Enhanced Warfighters: A Policy Framework

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Militaries worldwide are making substantial investments in human enhancements— giving the warfighter a technological upgrade. Driven by neuroscience, biotechnology, nanotechnology, robotics, and other emerging technologies, this upgrade includes research to build warfighters who can operate for days without sleep or food, lift superhuman loads, learn faster, and even communicate telepathically. Such new abilities jump right from the pages of science-fiction, giving rise to ethical and policy questions we have not seriously contemplated before. To be sure, much work exists on enhancement ethics in general. But there is currently little analysis of the issues in a m context, such as: How safe should these enhancements be prior to their deployment, considering recent controversies such as required amphetamine use for certain pilots to on long missions? Should warfighters be able to meaningfully object to being enhanced on religious grounds? How should we weigh the risks to the individual against the bene enhanced military? In this paper, we will offer a framework for considering these and o bioethical questions related to military enhancements. First, we will briefly review exis ethical and legal frameworks to determine their strengths and limitations, and then we w construct a hybrid framework that can account for the special considerations in a militar context, which is more complex than nonmilitary scenarios. We discuss these existing frameworks and our hybrid model more fully elsewhere, as well as o f f er a d ef en se of we mea n b y “h u man en han cem ent ;” So for space considerations,

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[5]allow us to stipulate that definition here: an enhancement is a medical or biological intervention to the body designed "to improve performance, appearance, or capability besides wh at is n ecessary t o achieve, su stain o r rest o re hea lt h ;"[6] This definition means that the following are *not* counted as enhancements: anabolic steroid use by a muscular dystrophy patient; modafinil use by person with attention deficit hyperactivity disorder (ADHD); meditation to overcome pain, emotion, hunger, and other mental states; eyeglasses for the near-sighted; and ordinary tools such as computers or hammers. In contrast, the following are counted as enhancements: anabolic steroids use by otherwise-healthy athletes; modafinil use by students for higher grades; drugs or gene therapies to overcome emotions, fatigue, hunger, and other physical liabilities; bionic eyes that enable super-vision; and neural chips that give an individual on-demand access to information online and spreadsheets. Notwithstanding a lack of general consensus on what counts as human enhancement, including notable grey areas in the distinction between enhancement and therapy, the above-stipulated definition should be reasonably clear enough for us to proceed.

1.0 Current Frameworks: Ethics, Law, and Risk

At first, identifying a specific set of norms for military enhancement might seem superfluous. Wo u ldn 't th ese b e t he same b asic n o rms th at govern milit ary med icine in gen era l? But there is no consensus yet about what *those* norms are. More importantly, as will be seen, the use of biomedical enhancement by the military does not comfortably fit current models of military medical care.

[4] See, *Enhanced Warfighters: Risk*, *Ethics & Policy*, a report funded by The Greenwall Foundation (Lin, Mehlman, and Abney, forthcoming).

[5] Eric Juengst, ' The Meaning of Enhancement', in Erik Parens (ed.), *Enhancing Human Traits: Ethical and Social Implications*, pp. 29-47 (Washington, DC: Georgetown University Press, 1998).

[6] See, e.g., Nick Bostrom and Rebecca Roache, ' Ethical Issues in Human Enhancement', in Ryberg, J., Petersen, T.S., and Wolf, C. (eds.), *New Waves in Applied Ethics* (New York: Palgrave Macmillan, 2008); and Fritz Allhoff, Patrick Lin, James Moor, and John Weckert, ' Ethics of Human Enhancement: 25 Questions and Answers' , *Studies in Ethics*, *Law*, *and Technology*, vol. 4, issue 1, article 4 (2010).

[7]Alternatively, the norms pertaining to performance enhancement in sports might be thought to be an appropriate ethical and legal framework for military enhancement. But there is considerable controversy over what the norms in sports ought to be as well. Moreover, even if one takes the position that doping in sport is unethical, a persuasive argument can be made that sport is not a good analogy for the military. For instance, enhancements in sports may confer benefits on individual athletes and teams, but they do little for society. In the military, on the other hand, safe and effective biomedical enhancements could produce significant societal benefit by promoting the welfare of our warfighters to better accomplish missions in the national interest—potentially decreasing our collective risk. In the following, we will briefly examine existing ethical and legal frameworks and see how much of what we need for an evaluation of military enhancements can be imported from the normative regimes of medical research, medicine, military practice, and public health.

