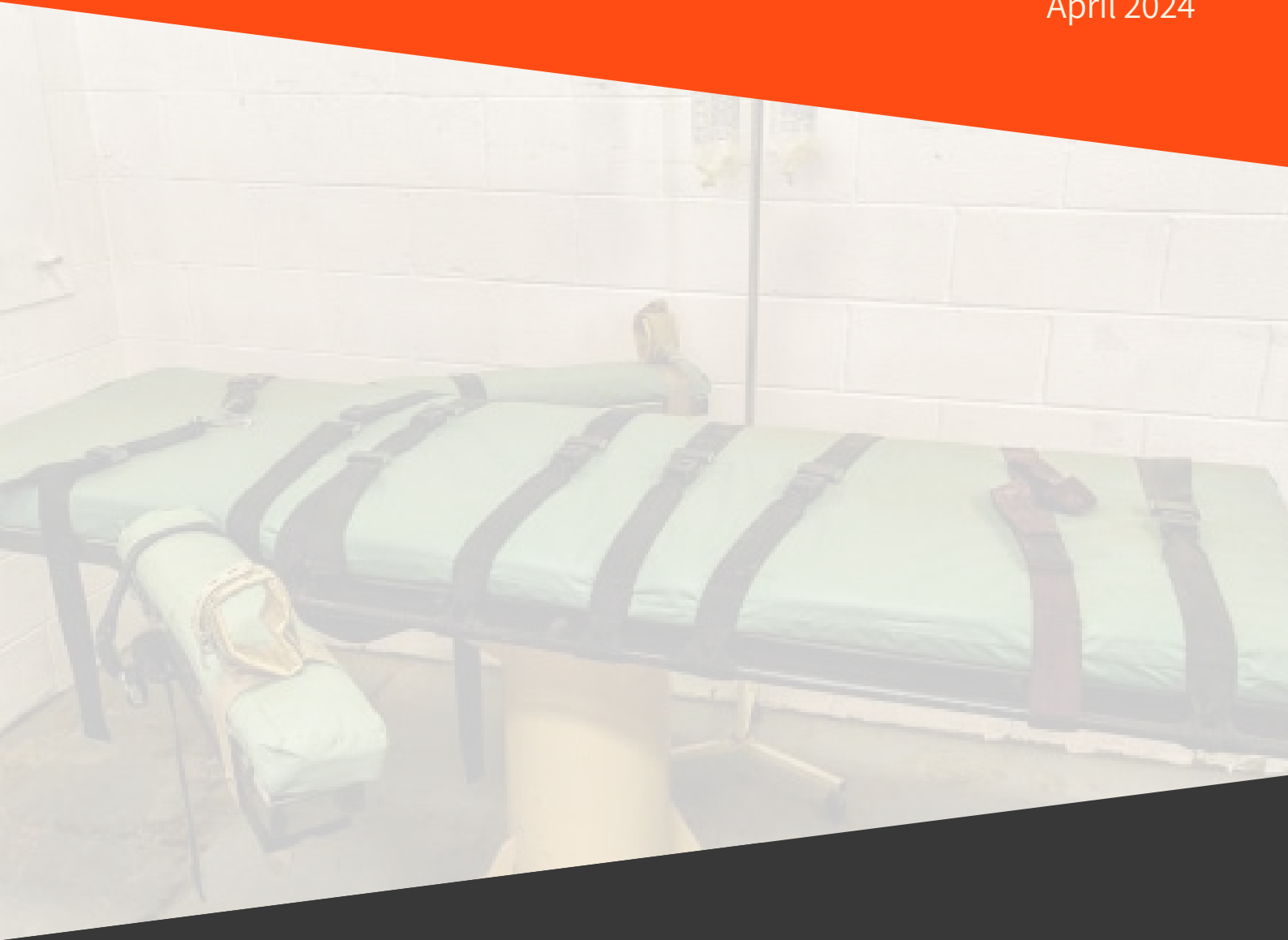


Lethal injection in the modern era: cruel, unusual and racist

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REPRIEVE

Findings at a glance

Researchers at Reprieve conducted an in-depth comparative study of botched lethal injection executions in the modern era of the U.S. death penalty, cross-referenced against the 1,407 lethal injection executions carried out or attempted during that period. The research found that:

