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Sexually Transmitted Infections Among Army Personnel in the Military Environment

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1. Introduction

Sexually Transmitted Diseases (STD's) have always been a considerable problem in the military environment. The incidence of STD's among soldiers participating in combat operations dates back to the very first military conflicts (Rasnake et al., 2005; Emerson, 1997; Holmes et al., 1970). Sex industry has always thrived in the vicinity of military quarters and bases, and services of female sex workers have routinely been used by military personnel – physically active men. A French commander living in the 17th century once claimed that commercial sex workers 'killed ten times as many men as enemy fire' (Greenberg, 1972).

The incidence of STD's among military personnel in the past was divided into four periods. The first lasted until the beginning of the 20th century when the effects of venereal infections were noticed but widely ignored. The second phase, which lasted until the 1940s, covered the period of intensive scientific development (including laboratory diagnostics which made it possible to identify sexually transmitted pathogens). It was also the time of implementing certain preventive measures such as criminal procedure in the cases of prostitution. The third period started in the 1940s from the moment penicillin was introduced as a means of treating syphilis and gonorrhea on a mass scale (Greenberg, 1972). The next, fourth period in the history of STD's started in the 1980s and lasts until today. This stage is dominated by viral infections caused by *immunodeficiency virus* (HIV), *herpes simplex virus* (HSV), *human papilloma virus* (HPV) as well as bacterial infections caused by *Chlamydia trachomatis*, which all commonly occur in the whole world, both among civilians and military personnel (Gaydos et al., 1998, 2000; Fleming et al., 1997; Kotloff et al., 1998). Diseases induced by the above mentioned pathogens together with an increased incidence of gonorrhea pose a serious epidemiological risk due to a large number of asymptomatic infections, particularly among women, and ease of transmission in closed environments such as the military. Nowadays the military career is becoming increasingly popular among females. As early as in 1996-97 app. 17% of all new recruits to all military services of the United States were women (Walter Reed Army Institute Research, 1998). Screening tests for *Chlamydia* infections conducted among female U.S. Army recruits in the same period demonstrated a prevalence of 9.2% in a cohort of >13,000 women (Gaydos et al., 1998). This led to a conclusion that preventive medicine tasked with controlling STD's in the military environment can no longer focus only on transmission of STD's among female sex workers

and men soldiers, but it should also concentrate on transmission among soldiers of both sexes assigned to military duty in the same time and place.

The institution which has gathered the most comprehensive data on the incidence of STD's among military personnel is undoubtedly health service of the U.S. Armed Forces. American soldiers remain the best diagnosed and medically consulted professional group in the U.S., although they represent merely 1% of working population aged 18-45 (Hodge et al., 2002). The incidence of venereal diseases diagnosed among soldiers serving in their home countries are comparable to those observed in the local civilian population. However, the situation may change drastically if troops are deployed to an area of operations overseas. The prevalence of venereal diseases in combat troops is likely to be much higher than during peacetime and it is then strictly connected with ongoing military activities in the theater operations (Malone et al., 1993; Melton, 1976).

2. Past and present scenario of STD's in army personnel

2.1 World war I

Throughout World War I venereal diseases accounted for over 6.8 million lost duty days and the discharge from active duty of more than 10,000 soldiers serving in the U.S. Army (Deller et al., 1982). STD's with dominating role of lues and gonorrhea were the second major reason for lost duty days (the first one were sanitary losses due to the influenza pandemic in the period 1918-1919) (Rasnake et al., 2005).

2.2 World war II

During World War II the incidence of STD's in all units of the U.S. Armed Forces was estimated at 43/1000 soldiers (Padget, 1963). In the period of preparations preceding the Invasion of Normandy taking place in the U.K., the prevalence of STD's was estimated at 35-40/1000 soldiers, whereas during the invasion itself the incidence dropped to 5/1000 soldiers. However, soon afterwards the prevalence of STD's increased again reaching the level of 50/1000 in combat troops. In the second part of 1945, after the ceasefire was declared and hostilities in Europe ceased, during the occupation of Germany by the U.S. Forces, the incidence rate of STD's surged (most of venereal diseases posed gonorrhea) and it was estimated at 190/1000 soldiers (Sternberg & Howard, 1960).

2.3 Korean war

Throughout the Korean War in the period 1951-55, the incidence of venereal diseases was estimated at 184/1000 soldiers (Deller et al., 1982), gonorrhea accounted for three-fourths of all STD diagnoses. In some of the U.S. Forces units the incidence rate reached up to 500 cases per 1000 person-years (p-yrs) (McNinch, 1954).