[8]**1.1 The Research Model** Members of the military might be given biomedical enhancements as part of a formal research study. ! f o rma l re sear ch st ud y, to qu ot e f ro m th e Belm o nt Repo rt , is "an act ivit y d e signed to test a hypothesis, permit conclusions to be drawn, and thereby to develop or contribute to generalisab le kno wled ge <;" Two prerequisites must be fulfilled in order for something to count as a formal research study: (1) the endeavor must be conducted according to basic principles of scientific research, and (2) the primary intent of those conducting the endeavor must be to produce knowledge, rather than to provide benefit to specific individuals, in particular, to the subjects. However, the military has a checkered past when it comes to human experiments on its members. Formal research studies conducted on military personnel are subject to a reasonably welldefined set of ethical and legal rules derived from the so-called Common Rule (32 C.F.R. §219.101 ff). This rule was a refinement of rules that were first enunciated in 1946 in the N u re mb erg Cod e, f o llo wed in 196 4 b y t h e Wo rld M ed ical !ssociat ion 's D eclara t ion o f Helsin ki, an d mo st n ot ab ly, th e 1979 Belm on t Rep o rt b y the Pr esid ent 's Com missi on for the Study of

[7] See, e.g., Maxwell J. Mehlman, *The Price of Perfection: Individualism and Society in the Era of Biomedical Enhancement* (Baltimore: Johns Hopkins University Press, 2009).

[8] National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, ' The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research 1979' (http://ohsr.od.nih.gov/guidelines/belmont.html) (last visited May 2, 2011).

[9]Ethical Problems in Medicine and Biomedical and Behavioral Research, which was codified in federal regulations as the Common Rule. The Belmont Report enunciates three overarching principles: "respect for persons," "beneficence," and "justice;" The first requires that competent individuals be asked to give their informed consent to participate as research subjects and that protections be afforded to persons who are not competent to give their consent. Second, beneficence— related to the principle of "nonmaleficence" or to do no harm — requires that the risks to subjects be minimized and the potential benefits maximized. It should be noted, however, that the benefits of the research need not redound to the subjects themselves; the study may involve gathering basic knowledge rather than providing health benefits, and the knowledge may benefit others or the population in general rather than the subjects themselves. Third, in the context of medical research, justice requires that subjects be chosen fairly and that the benefits from the research, if any, be widely available. The primary responsibility for seeing that research fulfills these requirements rests with the researchers, but the Common Rule establishes a system of institutional review boards (IRBs) to ensure that these requirements are carried out. The manner in which IRBs should review protocols for military research, however, is unclear. The fact that military research is intended to further national security interests may lead IRBs, especially those within the military, to approve studies that pose risks that would be unacceptable in civilian-sponsored research. This may very well be ethically and legally appropriate in view of the potential benefits to the nation, but both IRBs and researchers lack clear guidance on how these risks and benefits should be balanced. On the other hand, due to concerns about the inability of service members to provide truly voluntary informed consent, IRBs may reject studies using military subjects that would be approved if the subjects were civilians. In addition, military IRBs may be susceptible to undue influence due to the "command culture" in which they function. For instance, commanders choose the members of military IRBs, although subject to requirements concerning board composition. The result may be that IRBs approve military enhancement research that they otherwise should not, and block or unreasonably delay studies that otherwise should go forward. Furthermore, some military research may be classified, which creates special challenges for researchers and IRB review.

[9] Amoroso P.J., and Wenger L.L., ' The Human Volunteer In Military Biomedical Research', in T.E. Beam and L.R. Sparacino (eds.), *Military Medical Ethics Vol. II*, pp. 563-660 (Washington D.C.: Office of the Surgeon General, 2003).

[10]Fin ally, fed eral re gu lat ion s f orb id IRBs f ro m co n sid erin g "po ssib le lon g -range effects of applying knowledge gained in the research (for example, the possible effects of the research on public p o licy) as amon g th o se rese arch risks t h at fall with in t he pu rview of it s re sp o n sib ilit y;" It is not clear how this restriction should affect IRB consideration of the long-range effects of military research.

