The use of drugs as weapons
The concerns and responsibilities of healthcare professionals

May 2007
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Declaration of interest
External attendees of the round table meeting, as listed in appendix 1, have professional interests in this field. For further information about the editorial secretariat or Board members please contact the Science and Education Department which holds a record of all declarations of interest:
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- Professor Malcolm Dando, professor of international security and director of the Bradford Disarmament Research Centre.
- Professor Ann Sommerville, Head of BMA Ethics Department.
## Abbreviations

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<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>BNLWRP</td>
<td>Bradford Non-lethal Weapons Research Programme</td>
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<td>BTWC</td>
<td>Biological and Toxin Weapons Convention</td>
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<td>CWC</td>
<td>Chemical Weapons Convention</td>
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<td>DSTL</td>
<td>Defence Science and Technology Laboratory</td>
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<td>JNLWD</td>
<td>Joint Non-Lethal Weapons Directorate</td>
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<td>ICRC</td>
<td>International Committee of the Red Cross</td>
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<td>NATO</td>
<td>North Atlantic Treaty Organisation</td>
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<td>OPCW</td>
<td>Organisation for the Prohibition of Chemical Weapons</td>
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<td>WMA</td>
<td>World Medical Association</td>
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The British Medical Association (BMA) has, for many years, been involved in the international processes surrounding the control of the use of weapons. This has included collaborative work leading to a ban on the use of anti-personnel land mines and current work on strengthening the conventions which outlaw the use of chemical and biological weapons. The association published Biotechnology, weapons and humanity I and II in 1999 and 2004, respectively. The 2004 report describes the alarming gap between the quickening pace of scientific discoveries that could be misused and the comparatively slow development of international arms control; it provides practical suggestions on how the principles embodied in the Chemical Weapons Convention (CWC) and the Biological and Toxin Weapons Convention (BTWC) can be upheld. The BMA has observed recent trends in the development of weapons commonly referred to as ‘non-lethal’ and moves towards use of pharmaceutical agents in situations where civilians and combatants are mixed. The hard evidence of this trend was seen during the final stages of the Moscow theatre siege in October 2002.

The BMA hosted a round table meeting in 2006 on ‘The use of drugs as weapons’, attended by experts from the fields of anaesthetics, pharmacology and toxicology, international law relating to weapons and also representatives from relevant BMA committees. It was discussed whether or how the medical profession should react to the development and potential use of pharmaceutical agents (ie drugs) as weapons; whether in armed conflict, peace-support missions, hostage crises or law enforcement. There was general concern at the naming of such agents as ‘non-lethal’ as is the preference of proponents. Any therapeutic agent which affects human physiology or psychology has the potential to be dangerous and even lethal if not used in a specific and controlled manner. Participants were mindful of the basic tenet that ‘there is no difference between a drug and a poison except the dose’, as the starting point for the discussions. Participants were also mindful of the potential for malign use of the extraordinary advances currently being made in life sciences and biotechnology.

This report intends to draw attention to governments’ interest in the use of drugs as weapons. The report records some of the concerns raised at the BMA meeting of experts in 2006 particularly about the use of the term ‘non-lethal weapons’ for drugs used in this way. The key purpose of the report is to consider the role of healthcare professionals as frontline staff who potentially will have to manage and treat the consequences of their use, as well as considering the use of biomedical knowledge in the development of drugs as weapons. Thus, the recommendations made at the end of the report are focussed on the medical profession. The report also aims to sensitise policy makers as to the medical, ethical and legal complexities of the use of drugs as weapons.

The BMA is fundamentally opposed to the use of any pharmaceutical agent as a weapon. The BMA is concerned equally by the promotion of the use of drugs as weapons under the banner of ‘non-lethal’ weapons and by the ways in which this promotion could lead to weakening of the CWC and BTWC. The BMA believes that healthcare professionals have a duty, in addition to promoting individual and public health, to promote international law especially in relation to weapons and violence. This duty can be fulfilled largely by objective examination of the subject.

Sir Charles George
Chair, Board of Science

See appendix 1 for a list of attendees at the round table meeting.
Scope of the report and definitions

The scope of this report does not extend to the use of drugs either for inflicting the death penalty or for assassination. Nor does it extend to a substance, such as botulinus toxin, which has properties that clearly make it a prime candidate for use as a biological weapon, but which in very small quantities also has come to be used in a therapeutic, and indeed cosmetic, context. The principal theme of this report is the use of drugs in tactical situations such as riot control, sieges, breaking a hostage-taking situation, combat or even a covert attack on a group where the intention behind the use is not to cause deaths of those affected but rather to cause as few deaths as possible or to carry out a ‘silent’ attack which may be difficult to detect.

The report has to take into account the many terms which are in use such as ‘calmatives’, ‘biochemical weapons’, ‘non-lethal chemicals’ or ‘incapacitating chemicals’ and with which the subject matter overlaps considerably. These terms are used interchangeably in the literature and definitions are not standardised. For the purposes of this report, the following definitions are used:

**Drug**: a substance used in the diagnosis, treatment, or prevention of a disease or as a component of a medication in humans or other animals. It includes substances that are developed with a view to such use but which may have failed trials regarding their efficacy or safety. It also includes ‘drugs’ in the non-medical, drug ‘abuse’ and recreational senses such as substances which are narcotics or hallucinogens that affect the central nervous system, causing hypnosis, changes in behaviour and often addiction.

**Weapon**: material thing designed or used, or usable, as an instrument for inflicting bodily harm.¹

**Chemical weapon** (as defined in Article 2 of the 1993 Chemical Weapons Convention):

1. ‘Chemical weapons’ means the following, together or separately:
   (a) Toxic chemicals and their precursors, except where intended for purposes not prohibited under this Convention, as long as the types and quantities are consistent with such purposes;
   (b) Munitions and devices, specifically designed to cause death or other harm through the toxic properties of those toxic chemicals specified in subparagraph (a), which would be released as a result of the employment of such munitions and devices;
   (c) Any equipment specifically designed for use directly in connection with the employment of munitions and devices specified in subparagraph (b).
2. ‘Toxic chemical’ means: Any chemical which, through its chemical action on life processes, can cause death, temporary incapacitation or permanent harm to humans or animals. This includes all such chemicals, regardless of their origin or of their method of production, and regardless of whether they are produced in facilities, in munitions or elsewhere.

**Riot Control Agent** (as defined in Article 2.7 of the 1993 Chemical Weapons Convention): Any chemical not listed in a Schedule [of the CWC], which can produce rapidly in humans sensory irritation or disabling physical effects which disappear within a short time following termination of exposure.
**Biological weapon** (as defined in Article I of the 1972 Biological and Toxin Weapons Convention):

1. Microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes;
2. Weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict.

The Fourth Review Conference of the BTWC in 1996 reaffirmed that ‘the Convention unequivocally covers all microbial or other biological agents or toxins, naturally or artificially created or altered as well as their components, whatever their origin or method of production…’

‘Non-lethal’ weapons: weapons systems that are explicitly designed and developed to incapacitate or repel personnel, with a low probability of fatality or permanent injury, or to disable equipment with minimal undesired damage or impact on the environment.’
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The use of drugs as weapons: the concerns and responsibilities of healthcare professionals
Executive summary

This report has been written because of the widespread interest expressed by governments in the use of drugs as weapons. The ending of the Moscow theatre siege with, purportedly, a fentanyl derivative has brought both reality and urgency to the subject and has raised questions about ‘tactical pharmacology’ of so-called ‘non-lethal’ weapons and their relationship with different aspects of international law. These questions in turn raise a number of difficult ethical considerations for healthcare professionals.

The use of a drug as a method of warfare would constitute a violation of the 1925 Geneva Protocol and the 1993 Chemical Weapons Convention (CWC). Ambiguity in the text of the CWC leaves open the possibility of the use of a drug as a weapon for the purposes of ‘law enforcement including domestic riot control’. There is also a question as to whether some drugs fall within the definition of a biological weapon as defined in the 1972 Biological and Toxin Weapons Convention (BTWC). It is vital that the international community makes every effort to ensure that these weapons conventions remain intact. The development and deployment of drugs as weapons for whatever reason risks undermining the norms these conventions represent.

The primary conclusion of this report is that the use of drugs as weapons is simply not feasible without generating a significant mortality among the target population. Whether this is a consideration of either pharmacology, toxicology or both will depend on the reader's point of view. The agent whereby people could be incapacitated without risk of death in a tactical situation does not exist and is unlikely to in the foreseeable future. In such a situation, it is and will continue to be almost impossible to deliver the right agent to the right people in the right dose without exposing the wrong people, or delivering the wrong dose. Countermeasures may be easy to apply if such an attack is expected. This brings into question whether drugs can be used for law enforcement or any other tactical situation in which deaths and injuries should be minimised. From this many ethical considerations flow which include:

• the involvement of healthcare professionals in planning and executing an attack using a drug as a weapon
• gathering data about the effects of the weapon in question
• the role of medicine, including medical knowledge, in weapon development
• the dual responsibility of doctors to do no harm on one hand and on the other to support national security
• the role of healthcare professionals in upholding international law.

