

Cruelty or Compassion: The Ethics and Pharmacology of Lethal Injections in Capital Punishment

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Abstract

As the debate surrounding the death penalty intensifies, the involvement of physicians in state-sponsored executions has become a contentious ethical issue. Historically, lethal injection emerged as a supposedly more humane method of execution to address constitutional concerns of cruel and unusual punishment. Physicians were enlisted to lend credibility to the practice and garner public acceptance. However, the recent botched executions and shortages of lethal injection drugs have raised questions about the ethics of the practice and the legitimacy of physicians' role in the process.

In this paper, we look at this issue from several perspectives: state-by-state, social, pharmacological, and ethical. We investigate the dominant use of lethal injections and the shift in drug combinations employed by states during executions. Additionally, we explore the social factors that have impacted the availability of these drugs, including pharmaceutical industry opposition to capital punishment and the implementation of source anonymity laws. The shortage of lethal injection drugs has introduced complexities, leading to mishandled executions and raising questions about the efficacy of different drug protocols. We perform an in-depth pharmacological analysis on different drug protocols. We also examine physicians' role in state-sponsored executions from an ethical standpoint. Finally, we offer consideration of the Sarco Pod as a painless alternative to current execution methods. Our comprehensive analysis of these various dimensions underscores the urgency for a profound dialogue within the medical community and society. As the debate persists, we must seek compassionate ways to address the profound complexities of capital punishment practices while upholding the integrity of medical ethics and human dignity.

INTRODUCTION

In 2022, although the total amount of executions in the US were at a generational low, over a third of the ones performed were “mishandled” according to capital punishment researchers. Of the 20 executions that were attempted, seven were described as being problematic, with two even being abandoned during the process.¹ The troubles faced during capital punishment attempts this year have led researchers to call 2022 “the year of the botched execution.”¹ These mishaps have led to Alabama and Tennessee to temporarily halt all executions while their state protocols are scrutinized. Due to the growing lack of support for capital punishment, the states that want to perform it are facing more barriers each year in the shortage of drugs used for lethal injection protocols, the constitutional questions of “cruel and unusual punishment” in light of the botched executions in 2022, and the unquestionable financial burdens on states with inmates on death row versus those employing lifetime sentences. These barriers along with a general lack

of support have led 5 states to severely limit or abolish the practice entirely since 2015.² With all of these factors, however, the question of ethical physician participation in state executions remains and must be addressed by the medical community and society itself.

To circumvent objections that the death penalty was “cruel and unusual punishment” and therefore a violation of the 8th Amendment to the Constitution, advocates proposed lethal injection and the involvement of physicians to overcome the negative perceptions associated with the death penalty and to increase public acceptability of the practice. Initiated in 1982, lethal injection is now the main method of execution in all 27 states with the death penalty. The Death Penalty Information Center reports that 1391 of the 1571 executions carried out by states since 1976 and the reinstatement of capital punishment by the Supreme Court have been by lethal injection.³ More recently, of the 383 executions performed in the United States since 2010, 375 have been by

lethal injection.⁴ This “medicalization” of the death penalty has ignited a debate both by those within the medical profession and by others outside it regarding the appropriateness of physicians participating in executions: “This image of a white-coated symbol of care working with or as the black-hooded executioner is in striking contrast to established physician ethics, which bar physicians from involvement with executions.”⁵

Physicians participating as “agents” of the State in state sponsored executions argue that their presence ensures a more humane execution. They are being compassionate and caring by not abandoning their patient at his or her time of need and by ensuring the prisoner does not experience unnecessary pain or suffering. Some proponents even argue that this whole debate is nothing more than a ruse by death penalty abolitionists to end capital punishment in the United States. Opponents argue that physician participation violates the Hippocratic Oath, professed by many physicians upon graduation, to which the dictum “first, do no harm” is attributed. The goal may appear to be to reduce pain and suffering, but in reality the physician’s participation only maximizes efficiency.⁶ Opponents further argue that there is a profound conflict of purpose, role or interest. A study of physician’s attitudes about participation in executions by Neil Farber et al., found that the majority of physicians surveyed approved of most disallowed actions involving capital punishment, indicating that a majority of physicians believed it is acceptable in some circumstances for physicians to kill individuals against their wishes despite the continued objections by the American Medical Association (AMA) and other medical societies.⁷ This debate pits one ethical principle against another, beneficence against nonmaleficence. Despite changing state execution policies and practices, pending Supreme Court rulings, and calls for older forms of capital punishment, the basic question remaining is whether medicine has a role in addressing more competent and compassionate ways of executing people.

The purpose of this article, therefore, is twofold: first, to examine the role of physicians who are involved in executions; and second, to give an ethical analysis of the arguments for and against physician participation in executions, with special attention to the use of pharmaceutical agents in lethal injection.

CASE STUDY

A doctor is employed by the Georgia Department of Corrections and is medically responsible for the inmates at

the state prison in Jackson, Georgia. He treats the men and women for everything from high blood pressure, hypertension, diabetes and even more serious ailments. He is well-respected and trusted by the inmates. In 2000, lethal injection became the legal way to terminate prisoners in Georgia who were convicted of a capital offense.⁸ He was then instructed by the warden to assist at the executions. He does not administer the lethal injections, but he monitors the process, and, occasionally, he has testified, “he helps out.” If the prisoner’s heart monitor has not flat-lined after the injections meant to kill him, he orders additional chemicals. In 2001, after a nurse spent 39 fruitless minutes stabbing needles into Jose High, a former drug addict, in search of a sound vein, the doctor inserted a line through his neck that allowed the deadly chemicals to flow. It appears that he both promotes health and hastens death.

