

TEACHERS' TOPICS

Lethal Injection as a Component of a Therapeutics Toxicology Module

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Objective. To create and implement a required module that addresses both the clinical and ethical issues surrounding the use of lethal injection as a means of capital punishment.

Design. As a component of a pharmacotherapeutics module in toxicology, pharmacy students were introduced to ethical and clinical considerations and controversies with the use of drugs as a means of capital punishment. Basic information was provided on the history of capital punishment and the origins of lethal injection. Pharmacotherapeutic limitations and challenges were presented in the context of clinical and ethical dilemmas.

Assessment. Instructed material was assessed using block course examinations that had both objective and subjective components. Students were asked to synthesize information by both purposing a lethal injection reversal protocol and by acting as consultants in the fictional design of more effective lethal injection protocols. Students provided formative and summative evaluations of the instruction through regular student liaison meetings and summative course evaluations.

Conclusion. Lethal injection as a means of capital punishment in the United States is a controversial and ethically challenging topic on which pharmacists may be consulted and therefore should be knowledgeable about. Students positively evaluated this lethal injection module, which covered multiple clinical and ethical issues.

INTRODUCTION

Legal and ethical debates surrounding lethal injection involve perceptions that some critical deficiencies in protocols may produce significant pain and suffering; therefore, the process may fail to meet constitutional scrutiny in terms of the eighth amendment.¹ Capital punishment consistently has been an ideological and political debate in the United States, but with the advent of methods involving the administration of drugs, this issue increasingly has raised pertinent clinical issues.¹⁻³ Some have proposed that through the administration of drugs and use of other clinically related paraphernalia (eg, needles, syringes, gurneys), justice officials effectively have “medicalized” capital punishment.³⁻⁵

With regard to lethal injection, several professional issues exist specifically for pharmacists and health care professionals in general. Pharmacists will be expected to have an understanding of the clinical issues surrounding lethal injection because the process involves the administration of medications. As has been documented in at

least 1 case, municipalities may direct pharmacists by protocol to prepare and dispense doses of drugs intended to be used for lethal injection.⁶ Additionally, as legal experts continue to debate the constitutionality of lethal injection, some have proposed alterations to the current drugs and/or dosing schemes used in protocols.⁷ As pharmacotherapy experts, pharmacists may find themselves being consulted regarding alternative agents and/or other aspects of dosing or lethal injection protocol development and/or refinement. This has occurred in 1 state.⁸ Any involvement in processes that intentionally result in death raises ethical issues for health care professionals, even in the case where such situations are sanctioned by the state.

The use of lethal injection as a means of capital punishment in the United States is a relatively new concept that was first proposed in the 1800s and initially used in 1982 by the state of Texas.¹ Original protocols involved the intravenous administration of an ultra-short-acting barbiturate along with a paralytic agent. Historically, aspects surrounding lethal injection have been maintained in strict secrecy to protect those involved in administering these judicial orders. Legal challenges to lethal injection and associated processes have forced revelations regarding the drugs used in many of these procedures, as well as the specific courses of actions used to prepare and administer them.⁷ This also has made education of health care

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professionals in this area more relevant. The Accreditation Council for Pharmacy Education (ACPE) does not specifically address instruction regarding drug use for the purposes of lethal injection, but within Standards 2007 does address the scientific basis of doctor of pharmacy (PharmD) curricula within the area of toxicology.⁹ Under the toxicology umbrella, Standards 2007 describes curricular instruction related to the mechanisms of drug toxicity and toxicokinetics; the acute and chronic toxic effects of drugs, including overdose; and antidotes and approaches to toxic exposures. Pharmacy-based instruction of aspects and issues surrounding lethal injection might best be taught within the context of toxicology modules, which may or may not be a component of a broader therapeutics course. Here we describe the incorporation of instruction regarding both the clinical and ethical issues surrounding lethal injection within a toxicology module that is embedded in a required second-year therapeutics course.

DESIGN

Within our curriculum, a 5-credit-hour Introduction to Therapeutics course is instructed during the spring semester of the second year. Students enrolled in the course have completed most of their pharmacology modules with the exception of cardiovascular pharmacology, which is undertaken in the third year. The course itself is comprised of several modules including: women's health, pain management, nutrition support, and toxicology. Beginning in 2002, instruction regarding aspects of lethal injection was incorporated into the toxicology module. Instruction related to lethal injection comprised about 20% of the entire toxicology module, which was 6 hours in length.