[11] According to US Department of Defense rules, research using military subjects, like civilian research, ordinarily cannot take place without the informed consent of the subjects, and the military recognizes the importance of insulating soldiers being solicited to participate in experiments from undue pressure from their superiors. But there are two exceptions to the consent requirement: On e is f o r "e mergen cy re sea rch ," t h at is, st ud ies o f t echn iqu es t o t re at soldiers with medical emergencies who, because they are unconscious or otherwise *non compos mentis*, cannot make their own decisions.[12] A similar exception recently has been recognized for non-military research.[13] The second exception was adopted during the first Gulf War. In that conflict, the military wanted to give troops pyridostigmine bromide (PB) and botulinum toxoid (BT) vaccine to protect them against nerve agents and botulism. There is considerable debate on whether the use of PB and BT vaccine in the Gulf War were in fact formal experiments or even enhancements. (To be clear, on our definition we do not count vaccines as enhancements, as they can be used to sustain health; nonetheless, we refer to the PT and BT vaccine here merely to illustrate the problems in using various models to govern enhancements, and not as examples of enhancements themselves.) In those instances, commanders simply ordered troops to take a pill or receive an injection, the same way they ordered them to go certain places, take rests, or engage the enemy. Even if the commanders had informed the troops that the pills and injections were experimental, as a practical matter, t h e t roo p s may h ave felt co n st rain ed t o ob ey th e co mman d ers' o rd ers . A solution might be to restrict military enhancement research to subjects who were noncombatants, but this may not

[10] 45 CFR §46.111(a)(2).

[11] 10 USC. §980, 21 C.F.R. §50.24.

[12] US Department of Health and Human Services, Office of Human Research Protections, ' Informed Consent Requirements in Emergency Research 1996' (http://www.hhs.gov/ohrp/policy/hsdc97-01.html) (last visited May 2, 2011).

[13] William J. Fitzpatrick and Lee L. Zwanziger, 'Defending Against Biochemical Warfare: Ethical Issues Involving the Coercive Use of Investigational Drugs and Biologics in the Military' , *Phil., Sci , and L* . 3: March 3 article (2003); Jessica Wolfendale and Steve Clarke, ' Paternalism, Consent, and the Use of Experimental Drugs in the Military', *Journal of Medicine and Philosophy* 33 (4): 337-355, p. 343 (2008).

adequately reproduce the conditions on the battlefield under which the experimental intervention was expected to be employed; and a lengthy research trial may fail to comply with t h e u rgen cy o f "m ilit ary n ecessit y ." Apart from the perspectives of the subjects and their commanders, there is an additional perspective that must be considered, that of military researchers who are physicians. As physicians, they are subject not only to the general ethical and legal rules that protect human subjects, but also to special rules that govern physicians who are acting as researchers. The question, however, is whether these rules change when the physician researcher is a member of the military. This leads to the broader question of what rules should govern military physicians who participate in giving warfighters enhancements in non-research—that is, deployment— settings. Even if warfighters are not given enhancements directly by a physician, the fact that these interventions are biomedical in nature may suggest that, from an ethical and legal standpoint, giving them to warfighters should be treated essentially as the practice of medicine. The question then becomes: what ethical and legal rules for military enhancement are suggested by a medical as opposed to a purely research model?

[14]**1.2 The Medical Model** The medical model shares many elements with the research model. It too emphasizes patient autonomy, including voluntary, consensual, informed decision-making, and protections for persons who are not competent; justice; and beneficence, which entails maximizing benefits to the patient and minimizing risks. The two models differ in one key respect, however: In the medical model, the physician essentially owes her loyalty exclusively to the patient, a principle that the law reflects by treating the physician as a fiduciary for the patient. This means that everything the physician does in connection with t h e p at ient mu st b e in the p at ient 's b est in t erest , an d th at th e p hysician may n ot sacrif ice t h e p at ient 's welfare f o r t h at of t h e ph ysician or anyone else. Principle VII of the Code of Ethics of the American Medical Association puts it su ccin ct ly: "! p hysician shall, while caring for a patient, regard responsibility to the patient as p aram ou nt ;" Yet it is clear that, at least in some respects, patients who are members of the military clearly do not have the same rights as civilian patients. For instance, competent civilian patients have a right to refuse treatment, but it is generally understood that warfighters do not have the right to refuse care that physicians deem necessary to return them to active duty. As Michael

[14] Wolfendale and Clarke at 345, citing George Annas, ' Protecting Soldiers from Friendly Fire: The Consent Requirement for Using Investigational Drugs and Vaccines in Combat' , *Am. J. of L.*

[15]Gross observes, warfighters also have far fewer rights in regard to privacy and confidentiality: in the military, "th e h allmark p rin cip les th at d rive b io et hical d ecision makin g in o rd in ary clin ical settings are largely absent. Military personnel do not enjoy a right to life, personal autonomy, or a right of self-det ermin at ion t o an y degre e appro ach in g t hat o f o rd in ary p at ient s;"[16] As he p u t s it st arkly, "comb at an t s lo se t h eir right t o lif e as t hey gain th e righ t t o kill;"[17] More importantly, it seems fairly settled that at least in wartime, it is at least sometimes acceptable for the military to subordinate the welfare of individual warfighter for the greater good, namely, the welfare of the unit, the mission, and the state. "Un like b ioet h ical p rin cip les," Gross explains, " < th e prin cip les o f co n tem po rary ju st war o ft en re ach beyon d t h e welf are of a single individual—that is, the patient— to consider instead the aggregate interests of combatants and noncombatants, and the collective interests of the state. At the same time, t h ey mu st also con ten d wit h milit ary necessit y;"

