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Weapons of Mass Destruction and the Principle of Unnecessary Suffering: The Use of Nuclear Weapons in an Armed Conflict

Jaroslav KRASNY

Doctoral Student, Graduate School for International Development and Cooperation, Hiroshima University

Noriyuki KAWANO

Institute for Peace Science, Hiroshima University

Abstract

This research is concerned with the use of nuclear weapons against combatants in an armed conflict and whether such a use violates or would violate the principle of unnecessary suffering as codified in St. Petersburg Declaration of 1868 and the Hague Conventions. In order to analyze what constitutes unnecessary suffering the method chosen for this research is comparison of the effects of nuclear, chemical and biological weapons on the human body. The reason for choosing this method is the abhorrence and distaste amongst international society towards chemical and biological weapons. These "inhumane" weapons are also already prohibited in international law mainly on the basis of violating the principle of unnecessary suffering.

The paper deals with the physical and legal consequences of using nuclear weapons in an armed conflict. The main argument is that late effects even as a byproduct of nuclear explosion may cause "unnecessary" suffering of combatants. Even after a conflict ends these late effects continue to damage their organisms and thus prolong the suffering. On the other hand, not all nuclear weapons are the same. While a strategic use of a high-yield weapon would definitely be illegal, a tactical use of a low-yield nuclear weapon in remote areas, as anti-materiél or on high seas could limit the number of casualties and thus possibly be in compliance with the rules of international humanitarian law.

1. Introduction

Warfare underwent a fundamental change in 21st century. The number of inter-state conflicts decreased while intrastate conflicts with non-state actors represented mainly by religious extremists pose a major security threat. In this century, modern warfare is dominated by airstrikes, precision-guided missiles and swift ground operations.

Therefore, one question remains, what role is being played by nuclear weapons in this world, i.e., how would the use of nuclear weapons fit into modern warfare? Let's not forget that states are bound by international humanitarian law (IHL) when engaging in hostilities. IHL consists of sets of rules where the main weight is put on protecting civilians (non-combatants) and limiting the scope of inflicted/necessary suffering.

Our world is filled with approximately 20,530 nuclear missiles (Gillis, 2012) waiting in silos for an order we all hope will never be issued. While some consider nuclear disarmament to be an "impractical dream" (Robinson, 2001), most of the world population, including political leaders, military and intelligence officials[1], consider nuclear disarmament as crucial for safer, more peaceful future.

We believe the concepts of mutually assured destruction (MAD) with massive retaliation are largely concepts of the past. Today's conflicts are more compact and complex without clearly uniformed enemy who is located in predominantly urban areas and in the midst of civilian population. Therefore, given the international humanitarian law, how does nuclear warfare fit in this era?

While recognizing the necessity for peaceful solution to these conflicts, the conclusion is not based on my personal feelings towards the issue or future concepts of *ius de lege ferenda*[2]. In this paper, we have tried to grasp the realities of modern warfare and base our argument upon applicable principles of international humanitarian law, i.e., *ius de lege lata*[3]. Also, we believe it to be a paradox that biological and chemical weapons are banned while nuclear weapons remain presumably "legal".

2. Background

An important document has been agreed upon in 1868, the so-called St. Petersburg Declaration. Proposed by the Russian Empire, it codified the concept of "unnecessary suffering" in combat. The idea is, without a doubt, noble: "*if you can, capture without killing, if you have to inflict injuries, inflict light injuries and kill only as the last resort without inflicting prolonged or "unnecessary" suffering on the enemy*"

[1] e.g. Stansfield Turner (former director of the CIA).

[2] Set of rules that should apply in the future.

[3] Currently applicable set of rules.

(*International Committee of the Red Cross*, 1973). Now, this is obviously easier said than done. Warfare is an extremely complex situation where lives are put in jeopardy, property and sometimes even environment inevitably destroyed. To define what exactly constitutes "*unnecessary suffering*" is undoubtedly difficult, however, important task. Therefore, I will refrain from analyzing so-called "conventional"[4] weapons and focus solely on "unconventional" weapons, i.e., weapons of mass destruction (WMD), recently being increasingly referred to as CBRNe (chemical, biological, radiological and nuclear explosives).

While discussing the possible ban on the use of nuclear weapons we have to mention that in the past nations have already agreed upon banning/restricting certain types of weapons. These include landmines, dum-dum bullets and cluster bombs and imposed restrictions on flamethrowers and napalm bombs through the Treaty on Certain Conventional Weapons (1981). However, whether a state is a party to a certain convention is another issue.