Ethical considerations aside, the BMA views the interest of governments in the use of drugs as weapons as dangerous for three reasons:

1) The international legal norms which protect humanity from poison and the deliberate spread of disease which have been put in place by decades of negotiation risk being undermined.

2) Widespread but responsible deployment of drugs as weapons would inevitably result in their reaching the hands of state or non-state actors for whom lethality among those targeted is not of concern. This would simply be chemical warfare with a medical label.

3) Using existing drugs as weapons means knowingly moving towards the top of a ‘slippery slope’ at the bottom of which is the spectre of ‘militarization’ of biology; this could include intentional manipulation of peoples’ emotions, memories, immune responses or even fertility.

Controlling these future threats might be feasible if healthcare professionals address adequately the use as weapons of currently known drugs such as anaesthetics, sedatives and analgesics, and if they find adequate control methods today.
Healthcare professionals and their associations have a number of responsibilities with regard to the use of drugs as weapons. The most important is to bring their specific knowledge to bear in this domain. This would bring reality to the political, diplomatic, legal, military and law enforcement dialogue about ‘non-lethal’ weapons. From an ethical perspective, healthcare professionals need to begin a deeper examination of their roles in relation to such use of biomedical knowledge and medical expertise for hostile purposes. This is, ultimately, a matter relating to health because the lives and wellbeing of humans are at stake.
1. Introduction

On 23 October 2002 over 800 people were taken hostage in a Moscow theatre by a group of armed Chechen men and women. After two and a half days the crisis ended when Russian security forces pumped an unidentified gas into the theatre through the air conditioning system before entering the building. Approximately 130 hostages died, either during the raid or over the next few days, as a result of the effects of the gas; all of the hostage takers were killed by gunshot during the raid. The outcome is deemed positive by some while others have expressed outrage. The depth of the coma and the number of deaths were significantly affected by the time delay after the gas was released and before Special Forces accessed the theatre. There was a lack of information available to healthcare professionals about the nature of the gas. In the aftermath of the siege it was reported that efforts to treat victims were hampered by the refusal of the Russian government to inform doctors what active agent had been used. Only after increasing pressure and a request from the Organisation for the Prohibition of Chemical Weapons (OPCW) did the Russian Health Minister announce on 30 October that ‘a fentanyl-based substance was used to neutralise the terrorists’.5

Fentanyl is an opioid chemical related to, although significantly more powerful than, morphine; in medicine it is used primarily as an analgesic during surgery or as an anaesthetic agent.5 Related compounds, such as carfentanyl, which are more potent still are used as anaesthetics in veterinary practice when dealing with large animals.7 There has been much debate about whether or not a fentanyl-based substance, used in this way, could have had the effects witnessed in Moscow.6 Regardless of which fentanyl derivative was used, this was the first time a therapeutic agent had been used in a tactical situation.6 It is clear that the Russian forces had not used the gas with the intent to cause so many deaths.

The Russian government is not alone in its interest in developing the means to use drugs as weapons. There is evidence that many other governments, including the UK, have related policies and development programmes.10-14 A 2006 review paper from the Bradford Non-Lethal Weapons Research Project (BNLWRP) details some recent developments of new pharmaceutical weapons in Europe and North America. These developments might appear to contradict governments’ ‘ostensible desire to prevent proliferation of chemical and biological weapons’.10

Nevertheless, basic pharmacology can bring an understanding of the advantages as well as the potential disadvantages of the use of drugs as weapons. The development, deployment and use of drugs as weapons raise far-reaching questions for healthcare professionals:

• Is this not use of the practice and development of medicine for something that specifically does not promote health?
• Do healthcare professionals have a responsibility to inform policy makers and potential users of such weapons about the full range of disadvantages?
• Does the issue fall within the domain of toxicology rather than pharmacology?
• Does preparing to treat affected people encourage the use of such weapons?
• Is using a drug as a weapon feasible given the difficulties of delivering the right drug in the right dose to the right person against the wishes of that person in a tactical situation?
• What is the clinical role of healthcare professionals who might be called upon to treat people affected by the use of drugs as weapons?

The ethical implications for medical professionals in relation to all the above questions cannot be ignored.
There is also concern at the possible impact the use of drugs in this way could have on public confidence in medicines; for example, a letter from a group of anaesthetists published in *The Lancet* in March 2003 indicates that the Moscow siege increased patients’ insecurity about the safety of drugs commonly used as anaesthetics. Beyond the concerns of healthcare professionals collectively, there are considerations for politicians, diplomats, lawyers specialising in disarmament law, international humanitarian law and human rights law, soldiers, police and the pharmaceutical industry.

The BMA has a long history of interest in weapons control and for some time has taken a proactive stance with respect to the dual use of medical knowledge. Different aspects of this issue are, for example, considered in *Medical ethics today* (2004) and *The medical profession and human rights, handbook for a changing agenda* (2001).\(^1\)\(^6\)\(^13\) This is also clear in the two BMA publications entitled *Biotechnology, weapons and humanity*.\(^1\)\(^2\) These publications go much further than considering how existing drugs could be used as weapons; they point out that knowledge and technology developed for the purpose of benefiting people or protecting populations may also be used for malign purposes or at least for purposes for which they were not originally intended. In an article pertaining to ‘militarization of biology’ Dando and Wheelis also emphasise the future threat. They hail advances in the understanding of neuroscience as potential breakthroughs for the treatment of mental illness but warn that such understanding of neurobiology could have frightening applications in the development of new weapons. They conclude that any efforts to contain malign applications of biology will require action from the scientific and medical communities.\(^13\) Their conclusions are supported by a report entitled *Globalization, biosecurity and the future of the life sciences* published in the USA by the Institute of Medicine and the National Research Council.\(^17\) It is clear that the issue of the use of drugs as weapons has important implications for the future. Containing future threats brought by advances in life sciences and biotechnology may be possible if there is already an active dialogue between all stakeholders in relation to the use of existing drugs as weapons.

This report addresses a series of related concerns: governments might permit development and deployment of drugs as weapons and risk undermining the fundamental norms against the use of chemicals, biological agents and toxins as weapons and would therefore weaken the international legal instruments which represent these norms (see section 2).

While it is a reality that such weapons are being developed and have been used, the BMA hopes that this document and its recommendations will initiate debate within professional as well as policy-making circles about the full implications of the development, deployment and possible proliferation of drugs as weapons.
2. Drugs: another name for biological or chemical weapons?

The definitions given on page vi and vii raise the question of whether a drug, when used as a method of warfare, would fulfill the definitions of a chemical weapon or even a biological weapon. Given the outcome of the one well-documented use of a fentanyl derivative in a tactical situation (the Moscow theatre siege, where lethality was 16 per cent among the hostages), claims that low lethality places drugs in a separate category to ‘other’ chemical weapons cannot be upheld. The use of drugs as weapons, therefore, has to be considered in the context of current international legal norms.

There is an unambiguous and unchallenged prohibition of the use of biological and chemical weapons as methods of warfare. The notion of the use of drugs as weapons has generated confusion and ambiguity with respect to these prohibitions. Using drugs as weapons suggests fewer deaths and brings a certain apparent moral acceptability or legitimacy because ‘medicines’ are used. There is a perceived need for new weapons which could be labelled ‘non-lethal’ because of the changing roles of military and law enforcement agents in situations that are not necessarily part of armed conflict, including riot control, hostage release and peace-keeping. With respect to drugs, a number of terms such as ‘non-lethal’, ‘incapacitating’, ‘calmative’ and ‘biochemical’ are used all of which imply, incorrectly, that weapons so named do not fall within the definition of chemical or biological weapons (see Scope of the report and definitions). As life sciences and biotechnology advance, it is likely that the use of drugs as weapons will become a more attractive option for agencies from both military and law enforcement domains. This attraction must be examined in light of the 1925 Geneva Protocol (prohibiting the use of asphyxiating, poisonous or other gases and bacteriological methods of warfare), the 1972 BTWC and the 1993 CWC.

Circumventing the prohibition on biological and chemical weapons?

The international conventions which prohibit the use of biological and chemical weapons are based on a long standing taboo on the use of poison and deliberate disease and a general abhorrence of their effects on humans. On the occasion of the 80th anniversary of the 1925 Geneva Protocol, Dr Jacques Forster, Vice-President of the International Committee of the Red Cross (ICRC) addressed a diplomatic meeting in Geneva, Switzerland. He said: ‘On 6 February 1918, the ICRC made a forceful public appeal against the use of poison gas to the belligerents of World War I. The ICRC described this gas as a “barbarous invention which science is bringing to perfection”, protesting “with all the force at our command against such warfare which can only be called criminal” and warning of “a struggle which will exceed in barbarity anything which history has known so far”.’ He went on to ask ‘What would the Second World War have been like if the prohibition of poisonous weapons had not been restored with the 1925 Protocol? While many fundamental humanitarian principles have been utterly violated during those six years of conflict, the 1925 Protocol was respected by all belligerents. It might be argued that fear of reprisals was the main deterrent. Although this is likely, whether because of a fear of reprisals or for some other reason, the Protocol drew a line which no belligerent dared to transgress.

