiological study (PCR).

Time of accomplishment – May 2002.

RESULTS

Studies were carried out on the territory with square 20000 hectare: Military base in Vaziani and surrounding territory. Training ground for military exercises. One species of tick (Haemophisalis punctata) was found. The tick was studied by bacteriological and virological methods. No antigens to any infectious agent were found.

Rodent settings were not seen on the investigated territories. As a result of study, there is no risk of infectious diseases on the investigated territories. The permission to hold "Best Effort-2002" on the marked territory was issued.

Recommendation: Similar research is needed to be held annually in March-April, September-October. This is the optimal time for epizootological studies on the interesting us territories.

To our mind, this work is interesting for NATO by reasons listed below:

- NATO and its partner countries' military contingent will be prevented from the infectious diseases on the territory of Georgia.
- The experience of Georgian Ministry of Defence will be interesting and necessary for the other countries, where the international training is going to be carried out.
- NATO and partner countries' epidemiological services must have permanent contact with each other, and Centre of Disease Control (NCDC) of Georgia as well. It is very important especially for neighboring countries.
- Problematic infections for Georgia for today are: Quarantine diseases (plague, cholera, yellow fever, hemorrhagic contagious viral fevers). Also: malaria, aids, tularemia, meningitis, leptospirosis, hydrophobia, unknown diseases with fever (when high temperature lasts more than 5 days), isolation of multiresistant microorganisms and vancomynin-resistent staphylococcus.

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[4] P. imnadze, N. Tsertsvadze, L. Bakanidze, Sh. Tsanava, M. Manrikian, T. KukhalaShvili, E. Zangaladze, M. Kekelidze, D. Tsereteli and M. Nadiradze, "Plague in Southern Caucasus", Antibiotica Monitor, Vol.XVIII,½, 2002.

Individual Ballistic Protection Equipment

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1.0 INTRODUCTION

One of the main elements in the modern soldier's equipment is increasing of ballistic hardness and at the same time decreasing of the weight characteristics of comfortable individual means of protection.

The unique technology is elaborated by group of Georgian scientists for manufacturing individual means of protection by using armor composite ceramic material "**TORI**" and well-known textile "**KEVLAR**".

As for ballistic tests for armor cloth (**armor vests, suits for miners**) we are successfully using the **Standard of US National Institute of Justice NIJ-01-01-03/04.** But we have special opinion regarding to the same aspects of the mentioned standard. For example: regarding of the firing tests of soft ballistic elements, which by **NIJ** standard requirements are placed on the plastic flat block, do not show complete real conditions for implementation of **Individual Ballistic Protection Equipment** (**IBPE**) during the wearing on human body.

2.0 RESEARCH METHODOLOGY

As it is well known in the world practice, ballistic packages of **IBPE,** composed from multi-layer high strength materials in single construction are joint by different methods: with parallel or crossing insertion with different angles of hard threads, sticking layers to each other, including them into the special package. Composition parts of **IBPE**, according to the anthropological configuration of body or edges, in all kinds of construction, during wearing on human body, are flexed. This will cause wrinkles and the flatness of package is destroyed (Fig. 1).

Paper prepared for the RTO HFM Symposium on "NATO Force Health Protection Requirements from Pre- to Post-Deployment: Population Health for the Military", which was to have been held in Antalya, Turkey, 7-9 April 2003, and is now published in RTO-MP-109.