International community achieved an important step forward when chemical and biological weapons were banned as a whole category of weapons in an unprecedented step. Seeing this development there is no reason to believe nuclear weapons can't follow the same path. We saw the first attempts in 1996 when International Court of Justice (ICJ), the judicial body of the United Nations (UN), issued its Advisory Opinion on the use of nuclear weapons and concluded the use would be generally contrary to the purposes of the United Nations (UN) Charter. However, the International Court of Justice (ICJ) also concluded the use might be permitted under extreme circumstances where the sole existence of a state is in jeopardy (Boisson, 1999).

3. WMD Effects on the Human Body

The effects of various types of biological, chemical and nuclear weapons can be divided into two categories: acute and late effects. Acute are the most documented while late effects of nuclear weapons (i.e. ionizing radiation) are not yet fully comprehended and further research is still being conducted. Similarly, great difficulties exist regarding the assessment of late health effects of chemical and especially biological weapons. While for biological weapons we can use the Centers for Disease Control (CDC) data on various types of viruses and diseases most of the data in the area of chemical weapons (mainly *sulfur mustard*) come from Iran-Iraq war through the research and activities of Dr. Shahriar Khateri of Tehran Peace Museum.

a) Biological Weapons

Biological weapons employ bacteria; rickettsia or fungi that multiply within the

[4] Weapons that produce energy through chemical reaction.

host body causing various types of diseases (Garrett&Hart, 2009).

The joint research on Saddam Hussein's chemical warfare victims conducted by medical experts from Hiroshima and Iran offer valuable data for assessing long-term effects of sulfur mustard (aka *mustard gas; yperite*) on the human body. Thus, to assess long-term effects of chemical agent (*yperite*) on the human body the case study of Iran-Iraq war was chosen.
In 1970, the World Health Organization (WHO) conducted a study which was complimentary with the studies done by the UN in 1969. The WHO report reached the following conclusions regarding chemical and biological weapons:

1. *Chemical and biological weapons pose a special threat to civilians due to the indiscriminate nature of these weapons and high concentrations which would be used in military operations which would downwind affect civilian population*
2. *The large scale or sometimes even limited use could cause illness to a degree that would overwhelm existing health resources and facilities.*
3. *Large-scale use of chemical and biological weapons could cause lasting changes in the environment.*
4. *The possible effects of CB weapons are subject to a high degree of uncertainty and unpredictability depending on the mixture of meteorological, physiological, epidemiological, ecological and other factors.*
5. *Although advanced weapons would be required for CB deployment for a militarily significant attack, isolated sabotage could be effective under certain conditions.*

(WHO Report, 1970)

Focusing on biological weapons, deployment of, e.g., highly infectious smallpox or plague bacteria would not only cause infection amongst combatants but would most probably spread beyond limits of battle operations due to the interaction of civilians and combatants in hospitals, restaurants etc. causing uncontrolled infection amongst civilian population which can on contrary turn also against the aggressor. It is not difficult to imagine that with a major outbreak of a disease the possibility for chaos exists. We can just go back to H5N1 "bird flu" virus or more recent H1N1 "swine flu" panics. Should a weaponized virus or bacteria cause outbreak of certain disease the subsequent floods of infected, panic amongst civilians and demand for vaccination could be overwhelming. Introducing a new virus or bacteria to a certain specific eco-system could cause unpredictable long lasting negative effects. This could then lead to long-term consequences by establishing new foci of diseases.

It is extremely difficult to assess long-term effects of biological weapons due to the lack of sufficient data and information.

Generally, we can use our knowledge of viruses and bacteria to assess their possible long-term effects on the human body. According to WHO study (1970) these effects include: a) chronic illness caused by certain biological agents, b) delayed effects in persons directly exposed, c) creation of new foci of infective disease. Therefore, the possible long-term effect of a biological weapon is weakened immune system with developed susceptibility to various infectious diseases.

In 2003, the US Department of Veterans Affairs sponsored a study conducted by Veterans Health Initiative (VHI) regarding *the Health Effects from Chemical, Biological and Radiological Weapons*. The study describes these effects based upon numerous human experiments conducted by the US army during the Cold War. These experiments were conducted until 1975, six years after President Nixon announced the US is ceasing its biological weapons program. The only conclusion by the Initiative regarding long-term health effects of a biological agent states that "long term sequelae following infection (and recovery) by biological warfare agent must be considered including psychological impacts, such as the Post Traumatic Stress Disorder (PTSD).