Some ethicists claim that physicians who participate in executions violate the most fundamental tenet of medical ethics. But others defend these physicians, saying that lethal injections, the almost-universal form of execution in the United States, can be performed humanely only by medical professionals. Some in the medical profession are advocating disciplining these physicians by revoking their licenses if they participate in executions. Others feel this would be a grave mistake, because the alternative would be having prison employees with little training perform the procedures. In the absence of medical oversight, it is feared that many of the executions would be unnecessarily painful.

Most states allow or require a physician to be present for executions. Information about the exact numbers who participate is difficult to find because states generally refuse to name anyone involved in executions, citing security and privacy concerns. Georgia refers to executions as “confidential state secrets and privileged under law.”⁹

Many of the states that require a physician to be present for the execution have seemingly contradictory laws that allow physicians to be disciplined by state medical boards for violating codes of medical ethics. Those codes universally forbid participation in executions. The American Medical Association’s ethics code states, “as a member of a profession dedicated to preserving life when there is hope of doing so, a physician must not participate in a legally authorized execution.”¹⁰ The code forbids physicians to perform an array of acts at executions, including prescribing the drugs, supervising prison personnel, selecting intravenous sites, placing intravenous lines, administering the injections and pronouncing death. Interestingly, a 2001

survey found that 41% of physicians would be willing to perform at least one of these forbidden activities.¹¹ Many states, including Georgia, have various “shield” laws to ensure the anonymity of physicians who do participate in executions, and some states have passed “safe harbor” laws as well to prevent medical boards from disciplining these doctors.¹² The states argue that aiding in executions is not the practice of medicine. The physician's role is to treat when you can and comfort when that is all you can do. Some argue that assisting at an execution is giving comfort to the dying.

STATE-BY-STATE ANALYSIS

Since 1976, 1571 men and women have been executed in the United States.¹³ The U.S. Government, the U.S. Military, and 27 states currently retain the death penalty; however, 5 of these states—California, Pennsylvania, Oregon, Arizona, and Ohio—have issued gubernatorial moratoriums on executions.¹⁴ Lethal injection is used as the primary, if not only, method of execution. To date, 1391 prisoners have been executed by lethal injection since 1976.¹⁵ Until 2009, most states used a three-drug cocktail in lethal injections, typically involving sodium thiopental as an anesthetic (later replaced by pentobarbital in 2010), pancuronium bromide as a paralytic agent, and potassium chloride to induce cardiac arrest and cause death.¹⁶

Due to shortages of these drugs, however, states have implemented alternative lethal injection methods. 8 states—Arizona, Georgia, Idaho, Missouri, Ohio, South Dakota, Texas, and Washington—have used a single-drug method for executions, usually a lethal dose of pentobarbital. A total of 14 states have used pentobarbital in executions (whether they be one- or three-drug injections): Alabama, Arizona, Delaware, Florida, Georgia, Idaho, Mississippi, Missouri, Ohio, Oklahoma, South Carolina, South Dakota, Texas, and Virginia. Colorado includes pentobarbital as a backup drug in its lethal-injection procedure. 7 states have used midazolam as the first drug in the three-drug protocol: Florida, Ohio, Oklahoma, Alabama, Virginia, Arkansas, and Tennessee. Many of these states, however, have seen botched executions with this drug that left prisoners coughing, convulsing, and gasping for breath. In January 2017, Florida abandoned its use of midazolam in its three-drug protocol and replaced it with etomidate. Ohio initially discontinued its use of midazolam in a two-drug protocol, but later opted to keep the drug in a three-drug protocol in 2016. Arizona also abandoned the use of midazolam in both two-drug and three-drug protocols in 2016. Nebraska introduced fentanyl as a lethal drug in a 2018 execution.

Nevada has likewise declared its intention to use fentanyl with other drugs to carry out executions.¹⁷

Despite the Supreme Court upholding the constitutionality of lethal injection, states that perform executions face ongoing challenges and pushback prior to every execution. Because of resistance by drug manufacturers to provide the drugs typically used in lethal injections, states have resorted to experimenting with new drugs and drug combinations to carry out executions, resulting in numerous prolonged and painful executions. Some states also allow the use of alternative methods if lethal injection cannot be performed, resorting to previously abandoned methods of execution, such as electrocution or lethal gas.¹⁸ Of course, while some states may permit these alternate methods, they may not have necessarily performed an execution using that method. Lethal injection remains the primary method for most states, and alternative methods were permitted as a contingency if other methods were found unconstitutional, unavailable, or impractical.¹⁹ 8 states—Alabama, Arkansas, Florida, Kentucky, Mississippi, Oklahoma, South Carolina, and Tennessee—have authorized the use of the electric chair.⁷ 7 states—Alabama, Arizona, California, Mississippi, Missouri, Oklahoma, Wyoming—have authorized the use of gas chambers, namely death by nitrogen hypoxia. Delaware, New Hampshire, and Washington have hanged a total of 3 prisoners since 1976, though all 3 states struck down their death penalty statutes since. Mississippi, Oklahoma, Utah, and South Carolina permit the use of a firing squad, although Utah is the only state that has used this method, its most recent execution being in 2010.^{20, 21, 22}

SOCIAL ANALYSIS

In exploring a physician's role in executions, it is important to also examine the supply of the actual drugs utilized to complete the act and the social elements controlling such supply. For context, from 1982 to 2009, state prisons utilized a three-drug combination including sodium thiopental to carry out their executions. This method was involved in hundreds of executions throughout the U.S.²³ However, in 2011, Hospira Inc., the main manufacturer of sodium thiopental, halted production of this lethal drug after a rise in anti-capital punishment activism in the U.S. and a ban on execution drugs imposed by the European Union.²⁴ Because Hospira, a U.S. company, had been using its plant outside of Milan in Italy to produce and export sodium thiopental, these changes in 2011 left state prisons with an abrupt shortage in the typical concoction used to carry out executions.²⁵ In response, the Justice Department switched to

primarily using pentobarbital, a powerful barbiturate used for animal euthanasia and human seizure patients. But most US pharmaceutical companies began objecting to capital punishment altogether and halting production of this drug as well. A subsequent shortage in this drug, too, left states to rely on compounding pharmacies, which operate without need for FDA approval and mix individually tailored drugs for their drug production, for their execution drug supply, leading to concerns about safety and pain during execution.²⁶