2.4 Vietnam war

An increased sexual activity and therefore higher incidence of STD's was observed in the population of American soldiers fighting in Vietnam in the 1960s and 1970s (Hart, 1973, 1974). During the Vietnam War venereal diseases were listed as the number one diagnosis

in the Army's monthly morbidity reports (Deller et al., 1982). A substantial number of STD's led to the foundation of the Venereal Disease Control Branch of the U.S. Public Health Service (U.S. Department of Health, Education, and Welfare, 1962). In the period 1963-72 the prevalence of STD's among U.S. soldiers serving in Vietnam was estimated at 260 cases per 1000 p-yrs. Despite increased morbidity rates, merely 1% of patients diagnosed with STD's required hospitalization. Modern therapy of STD's, unlike medical treatment provided at the beginning of the 20th century, does not generally require a patient to be hospitalized and the majority of cases are diagnosed and treated on the outpatient basis (Deller et al., 1982; Shapiro & Breschi, 1974). Research conducted in the U.S. Air Force Hospital in Vietnam from November 1970 to June 1971 demonstrated that only 25 American soldiers were hospitalized due to venereal diseases. Whereas in all clinics (General Medicine, Dermatology, and Urology) of the same U.S. Hospital an average of 292 reported new cases of gonorrhea were treated ambulatorily per month (3202 cases from November 1970 to September 1971) (Shapiro & Breschi, 1974). The incidence of gonorrhea accounted for 90% of all STD's diagnosed in the U.S. Forces during the Vietnam War. In 1963 American troops serving in Vietnam were experiencing more than 300 cases of gonorrhea per 1000 p-yrs (Rasnake et al., 2005). In a study on a crew of a Navy aircraft carrier, the annual rate of gonorrhea was 582/1000 service members and nongonococcal urethritis was 459/1000 men (Harrison, 1974). Soldiers typically contracted an infection on a leave during port calls as a result of sexual contact with a female sex workers. During a 6-day port call in the Philippines, the average U.S. sailor had 1-2 partners and had intercourse three times. Examination post-exposure demonstrated gonorrhea in 8.2% white and 19.1% black soldiers (Holmes et al., 1970). By contrast, a recent study of U.S. soldiers in Fort Bragg, North Carolina, reported rates of 5 cases of gonorrhea per 1000 p-yrs (Sena et al., 2000).

Throughout the military conflicts conducted in Korea and Vietnam a vast number of STD's characteristic of hot climate areas were also reported. For instance, chancroid was 14- to 21-fold more common than gonorrhea in the population of American soldiers deployed to Korea (Asin, 1952). Research conducted among soldiers serving in the U.S. Forces assigned to Vietnam revealed that chancroid was the second most frequently reported venereal disease, the first one being gonorrhea (Kerber et al., 1969). Another venereal infection prevalent in hot climate areas is lymphogranuloma venereum. The disease is rare in both the U.S. and Europe but it is diagnosed in the population of sailors or soldiers returning from endemic regions in Asia, Africa, South America and the Caribbean (Perine & Osoba, 1990). Research conducted in the U.S. Forces in 1968 demonstrated 20 cases of lymphogranuloma venereum among military personnel home-bound from Vietnam or having a sexual partner returning from Asia (Abrams, 1968).

2.5 United Nations peacekeeping operations

Countries in Southeast Asia or Sub-Saharan Africa are characterized by high incidence of STD's in the local population. Soldiers deployed to military operations (usually UN peacekeeping missions) executed in the aforementioned endemic areas are at a high risk from STD's (Shafer et al., 2002). Military personnel is reported to have high rates of sexual contact with overseas nationals during deployments, ranging from 45% to 56% (Miller & Yeager, 1995; Hopperus et al., 1995). A study of Dutch soldiers deployed on five-month