The taboo against the use of poison in warfare, although codified in the 1925 Protocol, predated it by more than two millennia and was built upon the rules of warfare of diverse moral and cultural systems. Ancient Greeks and Romans customarily observed a prohibition on the use of poison and poisonous weapons. By 500 BC, the Manu Law of War in India had banned the use of such arms. A thousand years later regulations on the conduct of war drawn from the Koran by the Saracens specifically forbade poisoning.

The 1925 Geneva Protocol was a landmark of international humanitarian law; it also represents the source of both the BTWC and the CWC. These newer disarmament conventions both extend their respective prohibitions to ban the development, production and stockpiling of weapons and carry commitments for destruction of stockpiles. Evidence of the customary law (see appendix 2) status of the prohibition on the use of biological and chemical weapons can be found in the background research supporting the study on Customary International Humanitarian Law published by the ICRC.
In relation to the use of drugs as weapons, there are four pertinent features of these prohibitions. The first is that Article II.9.d of the CWC states that ‘law enforcement including domestic riot control’ falls under ‘purposes not prohibited under this Convention’. In relation to the use of a fentanyl derivative (which would fulfill the definition of ‘toxic chemical’ but not the definition of a ‘riot control agent’) in the Moscow theatre siege, a section of legal opinion concludes that this was not a violation of the CWC because it was used for the purposes of law enforcement (although it is not known whether the ‘types and quantities’ were consistent with this purpose). The use of drugs as weapons for law enforcement might, therefore, be permitted but not as a method of warfare. Because of ambiguity in the original negotiations of the CWC and in the resulting text, legal opinion is divided as to whether this would extend to the use of toxic chemicals in, for example, peace enforcement missions in which the combat and law enforcement roles of military personnel may be mixed or change rapidly from one to the other.

The second feature is that some drugs could fall within the definitions of both chemical and biological weapons (see Scope of the report and definitions) and the BTWC has no such ‘purposes not prohibited’, that is, there are no exceptions to the ban on biological weapons. Article I.1 of the BTWC prohibits the development, production, stockpiling, acquisition and retention of biological weapons ‘of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes’. Article I.2 likewise prohibits ‘weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict’. (The 4th Review Conference of the BTWC in 1996 affirmed that this prohibition also covered use of biological weapons.) A legal question that remains unanswered is whether the development, production, stockpiling, acquisition, retention and use of a drug for law enforcement that falls within the definition of a biological weapon are activities compatible with ‘prophylactic, protective or other peaceful purposes’. It follows that whether a drug as defined for this report also fulfills the definition of a ‘microbial or other biological agent or toxin’ as defined in the BTWC is an important consideration for states’ obligations to international law given the interest in drugs as weapons.

The third pertinent feature of these prohibitions is that the use of riot control agents as a method of warfare is prohibited. This has assumed the status of customary law. While the use of riot control agents for law enforcement outside a national jurisdiction is prohibited, it is not prohibited within such a national jurisdiction.

The fourth pertinent feature of the BTWC and the CWC in relation to the use of drugs as weapons is that neither Convention makes reference to lethality as a criterion for prohibition. The term ‘non-lethal’ is not referred to in either text. The absence of such a tiered approach fundamentally undermines the arguments of those who seek to use this definition to legitimise new weapons; the conventions ban the use of these weapons regardless of the level of lethality they produce.

In relation to future threats including the use of drugs as weapons, Controlling biochemical weapons has recently been published by Kelle et al. The authors draw attention to the spectrum of threats from classical chemical warfare agents at one end to genetically modified biological warfare agents at the other end with toxins and bioregulators in between. They claim ‘that the scope and pace of scientific and technological change in the life sciences will affect all parts of this spectrum’. They point out that ‘as the two prohibition regimes that have been set up to address the problem of chemical and biological weapons are agent-based (admittedly in combination with the intended use of these very agents), this revolution in the life sciences cannot but raise the question of the implications this change in our understanding of the human body at the molecular level will have for the normative structure of the two prohibition regimes currently in place’. They emphasise the need for an overarching framework of biochemical controls which includes national and international legal measures and closer oversight of pertinent scientific activities. Each measure would serve as part of a ‘web of prevention’.
Interest of governments in drugs as weapons

Despite the prohibitions on biological and chemical weapons, governments are demonstrating considerable interest in the possibility of using drugs as weapons. This does not come from a renewed desire to use chemical or biological weapons on the battlefield but because the roles of military and police continue to diversify; there is a need for new strategies and weapons systems which might reduce the number of dead and injured. The drive over recent years has come from a perceived need for so-called ‘non-lethal’ weapons. The BNLWRP comments that: ‘The concept of ‘non-lethal’ warfare is attractive to politicians. Civilian law enforcement agencies are also seeking alternative and more humane methods to manage situations of civil disturbance such as terrorist attacks, control of crowds and riots, the arrest of violent criminals, and the release of hostages. There will be continuing pressure from those seeking ways of waging war in a more humane manner, which is less destructive of people and environment.’

The Bradford Programme in 2006 has dedicated a part of its research towards ‘biochemical incapacitating agents’. The technical, tactical, legal, health, political and media implications of the use of the term ‘non-lethal weapon’ are extremely complex. As discussed in section 3, these implications become more complex still in relation to the use of drugs as weapons with a purportedly low lethality. While the use of drugs as weapons raises major questions with respect to the obligations of governments under international law, interest nevertheless is sustained. As well as Russia, publicly available information provides evidence of interest in some member states of the North Atlantic Treaty Organisation (NATO) and in particular, Germany, the Czech Republic, the UK and the USA.

In August 2006 the Research and Technology Organisation (RTO) of NATO published a report from its Human Factors and Medicines (HFM) Panel on the human effects of non-lethal technologies. This document describes a roadmap for the introduction of ‘non-lethal’ weapons into NATO. Development and deployment of ‘non-lethal’ weapons is considered by NATO to be necessary in order to ensure that it has ‘sufficient capabilities for the full spectrum of crisis response operations’. The countries represented were: the Czech Republic, France, Germany, the Netherlands, Norway, Sweden, Switzerland, the UK, and the USA. Representatives of these countries explained that research activity in the field of ‘non-lethal’ technologies forms part of their own national development programmes. Section 4.9 of the NATO report is dedicated to ‘sedatives’. This section simply refers to annex M entitled Medical aspects of the Moscow theatre siege, which is a study of what happened in that siege.

Annex E of the report contains statements from representatives of member states. Of particular relevance, the statement of the German representative focused on ‘non-lethal’ chemicals and included reference to a perceived necessity to change international law: ‘There is an urgent need for rethinking and rewriting the existing laws with respect to the implementation of NLTs [non-lethal technologies] using chemicals. International legal experts should reconsider the old laws in the light of new security imperatives and the development of new NLTs. Especially after the riots in Kosovo in March 2004, when it was reported that 28 people died and 800 were injured and 15 churches and about 110 houses were destroyed, we should consider relaxing restrictions on the use of “chemicals” in certain situations. Such exceptions could be limited to Operations Other Than War (OOTW) or for discrimination between rioters, combatants, and civilians in a hostage or human-shield situation’. The statement from the representative of the Czech Republic referred to ‘Research on the development of drug combinations that can be used for anaesthesia, analgesia, and psychological status improvement, in order to control the panic reactions of individuals or a crowd’. More details of the Czech research have emerged at the 3rd European Symposium on Non-Lethal Weapons in Ettingen, Germany in May 2005. The research was undertaken in the Institute for Clinical and Experimental Medicine in Prague. In the paper on Pharmacological non-lethal weapons the authors recognise that with regard to military use ‘at present, their use contradicts the conventions on the use of chemical weapons’. They point out, however, that
their research could ‘possibly find widespread use in police work’. Given these observations, the Bradford report asks why such research is being funded by the Czech army. Of pertinence to ethical considerations raised in section 4, the authors state ‘many agents used in everyday practice in anaesthesiology can be employed as pharmacological non-lethal weapons. An anaesthetist familiar with the pharmacokinetics and pharmacodynamics of these agents is thus familiar with this use. As a result, he or she can play a role in combating terrorism’. Although it sounds very laudable or reassuring for doctors to be consciously involved in combating terrorism, the reality is far more complex: not least because it is impossible to separate that activity from the misuse by terrorists of the same knowledge. As is later discussed in section 4, the BMA does not believe it is part of doctors’ role to develop weapons to harm people, even in order to fight terrorism, since that is contrary to the ethos of medical training.