Currently, four U.S. pharmaceutical companies have FDA approval to produce pentobarbital, but all four have adopted anti-capital punishment policies and none of them sell the drug to the Department of Justice. This has caused significant issues for the Department of Justice, as one of its compounding pharmacies had contamination problems in 2018. Various drug testing labs have tested pentobarbital samples from compounding pharmacies reportedly without knowing that execution was the drug's intended use. In fact, DynaLabs, one such lab based in St. Louis, had declared itself anti-capital punishment many years ago but was testing samples of pentobarbital as recently as 2019 due to unawareness of the drug's ultimate purpose.²⁷ This is plausible because of pentobarbital's other potential uses for animals and humans.

Pro-capital punishment entities have pushed for source anonymity for execution drugs, including the Trump administration and 13 states who have established such measures.²⁸ The Trump administration argued back in 2018 that without this anonymity, the supply of execution drugs would be extremely limited, as companies do not want to be linked to the supply of execution drugs. Anti-capital punishment groups argue that this secrecy is dangerous for prisoners in that condemned inmates and their families are unable to investigate for themselves whether or not the execution will be safe from cruel and unusual punishment.²⁹

An example of this secrecy practice can be found in Missouri's execution system. While the protocol performed for specific executions is public as are inspection results and drug receipts, a statute grants confidentiality to execution staff regarding the knowledge of drug suppliers.³⁰ Missouri has encountered significant issues with its previous supplies, as one, namely the Apothecary Shoppe, was found to have violated over 1500 guidelines issued by the FDA.³¹ It is currently not publicly known where Missouri is getting its execution drugs.³²

Overall, it appears that the pharmaceutical industry is putting

up an effective fight against capital punishment, as executions in the U.S. have significantly reduced since supplier-induced shortages arose.³³ However, another concern with these imposed shortages, like we've seen in other areas like the opioid crisis and the current Adderall shortage, is that preventing production of these drugs can negatively affect those who need the drug for other uses. While it does not appear that the shortage of pentobarbital is having any negative effects on human seizure patients at the moment, animal euthanasia has been affected by the shortage.³⁴ Though this is not necessarily a drastic consequence of the shortage as there are alternatives, it exemplifies the constant need to examine downstream effects of drug supply bottlenecks and their unintended consequences. And as states like Texas and Missouri continue to fight for doses and suppliers, with no export from Europe and compounding pharmacies rooted in controversy, lethal doses may soon run out.

PHARMACOLOGICAL ANALYSIS

Lethal injections are oftentimes considered the most humane way for a prisoner to be executed, as they are meant to be painless. However, as executions by lethal injections have shown in the past, not every prisoner executed experienced a painless death. Many factors contribute to this, which stems from the pharmacology of the drugs and how the body reacts. In the past, lethal injections were carried out in a series of three injections, each of a different drug class. Drug classes are used to describe a drug in terms of its mechanism of action, its physiological effects, and its chemical structure. The three classes used in executions generally consist of an anesthetic, a neuromuscular blocking agent (paralysis-inducing drug), and the executing agent. Executing agents can be a variety of drug classes; however, the way that most executing agents work is by causing the patient to undergo cardiac arrest.

Three-drug Protocol:

A common three-series drug in executions is sodium thiopental or pentobarbital as an anesthetic agent, pancuronium bromide as a paralyzing agent, and potassium chloride as the executing agent. All of these drugs are administered intravenously. IV admission allows the full drug dose to enter the patient's body and for a quicker onset. Sodium thiopental has a rapid onset of action and distribution to the body upon entering the bloodstream. Sodium thiopental is a lipophilic and nonpolar molecule, which allows it to cross the blood-brain barrier, causing an

anesthetic effect on the central nervous system. Patients can typically feel the anesthetic effect within 30-60 seconds; however, the effects of the anesthetic may only last up to 15 minutes. This can be a problem for some patients because patients who may have used central nervous system depressant drugs in the past can experience tolerance.³⁵ For example, benzodiazepines such as Valium and Xanax are popular CNS depressants that create a euphoric high. These drugs primarily enhance and create tolerance on gamma-aminobutyric acid (GABA) receptors which are the primary site of action for barbiturates like sodium thiopental. If a death row patient is not receiving the accurate dose of an anesthetic drug due to tolerance, the effects may not be as potent or long-lasting, resulting in the patient experiencing excruciating pain from the executing agent.

Sodium thiopental was the primary anesthetic used until some states began introducing pentobarbital as an anesthetic in 2010. Pentobarbital is also in the drug class of barbiturates and acts on the CNS via GABA receptors, however, pentobarbital is longer-acting than sodium thiopental.³⁶

Midazolam is a benzodiazepine that is commonly used by some states as a sedating agent. Seven states use midazolam as the primary analgesic drug; however, concerns were raised when execution procedures were met with violent adverse reactions.³⁷ Midazolam is typically prescribed as a second line of therapy when a patient is tolerant to barbiturates for anti-seizure therapy and also acts on GABA receptors. Similar to sodium thiopental, midazolam is a short-acting drug, and the analgesic effects can wear off in a patient who is tolerant or incorrectly dosed. In addition to a short half-life, midazolam has many potential adverse effects, such as vomiting, nausea, cough, and more. Some extreme reactions to midazolam include thrombosis and respiratory depression. Patients who have a history of lung related diseases such as chronic obstructive pulmonary disease are potential contraindications for administering midazolam. Midazolam is considered toxic at levels greater than 2.4mg/L and can also become toxic when used with agents such as opioids, alcohol, and other depressants.