- Black people had 220% higher odds of suffering a botched lethal injection execution than white people.
- Botched lethal injection executions occurred whether a one-drug or a three-drug protocol was used, and regardless of whether the primary drug was sodium thiopental, pentobarbital or midazolam.
- Botched lethal injection executions typically lasted a very long time. Over a third lasted over 45 minutes; over a quarter lasted an hour or more.
- The odds of a botched lethal injection execution increased by 6% on average for each additional year of age.
- In the state of Arkansas, 75% of botched lethal injection executions were of Black people, despite executions of Black people accounting for just 33% of all executions.
- In the state of Georgia, 86% of botched lethal injection executions were of Black people, despite executions of Black people accounting for just 30% of all executions.
- In the state of Oklahoma, 83% of botched lethal injection executions were of Black people, despite executions of Black people accounting for just 30% of all executions.
- Secrecy and haste were found to be factors contributing to increased rates of botched and prolonged executions.

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Executive summary

lethal injection is the primary method of execution in the United States.¹ When it was first adopted as a method of execution by Oklahoma in 1977, proponents argued it would be a quick and humane way to put people to death.² It was claimed that the process would take around five minutes, with people painlessly falling asleep and dying less than two minutes after the final injection.³ These claims were not based on evidence or expertise.⁴ The reality is that lethal injection executions frequently result in prolonged painful deaths, which have become commonly known as “botched” executions.

This report examines the phenomenon of botched executions by lethal injection, exploring the trends and contributing factors leading to botched executions through an analysis of 73 botched executions in the 1,407 lethal injection executions since 1977 (known as the modern era of the death penalty in the U.S.). This analysis used a process called multi-variable logistic regression,⁵ a type of analysis that assesses the odds of something happening considering multiple variables, to assess how identifiable characteristics (gender, age, and race) were associated with botched executions.

One of the most significant findings to emerge from the regression analysis is that Black people had **220%** higher odds of suffering a botched execution than white people, accounting for gender and age.

Analysis of the lethal injection executions conducted in the modern era of capital punishment found that **8%** of executions of Black people were botched (37 executions out of a total of 465 executions), compared to **4%** of executions of white people in the same time period (28 out of a total of 780 executions).



For decades, studies have documented that the death penalty disproportionately impacts Black people. Racial bias has a strong effect on who is capitally charged⁶, excluded from juries,⁷ sentenced to death,⁸ and ultimately executed.⁹ This new research shows that the racial disparities in capital punishment extend all the way to the execution chamber.

In certain states, racial disparities in botched executions were particularly stark. For example: in the state of Arkansas, **75%** of botched executions were of Black people, despite executions of Black people accounting for just **33%** of all executions; in the state of Georgia, **86%** of botched executions were of Black people, despite executions of Black people accounting for just **30%** of all executions; and, in the state of Oklahoma, **83%** of botched executions were of Black people, despite executions of Black people accounting for just 30% of all executions.

While the statistical analysis demonstrates a significant racial disparity in the rate people suffer botched executions, it is beyond its scope to provide a conclusive explanation as to why this occurs. The research does indicate that there are no easy answers: across the botched executions studied, similar issues arose whether the execution was of a Black person or a white person; yet in the case of Black people, the rate that executions were botched was significantly higher. Further research into why the odds were so much higher for Black people is needed, and should be considered in the context of extensively documented racism in the U.S. capital punishment system.

Beyond the significant racial disparities identified by the research, this analysis also found that botched executions typically lasted an extremely long time: over one third (26) of botched lethal injection executions lasted more than 45 minutes, with over a quarter (19) lasting over one hour. The longest execution, of a Black man in Alabama in 2022, took over 3 hours.

Age was also found to play a significant role in incidences of botched lethal injection executions, with regression analysis showing that the odds of a botched execution increased by **6%** on average for each additional year of age, accounting for race and gender.

Additional qualitative research suggests that factors relevant to botched executions included the deliberate secrecy surrounding the execution process, the use of unreliable and untested drugs, and hasty executions of multiple people.

Methodology

This report is based on an analysis of 73 botched executions, cross-referenced with data on all lethal injection executions performed or attempted between the reinstatement of capital punishment in 1976 and December 2023, when this research was conducted.