In its publication *Biological Weapons: Limiting the Threat* published by the *Belfer Center for Science and International Affairs* (1999) the authors describe the bacillus anthracis, i.e., anthrax. The organism lives in the soil and in cattle, sheep, goats and/or horses worldwide. Anthrax can be contracted via minor skin lesions or through contact with infected animals or their products. Anthrax spores were weaponized by the US before biological weapons program was terminated by the Nixon administration. Iraq, in 1995, also admitted to conduct a research into weaponizing the bacillus. Anthrax can also enter the body through swallowing (gastrointestinal ingestion) or inhalation. Since weaponized anthrax would most likely be used in the form of aerosol after the bacteria deposits in the lower respiratory tract, spores are phagocytized by tissue macrophages and transported to hilar and mediastinal lymph nodes then they germinate and produce necrotizing hemorrhagic mediastinitis. The symptoms include fever, malaise, fatigue, cough and chest pain, this may progress directly to dyspnea, stridor, diaphoresis and cyanosis. Bacteremia, septic shock, metastatic infection and death usually follow within 24 to 36 hours and once symptoms appear treatment is usually ineffective (Belfer Center, 1999: pp.44-45). The publication does not discuss long-term effects which might include chronic cough, fatigue and joint swelling and pain.

In 1969, President Nixon unilaterally declared the US is abandoning its biological weapons program. Subsequently, this step helped to pave the path towards the *Biological Weapons Convention* (BWC) which entered into force in 1975. Chemical weapons

were banned much later in 1997 under the *Chemical Weapons Convention* (CWC) together with the establishment of the Organization for Prohibition of Chemical Weapons (OPCW), a control body under the Treaty. It is also important to remember that not all biological and especially chemical weapons are lethal. Police forces around the world are allowed to use CS (tear gas) in suppressing riots. What is banned is the use of certain CB weapons for military purposes.

b) Chemical Weapons

In 1975, the Stockholm International Peace Research Institute (SIPRI) published a study regarding delayed effects of chemical weapons. This study used data from former military employees (e.g. former Wehrmacht employees advanced legal claims concerning their health) handling chemical agents who suffered chronic poisoning through constant exposure to small doses of various agents. Delayed lesions were subsequently caused by acute or sub-acute poisoning. Besides evaluating the effects of mustard gas the study focused on organoarsenic agents (sternutators and vesicants). The effects of organoarsens include psychopathological-neurological problems, problems of gastrointestinal tract, hepatotoxicity, nephrotoxicity and hematotoxic delayed/late effects (effects of arsenic).

Late effects of phosgene, a gas deployed by the French during WWI, include bronchial asthma and pulmonary emphysema. The study briefly touched upon the average interval between death from carcinoma and first contact with mustard gas, the interval was 18.5 years and for nitric mustard 4.6 years. (SIPRI, 1975: p.14). Mustard gas is said to have mutagenic, carcinogenic, hepatotoxic and neurotoxic effects.

The main portion of the study is devoted to organophosphorous compounds, i.e., nerve agents and their effects. These effects include miosis, spasm, bronchospasm, nausea, vomiting, abdominal cramps, diarrhea, increased salivation, tremors, cramps, myasthemia, giddiness, headache, anxiety, depression of the respiratory center – coma and convulsion (SIPRI, 1975: p.25). These results were also obtained through studies conducted on pesticides which are functionally related to CW (SIPRI, 1975: p.23). These compounds further damage CNS through derangement of acetylcholine by the inhibition of cholinesterases, particularly acetylcholinesterase. Therefore, late effects exist in the form of damage to the brain with resulting psychopathological-neurological lesions as described by Rowntree, Nevin and Wilson in 1950. Hematopoietic system is also affected.

A comprehensive look into the issue of banning chemical weapons and their "taboo" (especially regarding their use) was offered by Richard M. Price (1997) in his publication: "*The Chemical Weapons Taboo*". Price describes the evolvement of the ban throughout the history including important

milestones such as the extensive use in WWI, somewhat surprising non-use in WWII and subsequent development followed by comprehensive prohibition in the 90's. He describes the chemical weapons taboo as being formed since the medieval times. Poison was considered somewhat a treacherous, cowardly weapon against which there was no known defense. Furthermore, poison could be employed by the weak (peasants, servants etc.) and often was. Soldiers looked with disfavor on weapons which denied them a chance of escape.