Pancuronium bromide is used to induce paralysis in a patient's skeletal muscles. Drug administration intravenously allows for pancuronium bromide to be rapidly distributed throughout the body and have a quick onset. In contrast to the barbiturates mentioned previously, pancuronium bromide has poor lipophilicity, which prevents it from crossing the blood-brain barrier and causing paralysis

of the CNS.³⁸ Pancuronium bromide belongs to a class of drugs known as competitive acetylcholine antagonists, which block the nicotinic receptors of the postsynaptic membrane, thus preventing the depolarization signal that results in muscle contraction. The purpose of having a muscle paralysis agent is to prevent the patient from showing physical distress, which supports the process of a "peaceful" death. Pancuronium bromide is one of the nNMBs that has the fewest adverse reactions.

Potassium chloride contains potassium ions which is an essential electrolyte in proper cell function through different ion channels. Potassium chloride is typically used in low doses for patients that are experiencing hypokalemia. However, when used in executions, high doses of potassium chloride are fatal. High doses of potassium chloride cause ion channels of bodily cells, such as the heart, to not undergo depolarization, ultimately resulting in cardiac arrest and death.

One-drug Protocol: Pentobarbital

The one-drug protocol with pentobarbital has become popular in the United States, with eight states adopting the method and six states announcing plans to use the single-drug protocol. Using a one-drug protocol simplifies the execution process and has proven to be effective in executions. Pentobarbital, when administered in high doses, can be fatal. Pentobarbital induces rapid sedation and renders patients unconscious, which prevents a violent reaction. High levels of pentobarbital gradually suppress the autonomic nervous systems, such as the respiratory centers within the brain.³⁹ This causes the lungs to eventually stop functioning, and the heart to enter cardiac arrest due to a lack of oxygen, leading to death.

New Drug Regimen: Fentanyl Combination Drug

Nebraska is the first state to use a combination drug with fentanyl to execute a death row patient.⁴⁰ The combination consisted of a four-step protocol starting with diazepam as the sedating agent, followed by fentanyl, cisatracurium besylate, and lastly, potassium chloride. This four-step protocol is similar to the three-step protocol of a sedating, paralyzing, and executing agent, however, with the addition of fentanyl. Diazepam is a benzodiazepine that has a long duration of action which can induce CNS depression for more than 12 hours.⁴¹ Like pancuronium bromide, cisatracurium besylate is a competitive acetylcholine antagonist that induces paralysis. Although a comparison of

the potency of the two drugs has not yet been established, cisatracurium besylate has a shorter duration of action compared to pancuronium bromide. The mechanism of adding fentanyl may possibly be to maximize sedating effects to ensure that the lethal injection is painless. Fentanyl is a high potent opioid that causes sedation by binding primarily to mu-opioid receptors. Mu-opioid receptors are largely responsible for the transmission of pain signals. In addition to reduced transmissions of pain signals, fentanyl causes a surge of dopamine which further eliminates the pain factors associated with executions.⁴² A fentanyl combination lethal injection has only been used once in execution and was deemed by witnesses to have “no complications.”

ETHICAL ANALYSIS

The ethical controversy surrounding the debate about the participation of physicians in executions has taken on a sense of urgency because authorities both in the penal system and in state legislatures are increasingly incorporating physician’s evaluative skills and therapeutic techniques to not only prepare prisoners for execution but to help legitimate the act of killing. Penal authorities are asking physicians to use their evaluative skills in three ways: clinical assessment of condemned inmates’ mental competence for execution, physician examination in preparation for the execution, and clinical monitoring of critical skills during the execution. The ethical debate centers on whether the presence of the physician at executions is to ensure a more humane execution that is reducing pain and suffering, or is it to maximize efficiency. These authors will argue that under the ethical principles of respect for persons, beneficence, nonmaleficence and justice, the participation of physicians at executions is unethical and should be stopped immediately. Failure to do so should entail the revoking of their medical license.

“*Respect for persons*” refers to the right of a person to exercise self-determination and to be treated with dignity and respect. Proponents of physician participation in executions argue that the physician’s obligation to his/her patient is never to abandon a patient. For a physician to abandon his or her patient at their most vulnerable hour—as the person faces death—would be a direct violation of the principle of respect for persons. The preservation of life is a basic maxim of the medical profession but it is neither always the paramount ethical value nor always in the best interest of the patient.⁴³ “To be sure, medicine has for centuries realized that one of its important functions is to comfort and relieve, when unable to cure.”⁴⁴

The preservation of life can yield to other objectives such as relief of pain and suffering. This is the logic behind the ethical acceptance of withholding or withdrawing life sustaining treatment for those in a terminal condition or to relieve pain and suffering. Performing this action may hasten and even cause death but this is an unintended consequence. This action has always been morally justified by the principle of double effect. The principle refers to one action with two effects. One effect is intended and morally good; the other is unintended and morally evil. It is not an inflexible rule or mathematical formula, but rather an efficient guide to prudent moral judgment in solving difficult ethical dilemmas.⁴⁵ In some instances, allowing for the hastening of death in a way that relieves pain and suffering is the only compassionate action. “What is important is not that physicians stave off death, but that they tailor their actions, as much as possible, to the interests of their patients and the realities and necessities of the circumstances. The practice of medicine is a therapeutic and compassionate enterprise, dedicated to furthering human dignity and wellbeing beyond the myopic goal of simply preserving life.”⁴⁶ In this situation the patient is going to die and all hope of legal appeals has been exhausted. Therefore, the physician should help make the patient’s death as free of pain and suffering as possible to protect the dignity and respect of the patient. The AMA’s Council for Ethical and Judicial Affairs negates this argument in two ways:

First, although death may ensue from the physician’s actions, the individual patient is voluntarily choosing to risk death upon withdrawal or withholding of care. With capital punishment, the physician is causing death against the will of the individual. Second, when life-sustaining treatment is discontinued, the patient’s death is caused primarily by the underlying disease; with capital punishment, the lethal injection causes the prisoner’s death.⁴⁷

Participation in an action that deliberately causes the death of the patient violates the basic dignity and respect of the person.