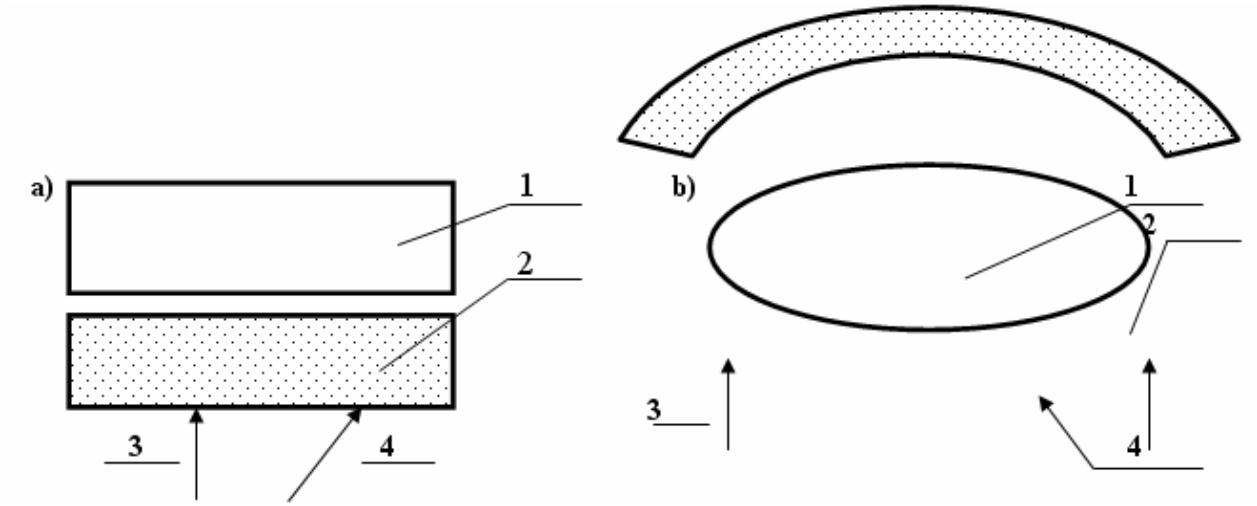

Figure 1: Stand Cut View from the Top.

a) Test by NIJ Standard **b) Test by standard of "Toritech"**

1. Plastic block
2. Ballistic package
3, 4. Angle of shooting (hitting)

3.0 TEST METHODS

As it could be seen from Fig. 1, the strength of construction are destroyed and wrinkles are occurred in ballistic package (which will have 15-30 and more layers), as well as each layer is getting deferent strength and which is decreasing its resistance to the ballistic hit.

Thus, bringing the firing tests closer to the real conditions of using **IBPE**, we are able to find real ballistic characteristics of researched armor protection. Even in case of positive results of armor protection, this is not a last, optimal index of quality for **IBPE,** less but not the last meaning has the weight of collar, as well as physiological-hygienic and ergonomical indexes of **IBPE**.

By long-term researches of protection properties of different **IBPE** construction, it is determined that during uneven distribution of weight, inconvenient construction and not effective remove of surplus heat isolation, man become tired quickly, damp, psychologically irritable. This will cause disturbing of movement coordination, which by itself will cause mistakes and inaccuracy with tasked operation (this is especially important during the mine clearance of places).

4.0 CONCLUSIONS

Coming from the above-mentioned, after ballistic tests for issuing the certificate on tested **IBPE**, materials are tested on the physical-hygienic and ergonomic characteristics, elaborated by following method:

Five totally health persons are involved in tests, they are doing specific actions and training without **IBPE** in completely similar to the nature conditions.

During all tests, physiological characteristics are getting from those persons (temperature of different parts of body, frequency of breathing, hurt decreasing, pressure and strength made by arms).

Physiological and other subjective characteristics in 5 marking system is listed in special blanks and mean characteristics are output (in case of 180 and more hit of hurt in minute, tests are immediately cancelled). **IBPE** can be useful, if mean characteristic is not less than 4.

Thus, coming from the above-mentioned method, conducted tests (hit-physical, ballistic and ergonomic) give the opportunity to find the optimal version for construction of **IBPE** and to increase the coefficient of quality as well as getting some economical effect.

5.0 PRACTICAL IMPLEMENTATION

We will pay your attention to the new ballistic composite ceramic materials, which includes the best characteristics of over-known armor materials (**B_4C, SiC_2, AlO_3 etc.**).

The unique technology (protected by 2 patent) is elaborated for manufacturing individual means of protection by using armor composite ceramic material "TORI" and well-known textiles ("**KEVLAR**", "**TVARON**"), taking into account their structure and specifics:

- Hard individual mean of protection – such as **armor plate**;
- Elastic individual mean of protection – such as **armor vest**;
- Moreover, have been made the following types of samples.

1) **TORI – 1** armor plate for police, matches to the NIJ 0101.03 III class standard, protects from the following types of bullets:
   - 7.62 mm (308 Winchester) FMJ;
   - Bullet weight: 9.7g;
   - Velocity: 838 m/sec;
   - Protection area: 7.5 dm^2 (250 x 300) mm;
   - Plate's weight: 2.0 kg;
   - Deformation depth: 18 mm.