peacekeeping duties with the United Nations Transition Authority in Cambodia (UNTAC) found that 45% had sexual contact with prostitutes or other members of the local population during their deployment (Soeprapto et al., 1995). STD's were the most commonly reported infectious diseases for the duration of the UN peacekeeping mission in Cambodia at the beginning of the 1990s. Cases of a HIV infection were the focus of attention of military health services operating on the UNTAC peacekeeping mission largely due to the fact that the incidence of HIV/AIDS among local female sex workers was high. The research conducted in 5 different areas of Cambodia among 437 prostitutes providing services in local brothels demonstrated that up to 40.5% were HIV positive, 38.7% had a *Chlamydia* infection and/or gonorrhea, and 13.8% syphilis (Ryan et al., 1998). The risk of infection was much increased by the fact that Cambodian citizens were not using condoms (Hor et al., 2005). The research conducted among female sex workers from Siem Reap (n=140) demonstrated that 78% were using condoms during intercourse with clients, whereas only 20% of them were using condoms during intercourse with their regular partners (Wong et al., 2003). The research conducted in the population of Indonesian contingent (n=3627) demonstrated HIV infections in 12 cases (ratio 3.3/1000 soldiers). The analysis of medical records belonging to 707 Polish soldiers assigned to the UNTAC peacekeeping mission who had been treated on the 1st and 2nd level of UN medical centers from May 1992 to September 1993 revealed that 92 soldiers (13% of the studied group) developed an STD (85 cases of gonorrhea, 5 HIV infections, 1 case of syphilis). All of the infected soldiers reported sexual contact with local women. The majority of the infectees were young privates (Korzeniewski, 2008). The entire population of the Polish Military Contingent acting under the UN mandate in Cambodia in 1992-93 (n=1254) were subjected to medical examination and diagnostic tests upon their home-coming. 97 of the examined soldiers were diagnosed with imported STD's: 9 HIV infections, including 1 case of AIDS; 55 of gonorrhea, 8 of syphilis, 17 of genital warts, 5 of genital herpes, 2 of granuloma inguinale, and 1 of lymphogranuloma venereum) (Korzeniewski et al., 2003).

UNAIDS has estimated that military personnel are two to five times more likely than civilians to contract STD's including HIV (Bazergan & Easterbrook, 2003). In times of conflict, the rate of HIV/AIDS among the military can be even more than 50 times higher than in peacetime (Tripodi & Patel, 2004). In 2000, a U.S. Intelligence Council Report estimated a HIV prevalence rate of between 10 and 20% among the armed forces of the Ivory Coast and Nigeria, and even higher prevalence of 40-60% among the militaries of the war-affected countries of Angola and the Democratic Republic of the Congo (U.S. National Intelligence Council, 2000). The UN recommends that HIV-positive personnel serving in national contingents should not be deployed to peacekeeping missions (United Nations, 1999). However, internal control over military personnel assigned to the UN operations based on routinely conducted tests is still missing. As a result, actual incidence rates of HIV infections among the UN peacekeepers cannot be specified. Although reliable data is absent, it has been estimated that rates are high among peacekeepers, especially in areas where the rate of HIV infection in the entire population exceeds 5%. HIV prevalence among peacekeepers assigned to the UN mission in Sierra Leone (UNAMSIL) was estimated at 32%, 17% in the UN Mission in Ethiopia and Eritrea (UNMEE), and 8% in the UN Mission in the Democratic Republic of the Congo (MONUC) (U.S. General Accounting Office, 2001).

2.6 U.S. Armed Forces

Within the last two decades the incidence of STD's among American troops was highly irregular. For the duration of such operations as *Desert Shield/Desert Storm* (the Persian Gulf War), *Restore Hope* (Somalia) it did not exceed 1% of the total number of all diagnoses. Several factors are considered to have influenced such a huge reduction in the number of STD's infections. In the case of nearly all contemporary military operations, especially those conducted in Muslim countries, contacts with local people have always been kept to a minimum (Hyams et al., 1995; Wassermann et al., 1997). Also, alcohol is prohibited, and if soldiers are entitled to a leave it always takes place outside the zone of operations. Health prevention measures undertaken by medical services in a mission area are directed towards preventing STD's by offering soldiers unlimited access to condoms (Berg, 2005). Yet, despite all the prevention measures taken by medical services, the incidence of STD's in U.S. military personnel, especially in those under 25, has been increasing. At the beginning of the 1990s 7.4% of U.S. military personnel was diagnosed with gonorrhea and 15.6% with *Chlamydia* infections (Zenilman et al., 2002; Cecil et al., 2001). In the period 2004-2009 research on prevalence of gonorrhea and chlamydiasis was carried out in the population of American soldiers serving in Iraq and Afghanistan. Gonorrhea rates ranged from a low 5/100,000 deployed personnel in 2005 to a high 17.6/100,000 in 2008 and 2009. Much higher rates were reported among young female soldiers and among personnel who had just been deployed to Iraq and Afghanistan. *Chlamydia* infection rates increased every year, peaking in 2009 with a total rate of 246.3/100,000 deployed personnel with higher rates in females (770.9/100,000) than in men (192.6/100,000) (Aldous et al., 2011). The research carried out in the population of the U.S. Forces soldiers (n=7,000) deployed to Bagram, Afghanistan from March to August 2005 demonstrated that 17 out of 2870 admissions to the U.S. Combat Support Hospital (on an outpatient basis) were due to STD's (8 cases of chlamydiasis, 4 of gonorrhea, 2 of genital warts, 2 of genital herpes, 1 of trichomoniasis) (Korzeniewski, 2011).