The fundamental provision that the infliction of "suffering" on a combatant was not unlimited was codified in the US field manual issued by the Union Army in 1863, the so-called "Lieber Code" which states: "*Military necessity does not admit of cruelty – that is, the infliction of suffering for the sake of suffering or revenge, nor of maiming or wounding except in fight, nor of torture to extort confessions. It does not admit of the use of poison in any way, nor of the wanton destruction of a district"*. This idea was later re-confirmed during the Hague Conferences. The Hague Declaration was an invitation to self-restraint amongst the strong (Price, 1997: p.34). In just war doctrine, destruction of the innocent is unthinkable. However, these Hague Declarations were only binding between contracting powers.

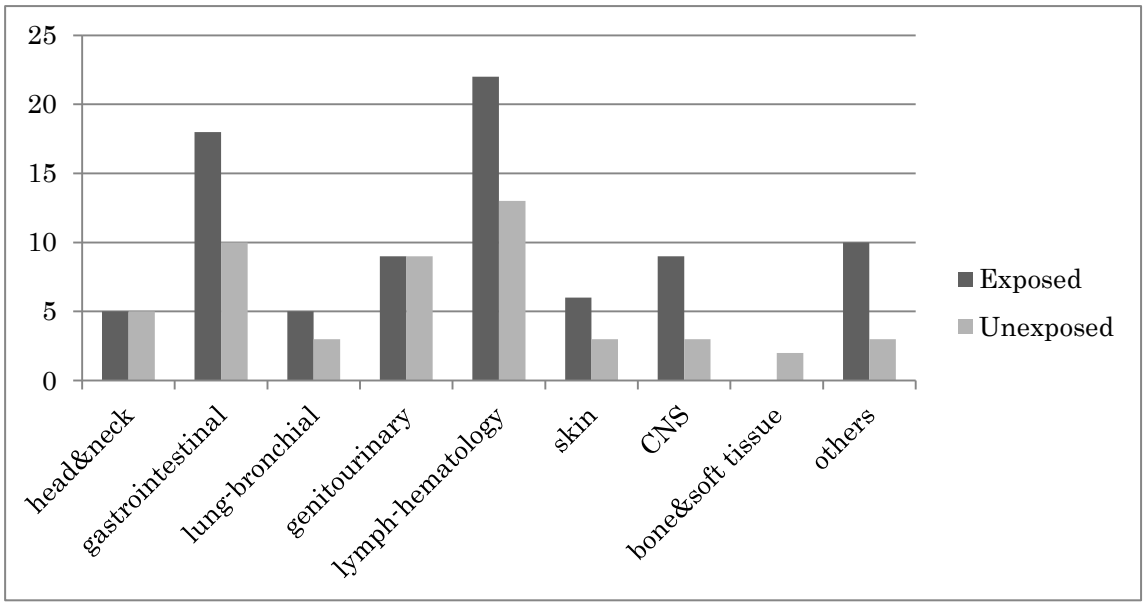
Even though the Hague Declarations were violated as we know from our past it does not mean they failed, same as committing a crime does not mean criminal law failed. Gas in WWI was first based on reprisals – a lawful response towards a violator of IHL. Later, Paris Conference of 1989 helped to strengthen the way for CWC after Iran-Iraq war. Saddam Hussein stated in 1990 prior to invasion of Kuwait he will use chemicals against Israel if it tries to attack Iraq, even though Iraq did not possess nuclear weapons, the parity between chemical and nuclear weapons was strengthened. Therefore later, some nations resorted to CW to match nuclear weapons of developed nations.

One of the most important studies regarding the effects of sulfur mustard on the human body was conducted by the joint research groups from Hiroshima and Tehran. The research was initiated by an NGO based in Hiroshima, MOCT. Two teams of scientists and doctors were formed and worked together on the Atlas of Mustard Gas Injuries published by MOCT in 2012. The Atlas is an invaluable resource providing an insight into the biological effects of this agent.

Sulfur Mustard (SM) is a cytotoxic vesicant which is also believed to be carcinogenic through the process of alkylation. The reactive sulphonium ion binds covalently to other substances. Subsequent intermolecular interactions eject chlorine ion from sulphur mustard molecule creating a reactive sulphonium ion which binds to a number of different biological molecules through alkylation. Sulfur mustard disrupts crucial molecular structure within a cell. Chromosomal changes include

increase in sister chromatid exchanges, gaps, deletions, chromosomal stickiness and chromosome shattering (Inai, 2012 pp.36-37).