Further, opponents of physician participation argue that the physician-patient relationship is the primary focus of ethics in medicine. Trust is the bridge to the physician-patient relationship, and the burden is on the physician not only to expect the patient’s trust but also to build a solid foundation

upon which the patient can place his or her trust.⁴⁸ If this relationship becomes fractured, a loss of confidence will result, and the effect on the patient could be devastating. For prisoners to see their primary care physician also in the role of assisting in the execution undermines the credibility of the medical profession and is irreconcilable with the physician's role as healer. There also seems to be a conflict of interest present between preserving the primary fiduciary relationship between physician and patient and the responsibility of an employee to an institution with different interests or when remuneration does not fit with activities that benefit the patient. Physicians employed or paid by the prison system may have a compromised relationship to the prisoner-patient if the prison acts against the prisoner's health. When a prison physician participates in, trains technicians or nurses to perform, or provides lethal substances for executions, the conflict is profound.⁴⁹ It is true that the preservation of life is not always a moral absolute, especially in instances when the patient is terminally ill.

However, in many of these execution situations, prisoners know that if the physician is not present the execution cannot happen legally. There is a definite conflict between the physician's duty to his/her patient and the physician's duty to his/her employer. Participation in the execution of your patient not only violates the fiduciary relationship between physician and patient but shows a clear conflict between a physician who serves the interests of the state and not those of his/her patient. Serving the state by direct participation in an execution also undermines the credibility of medicine as a therapeutic endeavor.⁵⁰ The World Medical Association's International Code of Medical Ethics states "physicians are clearly out of place in the execution chamber, and their participation subverts the core of their professional ethics, which require them to maintain the utmost respect for human life from its beginning even under threat and to provide competent medical service in full technical and moral independence, with compassion and respect for human dignity."⁵¹ Physician participation in an execution violates the principle of respect for persons by denying individuals, who at this stage are the most vulnerable, of their basic dignity and respect.

"Beneficence" is the obligation to prevent and remove harms and to promote the good of the person by minimizing the risks incurred to the patient and maximizing the benefits to them and others. Beneficence includes nonmaleficence, which prohibits the infliction of harm, injury, or death upon others. Proponents of physician participation in executions

argue that it is in the prisoner's best interest that physicians are involved with starting intravenous lines, setting up intravenous infusion sites, and measuring out and administering the appropriate drugs so that the execution proceeds as painlessly as possible.⁵² Participation by physicians is done for compassionate and caring reasons, not to intentionally harm the patient. If the role of the physician is to prevent and remove harms and to promote the good, then considering the circumstances, that the patient has been legally condemned to death and there are no viable options, then it is the duty of the physician not to abandon his/her patient and to ensure the person's comfort by minimizing the pain and suffering. To promote the good of the patient and remove harms, the caring physician can:

"prescribe and prepare a lethal pharmacological regimen compatible with the condemned's unique medical condition, and assure that the drugs are given in the correct order, thereby minimizing the chance that the condemned will regain consciousness during the lethal injection and suffer the unimaginable horror of conscious asphyxiation. The physician can locate appropriate veins and insert catheters so that the condemned will not suffer pain and humiliation of multiple needle punctures by inept technicians. The physician can monitor vital signs during the injection to guarantee that death, and not some irreversible condition of brain damage, is achieved."⁵³

Proponents argue that this is the ethical duty of every physician—to maximize comfort and minimize pain and suffering. Few question physicians who do this when the patient is terminal and there is no hope for survival. How is this situation any different? There are no legal appeals left and death is imminent.

Opponents argue that physician participation in executions violates the basic Hippocratic dictum, "first do no harm." Many argue that the physician's role is not in reality to reduce harm but to legitimize the practice. The reason lethal injection was proposed was to overcome the growing concern that the other methods of execution—electrocution, hanging, firing squad, gas chamber, etc. violated the Eighth Amendment to the Constitution concerning cruel and unusual punishment. Having a physician participate in the lethal injection makes the execution have the appearance of

a “medicalized” procedure and may even add some degree of humanness to the execution, but it does not outweigh the greater harm of causing death to the individual. A death that while on the surface may seem painless but in reality, may be just the opposite. The three drug “cocktail” of lethal injection initially used appears to bring about a peaceful, painless death, but this may be only an illusion. Initiated in 1977 by state medical examiner of Oklahoma, Dr. Jay Chapman,⁵⁴ the three-drug regimen consists of sodium thiopental, followed by pancuronium bromide followed by a final infusion of potassium chloride. Beginning in the 1980s this regimen was intended as a more humane form of execution however in 1985 inmates on death row filed a claim, which was the start of several claims throughout the years, stating the courts were obligated to review the three-drug protocol efficacy in human execution.⁵⁵