The U.S. Preventive Services Task Force guidelines (Meyers et al., 2008; U.S. Preventive Services Task Force, 2007) recommend yearly gonorrhea screening for sexually active women under 25 and chlamydiasis screening for sexually active women under 25 or for those over 25 with risk factors. All the U.S. services follow these guidelines and provide routine testing for those 25 years old and younger (USACHPPM, 2007). *Chlamydia* infection and gonorrhea remain the two most commonly reported STD's in the U.S. Forces (Seung-eun, 2010). American soldiers are a high-risk group as far as the incidence of STD's is concerned. App. 40% of the U.S. Forces personnel are people aged 17-24. In contrast, the U.S. civilian population at the same age accounts for only 14% of the entire population (Armed Forces Health Surveillance Center, 2009). Untreated *Chlamydia trachomatis* and *Neisseria gonorrhoeae* infections can result in pelvic inflammatory disease which may lead to ectopic pregnancy, infertility, and low birth weight (Cates et al., 1990). A considerable number of STD's diagnosed among military personnel, such as chlamydiasis or gonorrhea are mildly symptomatic or asymptomatic and therefore they do not greatly affect combat readiness of troops (Gaydos et al., 2000). It does, however, facilitate the spread of STD's both inside and outside the military environment, which may in the future lead to some serious health complications, especially in women (Gaydos & Gaydos, 2008).

Chlamydiasis remains the most commonly reported infectious disease not only in the U.S. Armed Forces but also in the U.S. civilian population (Niebuhr et al., 2006). The incidence

rates of *Chlamydia* infection registered in a military base Fort Bragg, North Carolina (one of the largest U.S. Army's units) in 1996 among male and female active duty soldiers were 3-fold to 6-fold higher than comparable rates reported in the civilian population of North Carolina and in the United States as a whole, especially among soldiers who were in the lower enlisted ranks, nonwhite and single (Sena et al., 2000). Reports prepared in the United States within the framework of the Defense Medical Surveillance System in the period 2000-2008 among non-deployed, active duty members demonstrated overall incidence of 922 cases per 100,000 person-years (392/100,000 person-years in the Navy; 1431/100,000 person-years in the Army). A total of 103,257 *Chlamydia* cases (95% lab-confirmed) were reported during the study period (Jordan et al., 2011). In the period 2000-2009 over 12,000 U.S. soldiers had recurrent diagnoses of a *Chlamydia* infection within a single year (Armed Forces Health Surveillance Center, 2010a). As opposed to gonorrhea, more than 90% of *Chlamydia trachomatis* infections in males are asymptomatic. Research in male population diagnosed with chlamydiasis demonstrated a slight increase in prostatitis and a fourfold risk of epididymitis (Trei et al., 2008).

Gonorrhea remains second, following *Chlamydia* infection, on the list of the most frequently reported venereal diseases in all services the U.S. Armed Forces. In the past gonorrhea provided a benchmark for determining morbidity rates in the military environment (Emmerson, 1997). In 2003 the incidence rate of gonorrhea in the U.S. Forces was estimated at 143 cases/100,000 in relation to 116/100,000 reported nationwide. Such high morbidity rates can be explained by a large number of asymptomatic infections, particularly among women. In male population asymptomatic infections account for 10% of all cases, whereas in female population - 50% (Niebuhr et al., 2006).