In the UK, evidence of interest in drugs as weapons can be found as early as 1959 when the drugs LSD and mescaline were proposed ‘to try out this test plan’. More recently the Defence Science and Technology Laboratory (DSTL), an agency of the Ministry of Defence, described how their ‘biomedical expertise is guiding the evaluation of “less lethal” weapons being considered by the government, against a backdrop of unrest in Northern Ireland and increasing public disorder and violence on the UK mainland’. The four less lethal weapons areas on which the DSTL concentrates are kinetic energy rounds, electrical incapacitators (or tasers), water cannons and irritants. The UK’s Northern Ireland Office published the Patten report recommendations relating to public order equipment in January 2004 (the Patten report). A steering group examined ‘calmatives’. The report did not make mention of the Moscow theatre siege nor either the BTWC or the CWC. The conclusions were that ‘from the limited information given above, it is apparent that use of calmatives in policing situations would not be a straightforward process. The decision to use any drug whether intended to induce a state of calm or complete unconsciousness requires knowledge of a subject’s medical history, particularly the use of any prescribed or non-prescribed medication and any relevant medical conditions. There would also be considerable responsibility in terms of immediate and post-incident aftercare.’ The steering group also concluded that ‘further research [on ‘calmatives’] is not required at present [but recommended monitoring of] this area, focusing on international research programmes and future developments in delivery methods and potential tranquillising methods’.

In the USA the interest in so-called ‘non-lethal’ weapons is led by the Pentagon’s Joint Non-Lethal Weapons Directorate (JNLWD) programme which was established in 1997. There is a great deal of publicly available information about the activities of the JNLWD; which include funding the development of crowd dispersal munitions, chemical anti-traction materials and chemical incapacitating agents or ‘calmatives’. In relation to the use of drugs as weapons, an independent task force of the influential Council of Foreign Relations in 1999 argued that ‘[o]n occasion, US security might be improved by a modification to a treaty’, suggesting that opinion leaders recommended amending the BTWC and/or the CWC. A second such task force in 2004 reached the opposite conclusion. It ‘considered the benefits that would accrue and the problems that would be posed by either a US attempt to interpret the CWC or by a US move to amend or renounce the CWC in order to be able to use chemicals as non-lethal weapons against enemy combatants’. The task force concluded that ‘to press for an amendment to the CWC or even assert a right to use RCAs [riot control agents] as a method of warfare risks impairing the legitimacy of all [non-lethal weapons.] This would also free others to openly and legitimately conduct focused governmental [research and development] that could more readily yield advanced lethal agents than improved non-lethal capabilities’. The task force went on to recommend ‘the best course of action for the United States is to reaffirm its commitment to the CWC and the BTWC and to be the leader in ensuring that other nations comply with treaties’.

This change may have been influenced by a public statement by Donald Rumsfeld, then US Defence Secretary immediately before the invasion of Iraq when addressing congress on 5 February 2003. He said: ‘While countries may use non-lethal chemicals domestically for law
enforcement and crowd control, the Chemical Weapons Convention… specifies: Each state party undertakes not to use riot control agents as a method of warfare’ and went on to say, ‘[w]e are doing our best to live within the straightjacket that has been imposed on us on this subject. We are trying to find ways that non-lethal agents could be used within the law’. It is unclear whether the confusion between riot control agents and toxic chemicals was intentional or not.

**Drugs as weapons and the pharmaceutical industry**

Not only is it clear that governments are interested in drugs as weapons, but it is also clear that some governments are looking towards medical research and therefore the pharmaceutical industry for likely agents.

The Applied Research Centre of the College of Medicine at Pennsylvania State University, has been ‘helping United States law enforcement and military agencies to make decisions on minimal force options for conflict resolution since 1997’, which included working with the JNLWP. One of its research objectives is to assess the potential use of calmatives as non-lethal techniques, where calmatives include ‘compounds which depress or inhibit the function of the central nervous system. The 2000 report *The advantages and limitations of calmatives for use as a non-lethal technique* (the Penn State report) states ‘There may be a need for development of non-lethal techniques with a high degree of specificity, selectivity, safety and reversibility that would avoid production of a lasting impairment to the subject(s) or individual(s) activating the technique. Pharmaceutical agents, or calmatives, with a profile of producing a calm-like behavioural state were considered highly appropriate for consideration in the design, enhancement, and implementation of non-lethal techniques’.

The report concludes with recommendations for close collaboration with the pharmaceutical industry to develop new drugs and methods of delivery which might facilitate ‘non-lethal techniques’. It also calls on the pharmaceutical industry to consider thousands of discarded or shelved drugs, the development of which has been terminated because of ‘unwanted side effects’. The authors claim ‘in the variety of situations in which non-lethal techniques are used, there may be less need to be concerned with unattractive side-effects: indeed, perhaps a calmative may be designed that incorporates a less than desirable side effect (eg headache, nausea) as part of the drug profile. Furthermore, it may be appropriate to develop a working relationship with the pharmaceutical industry to better incorporate their knowledge and expertise in developing a non-lethal calmatitive technique. Perhaps the ideal calmative has already been synthesised and is awaiting renewed interest from its manufacturer’.

The UK’s Patten report fed principally off the Penn State report and, as pointed out above, the Czech research clearly investigates existing agents in everyday clinical use.

**The future**

The case is made above that governments’ interest in drugs as weapons for law enforcement and other situations short of armed conflict is increasing. At the same time, there does not seem to be a mounting recognition in official circles that the BTWC and CWC need to be amended to permit their use as a method of warfare.

While the Penn State and Czech reports focus on existing agents and technologies which involve a diminished level of consciousness, the previous publications from the BMA on *Biotechnology, weapons and humanity* and publications from other sources make it clear that the future potential for the pharmaceutical and biotechnology industries to contribute to the use of drugs as weapons is considerable. New effects that might be considered desirable in this context include convulsions,
behaviour change, mood change, memory or even fertility impairment to mention but a few. This justifies the BMA’s concern about the use of drugs as weapons. These concerns have been echoed by the ICRC. 33

These concerns are not limited to the type of agents which might be used as weapons in the future but also who the users might be. The deployment of drugs as weapons in contexts that are not part of armed conflict would mean that agents might not necessarily remain in the hands of law enforcement officials. The weapons would be developed for and deployed by military users and so the step to their use as a method of warfare is very small. In this regard two Chinese authors have painted a colourful but alarming picture of military power using new biotechnologies. They see this potential as a positive development in military technology and state: ‘We can use many modern biotechnologies directly as a means of defence and attack, and with further developments, they will probably become new weapons systems’. In relation to ‘specificity of wounding’ they claim ‘[i]f we acquire a target’s genome and proteome information, including those of ethnic groups or individuals, we could design a vulnerating agent that attacks only key enemies without doing any harm to ordinary people’. 34 These words reinforce a concern set out in the BMA report Biotechnology, weapons and humanity II about the development of ethnically targetable weapons.

The above discussion highlights that there is active interest by governments in the use of drugs as weapons. This is not directed primarily at use in armed conflict but for the many contexts which fall short of armed conflict and in which soldiers or law enforcement officials may have to operate. Biomedical research at the interface of academia, military interest and the pharmaceutical industry is, according to publicly available information, the perceived source of suitable agents.

The future may bring much more sophisticated and sinister agents. This multiplies the concerns of the BMA with respect to the use of drugs as weapons. These concerns multiply further still because the perceived users are likely to be military personnel rather than law enforcement officials. The kind of research that has been cited in this chapter is skirting dangerously around the international norms of prohibition on the development, production, transfer, stockpiling and use of drugs as weapons namely, the BTWC and the CWC.
3. Tactical pharmacology: fact before fiction

The idea of a ‘knockout gas’ or ‘incapacitation’ by pharmacological means has great appeal to both politicians and commanders. As a result, proponents readily describe the advantages without realistic considerations of the disadvantages. The fact – as opposed to the fiction – must be stressed by answering, on the basis of the best available evidence the following question: how can a soldier or law enforcement official deliver the right drug in the right dose to the right people, without their consent. In a tactical environment in which the objective is not to cause loss of life, the difficulties in achieving this are many.

An ideal ‘calmative’?

The Penn State report lists the characteristics of an ‘ideal calmative’. These are:

- easy administration
- adaptable for administration via topical, subcutaneous, intramuscular or oral routes
- rapid onset
- most likely to be of short or limited duration
- production of approximately the same magnitude of calm (ranging from a less agitated, groggy, sleepy-like state to a stunned state of consciousness) in all individuals of similar body mass index and age range
- the effect should be reversible by a profile of rapid turnover and/or the availability of a selective antagonist to serve as an antidote
- the compound should be safely administered by an individual and free of prolonged toxicity to the individual(s) receiving the agent
- only be administered on a temporary basis
- produce side effects, if any, of short duration.

The report also lists the major classes of pharmacological compounds under the category of ‘calmatives’, many of which will be familiar to physicians or medically qualified individuals. These are:

- anaesthetic agents
- skeletal muscle relaxants
- opioid analgesics
- anxiolytics
- antipsychotics
- antidepressants
- sedative-hypnotic agents
- selected drugs of abuse.