Carcinogenicity is defined by an increased risk of upper and lower respiratory tract cancers (oral cavity, nasopharynx, larynx and lung). The risk is proportional to the time of exposure. The relative risk is estimated to be 4.02 times higher than unexposed. Relative mortality risk was calculated to be 1.44 times higher. Even though there is increased rate of malignancies in the exposed individuals no exact relationship was found between single-acute exposure to sulfur mustard and particular type of cancer (Inai, 2012: p.53; see the figure 1).



Source: Adopted from *the Atlas of Mustard Gas Injuries*, Inai (2012), p.53

Figure 1. Frequency of cancer in two groups of veterans of Iran-Iraq war

Acute phase of injuries to the respiratory system are the most prominent effects of sulfur mustard. These injuries are determined by several factors including time of exposure, concentrations of the gas and biological susceptibility of exposed individuals (Inai, 2012: p.61).

Inhaled vapors of sulfur mustard contact airway surfaces through the process of molecular diffusion causing most of the damage in the nasal, laryngeal and bronchial regions of the respiratory tract (Inai, 2012). Studies have shown that exposure results in mucosal damage that occurs in the upper tract and usually extends to bronchioles. Low dose exposure causes congestion.

Furthermore, damage to the respiratory tract causes acute edema, inflammation and destruction of the airway epithelial lining. Also, sulfur mustard

damages nucleic acids and disrupts proteins at the cell membrane and at intracellular sites through alkylation (Inai, 2012: p.61). The acute effects are represented by difficulty breathing, rhino rhea, respiratory tract inflammation and high doses exposure may result in pulmonary edema with pulmonary infections manifested with septicemia. (Inai, 2012: p.66)

In the chronic phase epithelium can either resolve completely or develop into chronic respirational tract inflammation, chronic rhino sinusitis, scarring and stenosis of trachea and bronchi and excessive proliferation of granulation in the small airways. However, the exact pathogenesis of chronic disorders not yet been clarified. The potential mechanisms for pathogenesis are apoptosis and oxidative stress. Chronic effects are then represented by chronic rhino sinusitis and tracheobronchial stenosis, tracheobronchomalacia, bronchiectasis, asthma and airway hyper responsiveness, chronic bronchitis, bronchiolotic obliterans and increased risk of lung cancer (Inai, 2012: pp.66-73).

Eye injuries to exposure are also divided into acute and chronic injuries. In the acute phase. The first phase is characterized by sensation of grittiness, soreness and an appearance of a blood-shot in the eye which further proceeds to swell and conjunctivitis. According to the Atlas of Mustard Gas Injuries (Inai, 2012), 2-6 hours after exposure, patients complain of severe pain, tearing, photophobia and sometimes temporary blindness. Physical findings include involuntary eyelid twitching, periorbital swelling, and conjunctival injection with edema occurring with doses exceeding 200mg/min. After several hours, the corneal epithelium begins to blister and slough off which leads to decreased visual acuity. With even high doses the possibility for permanent blindness exists. Complete recovery may take 6 weeks or longer. The course of a patients is described as follows: complete resolution, persistent smoldering inflammation (chronic form), or reappearance of lesions after a latent period (Inai, 2012: p.109).

The chronic phase is characterized by photophobia, redness, tearing and decreased visual acuity. Permanent blindness or decreased visual acuity can occur in approximately 0.5% of those severely wounded. Wide range of late ocular symptoms has been reported these include chronic inflammation of the eyelash follicles, meibomian gland dysfunction, decreased tear meniscus, conjunctival vessel twistedness, limbal ischemia and stem cell deficiency, corneal scarring, thinning, lipid/amyloid deposits and the formation of new blood vessels, i.e., neovascularization. Limbal and corneal involvements are unique features of sulfur mustard keratitis. In 1 to 40 years the exposed can experience resurgence of symptoms as delayed onset sulfur mustard keratitis. These symptoms include photophobia, excessive tearing, redness and decreased visual acuity.

In skin injuries, only about 20% of SM penetrates skin and the absorbed fraction cannot be extracted from the body. 10% interacts with the skin tissue and the remainder is absorbed into the bloodstream. Skin injuries due to the SM are classified in two categories: early and late skin lesions. The exposed experience itching, erosion, burning and progress towards development of large blisters which spontaneously rupture and cause wounds that heal slower than thermal burns. After wound recovery, a pigmented scar appears. Epidemiological, cellular and toxicological evidence indicate a causal relationship between SM exposure and the incidence of lung, skin cancer and possibly leukemia.

c) Nuclear Weapons

The bombings of Hiroshima and Nagasaki provided the most detailed data on the effects of nuclear explosion on the human beings. The Atomic Bomb Casualty Commission (ABCC) is still conducting research into the effects of ionizing radiation. The following analysis is based on the data obtained after the bombings through several research groups.