In the 1980s another STD joined the list of venereal diseases occurring in the military environment - AIDS. The HIV testing program covering donors at Army blood banks, applicants to the military, active-duty soldiers, the Army Reserves, and the National Guard was introduced in the U.S. Forces in 1985 (Brown et al., 1996). Until the end of the 1990s the number of HIV infections among the U.S. Forces personnel remained at a relatively low and constant level (Vu et al., 2002). In 1994 in the population of 378,000 active-duty soldiers who were screened, 650 were found to be HIV-positive (Renton & Whitaker, 1994). The rate of HIV seroconversion amounted to 1275 cases in all of the U.S. Forces (Renzullo et al., 2001). In recent years the number of infections has increased. 1373 new cases of HIV infections had been registered until January 2004 only among the U.S. Air Force personnel, 561 soldiers died of AIDS (Rasnake et al., 2005). Since October 1985 a HIV infection has been a medically disqualifying condition for entry to military service in the U.S. Forces. However, other STD's continue to occur at relatively high rates in the active American soldiers. Research into the incidence rates of STD's among the U.S. Forces military personnel was conducted in the period 2004-2009. Overall incidence rates of *Chlamydia* infections, *herpes simplex virus* (HSV), gonorrhea, and *human papilloma virus* (HPV) were 1056.2, 879.6, 230.8, and 2307.4 per 100,000 p-yrs, respectively (more service members were diagnosed with HPV than other STD's). The rate of syphilis was much lower than the rates of other venereal diseases (34.6 per 100,000 p-yrs). STD's rates were higher among military members who were female, in their 20s, black, in the Army, and from the southern regions of the United States (Armed Forces Health Surveillance Center, 2010b). Examination of 1737 female American soldiers preparing for deployment to *Operation Iraqi Freedom* (Iraq) and *Operation Enduring Freedom* (Afghanistan)

which was conducted in Camp Doha, Kuwait at the turn of 2003 and 2004 revealed venereal infections in 44 patients (2.5% of the examined group). *Herpes simplex 2* (genital herpes), *Condyloma acuminata* (genital warts), and *Chlamydia trachomatis* were the most commonly identified infections accounting for 29.5%, 25%, and 20.5% of the diagnoses, respectively (Wright et al., 2006). The majority of women with genital herpes and genital warts are asymptomatic. Asymptomatic are also 70% women with chlamydiasis. It has been estimated that there is an 8% prevalence rate of *Chlamydia* in a non-deployed, asymptomatic active duty female army population (Catterson & Zadoo, 1993). Nevertheless, it seems that STD's incidence rates reported in the population of soldiers deployed to contemporary military operations executed in different climatic and sanitary conditions have no significant influence on military readiness (Wright et al., 2006). As far as the military environment is concerned, the largest number of STD's is observed among young soldiers (recruits and basic trainees) who enter the military service with habits and behaviors they had acquired in their home environment (Brodine & Shafer, 2003; Gaydos et al., 2003). In the United States nearly 50% of all STD's reported every year are diagnosed in the population aged 15-24 (Weinstock et al., 2004). They experience certain health problems, including asymptomatic STD's which are not subjected to introductory screening upon admission to the military service (Shafer et al., 2008). Both, male and female military personnel are at risk (Abel et al., 1996).

2.7 STD's in the world

According to the World Health Organization approximately 340 million new STD's, mainly gonorrhea, chlamydiasis, trichomoniasis and syphilis are treated in the whole world every year. In addition to this, a substantial number of viral STD's, such as HPV, HSV or HIV infections are reported annually. Although the majority of all reported STD's are found in the Third World countries, they also pose a considerable epidemiological and economic problem in highly industrialized countries. Prevalence and incidence of STD's throughout the world depend on a number of factors, such as accessibility of diagnostics and health prevention programs aimed at controlling venereal diseases, sexual behavior in local population, the standard of living, the number of female sex workers, drug addicts and other risk groups inhabiting a given territory. Morbidity rates of particular STD's vary in different regions of the world. For instance, gonorrhea is far more common in developing countries, whereas in highly industrialized countries (where the introduction of effective prevention programs led to a reduction in the number of gonorrhea cases), *Chlamydia* infections prevail (Berg, 2005).

2.8 STD's in the U.S.A.

In the United States alone up to 18.9 million new venereal diseases are diagnosed per year and an astronomical amount of 17 billion USD is allocated for medical treatment of STD's (Weinstock et al., 2000). The highest incidence of STD's is reported in the population under 25, i.e. young people who appear to be more inclined to risky behaviors (such as unprotected sex) than the older section of a society. 1.2 million cases of chlamydiasis (401.3 cases/100,000 population) and over 340,000 cases of gonorrhea (111.6/100,000 population), two most commonly occurring contagious diseases in the U.S., were reported to Centers for