The decision to incorporate this material came after consideration of several factors. While not specifically referenced within Appendix B of the ACPE accreditation standards, topics associated with lethal injection are consistent with content areas related to toxicology and ethics.⁹ A course on the issues surrounding lethal injection potentially would fill a niche, with the curriculum having both clinical content and societal/ethical considerations that encompass several domains. The topic also was seen as especially relevant within the Commonwealth of Kentucky as the state was engaged in judicial deliberations regarding the constitutionality of lethal injection as carried out by local prison systems.⁷

The toxicology module was designed to provide an introduction and review of basic toxicologic principles (Table 1), followed by a review of commonly encountered *toxidromes* and toxic ingestions (Table 2). Aspects of lethal injection were introduced following the presentation of basic principles and before the general discussion of *toxidromes*. Students first were provided with an

overview of the history of capital punishment in the United States, from the initial method of hanging to the eventual proposal of lethal injection as a preferred method of sanctioned execution. Typical lethal injection protocols were reviewed, including the specific doses and toxicology associated with each agent, as well as the overall rationale in specific drug and dose selection. These discussions also included a review of the processes (as best known) used by justice officials to deliver these lethal agents, including drug acquisition and preparation, methods for gaining intravenous access, and specific backgrounds/qualifications of the personnel administering the drugs. Students also were instructed regarding the potential antidotes and decontamination procedures that would be involved in the event that a lethal injection protocol was prematurely or inadvertently terminated. Specific student-based learning outcomes for instruction in this area are summarized in Table 3.

Following a presentation of the historical and clinical aspects of lethal injection, students were challenged to consider the various pros and cons associated with lethal injection as a method of capital punishment. Students were expected to be able to critically evaluate and support or defend the use of lethal injection as the primary method of capital punishment in the United States. Also, students were expected to discuss the various legal and ethical ramifications of lethal injection, particularly from the perspective of future health care practitioners. Various questions were posed including "Should health care providers ever be involved in any aspect of lethal injection from medication preparation to medication administration?" and "Is it ever appropriate for a health care provider to be involved in consultative work involving the design or streamlining of lethal injection protocols?" Students were expected to defend their positions in this regard. Lastly, students were exposed to position statements regarding lethal injection as approved by various professional associations both internal and external to pharmacy. The aforementioned research was exempted by the university's institutional review board.

Table 1. Basic Toxicologic Principles Taught Within an Introduction to Therapeutics Course

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- Epidemiology of poisonings in the United States (children and adolescents, adults, elderly)
 - Potential routes of toxic exposures
 - Basic approaches to the poisoned patient
 - Basic toxicologic laboratory assessments
 - Initial and basic toxicologic management principles
 - Decontamination strategies (ipecac, charcoal, gastric lavage, cathartics, hemofiltration)
 - Antidotes
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Table 2. Examples of Toxidromes and Toxic Ingestions Covered in the Toxicology Module of an Introduction to Therapeutics Course

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- Cocaine
 - Carbon Monoxide
 - Tricyclic antidepressants
 - Opioids
 - Beta-blockers
 - Hydrocarbons
 - Organophosphates
 - Barbituates
 - Benzodiazepines
 - Alcohols (ethanol, methanol, isopropyl, ethylene glycol)
 - Acetaminophen
 - Non-steroidal Anti-inflammatory Drugs
 - Cyanide
 - Amphetamines
 - Digoxin
 - Calcium Channel Blockers
 - Iron
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EVALUATION AND ASSESSMENT

The toxicology module was assessed as one component of the larger therapeutics course primarily through broader examinations covering several other temporal content areas. Specific assessment methods used within examinations have varied based upon specific parameters associated with the umbrella course. During different semesters, subjective and/or objective examination items have been used. Subjective items focused on students demonstrating achievement of module-related learning objectives (Table 3), including knowledge of the toxic potential and ultimate cellular-level consequences of the drugs administered, an understanding of the rationale for drug selection and sequencing in specific protocols, and knowledge of the procedures involved in carrying out lethal injection. In some cases, students have been asked to propose lethal injection protocols that might better meet constitutional scrutiny, and to provide a rationale for their choices.

The toxicology module (including instruction on lethal injection) was evaluated regularly in a summative

fashion through the college's course evaluation process and as a component of global end-of-year surveys. Evaluation also was provided formatively through the college's student liaison process. This process involved a committee of representative students from each year that provided real-time feedback, opinions, and assessments with regard to the progress of the curriculum, coursework, and teaching. These liaison sessions occurred twice per academic semester and were guided by a member of the college's office of education.

Evaluations were positive for the lethal injection component of the course with no documented student objections or concerns. In summative course evaluations, the umbrella therapeutics course received a mean overall student value rating (scale: 1 = poor; 2 = fair; 3 = good; 4 = excellent) of 3.3 ± 0.6 in 2008 (99% response rate), 3.4 ± 0.7 in 2009 (99% response rate), and 3.5 ± 0.6 in (98% response rate). Most students agreed that course and learning objectives were met (responses 3.3 ± 0.5 in 2008, 3.1 ± 0.7 in 2009, and 3.2 ± 0.5 in 2010). Subjective student comments submitted over this same time period (2008-2010) reflected positively on the contributions of the toxicology module and associated discussions regarding lethal injection. No negative comments regarding any aspect of instruction surrounding lethal injection have been recorded in either student liaison sessions or during the conduct of summative evaluations since inception of the course content in 2008.