Over this period there were 1,402 lethal injection executions in total and five lethal injection execution attempts that were halted while in progress (for a total of 1,407 executions).¹⁰ The 1,407 executions included 1,391 males (**99%**), 780 white individuals (**56%**) and 465 Black individuals (**33%**). The average age at execution was 43, with 97 individuals aged 60 or over (**7%**).¹¹



1,407

executions performed or attempted by lethal injection between 1976 and December 2023

To identify botched executions, researchers drew on four separately compiled datasets of botched executions:

- A list of high-profile botched executions since 1976 compiled by Professor Michael Radelet and the Death Penalty Information Center¹²
- A list of botched executions compiled by Professor Austin Sarat up to 2010¹³
- A 2006 report published by Human Rights Watch¹⁴
- Reprieve's internal list of botched executions and attempted executions, last updated in December 2023.¹⁵

Methodology

The data from each list was consolidated into a single database, with information on state, gender, age, race, the type of drug(s) used¹⁶ and full length of execution (if known) added.¹⁷

The data was standardized to ensure the executions identified were consistently categorized. Researchers consulted with medical experts to create a list of indicators of botched executions (detailed below), then analyzed each execution classified as botched across this list, assessing whether one or more of the botched execution indicators were present. The indicators were:

- 1. Evidence of consciousness** after lethal drug(s) were administered (e.g., speaking; sitting up and moving);
- 2. Medical complications** (e.g. an allergic reaction to the drug(s));
- 3. Problems with drug(s)** (e.g., the drug(s) solidifying and clogging the IV tube; the use of the wrong drug);
- 4. Intravenous (IV) access and administration issues** (e.g., multiple IV insertion attempts; incorrect IV insertion);
- 5. Visible or audible expressions of pain** after lethal drug(s) were administered (e.g., screams; groans; and reports of feeling pain);
- 6. Unanticipated reactions** to the drug(s) or procedure (e.g., frothing at the mouth; vomiting; violent convulsions);
- 7. Executions that were halted while in progress** due to one or more of the complications detailed above.

Following this process, researchers divided the executions into three categories: botched executions, probable or possible botched executions, and unknown.

Botched executions were those where one or more of the indicators were found to be present in descriptions of the execution. Probable or possible botched executions were those where one or more of the indicators may have been present, but the information available was too limited to conclusively define the execution as botched.¹⁸ Executions marked unknown were those where none of the indicators were found to be present in the limited publicly available information about the execution.

The resulting dataset contains 73 executions identified as botched from 1977 to December 2023.

Analyzing the dataset of 73 botched executions and the full list of lethal injection executions, independent statisticians¹⁹ used multi-variable logistic regression (a type of analysis that assesses the odds of something happening considering multiple variables) to assess how identifiable characteristics (gender, age, and race) were associated with botched executions. Executions coded as probable or possible botched executions were not included within the regression analysis to keep the analysis as rigorous as possible.

Where it was possible to ascertain the total length of an execution from IV insertion to reported time of death, and where the execution took over 45 minutes, researchers flagged these as prolonged executions. (See the [Prolonged Executions](#) section on page 10 for more detail).

Qualitative analysis was also conducted to identify themes and issues emerging from the data with reference to available descriptions of the executions, the process leading up to the executions, and relevant state context.

Research limitations

Due to the extensive secrecy around executions, the restrictions placed on access to the execution chamber, and the limited or inconsistent reporting on individual executions, it is likely that the true number of botched executions in the reporting period is much higher than the number identified in the dataset connected to this report.

Further, because execution length is not recorded in a standardized way across states, and a number of states do not report on or allow witnesses to view the intravenous insertion phase of the execution, it was not possible to gather data on execution length for all botched executions; accordingly, there may be many additional examples of prolonged executions that were not identified in the report.

Finally, the gender and race of a person coded in the dataset was taken from the gender and racial identity assigned to the person by the state or federal authorities.

Further research and analysis needed

While this research describes a significant racial disparity in the rate of botched executions, it is beyond its scope to conclusively explain the underlying reasons for this alarming phenomenon. The data does illustrate that no single indicator of a botched execution appears to account for the disparity (see [Racial disparities](#) section on page 8 below). Further research is needed as to why Black people had such higher odds of suffering a botched execution, and this should be undertaken in the context of existing scholarship documenting extensive racial bias in the U.S. capital punishment system.

Regression analysis showed that the odds of a botched execution increased by 641% for American Indian or Alaska Native people compared to white people, accounting for age and gender.²⁰ There were 20 executions of American Indian or Alaska Native people of which 4 were botched (25%). This finding is not examined in detail in this report as the sample size is small, but warrants further research.