The first drug that is given is sodium thiopental which renders the prisoner unconscious. Sodium thiopental is currently registered under the name Pentothal® and is a short acting barbiturate used as an anesthetic to place surgical patients in an unconscious state. It was introduced as an anesthetic in 1932 and depressant effects to the cardiovascular system were discovered in 1941 when it was used for patients subsequent to the Pearl Harbor bombing. However, during this time unexpected deaths occurred with its use forcing scientists to look for an alternative.^{56,57} Sodium thiopental is currently available in 500 mg and 1 g vials for reconstitution to be diluted and administered as an intravenous solution based upon weight. Current clinical doses range from 3-5 mg/kg of body weight followed by a maintenance dose of 1-1.5 mg/kg per minute. For lethal injection, large quantities of sodium thiopental are used. In the state of Kentucky lethal injection of sodium thiopental is dosed at 3 g, increased from 2 g in 2004, with unconscious results expected within 1 minute. This is equivalent to approximately 7 times the initial clinical dose for a 6ft/180lb male. If loss of consciousness has not been achieved, a second dose of sodium thiopental is administered via a separate intravenous line. The 2 g dose has been criticized in regards to efficacy, arguing technical difficulties and errors in procedure can promote ineffective administration of the full dose of sodium thiopental. Reports argue 2 g sodium thiopental as a suboptimal dose for lethal injection and its use in inmates with a history of chronic substance abuse requires altered dosing. Autopsy reports show varied concentration of sodium thiopental in the blood ranging from trace amounts to 370 mg/L lending to the assumption some inmates would have been conscious when the

pancuronium bromide and potassium chloride were infused.⁵⁸ Sodium thiopental potency degrades over 7 days if reconstituted and not used immediately. Lack of supplies, in the prison system, may promote storing a reconstituted vial without knowledge of the degradation effects. In 2005, imports of the drug were restricted with import occurring to the US only upon licensure by the Export Control Organization stating purpose of use and delivery destination. Alternatives on the market were considered due to decreased supply with sodium thiopental being replaced in many states by Propofol.

The second drug is pancuronium bromide, which is used to relax the muscles to prevent involuntary movement and makes the execution look esthetically pleasing to those who view it. Pancuronium bromide is registered as Pavulon® and was first created in 1964 and developed by Dr. David Savage, medicinal chemist Scotland Oregon. An aminosteroid compound and non-depolarizing agent, it is a highly potent muscle relaxant based upon its bulky steroid nucleus.^{59,60} Pancuronium bromide is a neuromuscular blocking agent (NMBA) with inhibitory effects on cholinesterase.⁶¹ Used for its neuromuscular blocking properties, pancuronium bromide stimulates muscle relaxation and induces paralysis with long term potency based upon such factors as age, concomitant drug interactions, body temperature, dehydration, electrolyte imbalance and renal/liver impairment. Additional effects include decreased visual muscle movement and decreased respiration.⁶² Current clinical dosage ranges from an initial dose of 0.04 to 0.1 mg/kg based upon body weight followed by a maintenance dose of 0.01 mg/kg with incremental increases. Dosed in high quantities, pancuronium bromide can create significant tachycardia and hypertension. From a historical multi-state perspective, pancuronium bromide was introduced into Oklahoma’s three drug lethal execution regimen in 1977. In the state of Kentucky, lethal injection of pancuronium bromide was disclosed to be 50 mg, which would be equivalent to approximately 6 times the initial clinical dose for a 6ft/180 lb male. Fifteen years ago, the state of Tennessee was required to defend the use of sodium thiopental administration prior to pancuronium bromide. The claim stated if sodium thiopental was ineffective after infusion, and pancuronium bromide was administered, the prisoner would be paralyzed but not unconscious. This would result in suffocation followed by significant pain with the administration of potassium chloride. The prisoner claimed they could be awake but unable to speak but knowingly feel the effects of painful cardiac arrest upon

infusion of the third drug potassium chloride. The courts upheld that the current dose of sodium thiopental used in the state of Tennessee, was adequate to induce complete unconsciousness.⁶³ Pancuronium bromide is used in several states for animal euthanasia, however was banned in Tennessee for this use.⁶⁴

The third drug is potassium chloride, a cardiac depolarizing agent, which causes the death of the prisoner. Potassium chloride maintains heart rhythm and if raised to high levels, can cause suppression of the heart's normal activity. Even mild increase in potassium levels can be visual on an electrocardiogram (ECG) and if significant can result in ventricular fibrillation and cardiac arrest.⁶⁵ In the clinical setting potassium chloride is used to treat hypokalemia and its dosing is based upon the clinical presentation, age and weight of the patient. In the clinical setting potassium chloride is mixed as an intravenous solution since direct administration may include cardiac arrest.⁶⁶ Seen in suicide attempts, causing chemical burns where injected, local necrosis of the tissues can result due to extravascular leaking.⁶⁷ Clinically, the daily dose of potassium chloride should not exceed 200 mEq, in the state of Kentucky, it was disclosed that the lethal injection of potassium chloride was 240 mEq. Potassium chloride is the final infusion for lethal injection and is accountable for cardiac ceasing.

Due to the restricted access to drugs on the three-drug regimen list, states have sought out alternatives to include: Phenobarbital sodium (replacement for sodium thiopental), midazolam (anxiolytic), tubocurarine (replacement for pancuronium bromide) and propofol (replacement for sodium thiopental). Phenobarbital sodium (long-acting barbiturate) and pentobarbital sodium (short-acting barbiturate) are considered for lethal injection in replacement for sodium thiopental. Currently used in clinical practice as sedative-hypnotics if used in large quantities can cause depression of the central nervous system and respiratory failure.⁶⁸ Midazolam hydrochloride (Versed®), a benzodiazepine, frequently given prior to surgery causing muscle relaxation and sedation, has been considered in Florida for single drug execution. Tubocurarine, considered as a replacement for pancuronium bromide, is a purified alkaloid of curare used by South American Indians to coat their hunting arrows causing paralysis for those animals struck. Tubocurarine is a competitive antagonist blocking the effects of acetylcholine from activating receptors and is currently the "gold standard" in tracheal intubation with the use of a depolarizing muscle relaxant.^{69,70,71} However,