2) **TORI – 2** armor plate for army, matches to the NIJ 0101.03 IV class standard, protects from the following types of bullets:
   - 30-06 AP;
   - Bullet weight: 10.8 g;
   - Velocity: 868 m/sec;
   - Protection area: 7.5 dm^2 (250 x 300) mm;
   - Plate's weight: 2.5 kg;
   - Deformation depth: 22 mm.

3) **TORI – F** metal-ceramic armor plate for protection of light vehicles and helicopters from the following types of bullets:
   - 12.7 x 180 AP (inflammable, armor-penetrative);
   - Bullet weight: 51g;
   - Velocity: 850 m/sec;

- Energy: 18 000j;
- Plates' weight: 60 kg/m^2;
- Protection area: 7.5 dm^2 (250 x 300 mm);
- Plate's weight: 2.0 kg;
- Deformation depth: 18 mm.

4) **TORITECH – 01**: (Fig. 2) army vest, matches to the NIJ 0101.03 II class standard, protects from the following types of bullets:
   - 357 Magnum (JSP);
   - Bullet weight: 10.2 g;
   - Velocity: 425 m/sec.
   - 9 mm (FMJ):
   - Bullet weight: 8.0 g;
   - Velocity: 385 m/sec;
   - Coming from the size and protection area, weight is 1.3 ÷ 1.8 kg;
   - Maximum deformation depth15 mm.

Figure 2

5) **TORITECH – 02**. (Fig. 3) Vest for police, matches to the NIJ 0101.03 IIIA class standard, protects from the following types of bullets:
   - 44 Magnum (JSP);
   - Weight: 15.55 g;
   - Velocity: 426 m/sec;
   - 9 mm (FMJ);
   - Weight: 8.0 g;
   - Velocity: 426 m/sec;
   - Coming from the size and protection area, weight is 2.1 ÷ 2.7 kg;
   - Maximum deformation depth 20 mm.

Figure 3

6) **TORITECH – "Elite"** (Fig. 4) Vest for diplomatic and high range officers. Vest has unique construction. By our information, nobody has such elastic kind of construction. Vest protects from "TT" type steel-hard bullets:

- 7.62 x 25 mm;
- Weight 2.5 ÷ 3.2;
- Velocity 450 m/sec;
- Maximum deformation 12 ÷ 15 mm.

Figure 4

7) **Splinter-proof unloading army vest** (Fig. 5) has:

- Weight 1.8 ÷ 2.5 kg;
- Protection area 50 dm^2 (Maximum protection of trunk);
- V_{50} = 450 m/sec (1.1 g. FSP).

Splinter-proof unloading army vest is made to protect solder's trunk and to assess battle, additional and medical luggage weight ergonomically (optimally).

Figure 5

The following type of luggage can be assessed on our Splinter-proof unloading vest:

- Four units of automatic-gun magazine;
- Four units of hand-grandee;
- Sword-knife;
- Large pocket for general use;
- Medical package;
- One unit of flask.

Vest has zipper, which can be opened in both directions (ordinary and battle conditions). Splinter-proof unloading army vest is universal by size and can be adjusted from S to XXL size.

Splinter-proof unloading army vest has adjusted collar.

Coming from the client's request, Splinter-proof unloading vest can be made with any form and complication, by taking into account characteristics of solder's private luggage.

8) **Armored suit for miners** (Fig. 6) made with autonomous breathing device. It has unloading system. The suit is kit type. Base model is made for protection against 03M – 72 mine splints; weight 23 ÷ 27 kg. By additional elements suit can protect from the splints of directed action mine MOH – 50.

Figure 6

9) **Ordinary unloading vest (non-ballistic)** (Fig. 7) is made to assess solder's battle, additional and medical luggage weight ergonomically (optimally).

Figure 7

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Individual Protection Means with Autonomous Life Guarantee Systems for the Personnel Working in Different Extreme Conditions

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It is usual for any modern spares of working and specially, in military-industrial complex, the necessity, to work in environment of extreme conditions. In this case, implementing of autonomous means of individual protection, as protection means, have high meaning.