None would seem to fulfil the above necessary requirements as evidenced by the conclusions of the Patten report and the NATO report. This is perhaps because such an agent, as pointed out by Klotz et al, does not as yet exist.

Delivering the correct dose

Much of the literature on the use of drugs as weapons focuses on which drugs could be used. Little is written about how the correct dose might be delivered to every target individual. In his discussion document *The meaning of Moscow* (2005), Fidler describes how analysis of matters relating to dose has, in the open literature, fallen to those whom he refers to as the sceptics about so-called non-lethal weapons rather than the proponents of these weapons.

The fact that the only difference between a drug and a poison is the dose is not a new observation. Paracelsus, a Swiss physician from the sixteenth century said ‘all substances are poisons; there is none which is not a poison. The right dose differentiates a poison and a remedy’. Therefore, one feature –
and possibly the most important feature – missing from the above requirements of an ‘ideal calmative’ is that the mean dose for a ‘calming effect’ (the ED50) is well below the mean dose for lethal effect (LD50), i.e., it must have a high Therapeutic Index (which is given by LD50/ED50). (See appendix 3 for an explanation of what a dose response curve is) Once this feature is identified for a candidate drug, there then remains the question of the drug’s ‘ease of delivery’.

Figure 1 is a reproduction of standard dose-response curves for any drug. The response for the effective dose for ‘incapacitation’ within half a given population is less than that for death. Referring to ED50 and LD50 is a convention simply indicating that half of the population would show these effects at the respective drug concentrations. For most, if not all, drugs that affect the level of consciousness, there is some degree of overlap as shown in figure 1. This has a major implication: to use a drug as a weapon, one has to ensure that all people are immobilised; i.e., it would be ineffective as a weapon if only 50 per cent of hostage takers were immobilised; the user would have to deliver a dose which would ensure almost 100 per cent incapacitation for tactical advantage. This inevitably means the death of a proportion of the affected people (assuming they all receive the same dose) depending on the proximity of the two curves. A drug which could be used effectively as a weapon is one which would incapacitate say 98 per cent of the target population while causing a mortality rate of less than 0.05 per cent. The research of Klotz et al. suggests that such an agent would need to have a therapeutic index of about 10,000 to meet this definition, and would need to be used in ideal conditions. In an environment with many uncertainties, such as a hostage situation, the therapeutic index would need to be significantly larger to produce such a low level of lethality. The point is made that a therapeutic index of 1,000, which would cause a fatality of about 10 per cent, is far greater than any known anaesthetic or sedative agents which typically have a therapeutic index of between five and 10, and rarely above 20. Using this analysis, therefore, the research concludes that ‘genuinely non-lethal chemical weapons are beyond the reach of current science’.

**Figure 1: Relationship among dose, incapacitation, and lethality in a two-receptor model at equilibrium**

![Figure 1](image_url)

Adapted from: Klotz L, Furmanski M & Wheelis M (2003) Beware the siren’s song: why ‘non-lethal’ incapacitating chemical agents are lethal. Federation of American Scientists
It is interesting to compare the dose response curves reproduced by Klotz et al in figure 1 with those shown in annex M of the NATO report. The latter uses ‘idealised’ curves to show an ‘envelope’ of ‘non-lethal effect’ between the two curves (see figure 2).

**Figure 2: Idealised curves and theoretical useful ‘envelope’ for the action of a hypothetical NLW.**

There are four other important factors that proponents do not discuss at all:
- immediate and total incapacitation with a drug other than by intravenous injection is not possible;
- the more rapid the incapacitation desired for tactical reasons, the higher the dose required;
- the dose delivered, for example by aerosol, will not be uniform in a given space;
- if someone receives an adequate incapacitating dose of a drug delivered by aerosol in a tactical situation, the incapacitated person remains (incapacitated) in the presence of the drug. The dose, therefore, will continue to mount unless the person or the aerosol is immediately removed from the area.

Furthermore, the position an affected person assumes or is placed in when incapacitated may make the person much more susceptible to a potentially lethal dose; for example, in the case of someone having a low blood pressure and sitting upright, cerebral hypoxia and/or brain damage are more likely to be caused. The main measures, therefore, to avoid death combine separation of the person from the agent, rapid administration of an antidote and appropriate first aid.
Another important factor is that unlike the theoretical ‘model’ population, the target population will not all be fit young men weighing 75 kilograms without previous medical problems. The target population will almost always be heterogeneous in terms of:

- age
- weight and size
- premorbid health
- other medications being taken
- amount of physical activity
- genetics
- pregnancy
- levels of anxiety/stress
- metabolic rate
- recent food intake
- hydration.

Each of these factors will influence exactly where any individual sits in relation to the dose response curves described above. Such factors would be largely unpredictable in most tactical situations.

The Penn State report, the Patten report and, in relation to the Moscow theatre siege, the NATO report refer only to the need for medical attention for those who might receive a dangerous dose. They do not address how a ‘safe’ dose might be achieved. In discussion, however, NATO does conclude that the ‘idealised’ curves [as shown in figure 2] represent an oversimplification for two reasons: firstly, they are representative for an ‘average’ human and secondly they assume an instantaneous and specific dose. Consequently, it is conceded that ‘[i]f the level of 95 per cent efficiency is absolutely required to neutralise terrorists and to prevent total mass destruction, there is no chance of eliminating some severe consequences and fatalities’.

The ‘medical’ involvement in preparing an attack such as calculating dose brought by a given volume of aerosol in a particular volume of air may raise ethical considerations which are addressed in section 4.

**Mechanisms of delivery**

The route of delivery of existing drugs as weapons was also considered by the Penn State report. Those mentioned include oral, subcutaneous and intravenous injections, pulmonary and transcutaneous routes. For obvious reasons, the appropriate dose is more likely to be delivered by the oral route or by injection but using these routes is unlikely to be feasible in most tactical situations. It is not surprising, therefore, that the pulmonary route is seen to have many advantages especially if a drug is to be used against more than one person. Proponents tend to assume that any drug used as a weapon which would be effective via the pulmonary route would be both invisible and odourless so the target group would not know they are under attack. In fact, medical experience makes it clear that many such agents will be readily detectable. Questions about delivery of the appropriate dose are both critical and complex especially given that the pulmonary route is amenable to both gases and aerosols (ie droplets).

The factors influencing the onset of action of volatile anaesthetic agents delivered as gases are well known. Effective methods of delivery of dissolved or liquid drugs by aerosolisation or nebulisation are much less predictable. Droplet size of any aerosolised chemical agent can be controlled at the point of release but rapidly changes following discharge into the atmosphere. Droplet size is important since it affects both the rate and degree of absorption of the agent as it passes through the nose and mouth to reach the lungs. Larger droplets will tend to be deposited in the upper airway while the smallest droplets will reach the alveoli where they will be more efficiently absorbed into the bloodstream.
When aerosolised agents are allowed to dissipate in a large area, as is the case in using the pulmonary route to deliver a drug as a weapon, the droplet size will enlarge through clumping of particles. Because large droplets are absorbed more slowly and unpredictably, the effectiveness of the agent will be compromised. Furthermore, large droplets will tend to precipitate out while small droplets will stay suspended in the air longer and spread over a larger distance. This will be influenced by other externally uncontrollable factors including ambient temperature, humidity and air flow so that the dose received by any individual at a given distance from the source is likely to vary considerably. The dispersal of droplets will also depend upon air flow; if there is air conditioning, for example, dispersal will be directed by this or if air is stagnant dispersal will be slowed down. These factors all relate to the possible efficacy of the use of a particular drug as a weapon delivered by the pulmonary route. A report from the Federation of American Scientists which analyses this matter concludes that ‘none of these technical problems are likely to be soluble’. It seems almost impossible to create a delivery system which would ensure an evenly distributed dose and which would produce a response in a fast and effective way.

Further, in order to mitigate any potential counter response (see below) the time between exposure to a drug and incapacitation must be as short as possible. Any suitable delivery mechanism should therefore be able to deliver the drug quickly and the effects of that drug must be rapid in onset.

The delivery of drugs in gas or aerosol which target the pulmonary system is likely to use delivery systems that are already in use for the delivery of riot control agents, for example, by canister. When it comes to open-air use of riot control agents, however, the dose is not so critical because the dispersal or movement of the crowd is the objective and not their incapacitation. These same delivery systems, if used for a drug which diminishes the level of consciousness, would not guarantee the correct dose. Calculating the correct dose would be a formidable task in a building when the dimensions of the rooms were known; in open air, for instance in a street battle, this would be almost impossible. It is worth noting that in the Moscow theatre siege, the theatre's ventilation system was used to diffuse the gas but this did not prevent a significant proportion of the people inside receiving a lethal dose of the agent.

Contracts for weapons’ development in the USA in this domain include one which is to find ‘improvements to a “non-lethal” round for chemical payloads’ and another to ‘provide support for US Army development of a 155mm “non-lethal” chemical anti-personnel round with a range of 15 to 20 kilometres’ and ‘develop [a] liquid payload dissemination system [ie aerosol generation technology]’. Researchers have questioned the suitability of such long-range munitions for law-enforcement purposes.