Disease Control and Prevention (CDC) in 2008. The largest number of infections was diagnosed in girls and young women aged 15-24. The majority of *Chlamydia* infections prevailing in the United States remain undiagnosed. The number of chlamydiasis among American citizens is estimated at 2.8 million new cases per year (Centers for Disease Control and Prevention, 2009). In the period 2002-2008 detection of *Chlamydia* infections in male population had increased by 45%, which was largely due to the accessibility of less invasive diagnostic procedures. Although the reported number of chlamydiasis in males is lower than in females, the CDC has estimated that the current numbers of new infections in both populations are comparable (Datta et al., 2007). According to the CDC undiagnosed and untreated STD's cause infertility in at least 24,000 American women every year (Centers for Disease Control and Prevention, 2009). Untreated chlamydiasis and gonorrhea lead to pelvic inflammatory disease (PID) in 10-20% of the infected females and in consequence can cause long-term complications such as chronic pelvic pain, ectopic pregnancy, and previously mentioned infertility (Hook & Handsfield, 2008; Hillis & Wasserheit, 1996). The highest incidence rates of *Chlamydia* infections and gonorrhea in the United States are reported in the population of young African-American women, whereas the highest incidence rates of syphilis are registered among young African-American men. Afro-Americans represent merely 12% of the American population, yet 70% of gonorrhea infections are reported in this particular ethnic group. In 2008 the chlamydiasis and syphilis rates among Afro-Americans were 8 times higher than in the white population (Centers for Disease Control and Prevention, 2008).

70% of chlamydiasis and 50% of gonorrhea infections in females are asymptomatic. The CDC recommends annual screening for *Chlamydia* infections in the population of sexually active women under 25, as well as among older women with risk factors such as multiple sex partners (Centers for Disease Control and Prevention, 2006). According to different sources of the U.S. health services the number of *N. gonorrhoeae* infections in the American population is estimated at 700 000 per year (Centers for Disease Control and Prevention, 2010). Asymptomatic gonorrhea is rare in males; it is far more common in females (Brill, 2010). It has been estimated that for every case of gonorrhea diagnosed in the U.S. there are 3 cases of a *Chlamydia* infection (Centers for Disease Control and Prevention, 2009). Additionally, app. 100,000 cases of primary and secondary syphilis are diagnosed in the population of American citizens per year. The number of syphilis diagnoses account for less than 1% of the total 12 million new cases reported annually in the whole world (Centers for Disease Control and Prevention, 2006). HPV infection (genital warts) is yet another STD commonly reported in the United States. It was diagnosed in 5.6% of sexually active U.S. adults aged 18-59 (Dinh et al., 2008).

2.9 Military environment

Incidence rates of STD's reported in the military environment cannot be directly compared to the same rates registered in the civilian environment due to large demographic differences in both populations. Military personnel are predominantly young single and sexually active men. Increased incidence of venereal diseases has been reported in the population of lower ranking enlisted personnel, whereas, there is not much data on incidence rates among officers, warrant officers, and senior noncommissioned officers. It has

been assessed that higher-ranking, older and better educated soldiers who follow health prevention programs (the use of condoms) rarely acquire an STD (Berg, 2005). Research conducted in the period 1989-91 among the U.S. Navy and Marine Corps male personnel (n=1744) during their on board deployment to South America and Africa revealed STD's in 10% of the crew, out of which only 10% were officers. The majority of sailors who reported sexual contact with prostitutes during port calls were young, non-white and single. 42% of the studied group reported sexual intercourse with female sex workers, of which 29% had one sexual partner, 35% 2-3, and 35% 4 or more partners. Enlisted personnel had sexual contact with prostitutes more often than officers (43% vs. 26%) (Malone et al., 1993).

The military environment represents a professional group which is at a high risk from venereal diseases, particularly on deployment to military operations conducted in different climatic and sanitary conditions. Even in the 1990s, when there was a lower number of armed conflicts with the participation of multinational coalition forces in the world, the incidence rates of STD's reported among military recruits (Gaydos et al., 1998) and other military populations were high (Brodine et al., 1998; McKee et al., 1998). A noticeable growth in the number of diagnosed STD's in the military environment is commonly reported during deployment to foreign countries. Regular sexual contact with sex workers and inconsistency in the use of condoms are considered to be the main risk behaviors for STD acquisition during deployment (Malone et al., 1993). Young, non-white, unmarried soldiers are at greatest risk from venereal diseases (Sena et al., 2000). Prevalence of STD's in the military environment is determined by a number of factors such as age, race, socioeconomic status (Coutinho, 1994). The epidemiology of STD's does differ markedly from the routes of transmission of other contagious diseases. In the case of venereal diseases a risk group usually represents only a part of the total population: young, sexually active people. Asymptomatic carriers have a dominant role in the spread of infections. The fact of having recovered from an STD does not boost immunity to venereal disease in the future; the clinical picture as well as the course of STD's may differ in each case. STD transmission rates may be characterized by such great diversity within the same population that monitoring venereal diseases in a specific study group is no mean achievement (Berg, 2005).