However, while it seems accepted that the interests of the unit, mission, and state can trump the interests of individual warfighters and leave them little in the way of personal autonomy, it is not obvious how this should affect the role of military physicians or the use of biomedical enhancements. At what point do individual interests stop mattering? How much harm may a physician cause a warfighter for the greater good? Could a physician, for instance, remove a sold ier 's kidn ey in ord er t o t ran sp lant it in t o a sup erio r? ! sold ier 's h eart? In terms of biomedical enhancements, how much risk is too much? And who gets to decide what co n st itu tes "accept ab le risk": t h e co mman d in g off icer, t h e milit ary physician, the warfighter himself, or someone else? Gross admits that the warfighter may retain some individual choice. But how much is not clear:

> Informed consent is the hallmark of bioethics, yet allowing soldiers to decide medical care for themselves might be chaotic. Where does one draw the line? May one compel a soldier to accept standard medical care but allow them to choose experimental care that might protect them against novel biological and chemical agents? The answer is not clear. If soldiers have but limited autonomy, on what basis may they refuse

and Med. 24: 245-260 (1998); and Michael Gross, ' Bioethics and Armed Conflict: Mapping the Moral Dimensions of Medicine and War' , *Hastings Center Rep.* 34: 22-30 (2004).

[15] Michael L. Gross, *Bioethics and Armed Conflict: Moral Dilemmas of Medicine and War* (Cambridge, MA: MIT Press, 2006), pp. 15 and 121.

[16] Gross at 23.

[17] Gross at 15.

[18]experimental or investigational drugs? This issue turns partly on acceptable risk during war and on the difference between military risk and medical risk. If a commander may expose his soldiers to significant military risk to gain an important military objective, may he not accept a similar level of medical risk when treating them? Even without resolving these questions, the medical model, with its emphasis on patient welfare and autonomy, does not seem capable of serving as the sole guide for determining the circumstances in which it would be appropriate for physicians to give enhancements to warfighters. This conclusion is reinforced in cases where enhancements are given to warfighters by persons who are not physicians, such as their unit commanders. Nor does the fact that warfighters were being given something biomedical alter this conclusion. Many biomedical products are transferred from one person to another without being deemed the practice of medicine, such as the sale of illicit drugs on the street. But there is another ethical and legal model with a medical dimension that is worth considering. Like the medical model, it deals with issues of health and welfare, but unlike the medical model, it does not give priority to individual well-being or autonomy. This is the model that governs matters of public health.

1.3 The Public Health Model

[19]The US Con st it ut ion gives t h e govern men t t he "po lice p o wer" to pro tect th e p u blic f ro m bein g harmed by its members, and while the police power may be most closely associated with law en f orceme nt , o n e o f it s mo st imp o rt ant ap p licat io n s is t o p rot ect th e p ub lic's h ea lth . The scope of this government power is very broad. !s Larry Go st in writ es, "p u blic health has constrained t h e right s of in d ividu als < t o p rot ect co mmun it y in t erest s in h ea lt h ;" Public health authorities sequester not only people who are known or suspected of having a transmissible disease, but those who merely have been exposed to such a disease, for example, by having traveled in a country where it is found. Furthermore, people incarcerated in this way, called quarantine, can be held for long as long as public health officials deem necessary to ensure that the patients have gotten over the disease or are no longer contagious, to demonstrate that they were not infected in the first place, or, as in the case of Mary Mallon, a.k.a. "T yph o id M ary" wh o spent a t ot al o f 26 years co n f in ed t o an islan d in th e Ea st River, to

[18] Gross at 17.

[19] Lawrence O. Gostin, *Public Health Law: Power, Duty, Restraint* 20 (Berkeley: University of California Press, 2000).