The effects on the human body correlate with the energy distribution during explosion. Thus, damage is caused by thermal radiation (e.g. burns), blast (e.g. trauma to the body, ear drum rupture etc.) and ionizing radiation (increased risk of malignancies). Radiation produced by nuclear weapons on the body can be again divided into two categories of "acute" and "late" effects. Before they were understood some of the late effects were described by *hibakusha* [5] as an "A-bomb disease" (*genbaku-sho*). This refers to primary and secondary radiation illness. The first study chosen for this review is the *Effects of Nuclear bombing of Hiroshima and Nagasaki* compiled by the *The Committee for the Compilation of Materials on Damage Caused by the Atomic Bombs in Hiroshima and Nagasaki in the publication Hiroshima and Nagasaki: The Physical, Medical and Social Effects of the Atomic Bombings* (1981).

As described in the introduction, nuclear weapons release an enormous amount of energy as thermal radiation, this amount is approximately $7x10^{12}$ calories and at the bursting point the fireball reaches temperature of several million degrees of Celsius. This temperature quickly drops to ground surface temperature of 4-5000 degrees causing burns within 3.5km in Hiroshima and 4.0km in Nagasaki. The temperature within 1Km reached over 1800 degrees. The heat rays consist of near ultra-violet visible rays with the main injury caused by infrared rays. The healing of the burns was further complicated by ionizing radiation (The Committee for the Compilation of Materials on Damage Caused by the Atomic Bombs in Hiroshima and Nagasaki, 1981: p.121). Subsequently, the blast pressure reached $1kg=cm^2$ at the

[5] Atomic Bomb survivors. Generally refers to those who were exposed to ionizing radiation.

hypocenter, directly below the burst point the pressure was 4.5-6.7 tons/m² in Hiroshima and 6.7-10 tons/m² in Nagasaki. The velocity of shock wave at the vicinity of hypocenter was 700-800m/sec. The initial radiation was due to α, ß, γ rays and neutrons. The α particles were formed by U and Pu which has escaped fission and ß particles by fission products. Both didn't reach the ground due to short wave lengths. 50% of the fatalities occurred within 1.2Km with 80-100% for distances lower than 1km.

Injuries caused by gamma rays and neutrons (ionizing radiation) damaged blood cells (lymphocytes) after single total body irradiation of 10 roentgens (p.128). After a dose of 100+ roentgens red cells, white cells, platelets are injured followed by gastrointestinal mucosa and with even greater dose fatal changes in the Central Nervous System (CNS) occur. LD_{50} is estimated for a dose ranging between 200-600 roentgens (p.128). Acute radiation effects are composed of vascular and cellular injuries. When radiation penetrates the cell, particles travelling at high speed cause ionization and excitation along the locus of radiation in the cell leading to a damage of molecules or molecular groups and the particles lose their energy, i.e., transfer their energy to the cell through linear energy transfer (The Committee for the Compilation of Materials on Damage Caused by the Atomic Bombs in Hiroshima and Nagasaki, 1981: pp.128-129). Radiation illness is classified into 4 categories of: I. very severe, II. Severe, III. Moderately Severe, IV Mild.

Secondary radiation caused by various neutron induced radioisotopes in the air and on earth (or in the fallout) cause further disease. One hour after the explosion the dose was estimated to 0.5 Sv for a person staying for 5 hours in the contaminated area. This drops to 0.1 Sv for 8 hour stay the very next day. Total external radiation from fallout and induced radioactivity 1 hour after the explosion is estimated to range between 0.04-0.4 Sv in Hiroshima and 0.48-1.49 Sv for Nagasaki (The Committee for the Compilation of Materials on Damage Caused by the Atomic Bombs in Hiroshima and Nagasaki, 1981: p.149).

A more recent study was published in 1995 in a publication "Effects of A-bomb Radiation on the Human Body". The study concerned a research on various acute and late effects of ionizing radiation produced by the bombs. The acute symptoms are those appearing at the time of bombing and by the end of December 1945 (Shigematsu et al., 1995: p.10). The acute symptoms can be divided into three phases as shown in Table1.