tubocurarine can in some cases provide unpredictable muscle response person to person and is affected by multiple drug interactions including Propofol.⁷² Propofol (Diprivan®) is used in the clinical setting as a short-acting anesthetic and considered a replacement for sodium thiopental for lethal injection. Propofol was introduced in 1977 and was considered by Missouri in the lethal injection regimen (October 2013) based upon its ability to cause "propofol infusion syndrome" causing significant metabolic acidosis, cardiac suppression, and failure of multiple organ systems.⁷³ Koniaris et al. obtained information from Virginia and Texas, where since 1976 nearly half the executions in the United States have been done. Neither state had a record of how they developed the execution protocol. In addition, the injection teams were made up of technicians or individuals from medical corps with no training in administering anesthesia, and that there was no assessment of the depth of anesthesia before the paralyzing agent and potassium chloride were injected. Toxicological reports from four other states (Arizona, Georgia, North Carolina, and South Carolina) indicate that the post-mortem thiopental concentrations in the blood of 43 of 49 executed prisoners (88%) were lower than those needed for surgical anesthesia, and 21 prisoners (43%) had drug levels consistent with awareness. That means it is possible that some of these prisoners were fully aware during their executions. Because they were paralyzed, any suffering would be undetectable. This would be a very cruel way to die: awake, paralyzed, unable to move, to breathe, while potassium chloride burned through your veins.⁷⁴ In fact, the authors point out that the American Veterinary Medical Association (AVMA) and 19 states, including Texas, prohibit the use of neuromuscular blocking agents to kill animals, because of the risk of unrecognized consciousness.⁷⁵ It appears that the current practice of lethal injection for prisoners in the United States fails to meet veterinary standards.⁷⁶ This clearly violates the principle of nonmaleficence.

Cases of "botched" executions bring this violation of the principle of nonmaleficence to light for the public and should do the same for the participating physician. In January 2014, Dennis McGuire was scheduled for execution in Ohio by lethal injection that included midazolam and hydromorphone. After the drugs were administered, reports indicate that Mr. McGuire gasped for air over the course of 25 minutes as the drugs took a prolonged time to take effect. Mr. McGuire's family brought a lawsuit against the state over the manner in which Mr. McGuire was executed.⁷⁷ Joseph Wood was executed in Arizona by lethal injection in

July 2014 where a reporter present for the proceedings “counted 640 gasps” during the one hour and forty minute period that it took for Mr. Wood to die.⁷⁸ Lastly, in April 2014, Clayton Lockett was executed by lethal injection in Oklahoma amidst numerous attempts to stall the proceedings due to objections to the use of an experimental injection drug protocol. Prior to the execution, the state would not release details concerning the drugs to be used, their source and the efficacy of the drugs. The state pushed forward with the execution. After hours of working to find venous access, a sedative was administered, but did not work as anticipated despite the declaration by the participating physician that the patient was unconscious. The next two drugs were injected, but Mr. Lockett was not unconscious and, therefore, clenched his teeth while straining to breathe and lift his head off the table. After 43 minutes, Mr. Lockett died of a heart attack, but not before the blinds were closed and the witnesses asked to leave the observation room.⁷⁹ The events surrounding Mr. Lockett’s execution precipitated a challenge by three current death row inmates in Oklahoma that now sits before the Supreme Court. The justices are expected to rule in June 2015 on whether the use of midazolam in the lethal injection method of execution is a violation of the prohibition on cruel and unusual punishment in the Eighth Amendment to the Constitution.⁸⁰

Traditionally, the three drug “cocktail” used for lethal injections included sodium thiopental, pancuronium, and potassium chloride. Recent drug shortages, however, have forced states to experiment with other combinations of drugs as the availability dictates. The use of midazolam in Clayton Lockett’s execution in Oklahoma of this past year is an example of this. Another example is the adoption of a one-drug, pentobarbital, protocol by Texas in 2012 when the state ran into a problem securing the necessary amount of drugs for executions with the three-drug combination it had used since the 1980s.⁸¹ Many of the drug shortages that are causing states to revisit execution methods in recent years are a result of foreign and domestic pharmaceutical manufacturing companies refusing to ship products to the different states knowing full well the reason for their purchase. On March 24, 2015, the International Academy of Compounding Pharmacists released a statement discouraging its members from participating in the manufacturing and distribution of drugs for use in state executions, a portion of which is below:

IACP discourages its members from participating in the preparation, dispensing, or

distribution of compounded medications for use in legally authorized executions. The issue of compounded preparations being used in the execution of prisoners sentenced to capital punishment continues to be a topic of significant interest. It is important to first understand the origin of this issue: states are turning to compounded preparations for this purpose because the companies that manufacture the products traditionally used have unilaterally decided to stop selling them for use in executions.⁸²

With both foreign and domestic drug manufacturers, as well as compounding manufacturers, actively working to prevent their products from being used in state executions, the states are scrambling to find lethal injection agents to substitute. This activity not only calls into question the constitutionality of these methods, but places an even greater burden on the participating physicians to recall the principles of beneficence and nonmaleficence inherent in the Hippocratic Oath and the physician-patient relationship.

Communitarians view the notion of harm not necessarily related to the participation of the physician in the execution, but instead in the context of the act. In the communitarian viewpoint, medicine defines a moral sphere within which medical activities have special meaning. The execution of a prisoner lies far outside the medical sphere. A physician’s participation in the execution does nothing to promote the moral community of medicine. Instead, it offends the sense of community by prostituting medical knowledge and skills to serve the purpose of the state and its criminal justice system. Participation by a physician subverts the profession for the nonbeneficial goals of the state. Medicine is at heart a profession of care, compassion, and healing. Physician assisted capital punishment fails to encompass these virtues.⁸³ Participation in the taking of the life of a healthy person at the command of the state not only fails the test of beneficence but also fails the test of nonmaleficence.