Generally, we were using standard methods of former socialist block and Soviet Union (because of the lack of necessary financial support we can not implement and use "STANAG" and "ISO" systems yet) for conduction researches of life guarantee for hit-physical characteristics of materials and packages, physiological-hygienic and ergonomically parameters of human body in isolated meaning of individual protection (after IMIP). Mentioned, former Soviet method had high level, but we had the aim to bring the research closer to the real conditions, to replace a worker in extreme environment. We had elaborated the system of methods: "Man + IMIP + Environment", by which we tried to simulate, as much as possible, all those characteristics, which have a harmful effect on human organism.

Thus, experimental researches of hit-physical characteristics (coefficient of caloric conductibility, resistance, irradiation, etc) of thermal-isolated packages, which are closer to the real conditions (at the working environment temperature in interval from –170°C (103K) to +300°C (573K), – by system "Man+ IMIP+ Environment", had been conducted by our method and construction of Calorimeter ().

However, during the bringing closer the physiological parameters of human body, fixing thermal sensors of temperature in thermal-isolating multi-layer packages, to get experimental data, taking into account the linear dependence of those measures, with some theoretical calculations, we will get the following:

For example, on materials from "Capron" and "Flax" accordingly:

$$\lambda=0.0254+104x10^{-6}xT$$

$$\lambda=0.553+109x10^{-6}xT$$

Where λ – unknown coefficient of caloric conductibility;

T – Necessary temperature.

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This way of research gives the possibility to estimate the caloric conductibility of any materials for given tasked temperature, which are close to the natural conditions for man in IMIP.

In case of conduction of IMIP in high temperature conditions 573K (300°C) experiments can be the same, but instead of low temperatures in calorimeter, we are implementing hitting elements.

Using these and other non-traditional methods with system "Man+ IMIP+ Environment", the following means of individual protections were developed and implemented in military-industrial complex of the former USSR:

Figure 1

1) **Special autonomous kit for NBC environment** is intended for emergency job in the environment of high gasification, nuclear dust and aerosols.

- Working temperature(°C): -50 to +30
- Quantity of given air in hose case (l/min): 600
- Continuous work time:
  - In autonomous regime (min): 40
  - In hose case regime (min): 60
- Kit weight:
  - With autonomous system of vital capacity (kg): 8.0
  - Without autonomous system of vital capacity (kg): 5.0

Figure 2

2) **Autonomous crio-suit** is intended for working in environment of low temperature, dusty and gasification.

There are flexible air blowers in crio-suit, ensuring the design quantity of warm air for crio-suit heating. Breathing and heating of workers in undersuit space ensured by ecsothermal reaction during regeneration of inhale air from ventilation aggregate and regenerative cartridge.

- Working air temperature (°C): -130
- Influence of harmful airs: not limited
- Crio-suit weight (kg): 15
- Continuous working time (min): 40

Figure 3

3) **Protective mean for working in high temperature conditions** is intended for ensuring normal conditions for working, it includes overalls of special construction, protective gauntlets and system of vital capacity with regulated undercloath microclimate. The system of vital capacity is working on the principal of cooling, moistening and cleaning from carbonic acid air, circulating through heat exchanging with centrifugal fan.

- Working temperature (°C): + 259
- Heat radiation (kvt/m^2): 4.0
- Influence of environment harmful airs: not limited
- Shielding kit weight(kg): 20
- Continuous working time (min): 30

Figure 4

4) **Armored suit for miners** made with autonomous breathing device. Has unloading system. The suit is kit type. Base model is made for protection against 03M – 72 mine splints weight 23 ÷ 27 kg. By additional elements suit can protect from the splints of directed action mine MOH – 50 and the weight of this kind of kit is 32 ÷ 35 kg.

Figure 5

5) **Special Heat-Shelling Suit**: is intended for repairing work in conditions of high temperature heating radiation, gasificated and dusty environment as a cooling agent and breathing air in suit against industrial traffic air is cleaned and cooled by heat exchanger and assessed even on all body surface.