Regression analysis did not uncover any findings of note regarding Latino/Latina/Latinx people. Further research on the impact of lethal injection executions on this group may be warranted.

Regression analysis did not identify any relationship between gender and botched executions, given the small sample available. However, gender may nonetheless play a role in the phenomenon of botched executions and further research may be warranted.²¹

Key statistical findings at the national level

Racial disparities

There were 1,407 lethal injection executions carried out or attempted in the reporting period. **8%** of the executions of Black people were found to have been botched (37 out of 465), compared to **4%** of the executions of white people (28 out of 780).



Black people had

220%

higher odds of a botched execution than white people

Regression analysis showed that the odds of a botched execution increased by 220% for Black people compared to white people, accounting for age and gender.²²

Analysis of the indicators identified in botched executions of Black and white people over the reporting period suggests there is no single factor connected to race causing the disparities witnessed. For example, Black and white people whose executions were botched experienced IV access complications at almost exactly the same rate (a one percentage point difference in occurrence). The occurrence of each indicator was tested for difference (where sample allowed) between Black and white prisoners, and no significant difference was found.²³

For decades, studies have documented that the death penalty discriminates against Black people, with racial bias impacting capital charging,²⁴ death sentencing,²⁵ execution,²⁶ and exclusion from capital juries.²⁷ This analysis of lethal injection executions over the last half century provides new evidence that racial disparities in capital punishment continue all the way into the execution chamber, with race playing a significant role in the odds of a person suffering a botched execution.

Case Study: Clayton Lockett – Oklahoma

Oklahoma rushed the execution of Clayton Lockett, a 38-year-old Black man, in 2014, scheduling both his execution and Charles Warner's on the same evening.²⁸ Over the course of 51 minutes, the execution team attempted to insert IV lines, with officials puncturing Mr. Lockett 16 times in locations all over his body – from his upper chest and jugular region, to his upper arm, elbow pit, wrist groin and foot – in their efforts to access a vein.²⁹ A sheet was placed over his groin to “maintain Lockett’s dignity”.³⁰

Mr. Lockett was injected with an untested drug cocktail of unknown origin. He started “breathing heavily, writhing, clenching his teeth and straining to lift his head off the pillow.”³¹

It was only then that the execution team lifted the sheet and discovered that a vein had “exploded” or “collapsed” and “the drugs were not getting into the system like they were supposed to.”³² The drugs had bubbled under his skin, resulting in a swelling “larger than a golf ball.”³³



Clayton Lockett
Credit: Wikipedia

At this point, prison officials pulled a curtain in front of the witnesses. Approximately 30 minutes after the first drug was administered, the execution was halted.³⁴ Mr. Lockett died of a heart attack 43 minutes after the start of his protracted execution. The warden called the scene a “bloody mess.”³⁵

The paramedic who tried and failed to establish IV access later claimed that Mr. Lockett’s execution was so prolonged and painful because “Black people have smaller veins,”³⁶ a statement with no scientific basis.

Age

Age was also found to play a significant role in the incidence of botched executions by lethal injection in the reporting period.

Regression analysis showed that the odds of a botched execution increased by **6%** on average for each additional year of age, accounting for race and gender.³⁷

Some states have attempted to overcome issues connected with ageing and associated illnesses by making adjustments to the lethal injection procedure, but the analysis of the botched executions in this dataset showed that these measures have not mitigated the risks of a botched execution.

For example, in 2017 Ohio attempted to execute Alva Campbell, a 69-year-old white man, who was dying from lung cancer and other ailments. Mr. Campbell used a walker and an external colostomy bag, relied on oxygen treatments four times a day, and could not breathe lying down.³⁸ Prison officials provided him a wedge pillow on the gurney, intended to help him breathe. Yet executioners could not find a suitable vein, with officials working on both of Mr. Campbell’s arms for about 30 minutes before trying to find a vein in his leg. The execution was eventually called off,³⁹ and less than four months later, Mr. Campbell died on death row of his terminal medical conditions.⁴⁰

With an ageing population on death row,⁴¹ the age-related complications of lethal injection executions will only increase.

Case Study: Doyle Hamm - Alabama⁴²

In 2018, Alabama tried to execute Doyle Hamm, a 61-year-old white man who was suffering from terminal cranial and lymphatic cancer.⁴³

Despite warnings from Mr. Hamm’s lawyers that his illnesses would make it impossible for the execution to be carried out,⁴⁴ executioners went ahead and struggled to find a workable vein, repeatedly puncturing Mr. Hamm in his arms, legs and groin.