[20]quarantine as long as necessary for them to die. In the 1990s, for example, New York City confined over 200 people for approximately six months after they refused to be treated for drug-resistant tuberculosis. In addition to quarantine, public health officers can in vad e p eop le's p rivacy b y req u irin g th em to reveal the identity of those with whom they have come into contact, a practice known as contact tracing. Contact tracing has been used in an attempt to combat the spread of HIV, particularly in San Francisco; the contacts in that case were sexual partners, which illustrates the degree to which individual privacy may be compromised in the interest of protecting the p u b lic's h ea lt h . In addition to quarantine and contact tracing, public health officers can forcibly treat people, compel them to be vaccinated, and obtain a sample of blood from a newborn before it is allowed to go home from the hospital with its parents. Added to this is the power of the states to pass laws defining and punishing unhealthy behaviors, which can run the gamut from operating an unsanitary restaurant kitchen to transmitting a venereal disease.

Public health ethics and law thus differ from medical ethics and law. This was starkly illustrated during the early stages of the AIDS epidemic, when physicians balked at efforts by public health authorities to force them to identify patients who were HIV positive, arguing that it would violat e t heir d ut ies t o main t ain t h eir p at ien t s' conf id en t ialit y an d p rot ect th em f ro m th e st igma and discrimination provoked by the disease. In fact, the public health model differs from the medical model in precisely those respects that differentiate the medical from the military model and that make the medical model ill-suited to govern the use of enhancements by the military. Like the military model, public health is based on utilitarian rather than deontological principles, subordinating the well-being of the individual for the good of others, and like military commanders, public health officials can use coercion if an individual refuses to consent to do what they deem necessary to protect the public health.

[21] The public health model therefore seems ideally suited to serve as a source of ethical and legal guidance for enhancement use by the military. Fitzpatrick and Zwanziger refer to this model, for example, in discussing the ethics of giving drugs like PT and BT vaccine to troops in the field. The analogy between the requirements of public health and military necessity is well precedented. Indeed, in the single Supreme Court decision upon which the public health authority of the state is based, a 1905 opinion in a case involving a Cambridge, Massachusetts, man 's r ef u sal t o be vaccin at ed again st smallp o x, Ju st ice Harlan an alo giz es t h e st at e's exercise

[20] NOVA: History of Quarantine (http://www.pbs.org/wgbh/nova/typhoid/quarantine.html) (last visited Sept. 26, 2010).

[21] Fitzpatrick and Zwanziger (2003).

[22]of its public health powers to its power to compel a citizen to risk his well-being in time of war: "He may be co mpelle d, by f o rce if n eed b e, again st h is will and with o ut regard t o h is perso nal wishes or his pecuniary interests, or even his religious or political convictions, to take his place in th e ran ks of t h e army o f h is co un t ry and risk the ch an ce o f bein g sh o t do wn in it s d ef en se;"

[23]Yet as Justice Harlan also recognized, the authority of public health officials to override individual interests and autonomy is not absolute. "! cco rd in g t o set t led p rin cip les, t he po lice power of a State must be held to embrace, at least, such *reasonable* regulations established d irect ly b y le gislat ive enact ment as will p rot ect th e p u blic h ealt h and t h e p u b lic saf et y;"[24] Harlan goes on to make it clear that the courts will strike down public health actions that are "ar b itrar y o r un re ason able" o r "cru el and in hu man ," an d t h at t he st at e can n ot f o rce someon e t o d o someth in g t hat wou ld "ser iou sly imp air h is h ea lth , or pro b ab ly cau se h is d eat h ;"th Public health officials have been condemned, for example, for conducting the experiment at Tuskegee where African-American men were left untreated for syphilis in order to chart the course of the disease, not to mention for leading the eugenics movement in the early 20 century that involuntary sterilized tens of thousands of Americans and that inspired the Nazi eugenics program. So the question is: wh at limit s are t h ere o n th e exercise of t h e st at e's pu b lic h ea lt h powers, and how wo u ld t h o se limit s app ly to t h e milit ary's u se of en h an c ements?

[25] A good starting point is a 2002 article by James Childress and colleagues (hereinafter "Ch ild re ss ").[26] They assert five principles to guide when individual welfare and autonomy may be overridden to achieve collective public health benefit: First, the public health action must be effective to protect the public health. In t h e aut ho rs' wo rd s, "inf rin gin g on e o r mo re gen era l moral considerations will *probably* p ro t ect pu b lic h ea lth ;" Second, the public health benefits must outweigh the burdens on those who bear them. Third, the public health action must be necessary, in that there are no effective alternatives. Fourth, the burdens must be minimized as much as possible. Finally, the action should be transparent, that is, accompanied by notice and public justification.

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[22] Jacobson v. Commonwealth of Massachusetts, 197 US 11, 34 (1905).

[23] Jacobson at 25 (emphasis added).

[24] Jacobson at 48.