- Working temperature (°C): + 280
- Heat radiation (kvt/m^2): 7.0
- Influence of environment harmful airs: not limited
- Suit weight (kg): 10
- Quantity of given air (l/min): 1 000
- Continuous working time (min): not limited

Figure 6

6) **Survival suit for the welders in the closed environment**:

- Working temperature (°C): + 70
- Heat radiation (kvt/m^2): 7.0
- Influence of harmful airs: not limited
- Suit weight (kg): 5
- Quantity of given air (l/min): 1 000
- Continuous working time (min): not limited

Figure 7

7) **Autonomous firemen's protection suit for gas fools inflame:**

- Working temperature (°C): +130
- Infrared radiation (kvt/m^2): 21.0
- Suit weight (kg):
  - Without cooling devices: 11.0
  - With cooling device: 12.5
  - Quantity of given air (l/min): 360.0
  - Continuous working time min: 30

Figure 8

8) **Noise Protection Suit for Aircraft Mechanics**

Meant for mechanics who make reconstruction and revision works in the conditions with the running air-engine.

Technical characteristics:

- Sound-proofing of:
  - Noise Protection Suit: 22
  - Noise Protection helmet: 38
- Environmental temperature (°C): -25 to +30
- Volume of top-blown air (l/min): 300
  - Air dir. for respiratory organs (l/min): 150
- Temperature of top-blown air (°C): +30
- Continuous work time: not limited
- Kit weight with life guarantee system (kg): 9.5

9) **Calorimeter includes the following elements**:

I-II: Upper and lower compartment;

1. Liquid nitrogen;
2. Low temperature zone;
3. Thermo isolation;
4. Human's skin;
5. Hydrophilic layer;
6. Heating elements;
7. Thermal transmitter;
8. Reservoir of liquid;
9. Pipeline;
10. Distributor of moisture;
11. Thermo regulator;
12. Investigated packet.

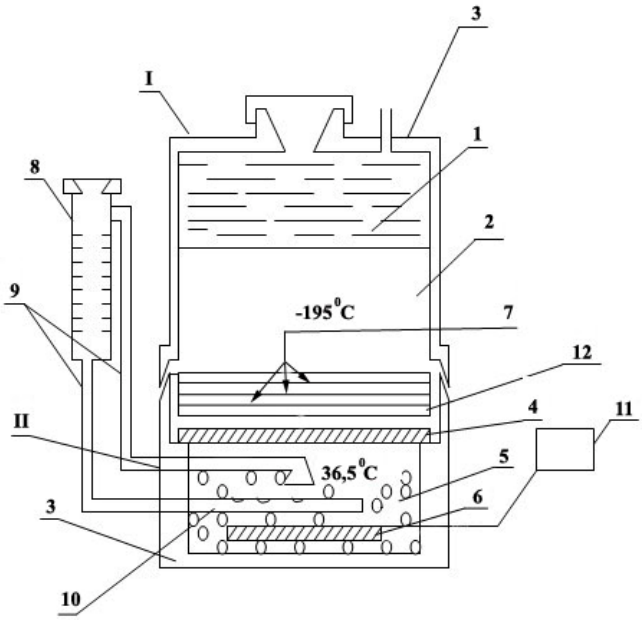

Figure 9

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Validation of Psychological Screening Procedures for Deploying U.S. Forces

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SUMMARY

During pre-deployment preparation, division mental health is responsible for assessing the deployability of large numbers of soldiers in a brief period of time. One efficient method to gauge mental health issues in a deploying force in a short amount of time is to use a survey. The psychological screening survey under development is built on a component of the Joint Medical Surveillance Program from 1996. The surveillance program for U.S. military personnel redeploying from Bosnia in support of the Implementation Force (IFOR), was initiated in order to determine immediate and long-term deployment-related mental health risks. Since that time, the Medical Research Unit-Europe has increasingly received requests for support from units deploying to various regions within the European Command. The first of two assessments to determine

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the effectiveness of U.S. Army psychological screening procedures was conducted in October 2002 with 864 soldiers as they prepared to deploy to Kosovo for a six-month peace-keeping rotation. In addition to a primary psychological screening survey, mental health staff conducted brief clinical interviews with all soldiers to determine the degree to which the survey content reflected the problems experienced by soldiers. Overall, the majority of the soldiers screened prior to deployment did not report mental health problems. There were also no content areas identified in the clinical interviews that were not already covered in the primary screen. Furthermore, of the 82 soldiers requiring referral, 75 of them were identified by the screening survey. In addition, all 5 of the soldiers who required immediate referral to determine suitability for deployment exceeded criteria on the primary screen. Further analyses of screening data will be conducted to determine final inclusion of items and the screening instrument will then be validated in a second assessment with a unit deploying on a combat mission.