3. Risk factors and prevention

The most common risk factors resulting in STD's infections, both inside and outside the military environment, include risky sexual behaviors, such as sexual contact with prostitutes, casual sex with strangers, sex with multiple partners (even if a person practices serial monogamy), homosexuality, sex with partners taking drug injections, sex with a partner who has had multiple sex partners, including partners taking drug injections, sex with partners likely to be STD's carriers, unprotected sex (condoms). Another group of risk factors include early sexual initiation, delayed medical diagnostics and avoiding medical treatment. Risk markers, which indicate presence of risk factors, include marital status, race, urban residence, low socioeconomic status (Aral & Holmes, 1990).

Other variables may also function as risk factors or risk markers, e.g. age, sex, smoking, use of alcohol or drugs, previous STD's infections, lack of circumcision (Berg, 2005). However, the dominant role in the spread of STD's, especially in developing countries, belongs to

female sex workers (Day, 1988; Padian, 1988). In areas of military deployment where contact among soldiers and the local people is unrestricted and where unwritten social norms do not exist, there is a specific kind of symbiosis between the population of soldiers who have money and wish to entertain themselves and the population of local female sex workers who need means of support. Prostitution is cheap and commonplace in all Third World countries. Due to low prices of sex services prostitutes need a large number of customers to earn their living, while soldiers can afford multiple sex services. In areas where multinational troops are deployed there are a large number of makeshift shops, bars, and restaurants all around military bases which provide military personnel not only with stimulants such as alcohol and drugs but also with sex services (Berg, 2005).

Another risk factor determining the occurrence of STD's in the military environment is sexual assault of women, which is experienced by 4 to 9% of female service members. 8% of Persian Gulf War veterans reported sexual abuse during *Operation Desert Shield/Operation Desert Storm* in 1990-91. Another 34% of female respondents reported a rape or attempted rape during active duty. Many had been raped more than once; 14% reported being gang raped during active duty. However, three-fourths of the women who were raped did not report the incident to a ranking officer (Valente & Wight, 2007).

The risk of acquiring an STD infection is higher in military personnel with a history of a venereal disease in the past, among soldiers who had sexual contact with men, sex workers or drug addicts, soldiers who had casual sex or multiple sex partners (Renzullo et al., 1990). Alcohol consumption by soldiers executing mandatory tasks on military operations is yet another risk factor as far as the incidence of STD's is concerned. Alcohol consumption reduces morale, and it also co-exists with sexual activity and often leads to contact with sex workers, part of whom (especially in war-affected countries with low sanitary conditions) are infected with venereal diseases. During World War II (Ratcliff, 1947; Wittkower & Cowan, 1944), similarly to the Vietnam War (Hart, 1974, 1973) alcohol was claimed to be one of the risk factors for an STD acquisition. A vast majority of STD's reported in the military environment is diagnosed among young soldiers. There is a tendency among adolescents to have unplanned casual sex with sexually active partners (Hamburg, 1986). They are well aware they are playing with fire, yet they justify their actions by saying it is a way to relieve emotional tension resulting from the dangers of military service. One of the most significant risk factors determining the occurrence of STD's in the military environment is the necessity to deploy troops to operations conducted abroad in adverse climatic and sanitary conditions - in areas where the incidence rates of STD's among the local people are particularly high and where military personnel have the possibility to spend their time off outside military bases making use of available sexual services.

Soldiers assigned to military service in different climatic regions are typically sexually active people who wish to relieve stress and emotional tension associated with the execution of mandatory tasks in the area of operations. There is a specific form of initiation which consists in familiarizing young soldiers by their older colleagues with certain amusements based on sexual services provided by prostitutes, alcohol consumption or drug use. Taking advantage of the so called 'illegal entertainment' is a common way of spending time off during holidays and on leaves among military personnel. Such forms of spending time off-duty is preferred by soldiers who are single, low-ranking, low educated or who have problems with obeying the law (Berg, 2005). Departure from the rule was the Vietnam War,

where all of the military personnel in the population of American soldiers, regardless of their age, marital status or education, made use of sexual services provided by female sex workers (in a large part infected with venereal diseases). 44% of married recruits, 56% of recruits over 30 years old and 30% with high school education treated sexual contact with prostitutes as a natural way of spending their time off-duty (Hart, 1973).