[25] James F. Childress, Ruth R. Faden, Ruth D. Gaare, Lawrence O. Gostin, Jeffrey Kahn, Richard J. Bonnie, Nancy E. Kass, Anna C. Mastroianni, Jonathan D. Moreno, and Phillip Nieburg, ' Public Health Ethics; Mapping the Terrain' , *J. Law, Med., & Ethics* 30: 170-178 (2002).

[26] Childress et al. at 173 (emphasis added).

To apply to military use of biomedical enhancements, these principles need refinement. For instance, the first principle depends on how much evidence of effectiveness the military needs. Giving warfighters an enhancement that was experimental, for example, might not be permissible according to this interpretation, at least if the enhancement had undergone little or no human testing (e.g., not beyond a Phase I clinical trial), although the use of the experimental enhancement might still be permissible if the use were regarded as human experimentation and the experiment was conducted according to the rules for military experiments. On the other hand, it is not clear that Childress et al. are correct when they require that a public health in t erven t io n "p ro b ab ly" will p ro tect t h e pu b lic h ealt h , sin ce if a pu b lic h ea lt h em ergen cy were dire enough, the authorities surely would be permitted to force people to take a completely untried p reventive measu re if , as mand ated b y Ch ild re ss' th ird p rin cip le of necessit y, no b ett er alternative was available. In sh o rt , Child re ss' mod el n eed s to mo re caref ully con sid er ho w t he various principles interact and are interpreted.

2.0 A Hybrid Framework: The Military Model

Having briefly analyzed the human experimentation, medical, and public health models, and considered how they might be adapted to the military, we are now in a position to synthesize them in order to construct an ethical and legal model to govern the military use of biomedical enhancements. The use of biomedical enhancements in the military to enhance warfighter performance cannot be ruled out as *a priori* unethical or illegal. As Michael Russo states in connection with drugs to enhance cognition:

[27] All militaries desire technological, training, and doctrinal advantages so as to increase the probability of success. Each military strives to have a performance edge. The US military, through multiple methods, seeks to optimize cognition so as to provide individuals with a cognitive performance edge. The use of cogniceuticals to provide a cognitive performance edge in military engagements does not appear to cause ethical concerns. At the same time, military leaders must strive to act within appropriate ethical norms and legal rules. D o in g so wou ld b e "right ," cau se th e lea st amo u nt of h arm t o th e warf ight er, an d help

[27] Michael Russo, ' Recommendations for the Ethical Use of Pharmacologic Fatigue Countermeasures in the US Military' , *Aviation, Space, and Environmental Medicine* 78 (5, Sec. II): B119-B127 (2007).

avoid criticism that could undermine military effectiveness. What follows, therefore, is a proposed set of ethical and legal rules to govern this military practice.

[28]**2.1 Legitimate Military Purpose** Enhancements in the military must be used for legitimate military ends. In the first place, the purpose must be military. For example, it would be unethical to give warfighters enhancements to enable them to excel at activities while on leave, assuming this could not be justified as boosting warfighter morale or self-confidence. Furthermore, the military purpose must itself be legitimate. So it would be unethical to give a warf igh t er an en h an cemen t t o in cre ase th e effe ct iven ess o f th e u n it if th e u n it ’s m ission is illegal. !s Gro ss ob serves, “ t he grou p d oes no t con st itu te it s o wn p u rp o se . Under JWT [just war theory], military organizations exist to defend some greater good < Th e goo d o f t he n at ion is both logically and morally distinguishable from the well-being of the military unit in the same way that the good of a patient is logically and morally distinguishable from the good of a p h ysician ;”

[29]**2.2 Necessity** The enhancement not only must be used to help achieve a legitimate military objective, but its use to achieve the objective must be reasonably necessary. Childress describes necessity as a lack of acceptable alt ernat ives, wh ile Gro ss st at es t h at “t he simp lest way to d et erm in e excessive harm is to ask whether military planners have less costly, alternative means at their d isp o sal t o ach ieve th e same goa l;”[30] A more precise way of establishing that the use of an enhancement is necessary is to show that there is no other means of achieving the objective that offers a better ratio of risks to benefits. Military necessity may not be clear cut, however, and reasonable minds may disagree on when it exists. As Hilary Jaege r em ph asiz es, “it is very easy t o b lu r th e lin e b et wee n o p erat ion al n ecessit y an d ad min ist rat ive co n ven ien ce;”

[28] Gross at 55.

[29] Gross at 62.

[30] Hilary F. Jaeger, ‘ ! Glan ce at th e Tip o f a Big Iceberg: Commen t ary o n ‘Reco mme n d at ion s fo r the Ethical use of Pharmacological Fatigue Countermeasures in the US Military’’ , *Aviation, Space, and Environmental Med.* 78 (5, Sec. II): B128-B130 (2007).