The UK's DSTL focuses on the delivery of irritants via projectiles because of the lack of precision of delivering riot control agents. It is recognised that this also raises the possibility of causing injury from the projectile itself and does not rule out factors such as overdose at one part of the target site and too low a dose at other parts.

With a view to future delivery technologies, some authors have indicated the possibility of vortex ring generators as the means to carry ‘chemicals’. In relation to the kinds of agents to which Wheels and Dando refer, the Penn State report claims that a key consideration in the development of calmative agents as non-lethal techniques is “the controlled delivery of macromolecular drugs such as peptides, proteins, oligonucleotides and polysaccharides.”
Training of users

Police and military personnel receive training in the use of tear gas and pepper spray. Despite the express interest of governments, no reference can be found to training of military or police users with respect to use of drugs as weapons in tactical situations.

Coupland, a medical advisor for the ICRC, has raised a number of theoretical concerns pertaining to combatants’ behaviour in a tactical situation when such weapons have been deployed. He points out that their use could lead to an increased lethality of conventional weapons through the increased vulnerability to attack of an incapacitated person. With respect to a combatant recognising that an opponent is affected by any new incapacitating weapon, he points out that these effects may not be recognised by healthcare professionals and asks ‘If they are not understood by medical people, are they likely to be understood by soldiers?’ This would apply equally to the use of drugs as weapons especially if the agent and dose were unknown. He asks: ‘Imagine a soldier entering an area in which enemy combatants have been incapacitated; they are standing or lying still with their weapons at hand with their eyes fixed on the sky. There is limited visibility. How will the attacking soldier, when rushing into attack, know his or her enemy has been incapacitated? The most likely scenario is that the soldier will shoot because he or she is trained to do so reflexly in battle. In other words, being incapacitated could simply serve to increase vulnerability to attack by conventional weapons’.

By what criteria will soldiers or police be given the instruction not to shoot?

Counter responses

Counter measures may be physical which would reduce the chance and level of exposure, or pharmacological which would eliminate the effects of the exposure.

Some of the physical countermeasures include maintaining a draught, for example, by leaving windows open, protective masks or employing ‘dead man’s switches’ (a switch or detonator which is activated if the operator becomes unconscious) if hostage takers have explosives. The Beslan school siege in 2004 was an example of how the hostage takers adopted tactics that assumed the Russian authorities would use the same gas that was used during the Moscow theatre siege two years earlier. Given that first, to have a maximum chance of success, a drug as a weapon must take its effect as quickly as possible and second, that countermeasures are relatively unsophisticated, one could conclude that a potential user of a drug as a weapon may only have one opportunity to use it with any chance of success because afterwards any potential enemy would be prepared. Even if a drug could be used to produce an immediate effect, fatalities or serious injury would not be prevented if a ‘dead man’s switch’ was in use.

Pharmacological countermeasures obviously depend on knowing what drug has been used; and yet these countermeasures may be precisely those that are required to treat affected people. The NATO report concludes ‘the planning and execution of medical attention to the hostages seems to have been scanty’. One Russian news source, however, claims that some children in Beslan died as a result of being given naloxone (the antidote to a fentanyl derivative) by the authorities because preparations were being made to use a gas similar to that used in Moscow. It is clear that the pharmacological countermeasures carry many of the same complexities as achieving the correct dose of the drug when used as a weapon.

Another important factor when considering countermeasures is that if the combatants or hostage takers are prepared with either physical or pharmacological countermeasures (and the degree of preparation will not be known), the non-combatants or hostages will suffer a disproportionate effect. Proponents tend to argue their case as if they will be the sole possessors of such agents and that the opponents will have no countermeasures. The potential for criminal or terrorist use of such agents is
greater because, presumably, such users would be less concerned with avoiding deaths in the target group. Today’s proponent may be tomorrow’s victim requiring the countermeasures. This is another reason to argue against the development, production and deployment of drugs as weapons.

**Treating affected people**

Treating affected people is obviously a top priority for any healthcare professional who must deal with the aftermath of an attack where drugs are used as weapons. The top priority of the user of the drug, after succeeding in the tactical mission, should be to ensure that people are not overexposed in the first place; reliance for this cannot be placed on medical back-up.

Planning and delivering medical care for people affected by a drug used as a weapon is subject to certain principles of care in the field as well as certain principles of pharmacology. These principles apply from the point of wounding, transport to a collecting point or first aid post and then on to hospital.

The following principles apply at the point of wounding.

- **Security is the most important factor determining whether the incapacitated person gets the right treatment at the right time. The security environment may prevent access of the carer to the person or may prevent competent treatment being given.**
- **Some kind of assessment must be made as to who is dead or dying; who needs immediate first aid; and who needs assistance to move.**
- **Giving the appropriate first aid, which involves:**
  - putting the unconscious wounded person in the recovery position
  - arrest of haemorrhage
  - protection of the wounded person from the environment
  - talking to the wounded person.

These principles must be put into practice at the point of wounding and also during any subsequent moving of the affected person. The treatment that follows, either at an improvised first aid post or at hospital, is then determined by the material and human resources available. In relation to the use of drugs as weapons, especially those that may diminish the level of consciousness, general and specific measures are needed. The general measures relate to care of an unconscious person and in particular airway management and respiratory support. The specific measures will require knowledge of the agent and the carers being equipped with adequate stocks of the antidote together with the means to deliver it.

The implications of the above are that all potential users of drugs as weapons must be trained to recognise when and to what degree a person is affected by the drug in question, to be able to give appropriate first aid, to be able to move the person from further contact with the drug (e.g., out of a room where the aerosol has been distributed) and to a place where correct treatment including administration of an antidote can be given. Such management must be given tactical priority and healthcare professionals must have rapid access to people affected and must know well in advance what kind of agent is to be used. This will ensure that the carers are adequately prepared in terms of information, drugs and equipment.

All the above raises the specific question of whether it is appropriate for the users of the weapon to be trained and prepared to deliver the antidote. Treating affected people would also require addressing any long-term effects of the use of the drug in question and its sequelae. The psychological impact of the event on affected people is another important factor. These longer term considerations go beyond this report.
This section has demonstrated the multiple, and probably insurmountable, difficulties that will be encountered when using drugs as weapons with a view to minimising deaths and permanent disability from use in a tactical situation. The feasibility of using existing drugs as weapons in a way that does not involve lethality must be brought into question. As the NATO report concludes: ‘After Moscow, we have to rethink the medical implications of all non-lethal agents, given the impossibility of getting an appropriate dose to all individuals in a large crowd’. Proponents, however, regard most difficulties as surmountable by medical measures; but this view does not take into account some basic pharmacological considerations nor the realities of bringing medical care to people in a tactical situation. The inevitable conclusion is that any use of an existing drug as a weapon is likely to produce a similar result to that produced in Moscow.

Another conclusion is that if minimising deaths is not a priority for the user, the use of drugs as weapons simply constitutes use of chemical or biological weapons with a ‘medical’ label.

The inevitable proliferation of drugs as weapons, combined with the ease of countermeasures, raise a question over the overall utility of drugs as weapons beyond whether it is theoretically feasible. It is difficult to know whether the kinds of agents described by Wheelis and Dando which would rely on very small concentrations would be subject to similar constraints. While the same dose-response principles would apply, the desired effects may be something bizarre or unpleasant and not simply ‘incapacitation’ or a ‘calm’ state and the effects of excessive dose may not be death through asphyxiation but severe psychoses or death via suicide, accident or prolonged convulsions.
4. Ethical considerations for healthcare professionals

Apart from the practicalities of treating affected people outlined above, there are a number of ethical considerations facing individual healthcare professionals and their associations with respect to the use of drugs as weapons.

**Medical involvement in an attack using drugs as weapons**

Sections 2 and 3 show how medical knowledge is required to select an agent and to calculate how the correct dose might be given. Medical knowledge is therefore required in planning an attack. This may not necessarily involve healthcare professionals. By contrast, to minimise the number of deaths among affected people, the treatment aspects are so critical that there would inevitably be a role for healthcare professionals in an attack as the providers of the means to moderate the effects of the weapon (the drug) in question. An attack which aims to minimise lethality while achieving its goals must involve healthcare professionals. This is clearly an area which throws up a number of ethical questions, the most important of which is whether such a role is compatible with the basic ethics of medicine including the premise of ‘do no harm’. There are additional questions such as whether healthcare professionals so deployed should be accorded the protection from attack that they would normally expect.

**Medical neutrality**

Healthcare professionals are traditionally accorded protection from attack in combat situations. The reason for this is that their role is seen as to provide a neutral presence and to care impartially for any sick or wounded people, friend or foe. It is a fundamental ethical principle that health professionals have a duty to provide such care without discrimination, apart from discriminating clinically on the basis of the relative urgency of the patient’s need. In the situations outlined above, however, health professionals cannot be genuinely neutral if they are actively involved in some way in the planning of an attack or in carrying it out. Even if they are acting on the side of a legitimate authority, they are by definition on one side of the struggle rather than standing neutrally apart from it. The loss of this perceived neutrality would have some significant implications for the health professionals concerned and for the ethos of medicine generally. It could well mean that those providing emergency care would be seen as legitimate targets for retaliation, rather than as protected personnel.