After two and a half hours, during which Mr. Hamm lost a significant amount of blood, the state called off the execution.⁴⁵ Mr. Hamm died of illness in 2021.⁴⁶



Doyle Lee Hamm
Credit: Alabama DOC

Key statistical findings at the national level

Prolonged executions

Despite being envisioned as a “quick” and painless way to execute when it was first introduced,⁴⁷ analysis of botched executions over the reporting period shows that the method has resulted in some of the longest executions in U.S. history.⁴⁸

Analysis shows botched executions by lethal injections are typically prolonged. Of the 73 botched executions in the reporting period, over one third (26 executions, or **36%**) of botched executions lasted upwards of 45 minutes,⁴⁹ with over one quarter (19 executions, or **26%**) lasting one hour or more.

The longest recorded execution by lethal injection was that of Joe Nathan James Jr., whose execution in Alabama in July 2022 lasted nearly three and a half hours.⁵⁰

Other examples of prolonged executions include:

- Elliot Johnson, whose execution in Texas in June 1987 lasted over one hour;⁵¹
- Jose High, whose execution in Georgia in November 2001 lasted over one hour;⁵²
- Romell Broom, whose execution in Ohio in September 2009 lasted over two hours. Officials tried and failed to locate a vein before eventually giving up.⁵³ Mr. Broom died in December 2020;⁵⁴
- Clayton Lockett, whose execution in Oklahoma in April 2014 lasted over 90 minutes;⁵⁵
- Brandon Jones, whose execution in Georgia in February 2016 lasted approximately one hour.⁵⁶

Analysis shows that prolonged executions happened regardless of the primary⁵⁷ drug used (whether sodium thiopental, pentobarbital, or midazolam) or the protocol (whether a one-drug or three-drug protocol) (see [Drug combinations](#) below).

Case Study: Joe Nathan James, Jr. – Alabama⁵⁸

Alabama’s execution of Joe Nathan James, Jr., a 50-year-old Black man, is believed to be the longest execution in U.S. history.⁵⁹ The execution lasted approximately three and a half hours in 2022, with three of those hours spent by prison officials attempting to insert IV lines, in a procedure closed to witnesses.⁶⁰

A private autopsy later documented numerous injuries, – including three unexplained cuts in Mr. James’ left arm – deep bruising, and needle puncture wounds in Mr. James’ hands, wrists, elbow and foot.⁶¹ When witnesses were allowed into the viewing room, Mr. James was motionless and unresponsive, raising concerns he had been secretly sedated prior to the lethal injection.⁶²

The results of the autopsy call into question comments from the Alabama Department of Corrections Commissioner John Hamm that “nothing out of the ordinary” occurred during the execution.⁶³ Alabama prison officials refused to be transparent about issues with the execution - delaying entry to media witnesses, giving “uninformative or evasive answers” to media questions, and refusing to provide the media and public with any additional information about the execution.⁶⁴



Joe James Jr.
Credit: Alabama DOC

IV access

IV access issues were a feature of many of the high profile botched lethal injection executions, but analysis of the data found that botched lethal injection executions cannot be explained solely by issues relating to IV access.

Two fifths of the botched executions recorded didn't have IV access issues as an indicator, but had other indicators present, including evidence of consciousness, problems with drugs, unanticipated reactions and medical complications.

Where IV access issues were found to be indicators of botched executions, they occurred at almost the same rate for Black people as for white people (a one percentage point difference in occurrence).⁶⁵

Drug combinations

Over the reporting period, states used a variety of drugs and drug combinations to carry out lethal injection executions. Researchers analyzed each botched execution based on the drug and / or combination of drugs used in the lethal injection.

The majority of executions in the reporting period involved either three-drug protocols (1196 executions), or one-drug protocols (208 executions). Some states used a two-drug or a four-drug combination, but these were a very small minority of cases.

The majority of executions in the reporting period used sodium thiopental as the primary execution drug (1071 executions), or pentobarbital as the primary execution drug (261 executions). A smaller number of executions were carried out using midazolam, etomidate or fentanyl as the primary execution drug.