2.3 Benefits Outweigh Risks

[31]Not only must the use of an enhancement be necessary in the sense that there are no less costly means of achieving the legitimate military objective, but the benefits of giving the enhancement to warfighters, which can accrue to the unit, the mission, and the state as well as to the warfighter him- or herself, must be greater than the risks to the warfighters and noncombatants. This principle may be thought of as an aspect of proportionality, a concept that is at the heart of military ethics and one of the main determinants of when and how much armed force may be used. !s Gro ss st at es, "n ecessit y re main s co n strained by p ro po rt io n alit y;"

The risks that are assessed here are net risks; that is, they are the risks from using the enhancement minus the risks of not using it. Of course, the difficulty lies in how values are assigned to benefits and risks. Further, the benefits to a unit, mission, or nation may be hard to measure, much less to quantify precisely. Another issue is about how great the risks can be from enhancements that an individual warfighter is required to take, or acceptable risks imposed on noncombatants (as we discuss in more detail in our larger report referenced earlier).

2.4 T h e W arf i gh ter's Di gn i ty i s Mai ntai n ed

[32] Michael Gross emphasizes the need to avoid humiliating warfighters. "Ord in arily," h e says, "an y violat ion of self -esteem and its derivative principles prohibiting torture, humiliation, and d egra d at ion is u n accep t ab le an d mo rally wron g;"[33] He is addressing the treatment of prisoners an d en em y co mb at ant s, b u t h is ad mo n it ion a pp lies t o o ur tro op s as well, sin ce "d ign it y < protects individuals from humiliation, dishonor, ill-t re at men t , and servit ude;" Biomedical en h an cem ent s t h at seriou sly co mp romised th e u ser's d ign it y t h ere fo re sho u ld b e avoided . This would bar enhancements, for example, that produced bizarre or repugnant effects, such as severe disfigurement or dramatically reduced lifespan.

2.5 Burdens Are Minimized In line with one of the principles of classic medical ethics, the burdens that an enhancement imposes on the warfighter must be minimized. One implication is that, if possible, any effects

[31] Gross at 61.

[32] Gross at 56.

[33] Gross at 45.

likely to cause the warfighter discomfort or distress should be temporary or readily reversible.[34] No one seriously questions the ethics of external "enhancements" (or tools), such as body armor, in part because they are readily reversible: one can simply take it off, when it is no longer needed or wanted. Reversibility is especially important if the adverse effects, unless reversed, would continue to affect the warfighter after leaving the military and could also impact people outside of the military, such as family members and other civilians, who do not volunteer for military service the way the warfighter does. One group of experts in military training observes, "optimal performance during battle and deployment must be balanced against health and sustainable social functioning upon re-entry;"

2.6 Consent As noted earlier, the consent requirement that is such a central feature of both medical and research ethics is largely absent in the military. A strong argument nevertheless can be made that warfighters should be asked to give their consent to serve as subjects in studies involving exceptionally risky enhancements, and the argument clearly is even more persuasive if only some of the members of a unit will serve as subjects. Some questions, however, will need answers: When is an enhancement *exceptionally* risky? What is "military risk", if we are to compare it with medical risk? Do warfighters have the right to withhold consent for "highly unusual" risks, and from whose vantage point do we gauge "unusual"? Does enlisting for military service already imply consent to the risks? This notion of "anticipatory consent" is interesting, but it too falls short, since there would seem to be no limit to the dangers that warfighters could be exposed to by their superiors so long as the dangers were generally described to them before enlistment. Telling them in advance that they might lose their lives in combat, for example, does not seem to justify ordering them to undertake a suicide mission.

These uncertainties underscore the fundamental point made earlier that the role of consent in the military must be understood as limited. Consent in the military simply cannot do the heavy ethical and legal lifting that is expected of it in civilian settings. For one thing, in many military situations, obtaining consent will be highly impractical. There may not be an opportunity for sufficient conversation between potential subjects and experimenters. And there are also internal pressures that warfighters experience, as well as the external pressures to which they are vulnerable.

[34] Wayne B. Jonas, Francis G. O'Connor, Patricia Deuster, Jonathan Peck, Caron Shake, Stephen S. Frost, ' Why Total Force Fitness?' , *Mil. Med.* Suppl. 175(8): 6-13, 9 (2010).