Table 1. Chronological appearance of acute effects

Phase 1	The time of bombing to the end of 2nd week – acute symptoms.
Phase 2	3rd week to 8th week (6 weeks): 3rd to 5th week – sub-acute symptoms 6th to 8th week – complications
Phase 3	3rd month to the end of December 1945 – signs of recovery

Source: Shigematsu et al. (1995) *The Effects of A-Bomb Radiation on the Human Body,* Tokyo, Bunkodo.

For most immediate fatalities the main cause of death was being crushed by collapsed buildings, being entrapped in the buildings and burned by subsequent fires or through severe shock to the body. The victims who suffered burns of more than 20% of the body complained of thirst, vomiting and then lapsed into shock with the most dying by the end of the first week. Even when the burns were not serious the victims complained of weakness, exhaustion, nausea, suffered from vomiting and within few days experienced fever, diarrhea, hemoptysis, hematemesis, bloody stool and hematuria. Their bodies became depilated and death occurred within 10 days of exposure (pp.10-12). Autopsy conducted on these victims revealed destruction of hematopoetic tissue (bone marrow, lymph nodes and spleen, swelling and degeneration in the epithelial cells of the intestines, reproductive organs and in endocrine gland cells due to ionizing radiation (Shigematsu et al., 1995: p.12).

Sub-acute symptoms included nausea, vomiting, diarrhea, epilation, weakness, fatigue, hematemesis, bloody stool, hematuria, nose bleeds, gum bleeding, genital hemorrhage, subcutaneous hemorrhage, fever, sore throat, stomatitis, leukopenia, erythropenia, aspermatism and emmeniopathy (Shigematsu et al., 1995: p.12).

Complications were characterized by relatively mild symptoms which indicated the initiation of recovery, these were: fever, ending of inflammation and the disappearance of bleeding tendency. In some patients, however, symptoms of pneumonia, empyema and sever colitis appeared. The cause is believed to be the ionizing radiation.

The last phase "signs of recovery" recovery was seen in trauma, burns and radiation caused functional damage of blood and various internal organs. Hair began to grow, leucocytes returned to normal and the proliferation of granulocytic and erythroblastic cells was initiated in the bone marrow. In this phase, various types of radiation caused damage began to appear such as cicatrical contraction and keloids. Also, male sperm counts were down and women experienced menstrual disorders due

to radiation (Shigematsu et al., 1995: p.13)

Overall, the main acute effects of radiation were epilation, hemorrhaging (incl. purpura), pathological changes in the oropharynx and leucopenia.

Late effects are effects on the human body which began to appear from 1946. Since diseases caused by late effects of radiation can also be caused due to other reasons (life style, biological making of the exposed etc.) increase in certain diseases in the exposed population was an indicator of radiation related disease. Increase was confirmed in leukemia and other malignant tumors (thyroid, breast, lung, gastric, colon and multiple myeloma) also cataracts, chromosome aberrations, somatic cell mutations, microcephaly of fetuses (in mothers exposed between 8-12th week of pregnancy), retardation of exposed fetuses and functional abnormalities in thyroid and parathyroid glands.

An increase was indicated (not confirmed) in esophageal, salivary gland, urinary tract and ovarian cancer, malignant lymphoma and skin cancer. On the other hand, no increase was indicated in e.g. chronic lymphocytic leukemia, osteosarcoma, and increased susceptibility to cardiovascular disease, sterility and congenital abnormalities (Shigematsu et al., 1995: p.16). While leukemia usually appears after a minimum of 2-3 years (reaching maximum after 6-7 years) solid tumors started to appear after a period of approx. 10 years (Shigematsu et al.. 1995). Subsequently, leukemia is attributable for approx. 55% of deaths while other malignant tumors for approx. 8% (Shigematsu et al., 1995).

The last study of the effects of atomic bombing was published by 1967 and it is the work of US psychologist Robert Jay Lifton who conducted a study on the survivors in order to determine their psychological status. The specialty of atomic bomb is that in a flash of a second all socio-economic structure is gone, the police, firefighters, social services etc., families are in a fraction of a second disrupted, children lose their parents, husbands their wives or parents their children. Lifton interviewed 75 survivors in order to determine the effects the bomb has had on their psyche. The main point of his argument is that most of the survivors suffer from life-long anxiety issues regarding their health (Lifton, p.103). This correlates with the above research regarding the risk of various malignancies, simply said, the survivors are anxious whether, when and what type of cancer they might develop in their future.