The analysis showed that rather than being attributable to one specific drug or protocol, botched executions were found to have occurred regardless of the primary execution drug used, or whether the execution used a one-drug or a multi-drug protocol.⁶⁶

Jurisdiction profiles

The racial disparities and concerning features of lethal injections identified in the national findings were also reflected in individual jurisdictions. Because the sample sizes were smaller, descriptive statistics were used rather than regression analysis. States with the highest observable racial disparities in lethal injection executions included Arkansas, Georgia and Oklahoma. Ohio and the Federal Government had particularly high rates of botched executions, with Alabama holding the dubious distinction of the highest number of executions halted midway through.

Jurisdictional profiles

Arkansas

Arkansas carried out **30** executions in the reporting period, making it the twelfth most active executing state. Of these executions, **13%** were botched (more than one in ten).

75% of botched executions were of Black people, despite Black people accounting for only **33%** of all executions in Arkansas over the same period.

Around a third (**30%**) of all executions of Black people in the state in the reporting period were found to have been botched.

Three quarters of the botched executions in Arkansas were prolonged, taking over 45 minutes each. Half of those executed demonstrated evidence of consciousness after the lethal drugs had been administered, and there was evidence of issues with intravenous access in three quarters of the cases.

The majority of the botched executions in Arkansas took place in a very short window between 17 and 27 April 2017. Officials had planned an “execution spree”⁶⁷ of 8 executions in 11 days, ahead of the expiration of one of the drugs they had purchased for lethal injections.⁶⁸ A pharmaceutical distributor of the drugs the state acquired, McKesson, sued the state to enjoin it from using the drug, which it argued had been purchased illegally and through misrepresentation.⁶⁹

The high rate of botched executions in Arkansas could be attributable in part to the rushed pace of executions in the state, as well as the illicit sourcing of drugs that were nearing their expiration date. For further information on the impact of haste and secrecy on botched lethal injection executions, see the section [Factors influencing botched executions](#), on page 17.

Case Study: Kenneth Williams – Arkansas⁷⁰

Arkansas executed Kenneth Williams, a 38 year-old Black man, in 2017. Mr. Williams was the fourth and final person to be executed in the 2017 execution spree where four executions took place out of a planned eight.

Witnesses described Mr. Williams as “lurching, jerking, convulsing and coughing” and reported that movement was seen after the administration of the second drug in the protocol, a paralytic.⁷¹ If the drugs had worked as intended, Mr. Williams’ voluntary muscles would have been paralyzed, and movement would not have been seen. It is uncontested that an execution using this protocol without full anesthesia would be torturous – the Supreme Court has stated that this would amount to a violation of the Eighth Amendment’s prohibition on cruel and unusual punishment.⁷²

Government officials who did not witness the execution called the execution “flawless”.⁷³ Arkansas’ governor at the time, Asa Hutchinson, refused to carry out an independent investigation into the execution, saying: “You don’t call for an independent investigation unless there’s some reason for it. Last night, one of the goals was there not be any indications of pain by the inmate, and that’s what I believe is the case.”⁷⁴



Kenneth Williams
Credit: [Wikipedia](#)

Georgia

Georgia carried out **53** executions in the reporting period, making it the seventh most active executing state. Of these executions, **13%** were botched (more than one in ten).

86% of botched executions were of Black people, despite Black people accounting for only **30%** of all executions in Georgia over the same period.

Over a third (**38%**) of all executions of Black people in the state in the reporting period were found to have been botched.

Botched executions in Georgia were found to be particularly prolonged. At least 4 executions in Georgia lasted 45 minutes or more.

Indicators of these botched executions included IV access issues, evidence of consciousness after the drugs were administered, and unanticipated reactions to the drugs.

Over the reporting period, Georgia used both a one-drug protocol (pentobarbital) and a three-drug execution protocol, with sodium thiopental as the primary execution drug. Executions in Georgia were found to be botched regardless of the drug used, or whether it was in a one-drug or three-drug combination.

Particular concerns have been raised about Georgia's use of compounded drugs in executions.⁷⁵

In March 2015, Georgia was scheduled to execute Kelly Gissendaner using compounded pentobarbital in a one-drug protocol. The day of the execution, officials found that instead of containing a colorless fluid, the syringe contained a "cloudy" liquid with particles floating in it.⁷⁶ Experts compared the texture and appearance of the injection to "cottage cheese".⁷⁷ The execution was halted hours before the execution to allow for an investigation into the drug issues.⁷⁸ Ms Gissendaner's execution was carried out the following year in September 2015.⁷⁹

For more information on issues with bad quality drugs and botched executions, see [Secrecy in drug sourcing, quality and administration issues](#) on page 18 below.