**Data gathering**

To what extent do healthcare professionals have an obligation to gather data about the effects of weapons and to publish them in a way that might reduce such effects to a minimum in the future? This is seen as an important part of doctors’ role in upholding human rights and international humanitarian law. This was also the subject of a seminar in Montreux, Switzerland in 1996 which paid particular attention to non-conventional weapons of the future and was the matter of a World Medical Association (WMA) resolution, which was subsequently updated in October 2006 (see appendix 4). How the observation, documentation and publication of the effects of the use of weapons might go beyond improving treatment to bringing about regulation of means and methods of warfare has been described by Coupland as the ‘Solferino cycle’. He points out that a dilemma exists because the same data might contribute to weapon development. The possibility of the use of drugs as weapons makes this dilemma particularly acute. In relation to the Moscow theatre siege, the lethality recorded among those affected reveals the two horns of this dilemma; on one side, proponents note the mortality, claim the successful ending of the siege and indicate a need for further research. The sceptics use the same data to voice their scepticism and argue for greater control. Healthcare professionals must recognise this dilemma and act in a manner compatible with professional ethics.
Weapons’ development

While doctors may have a legitimate role in reviewing the defensive capability of weapons, doctors should not knowingly use their skills and knowledge for weapons’ development for the same reasons that these ethical considerations oppose doctors’ involvement in torture and the development of more effective methods of execution. In other words, the duty to avoid doing harm rises above, for instance, a duty to contribute to national security. In this particular domain, healthcare professionals are well placed to argue that greater national security would come with respect for the BTWC and CWC and ensuring non-proliferation of such weapons.

The ethical considerations surrounding doctors’ involvement in weapons development have been discussed in other fora and publications. As with the area of data gathering, the use of drugs as weapons brings individual healthcare professionals and their associations face-to-face with a series of difficult dilemmas. These relate not only to the development of something that is designed to damage health but also to the upholding of international humanitarian law and human rights law as an effective and certain means to work towards the greater good.

The BMA’s publication Biotechnology, weapons and humanity II takes a more profound look at the implications for hostile use of advances in life sciences and biotechnology and the potential for making new weapons than this report. This is echoed by an initiative undertaken by the ICRC which reminds researchers in biotechnology of the risks associated with advances in life sciences and biotechnology, the pertinent rules of national and international law and their responsibilities to ensure that the outcomes of their research are used only to benefit humanity. Both publications point out that new knowledge and technologies could make biological or chemical weapons more effective, easier to use, more difficult to detect, more selective in terms of their effects and therefore more attractive to a would-be user. This echoes concerns about ‘militarisation of biology’ and requires consideration far beyond healthcare professionals; it is an increasingly important part of the thinking of all stakeholders in life sciences. Both the Royal Society and the ICRC have made comparable proposals to raise awareness and generate responsibilities on this subject. The spectre of ‘genetic weapons’ has been raised in the previous BMA publication referred to above. The matter is addressed in objective and non-alarmist terms. It should be recognised that the development of therapeutic drugs targeted at specific ethnic groups, for a condition like sickle cell disease for example, would be ethically sound. Where, however, the intended use is not therapeutic or is indeed lethal, the use of a drug that targeted a particular ethnic group identifiable by its genetic make-up, the potential of which are lauded by the Chinese authors quoted on page 10, would raise questions in relation to not only the BTWC and the CWC but also to the 1948 Genocide Convention. Another example of interest in genetic weapons is cited in the BMA’s book on human rights. It describes how, in 1998, the Truth and Reconciliation Commission in South Africa heard allegations that a chemical and biological warfare programme that was under the control of Dr Wouter Basson had, in 1984, been trying to develop a germ or bacterium that had the possibility of infecting or killing only black people.

Since the Nuremberg doctors’ trials of 1946/47, research and experimentation on humans has become progressively more robustly regulated. A large ethics literature and international case law have developed setting out the parameters within which research can be carried out. Transparency is an integral part of such ethical guidance. All research, including that carried out within the armed forces, should undergo scrutiny by an appropriately constituted and independent research ethics committee. The desire for transparency is often in tension with the state’s need to control sensitive information or companies’ desire to protect their commercial advantage. Healthcare professionals and other scientists may run into difficult ethical problems if their contractual or other employment conditions demand excessive or prolonged secrecy.
Research and testing of any agents should also be only carried out in accordance with the relevant ethical guidance, human rights law and national research legislation. All aspects of the research and experimental design and procedures must be compatible with accepted ethical codes, including the WMA’s Helsinki Declaration of ethical principles for medical research involving human subjects. This applies equally to research carried out by military or law enforcement researchers and to activities within the pharmaceutical industry. Researchers must think carefully about the potential consequences before exposing a research subject to risk. Consideration must also be given to ensuring that sufficient expertise has been brought to bear on questions relating to the design of the study. As with all scientific research on human subjects it is imperative that requirements relating to consent and disclosure of information to subjects are followed. Information about the law and ethics relating to research on humans are set out in the BMA’s book *Medical ethics today* (2004).

**Dual loyalty**

The debate and thinking about dual loyalties in medicine has focused almost entirely on scenarios where the doctor has a strong obligation to the state (or to state institutions such as the army) which potentially conflicts with his/her moral and ethical duty to individual patients. The situation is rather different for doctors and scientists who may be government employees but who, because they are involved in research several steps removed from treatment, do not necessarily perceive themselves to have a duty to patient populations. For healthcare professionals who are employed by governments and military bodies, there are multiple ethical dilemmas in relation to working on conventional weapons. These have been examined elsewhere. In brief, working to enhance national security may not always be compatible with the fundamental tenets of medical ethics. The border – or grey area – between offensive and defensive research in relation to the use of drugs as weapons is particularly complex precisely because, as indicated above, the roles of biomedical knowledge and of healthcare professionals are so closely linked to development, deployment of drugs as weapons, appropriate antidotes and the treatment of affected people.

There is no equivalent examination of the ethics of healthcare professionals employed by pharmaceutical companies. There exist some general recommendations about ethical duties where there is tension between the employer’s profit and medical ethics. Bickerstaff et al (2006) recommend ‘*pharmaceutical physicians should recognise their ethical responsibility to stand aside from product loyalty when assessing factors affecting the product itself. They must remain aware at all times that the ultimate interests of both patients and their own employers are best served by an objective scientific attitude. This may place a practising pharmaceutical physician in a position which demands considerable determination*’. This does not easily extend to the area of developing drugs as weapons, but it is not unreasonable to expect that they be aware at the time that new therapeutic products are developed and trialled that a significantly adverse reaction in some trial subjects could, for example, indicate a potentially malign use for that product. There are, however, specific recommendations made in relation to weapons development for all stakeholders in life sciences and biotechnology. There would seem to be ample and appropriate reference material at the interface of the general ethical considerations for healthcare professionals in the pharmaceutical industry and the specific recommendations relating to weapon development to a broader constituency within life sciences.
Upholding international law

The BMA believes healthcare professionals and their institutions, as a general rule, have a responsibility to uphold international law especially in relation to weapons and violence. Three BMA publications attest to this: *Biotechnology, weapons and humanity I* (1999) and *II* (2004) and *The medical profession and human rights* (2001). The use of drugs as weapons raises concerns relating to three branches of international law: the international law of arms control and disarmament (in particular the BTWC and the CWC), international humanitarian law (the 'law of armed conflict') and human rights law.

The most prominent of these concerns relate to whether:

- drugs, when used as weapons, fulfil the definition of either a chemical weapon, or a biological weapon or both
- a drug can be used as a weapon for law enforcement without violating the CWC
- promoting the notion of using drugs as weapons for law enforcement might lead to weakening the norms and laws prohibiting the use of chemical and biological weapons in warfare
- the prohibition on the use of any drug as a method of warfare also applies to peace-support missions mandated under the UN Charter
- the use of a drug as a weapon is incompatible with human rights principles such as the right to life, the positive obligation of states to protect life or the general prohibition on cruel, degrading or inhuman treatment
- the norms of international humanitarian law, which protect wounded combatants and those wishing to surrender, could be undermined
- in situations where combatants are mixed with civilians, the use of drugs as weapons could undermine the prohibition of indiscriminate attack.

Under humanitarian law, states have an obligation to review the legality of any new weapon that they are developing, acquiring or adopting for warfare. The ICRC promotes involvement of healthcare professionals in this process.