RESEARCH PROBLEM

The objectives of the Joint Medical Surveillance Program were to identify soldiers in need of mental health follow-up and provide commanders and their medical personnel with an assessment of the psychological readiness of their units. When psychological screening was no longer required for military personnel re-deploying from Bosnia, division commanders based in Germany and supporting the peacekeeping deployment to Kosovo continued to require psychological screening for their units. Currently, command-directed screening can occur for soldiers at pre-deployment to assess existing psychological issues, at re-deployment to determine acute stress reactions resulting from the deployment, and at post-deployment to assess psychological adjustment following return home (see Wright, Huffman, Adler, & Castro, 2002 for a review). A recent U.S. Army initiative to expand the psychological screening program to all deploying forces resulted in an assessment study to optimize the screening procedures for Army-wide implementation. Presented here is the first of two assessments to validate the effectiveness of the instruments and procedures currently used in screening.

METHOD

Primary Screen Survey

In October 2002, 864 soldiers were screened as they prepared to deploy for a six-month peacekeeping rotation to Kosovo. Each soldier completed a primary screen survey comprised of background questions and clinical symptom scales. Analyses of past screening data sets had resulted in a clinical section that included scales assessing depression, anger, relationship and alcohol problems. The primary screen had also been adapted to assess command climate variables in order to determine whether unit-level interventions were required. Table 1 summarizes the clinical and unit climate scales currently included on the survey.

Table 1: Primary Psychological Screen Survey Items and Scales

	Scale and Item Description			
Primary Screen Section	Scale	Cronbach's Alpha (α)	# of items	Sample Item(s)
Personal Background	Demographics	N/A	7	Rank, gender, marital status
	Military History	N/A	4	How many years have you been in the military?
	Clinical and Personal History	N/A	10	Have you been on any medication for emotional problems?
Clinical Symptoms	Self-Rating Depression Scale (Zung, 1965) [short and original version]	.85 (.84)	17 (20)	I feel hopeful about the future.
	Quality of Marriage Index* (Norton, 1983)	.98	6	We have a good relationship.
	Alcohol Use Disorders Identification Test (Babor, Higgins-Biddle, Saunders, & Moneiro, 2001)	.79	10	How often do you have a drink containing alcohol?
	Brief Symptom Inventory – Hostility Sub-scale (Derogatis, 1993)	.86	5	Felt easily annoyed or irritated.
Unit Climate	Perceived Organizational Support (Lynch, Eisenberger, & Armeli, 1999)	.91	8	My organization really cares about my well-being.
	Interpersonal Conflict (Spector & Jex, 1998)	.89	4	How often to people in your unit yell at each other at work?
	Morale Scale (Walter Reed Army Institute of Research)	.89	5	Your level of motivation.

*Instructions and phrasing modified to apply to unmarried individuals with significant others.

Secondary Screen Interview

In the typical screening procedure, soldiers exceeding cutoff criteria on any of the clinical scales receive a secondary screen, or brief clinical interview, with mental health personnel to determine referral need. However, for the screening assessment study conducted in October 2002, all deploying soldiers received a secondary screen interview, not just those exceeding primary screen criteria. This variation in procedure provided information on the content validity of the instrument by determining the degree to which survey content reflected problems experienced by soldiers.