Case Study: Brandon Jones – Georgia⁸⁰

Georgia executed Brandon Jones, a 72-year-old Black man, in 2016 via lethal injection. The executioners spent over 45 minutes attempting to set an IV line. After several failed attempts in Mr. Jones' arms, prison officials made incisions into Mr. Jones' groin area.⁸¹

Mr. Jones opened his eyes six minutes after the drugs were administered, suggesting the lethal injection drugs may have failed to render him insensate to pain.⁸²

Mr. Jones was the oldest person ever to be executed by the state of Georgia.⁸³



Brandon Jones
Credit: [The Intercept](#)

Jurisdictional profiles

Oklahoma

Oklahoma carried out **123** executions in the reporting period, making it the second most active executing state.

83% of botched executions were of Black people, despite Black people accounting for only **31%** of all executions in Oklahoma over the same period.

More than one in ten (**13%**) of all executions of Black people in the state in the reporting period were found to have been botched.

Over the reporting period, Oklahoma used various combinations of drugs in executions, with sodium thiopental, pentobarbital or midazolam as the primary drug. Botched executions were found to have occurred using all three primary drugs. Evidence of consciousness was found in one third of the botched executions; visible or audible expressions of pain were found in two thirds of the botched executions; and unanticipated reactions to the drugs were present in one third of the botched executions. Intravenous access issues, problems with drugs, and medical complications were also identified in the botched executions in the state.

Like Arkansas, Oklahoma has a history of scheduling multiple executions in quick succession, sometimes scheduling more than one execution on a given day. This was the case in April 2014, when the executions of two Black men – Clayton Lockett and Charles Warner – were planned for the same night.⁸⁴ Mr. Lockett's execution (detailed further above) was badly botched, with officials puncturing Mr. Lockett 16 times in locations all over his body – from his upper chest and jugular region, to his upper arm, elbow pit, wrist, groin and foot – in their efforts to access a vein.⁸⁵ The execution lasted for over 90 minutes, with Mr. Lockett writhing in pain on the gurney. It later emerged that officials had failed to inject the drugs into a vein, and instead had injected them into the flesh around Mr. Lockett's groin.⁸⁶

In an investigative report released after Mr. Lockett's execution, state officials admitted that the pressure of carrying out two executions in one night placed all the staff involved under stress.⁸⁷ One of the state's executioners described an "air of urgency" surrounding the execution.⁸⁸ General Counsel to the Oklahoma Department of Corrections (DOC) revealed that the Department felt immense pressure to "hurry up" with the scheduled executions.⁸⁹ The haste and urgency led to the execution turning into what an Oklahoma official described as a "bloody mess."⁹⁰

Secrecy was also a feature of Oklahoma's lethal injections over the period. Officials used illicit means to purchase drugs that had been restricted and were not intended for use in executions. In order to enable the unlawful procurement to continue, officials kept much of the information about the drugs and the purchase process hidden from the public.⁹¹

This atmosphere of covert drug procurement and pervasive secrecy contributed to the botched execution of Charles Warner in January 2015. Mr. Warner's execution was carried out using the wrong drug, and he is reported to have cried out in pain as the lethal injection was administered.⁹² Because of the secrecy around the process, the error that had been made with the drugs was only revealed to the public some eight months later, ahead of the scheduled execution of Richard Glossip.⁹³

For more information, see [Factors influencing botched executions](#) below, pages 17- 23.

Alabama

Alabama carried out **51** executions in the reporting period, making it the eighth most active executing state. **16%** (more than one in 10) of the executions in the reporting period were botched.

Public records shows that Alabama has called off more executions while they were in progress than any other state.⁹⁴ Between 2018 and 2022 alone, Alabama halted three executions.⁹⁵

Botched executions in Alabama were amongst the most prolonged in the reporting period. **50%** of Alabama's botched lethal injection executions lasted an hour or more, with some lasting more than two hours. Doyle Hamm's attempted execution in February 2018 took two and a half hours,⁹⁶ Alan Miller's attempted execution in September 2022 took almost two hours,⁹⁷ and Kenneth Smith's attempted execution in November 2022 took an hour and a half.⁹⁸

Alabama also had the longest ever recorded lethal injection execution, the execution of Joe Nathan James Jr. in July 2022, which took almost three and a half hours⁹⁹ (see [Prolonged executions](#) above at page 10).