Healthcare professionals are not expected to be conversant with all these bodies of international law and the pertinent provisions. The role of healthcare professionals is to bring evidence-based arguments to bear on weaponry considerations by regarding the effects of weapons on people and groups as a health related matter. In doing so, however, they need to understand, in outline, the prohibitions which apply.
5. Conclusions and recommendations

This report highlights a number of concerns in relation to the use of drugs as weapons. These concerns are pharmacological, clinical, ethical and legal. A number of conclusions can be drawn, and from these a list of recommendations for healthcare professionals are made. While the recommendations are targeted at the healthcare professions they may also be pertinent to policy makers and other stakeholders including military and police commanders.

Conclusions

- The use of drugs as weapons does not produce an acceptable or compelling solution to current or foreseeable problems in a military or police context. There is, however, ample evidence of long-term interest of governments in the use of drugs as weapons.

- The use of drugs as weapons for law enforcement or in peace support missions also risks undermining legal norms represented by the CWC 1993 and customary international humanitarian law prohibitions on the use of chemical weapons. Drugs deployed for law enforcement purposes risk being used for military purposes or by agents for whom lethality is not a concern.

- The use of drugs as a method of warfare would constitute a violation of the 1925 Geneva Protocol, the 1993 CWC, and customary international humanitarian law prohibitions on the use of chemical weapons. It may also constitute a violation of the 1972 BTWC.

- The terms ‘non-lethal’, ‘incapacitant’ and ‘calmative’ as applied to drugs which might be used as weapons are misleading and inaccurate, and should be abandoned.

- The use of drugs as weapons risks putting a ‘medical’ label on new chemical weapons and ‘medicalising’ an attack and therefore undermines the trust that is an essential element of patient/doctor interactions.

- The use of drugs as weapons presents healthcare professionals with a unique set of ethical considerations. Using medicines and medical knowledge for purposes such as harming or incapacitating people in combat situations has significant implications for the ethos and status of medicine and how doctors are perceived by the societies in which they work. Doctors risk losing their status as protected care-givers and will no longer be perceived as neutral but as active participants in combat.

- Healthcare professionals have a role in ensuring clearer understanding of the insurmountable technical problems of the use of drugs as weapons:
  - In a tactical situation, it is not feasible to deliver the right agent in the right dose to the right individuals in a manner that is both effective and without significant lethality
  - Countermeasures to the use of drugs as weapons are easy to acquire and use
  - Training of potential users of drugs as weapons is not addressed by any proponents of such weapons.

- If drugs are used as weapons in the near future, they are likely to be in the form of existing therapeutic agents, including sedatives, anaesthetics or analgesics, and so their origin will most likely be the pharmaceutical industry. Future agents may arise directly from programmes designed to develop more specific chemical or biological weapons and could have more discrete effects on the central nervous system. Those with a wider therapeutic index are of great concern for the future.

- Controlling the use of drugs as weapons is important to prevent their proliferation and to minimise the chance of more sophisticated agents being developed and deployed such as those which might affect emotions, memory, behaviour or the immune system.
Recommendations
National organisations that represent healthcare professionals should:

- Advocate a multidisciplinary input to policy-making about all weapons and their use in relation to international law or arms control and disarmament, international humanitarian law and human rights law.

- Ensure that governments and policy-makers in military and law enforcement circles who may be considering the use of drugs as weapons understand the fundamental scientific, legal and ethical considerations surrounding such use.

- Work to promote the norms prohibiting the use of poisons, and therefore the BTWC and the CWC. They should further promote understanding that the use of drugs as weapons would violate such norms.

- Advocate that, in the event of those states party to the CWC deciding that drugs can be used for law enforcement, these states declare the types and quantities of such agents.

- Ensure that the consequences of the use of drugs as weapons for military purposes are considered as part of the review of such weapons required by international humanitarian law.

- Question whether the use of any given drug as a weapon would be compatible with fundamental tenets of human rights law given the analysis in this report as to the feasibility of using a drug as a weapon with minimal lethality.

- Advocate against the use of drugs as weapons and not be involved in the training of military or law enforcement personnel in the administration of drugs as weapons.

- Recognise the complex ethical dilemmas raised by the research on, development of, planning for and use of drugs as weapons and promote professional debate on these matters.

- Develop guidelines for any healthcare professional involved in research and development of agents, materials or knowledge that might be put to a dual use.

- Ensure that the pharmaceutical industry is alert to the possibility that their research and products might be put to malign use, and work with them to prevent this.

- Encourage their members to abide by professional codes that disallow involvement in development of dual use technologies or materials.

- Cooperate with one another and with international organisations such as the ICRC and WMA to try to limit the misuse of medicinal products.
Appendix 1: Use of drugs as weapons round table meeting, 4 May 2006

In attendance:
- Professor Sir Charles George (Chair)
- Mr Robin M Coupland
- Dr Diana Dickson
- Professor Sir Andrew Haines
- Professor Michael Harmer
- Dr Peter Maguire
- Dr Brendan McKeating
- Professor Vivienne Nathanson
- Dr Bernard Riley
- Dr Andrew Smith
- Professor Ann Sommerville

Chair, BMA Board of Science
Medical advisor, International Committee of the Red Cross
Chair, Anaesthetics Subcommittee of the BMA Central Consultants and Specialists Committee
Director, London School of Hygiene and Tropical Medicine
President, Association of Anaesthetists
Deputy chair, BMA Board of Science
Chair, BMA Armed Forces Committee
Director of Professional Activities, BMA
Royal College of Anaesthetists
Senior toxicologist, Medical Research Council
Head of Ethics Department, BMA
Appendix 2: What is customary law?

Customary law derives from ‘general practice accepted as law’. While the rules of customary international law are unwritten, evidence of such practice can be found in official accounts of military operations and is reflected in a variety of other documents, including military manuals, national legislation and case law. The requirement that this practice be ‘accepted as law’ is often referred to as ‘opinio juris’. This characteristic sets practices required by law apart from practices followed as a matter of policy, for example. Customary international law is unwritten as opposed to treaty law which is written in conventions in which States formally establish certain rules. Treaties bind only those States which have expressed their consent to be bound by them, usually through ratification.

Appendix 3: Dose-response curve, ED50, LD50 and therapeutic index

A dose-response curve illustrates the relationship between the amount of a drug administered and the percentage of a sample population that experiences a defined response. Effective dose 50 (ED50) is the dose that produces the desired effect in 50 per cent of the population. Lethal dose 50 (LD50) is the dose that causes death in 50 per cent of the sample population. Therapeutic Index (TI) is a measure of a drug’s safety margin; it measures the ratio of the lethal dose in 50 per cent of the population to the effective dose in 50 per cent of the population. TI = LD50/ED50.

Source: http://abdellab.sunderland.ac.uk/Lectures/Nurses/doseresponse03.html (accessed December 2006).
Appendix 4: World Medical Association Statement on Weapons of Warfare and their Relation to Life and Health

Adopted by the 48th General Assembly, October 1996 and editorially revised at the 174th Council Session, October 2006.

Preamble
1. When nations enter into warfare or into weapons development, they do not usually consider the effects of the use of weapons on the health of individual non-combatants and on public health in general, either in the short or in the longer term.
2. Nevertheless the medical profession is required to deal with both the immediate and long-term health effects of warfare, and in particular with the effects of different forms of weapons.
3. The potential for scientific and medical knowledge to contribute to the development of new weapons systems, targeted against specific individuals, specific populations or against body systems, is considerable. This includes the development of weapons designed to target anatomical or physiological systems, including vision, or which use knowledge of human genetic similarities and differences to target weapons.
4. There are no current and commonly used criteria to measure weapons' effects on health. International Humanitarian Law states that weapons that cause injuries which would constitute ‘unnecessary suffering or superfluous injury’ are illegal. These terms are not defined and require interpretation against objective criteria for the law to be effective.
5. Physicians can aid in developing criteria for weapons that cause injury or suffering so extreme as to invoke the terms of International Humanitarian Law.
6. Such criteria could aid lawyers in the use of International Humanitarian Law, allow assessment of the legality of new weapons currently in development against an agreed, objective system of assessment of their medical effects, and identify breaches of the Law once it is developed.
7. Physician involvement in the delineation of such objective criteria is essential if it is to become part of the legal process. However, it should be recognised that physicians are opposed to any use of weapons against human beings.

Recommendations
8. The WMA believes that the development, manufacture and sale of weapons for use against human beings are abhorrent. To support the prevention and reduction of weapons injuries the WMA:
   a. Supports international efforts to define objective criteria to measure the effects of current and future weapons, which could be used to stop the development, manufacture, sale and use of those weapons.
   b. Calls on National Medical Associations to urge national governments to cooperate with the collection of such data as are necessary for establishing objective criteria.
   c. Calls on National Medical Associations to support and encourage research into the global public health effects of weapons use, and to publicise the results of that research both nationally and internationally to ensure that both the public and governments are aware of the long-term health consequences of weapons use on non-combatant individuals and populations.

References

21. See article 1.5 of the 1993 Chemical Weapons Convention.

26 Advisory Council on Scientific Research and Technical Development. Minutes of the 32nd meeting of the Chemistry Committee, 5 March 1959.


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