[35] Therefore, consent in the military cannot eliminate the need for ethical and legal oversight. This could perhaps be provided in part by military physicians, who are in the best position to appreciate enhancement risks, and who may retain enough of their sense of medical professionalism to give due regard to the welfare of the individual warfighter. As Hilary Jaeger re co mme nd s, "t h e milit ary physician must act as a counterweight, by being the voice of cau t ion ;" Another option is to establish an independent group of experts in law and bioethics, similar to th e N IH's Recomb in an t D N! !d viso ry Co mmitt ee (R!C), wit h the n ecessary secu rit y clearances and the responsibility to review and approve formal military enhancement exp erim en t s, enh an cemen t re sear ch p ro grams su ch as D !RP!'s, and , if milit ary n ecessit y permits, proposed deployment uses of enhancements; T h is wo u ld enab le a "crawl -walk-ru n " approach to enhancements with unusual or unknown risks, allowing for an objective or more careful assessment of their permissibility.

2.7 Transparency

No doubt one of the main reasons that the Army LSD and radiation experiments have been so heavily criticized is their secrecy. National security certainly may require that enhancement experimentation and use be kept secret from adversaries, but to the extent consistent with security concerns, the military should make public information about enhancement research and deployment, including the reasons why the military believes that the risks of the experiment or use are outweighed by the known or potential benefits. At the very least, as we proposed above, relevant information should be made available to third-party assessors with the necessary security clearances. Making military enhancement p art o f th e p ub lic re co rd wo u ld h elp su stain Fitz pat rick an d Zwanz iger's argu ment in favor of anticipatory consent, since recruits would be more likely to have heard about it before they enlist. Public awareness also could stimulate an open discussion about the ethics and legality of military enhancement that could reduce public opposition.

2.8 Fair Distribution of Risks and Benefits

As discussed previously, numerous commentators object to imposing risks on only a few individuals in the military. Similar ethical objections can be asserted against singling out a few warfighters to receive enhancement benefits. The best approach is to spread risks and benefits as widely as possible. But wh at if th ere were n 't en o u gh risks o r b en efit s to go aro un d ? What if

[35] Jaeger at B130.

[36]the supply of enhancements were limited, for example, because of manufacturing difficulties or regulatory obstacles? Arguably commanders should be allowed to distribute enhancements to certain individuals for good reason, in this instance, because their inherent talents made them less able than others or because only they were going to be placed in harm's way. If there were no valid substantive reasons for selecting one individual to receive enhancements over another, the fairest method of selection would be by lot.

Another concern raised by selective distribution of enhancements is the resulting unfairness, if the improved performances that enhancements made possible led to promotions or other advantages for the users. If everyone cannot have access to beneficial enhancements, a strong argument can be made that accomplishments produced in large part by enhancements should not count favorably. On the other hand, if the enhancement in question comes with significant risks, those who volunteer to accept the risks may be entitled to corresponding benefits as recompense.

2.9 Superiors Are Accountable

In view of the potential for superior officers to bully warfighters into taking unduly risky enhancements, the system by which the military holds superiors accountable for unreasonable acts must keep a lookout for unethical or illegal command decisions concerning enhancement use.

3.0 Conclusions

[37] We can already see a radical agenda to engineer the next-generation warfighter, and what we need now is a new framework to evaluate its ethical and legal implications— one that can account for more complex considerations than we find in existing models. In the above, we have sketched out such a framework, a hybrid model, which we build out with more details in our full-length report. With this framework in hand, we can begin to address biomedical issues arising from military enhancements. To be clear, there are also other questions that may fall outside our hybrid

[36] US v. Holmes, 26 F. Cas. 360 (E.D. Pas 1842) (No. 15,383) (lottery is fairest way to decide which people in overcrowded lifeboat should be cast overboard).

[37] See, *Enhanced Warfighters: Risk, Ethics & Policy*, a report funded by The Greenwall Foundation (Lin, Mehlman, and Abney, forthcoming).

model, that is, questions about secondary and tertiary effects, such as: Would enhanced warfighters affect squad cohesion? Does being enhanced require a change either way in the len gth of a warf ight er's service commitment? Would international laws, such as the Geneva Conventions, prohibit torture of enhanced warfighters who can tolerate greater physical and mental abuse? Considering that much of our technology—for instance, automobiles, nuclear power, microwaves, radar, GPS, computers, and the Internet— has military origins, the impact of military human enhancements on society may be significant. Further, most warfighters return to civilian life as veterans, potentially flooding society with new, disruptive abilities as well as greater needs, such as possible long-term health issues. Thus, by examining the ethics and policy of enhancements in a military context, we are also addressing these social issues at their source, with benefits that help inform the broader human-enhancement debate downstream.

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