Procedure

Figure 1 illustrates the screening procedure used in the study for those soldiers who exceeded primary screen criteria (positive screens), and for those soldiers who did not exceed primary screen criteria (negative screens). Soldiers completed the primary screen survey as they participated in pre-deployment preparation with their units. Typically, soldiers completed the survey in approximately 15 minutes, after which the research staff immediately scored the survey, and then directed the soldier to mental health staff for a brief secondary screen interview to determine whether a referral was required. The mental health staff conducted their interviews using a two-page semi-structured interview guide based on primary screen responses. The positive assessment guide prompted the interviewer to explore the clinical areas on the primary screen that exceeded cutoff criteria. The negative assessment guide explored areas of life functioning to determine whether problems or changes had occurred that might indicate the need for further assessment or referral. Decreases in functioning at work, increased problems in getting along with unit members, declines in social and family relationships, current life stress, and general satisfaction with how things were going were reviewed by the interviewer. The second page of the negative assessment guide included the same prompts for the interviewer to explore primary screen clinical areas as found on the positive assessment guide. There was also the opportunity at this time to determine whether the primary screen had missed problem or symptom areas. The positive and negative assessment guides both ended with a global rating by the interviewer of the soldier's level of functioning at work, with family, and in social relationships, and with the completion of a summary section on screening outcome and referral category. Figure 2 summarizes the possible screening outcomes. The referral categories included immediate referral to assess suitability for deployment or referral to mental health assets in Kosovo for further assessment and follow-up in theater.

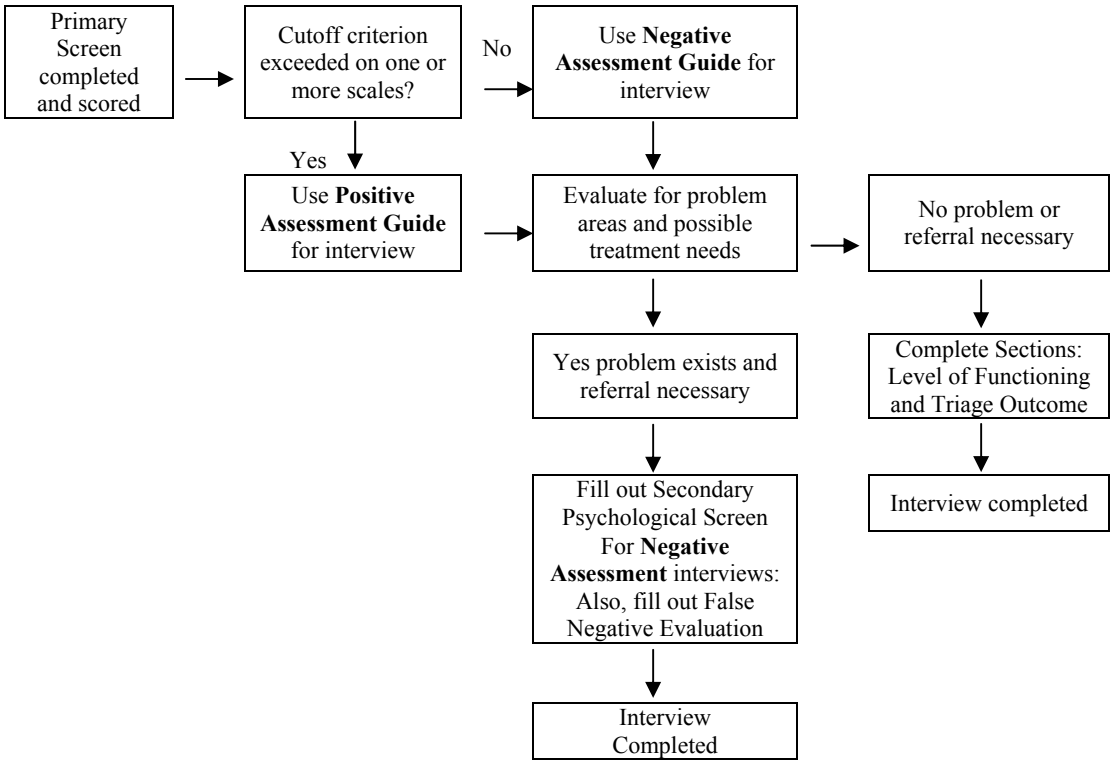

Figure 1: Positive and Negative Assessment Flowchart.

RESULTS

Demographics

A total of 864 soldiers were screened and interviewed for this study. Fifty-seven percent (57%) of the soldiers were junior enlisted, 35% were non-commissioned officers, and 8% were officers or warrant officers. The majority (65%) had served in the military for 5 years or less, 18% had served 6-10 years, and 17% had served for more than 10 years. Soldiers participating in the study were predominantly male (93%), White (61%) or African-American (19%), and had completed a high school diploma/GED (17%) or some college (41%). Approximately half of the soldiers (48%) were married, 47% were single, and 5% were separated or divorced.