Finally, the principle of “justice” recognizes that each person should be treated fairly and equitably, and be given his or her due. The principle of justice can be applied to physician participation in two ways. First, Farber et al. found that the most common rationale for physicians’ willingness to participate in execution was their sense of citizen obligation.⁸⁴ When physicians decline to participate in executions they believe they are breaching their obligations

as both physicians and citizens. The argument is that physicians have a moral duty to ensure that the execution is carried out in the most humane and painless way possible. Physician participation would not signal approval of the taking of life, but compassion for the person to be executed. Further, the physician's duty as a citizen requires him or her to participate because the executions take place with the authorization of the state.⁸⁵ Opponents of physician participation argue that the procedures used in lethal injection executions do not necessarily require the skills of a physician. These procedures can be performed by non-medical personnel with no more pain or discomfort for the prisoner. It may be true that physician participation adds some degree of humanness to the execution, but this does not outweigh the greater harm of causing death to the prisoner. Finally, while physicians do have certain civic duties, medical ethics do not require physicians to carry out civic duties which contradict fundamental medical and ethical principles, such as the duty to avoid doing harm. Further, state approval or authorization of an act does not constitute a requirement on the part of any citizen to act.⁸⁶

To argue that physicians have a duty as citizens to participate in executions is an exaggerated sense of civic duty, the type that has been attributed to physicians in Nazi Germany who performed medicalized killings. Dr. Joel Geiderman, in an article published in the March 2000 issue of *Academic Emergency Medicine*, examines the moral temper of the medical establishment in Nazi Germany and analyzes it in relation to current issues in medicine. Geiderman highlights several present-day practices, such as physician participation in executions, and suggests that the medical profession is still not entirely independent of the state's coercion. His hope is that in promoting awareness and discussion of these practices he can stop the medical profession from proceeding down the slippery slope to unacceptable behaviors that are clearly unjust.⁸⁷

Second, in the study done by Farber et al., 46% of physicians who responded believed that the death penalty significantly lowers or somewhat lowers the murder rate.⁸⁸ According to most criminologists, there is no conclusive evidence that capital punishment brings about either deterrence or brutalization (i.e., that the death penalty somewhat raises or significantly raises the murder rate).⁸⁹ According to Dr. Jeffrey Fagan of Columbia Law School, the new studies that claim the death penalty is a form of deterrence are "fraught with technical and conceptual errors: inappropriate methods of statistical analysis, failures to consider all the relevant

factors that drive murder rates, missing data on key variables in key states, the tyranny of a few outlier states and years, and the absence of any direct test of deterrence."⁹⁰ One has to wonder if physicians understood that capital punishment is not a more effective deterrent to murder than long-term imprisonment and does not protect public health by decreasing societal violence, would they have less of an appetite for participating in executions or otherwise supporting capital punishment?⁹¹ However, Wirt et al. also raise the possibility that physicians' expressed belief in deterrence is a surrogate or rationalization for other motives (for example, vengeance or the desire to make a moral statement regarding the sanctity of life). In this case, physicians' willingness to participate in capital punishment might be little affected by knowledge of the lack of deterrent effect as compared with long-term imprisonment.⁹² As a matter of justice there is also the issue of errors in the administration of capital punishment in the United States. Since 1973, 192 prisoners have been exonerated and released from death row.⁹³ Despite the safeguards in the current system, the threat of executing innocent individuals who are legally or actually innocent is real. A lack of information or misunderstanding by physicians regarding how race bias, class bias, and errors impact on capital convictions may provide a reason why a majority of physicians view their participation in executions as ethically acceptable and morally just.⁹⁴ The failure of physicians to recognize that civic duty can never trump medical ethical principles and that there is a viable option to capital punishment, which would protect against errors, is clearly an injustice. If the principle of justice mandates that each person should be treated fairly and equitably then physician participation in executions clearly violates the principle of justice since it is not a proven deterrent, allows for errors and is clearly an exaggerated sense of civic duty.

RECOMMENDATIONS

Given the growing concerns surrounding violation of "cruel and unusual punishment" associated with current methods of execution, it is crucial to explore more humane alternatives. One promising alternative that has emerged is the "Sarco Pod," a 3D-printed human-sized chamber designed to fill with nitrogen gas, rendering the patient unconscious after one minute and causing a supposedly "peaceful, even euphoric death" within ten minutes.^{95,96} The capsules were created by Philip Nitschke and launched in Switzerland in 2021 for use in the country's legal assisted suicide clinics.³ Nitschke, now campaigning for legislative support for the

Sarco in Scotland, has made it his mission to “demedicalize death.”^{97,98} Nitschke aims to make assisted suicide as unassisted as possible; because Sarco uses nitrogen, a readily available gas, instead of the barbiturates commonly used in euthanasia clinics and executions, it eliminates the need for a physician to administer injections or approve the use of lethal drugs.⁹⁹

In the context of capital punishment, we would like to offer consideration of the Sarco Pod as an ethical alternative. If executions must continue, we believe this capsule can be repurposed from a euthanasia device (which is still illegal in much of the USA) to a viable option for performing executions. If proven to be efficacious, use of the pod would greatly reduce the chances of a botched execution while also removing physicians from the process. Of course, the Sarco Pod is still in its nascent stages, and more testing and research must be conducted before considering the implementation of the pod for executions. Studies should focus on determining the safety, effectiveness, and potential complications associated with this method. Additionally, research should evaluate the physiological and psychological impact on the individual subjected to the Sarco Pod, ensuring it adheres to the principles of humane treatment. Furthermore, transparency and accountability must be maintained throughout its development, and its implementation should undergo rigorous ethical review. With these recommendations, we can ensure that the adoption of the Sarco Pod as an alternative method of execution is grounded in human rights and in physicians’ commitment to the Hippocratic Oath.

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