Increased incidence of STD's among military personnel engaged in military operations is also determined by the absence of alternative ways of spending time off-duty, such as a gym, a cinema or a library. As a result military personnel tend to seek other forms of entertainment to fight against monotony (Ratcliff, 1947). In military bases offering off-duty entertainment to service members the number of STD's being the result of sexual contact with female sex workers has been considerably reduced (Berg, 2005). The primary task of preventive medicine, which is part of medical support provided for troops engaged in operations conducted in adverse climatic and sanitary conditions, apart from defining risk factors for STD's in the military environment and preventing the occurrence of STD's, should be regular cooperation with representatives of the local public health authorities in the aspect of controlling the number of venereal diseases in a given territory, especially among risk groups (female sex workers) who may have contact with service members. A good example in this respect is the cooperation between the U.S. Navy and the Social Hygiene Department in the Philippines in the field of diagnostics and treatment of venereal diseases in the population of registered female sex workers who had been screened for STD's (the incidence rate of gonorrhea was merely 4% in the examined group). By contrast, the incidence rate of gonorrhea among unregistered female sex workers in the same territory was estimated at 40% (Hooper et al., 1978).

4. Conclusions

Sexually transmitted diseases do not pose a serious epidemiological risk among army personnel in the military environment under the condition of regular clinical and laboratory supervision of the soldiers' health status. The risk of acquiring an infection increases drastically in cases of unprotected casual, sexual intercourse. In recent years the hazard of developing of venereal diseases in the military environment has increased due to the fact that military service has ceased to be an all-male profession. In national contingents participating in peace and stabilization operations women account for a substantial part of military population. In some units of the U.S Forces female represent up to 15% of the population, which certainly influences the fact that sexual activity among military personnel is becoming increasingly commonplace. Screening conducted among personnel of the U.S. Forces revealed clinical symptoms and/or lab-confirmed cases of STD's. The results clearly indicate that detailed tests need to be carried out among male and female soldiers, before relocating to military service overseas as well as in the theater operation. Out of sexually transmitted diseases, chlamydiasis, gonorrhea and viral infections (HSV, HPV, HIV) prevail in military personnel. Chlamydiasis remains the most frequently diagnosed venereal disease in the population of soldiers. The epidemiological services of the U.S. Army recommend screening for *Chlamydia trachomatis* in all candidates entering the U.S Forces. Other STD's, especially HIV/AIDS, also constitute a considerable epidemiological risk in the military population. Screening for HIV infections is routinely carried out in the majority of the Armed Forces. The incidence rate of STD's among soldiers surges drastically during warfare

and is several times higher in comparison with peacetime. Military contingents generally consist of young, sexually active men who tend to treat contact with female sex workers as a means of stress relief. The incidence rates of venereal diseases are hugely influenced by the region of deployment. In Muslim countries lying in the Middle East and Central Asia which are burdened with a number of moral restrictions, the access to sexual services is extremely limited. Therefore, in comparison with other diseases prevalent in these areas, STD's do not pose a serious health hazard for service members. In contrast, the epidemiological situation in other parts of the world, i.e. in Southeast Asia or Sub-Saharan Africa is completely different. Unlimited access to sexual services provided by sex workers of whom a vast majority is infected with STD's results in the increased incidence rates of sexually transmitted diseases in these regions and a much higher risk of acquiring an infection by soldiers deployed to military operations. Military health services and the representatives of preventive medicine in particular, need to bear this information in mind as future military operations with the participation of the multinational coalition forces are likely to be conducted in Africa where the incidence rates of STD's are one of the highest in the world.

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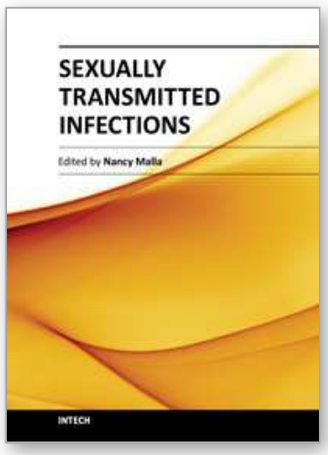
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Sexually transmitted infections (STIs) are infections that are spread primarily through person to person sexual contact. There are more than 30 different sexually transmissible bacteria, viruses and parasites. STIs lead to high morbidity and complications. This book entitled as Sexually Transmitted Infections is not a text book but provides useful information for general reference work for physicians, researchers and students interested in the subject. Each chapter is abundant in tips useful to general readers as well. It also includes the Introductory chapter providing an overview with special emphasis on syndromic approach to the management of STIs in clinical setting.

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