DISCUSSION

Most colleges and schools of pharmacy instruct toxicology either as a free-standing course or as a component of a larger integrated therapeutics sequence in order to comply with current accreditation standards.⁹⁻¹¹ Many colleges and schools may not have considered the incorporation of instruction regarding lethal injection into these courses or modules. Instruction surrounding lethal injection might serve multiple purposes and possess high instructional value in terms of demonstrating and interrelating multiple concepts. These concepts are not limited to the

Table 3. Learning Outcomes for the Lethal Injection Portion of a Toxicology Module Taught as Part of an Introduction to Therapeutics Course

Upon completion of this module students should be able to:

- Describe the history of capital punishment in the United States beginning with hanging and leading up to modern day use of lethal injection.
 - List typical drug components employed in lethal injection protocols and the associated rationale the use of these specific agents.
 - Discuss the pros and cons of lethal injection as a means of capital punishment including ethical implications for health care professionals.
 - Explain position statements of major healthcare professional associations (eg, American Pharmacists Association, American Medical Association, American Nurses Association) as they relate to member participation in lethal injection processes.
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clinical aspects of these agents, but also are pertinent to historical, legal, ethical, and moral discussions.

With regard to the clinical aspects of lethal injection, instruction can include information related to pharmacology, toxicology, dosing, and pharmacokinetics. These discussions can be based on the perceived limitations and/or criticisms of existing protocols. Opponents of lethal injection often cite several limitations to this method of capital punishment. The use of non-weight-based dosing of particular drug components is one common criticism, as is the inability to account for slight pharmacokinetic differences among prisoners that might result in variable drug concentrations and effects.¹² Other critics have described a perceived lack of skill in the administration of lethal injection agents by ill-trained and incapable prison guards or other nonmedical officials.¹³ The improper administration of various components of a lethal injection protocol might result in the inadvertent administration of intravenous agents by the subcutaneous route due to improper venous insertion. Such errors have been reported in the literature and can result in significant underdosing of drugs and subsequently botched and/or excruciatingly painful deaths for the condemned.¹³

Legal/ethical discussions surrounding lethal injection can include the notion of the plausibility of “medicalized” capital punishment. Topics that garner passionate student opinions and debate include the ethics of health care professionals participating as members of teams charged with operationalizing elements of lethal injection protocols. In these ethical discussions, students are asked to consider both the pros and cons of medical involvement within lethal injection processes. These include the negative implications of public perceptions that caregivers are using their knowledge to hasten and induce death. Conversely, students are asked to reflect on the potential consequences of lethal injection protocols that are developed and executed without any medical input. Such protocols might be less likely to meet constitutional scrutiny in terms of “cruel and unusual” punishment and might cause unnecessary harm to prisoners whose lives are destined to be terminated. These discussions can be enriched by asking students to research the official stances of various medical associations and groups including the American Pharmacists Association, the American Medical Association (AMA), and the American Nurses Association.^{8,14} In one of the few studies to evaluate knowledge of lethal injection guidelines among practitioners, Farber and colleagues surveyed 1,000 physicians in 2001 to assess their knowledge of current AMA position statements regarding lethal injection.¹⁵ Four hundred thirteen (41%) participated, two-thirds of which were AMA members. Only 3% of the entire study sample was aware of AMA guidelines regarding lethal in-

jection. No studies have focused on either the attitudes or knowledge level regarding lethal injection among health professions students. Certainly, instruction in this area requires faculty members to put aside their own personal opinions and prejudices with regards to the issue.

Our college is considering development of student-led debates on various aspects of lethal injections ranging from ethics to legal considerations. These debates could be used both to augment lecture-based instructions and/or as components of formative assessment. Additional research might involve an assessment of changes in opinions regarding lethal injection or global capital punishment as a result of these debates and/or the module. Additionally, a clinical toxicology elective is under development in which more in-depth discussions of lethal injection including case studies may be included as course components.

SUMMARY

Pharmacy faculty members often struggle to find interrelated topics within curricula that afford the opportunity to demonstrate connections and allow for the concurrent instruction of several concepts to students. Lethal injection as a means of capital punishment may provide one such timely example that easily corresponds to instruction in the area of toxicology and falls within the scope of ACPE standards. We found that a module on lethal injection could be easily incorporated into an advanced therapeutics course. This type of information may be lacking in many US schools. Additionally, the topic is contemporary, of general interest to students, and multifaceted in scope.

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