Lifton (1967) describes the first thoughts of acute radiation *"effects as dark feelings or invisible contamination"* with feelings of hopelessness once purple spots (purpura) appeared on the body of the exposed. This even led some to undergo sterilization in order not to pass this "death sentence" onto one's children and some even committed suicide. Lifton (1967) describes these feelings as traumatic neurosis, i.e., phobias or fears related to the specific event

(Lifton, 1967: p.125). These psychological conditions also affect physical healing and overall health of the victims.

Table 2. Comparative Analysis of the chosen WMD on the Human Body.

Anthrax	Sulfur Mustard	Nuclear bomb (15-17ktn)
Fever	Respiratory system damage	Eye damage (cataracts)
Vomiting	Eye damage	Burns
Diarrhea	Skin lesions	Scars
Blistering	*Risk of malignancies*	*Risk of malignancies*
Immune system disorders	*Immune system disorders*	*Immune system disorders*
Psychological disorders	*Psychological disorders*	*Psychological disorders*

4. International Humanitarian Law and Principle of Unnecessary Suffering

International Law tries to restrict, control or modify the behavior of international actors and states. Customary rules of international humanitarian law, i.e., laws of war were derived from philosophical and religious concepts of different cultures including Europeans, Arabs, Hindu, Chinese, Japanese and many others (Fleck, 2008). However, the basic principles were beginning to codify in 19th century with the Hague Declarations of 1899 and 1907.

As mentioned above, the principle was first codified in 1868 St. Petersburg Declaration with the purpose to relieve suffering of combatants. A principle later adopted in Hague Declaration and Geneva Conventions.

Later, in 1975, the International Committee of the Red Cross (ICRC) published a report titled: "*Weapons that may cause Unnecessary Suffering or have Indiscriminate Effects*". ICRC Report further confirmed basic principles of customary international law, including the principle of unnecessary suffering and refrain from weapons which effects cannot be controlled or are not necessary to accomplish military objective, i.e., are excessive in their effects. However, any weapon can be used indiscriminately and thus become illegitimate. Thus, to clarify what constitutes an unnecessary suffering, together with specific characteristics of a weapon we need to look at the possible uses of such a weapon. Nevertheless, some categories such as chemical, biological and arguably nuclear weapons are "inherently" indiscriminate and therefore illegal to use. Therefore, how do we define what constitutes an excessive *suffering* or pain? We have to define what pain actually is. Pain is a signal transmitted

by nociceptors to the spinal cord and brain (CNS). These nociceptors are thermal, mechanical, chemical and so called silent (react in case of inflammation of the wound).

Furthermore to assess pain 3 criteria were introduced in ICRC Report (1975).

1. *Degree of Pain.*
2. *Degree of permanent disability or injury.*
3. *Probability of death.*

Probability of death is then determined by:

a) *Localization of the wound.*
b) *The time lag between injury and treatment.*
c) *The state of physical resistance of the wounded person.*

Injuries to the CNS usually result in permanent damage (ICRC, 1975). Therefore, an "unnecessary suffering" is an excess of what is needed to put a combatant *hors de combat*[6]. This assessment of force must be made together with assessing military necessity and proportionality.

5. Conclusion

Nuclear weapons cannot be scrutinized as weapons of one type and one category. Depending on the type of weapon and method of deployment the destruction of enemy target(s) can be limited in space. High yield strategic nuclear weapons are by their very nature unlawful by violating the principle of unnecessary suffering by causing aggravated physical and psychological pain together with violating the principles of proportionality and necessity. On the other hand, tactical warheads of low to very low yield cannot be so simplistically disregarded as unlawful. Depending on the scope of deployment and technical specifications there might be instances where the use might become perfectly lawful, i.e., high altitude burst to produce EMP[7]. In other words, the same principles that apply to conventional weapons also apply to nuclear weapons. Therefore, current disarmament efforts are based on philosophical ideas of peace rather than IHL *in concreto*.

In regards of customary international law, the international community did not explicitly ban the use of nuclear weapons. Through the state practice of nuclear deterrence it is possible that nuclear weapons have already ascended to customary international law. However, given the total ban on chemical and biological weapons it is somewhat a paradox that nuclear weapons remain arguably "legal". As mentioned above, with the end of the Cold War, the nature of conflicts has changed therefore it is time for us to move forward and quit stalling at one place. It is our responsibility to hand over a safer world to future generations.

[6] A condition where a combatant is no longer capable of fighting.

[7] Electromagnetic pulse.

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