Screening Outcomes

All soldiers completed a primary psychological screening survey and received a brief clinical interview with mental health staff. Five soldiers (0.6%) required immediate referral to determine suitability for deployment; 77 (8.9%) were identified for follow-up by mental health assets in Kosovo [7 of whom were already in treatment]; 89 soldiers (10.3%) were identified as having symptoms or problems but not at a level serious enough to require a command-directed referral; and 693 soldiers (80.2%) did not report any significant problems. Overall, in terms of scores on the primary screen survey, 183 soldiers (21.2%) exceeded criteria [positive screens], whereas 681 soldiers (78.8%) did not [negative screens]. The following description of the two screening groups identifies how effective the primary screen was in predicting referral category.

Positive Screens

Of the 183 soldiers who exceeded criteria on the primary screen, 74 (40.4%) were referred [6 of whom were already in treatment], 67 (36.6%) reported moderate symptoms but not at a level that required command-directed referral, and 42 (23.0%) did not report any significant level of clinical distress. Twenty-seven of these 42 soldiers reported either misunderstanding the question or making an error in their response.

Negative Screens

Of the 681soldiers who did not exceed criteria on the primary screen, 651 (95.6%) did not require a referral and did not report significant clinical symptoms, 22 (3.2%) reported moderate symptoms but not at a level that required command-directed referral, and 8 (1.2%) did require a referral [1 of whom was already in treatment]. The 7 new referrals were all related to relationship problems.

Table 2: Screening Outcomes

No Mental Health follow-up necessary	No referral necessary; target for prevention	Mental Health follow-up necessary
• True Negative • False Positive (e.g., misunderstood item, response error, or no significant clinical distress)	• Sub-clinical – Problem no referral (e.g., moderate symptoms or problems but no referral required at the time of screening)	• True Positive • False Negative (e.g., minimization of personal problems) • Already in Treatment

CONCLUSIONS

Overall, for this study the majority of soldiers screened prior to deployment did not report mental health problems. There were also no content areas identified in the secondary screen interviews that were not already covered in the primary screen. Furthermore, the primary screen instrument identified 75 of the 82 soldiers requiring a command-directed referral. In addition, all 5 of the soldiers who required immediate referral to determine suitability for deployment exceeded criteria on the primary screen.

The screening program developed to meet the immediate requests from commanders and division mental health for support in the early identification of at-risk soldiers. The purpose of psychological screening is not to provide a diagnosis but rather to provide a decision support tool for division mental health and commanders to help allocate resources. The recently increased pace of deployments has also resulted in increased requests by units for psychological screening of soldiers. Because of the sense of urgency surrounding the implementation of psychological screening, the predictive validity of the secondary screen triage interview remains uncertain. For example, the triage interview has not been validated against deployment outcomes. In addition, it is not known whether the screening of soldiers could inadvertently place them at risk (e.g., through stigma or breaches of confidentiality) or conversely, whether neglecting to screen soldiers could also place them at risk (e.g., lack of early identification of problems and adequate early intervention).

Additional analyses from the pre-deployment assessment will be conducted to establish final item inclusion for the primary screen survey and to determine predictors of referral categories currently used by division

mental health assets. Combinations of clinical scales and background and context questions predicting increased risk will also be examined. Further analyses of screening data will determine the screening items and procedures that will then be tested with soldiers preparing to deploy on a combat mission. Results from this revised screening survey will be validated against medical evacuation data from the theater of operations, and against a database tracking outpatient medical contacts for deployed units. These studies are part of the comprehensive development of a psychological screening program for U.S. Forces.

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OOTW (Operations Other Than War)
Pre- and post-deployment health
Pre-deployment screening
Prevention
Public health
Risk assessment
Safety
Standards
Veteran health care

14. Abstract

The purpose of the Symposium was to bring together Public Health, Occupational Health and Military Health professionals to discuss the strategies and technologies available to combat the threats mentioned. The specific objectives would be to share expertise and approaches so that the protection of the health of deployed NATO forces might be optimized.

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