Alabama's execution process is shrouded in secrecy, a factor that is likely to have contributed to its high rate of botched and prolonged executions.

For further information on the impact of secrecy on Alabama's botched lethal injection executions, see [Factors influencing botched executions](#) below, pages 17 – 23.

Ohio

With **58** executions in the reporting period, Ohio was the sixth most active executing state. Ohio also had a high proportion of botched executions, with **16%** of all lethal injection executions botched in the reporting period.

Botched executions in Ohio were found to be particularly prolonged, with almost half of them (**44%**) lasting over an hour.

Ohio used multiple execution cocktails over the reporting period. These included a one-drug protocol, a two-drug protocol, and a three-drug protocol. Both sodium thiopental and midazolam were at different points used as the primary execution drug. Botched executions were found to have occurred with both sodium thiopental and midazolam, whether in a one-drug execution protocol or alongside other drugs. Unanticipated reactions to the drugs, evidence of consciousness after the drugs were administered, visible or audible signs of distress, and intravenous access issues were present in the botched executions in Ohio. Two botched executions had to be halted midway due to complications.¹⁰⁰

In 2019, concerns about lethal injections in Ohio led a district court judge to compare lethal injection executions to “waterboarding” and “fire [...] being poured into [the prisoner's] veins.”¹⁰¹

Ohio's Governor Mike DeWine later halted all executions, declaring: “Ohio is not going to execute someone under my watch when a federal judge has found it to be cruel and unusual punishment.”¹⁰² Due to ongoing issues related to lethal injection, there have been no executions in Ohio since 2018.¹⁰³

Jurisdictional profiles

Case Study: Romell Broom - Ohio¹⁰⁴

In 2009, Ohio executioners attempted to execute Romell Broom, a Black man who was 53 years old at the time. During the procedure, prison officials spent more than two hours trying and failing to access a vein.¹⁰⁵ Mr. Broom grimaced with pain, covered his face, and appeared to be sobbing.¹⁰⁶

After two hours of failed attempts, the state finally called off the execution. They had tried to insert the IV in 18 different places on Mr. Broom's arms and legs, and in one instance struck bone.¹⁰⁷

The state pushed to schedule a second execution date, but another execution was never attempted, and Mr. Broom died in prison in December 2020.¹⁰⁸



Romell Broom
Credit: Ohio DOC

Federal government

The federal government carried out **16** executions during the reporting period. Of these, at least **19%** (almost 1 in 5) were botched.

81% of these executions (13 out of 16) took place in just six months, between July 2020 and January 2021, with the last three executions in January 2021, just days before the end of the Presidency of Donald Trump on January 20.¹⁰⁹

The executions were characterized by secrecy and haste, with multiple executions taking place in a single week, using pentobarbital that had been procured from a secret supplier.¹¹⁰ In procuring the drugs, the federal government appears to have relied on a 2019 Opinion by the Department of Justice's Office of Legal Counsel which posited that execution drugs ought not be considered drugs under the Food, Drug and Cosmetics Act (FDCA), and that accordingly, the FDA lacks the authority to regulate such drugs.¹¹¹

The federal government procured the drugs of secret origin¹¹² by rushing through a no-bid contract.¹¹³ These drugs were never reported to FDA¹¹⁴ and seemingly fail to comply with the FDCA's premarketing, labeling, and prescription requirements,¹¹⁵ making them misbranded and unapproved.¹¹⁶ Experts have warned that unregulated drugs are more likely to be contaminated or sub-potent, and therefore carry the risk of causing botched executions.¹¹⁷

Three of the 13 federal executions in this period (23%) were found to have been botched. All of the botched executions used compounded pentobarbital, and in all of the botched executions the people executed exhibited unanticipated reactions to the drug. During the federal government's execution of Alfred Bourgeois in 2020, witnesses reported that he "could not stop heaving and shaking" and was "spotted open-mouthed and writhing in a sound-proof room."¹¹⁸

Case Study: Alfred Bourgeois - Federal Government¹¹⁹

The federal government executed Alfred Bourgeois, a 56-year-old Black man, in 2020. Mr. Bourgeois always maintained his innocence, and lived with an intellectual disability that his lawyers argued made him ineligible for execution.¹²⁰

Nonetheless, the government pressed ahead with his execution by lethal injection. As the pentobarbital entered Mr. Bourgeois' veins, he grimaced in pain. His stomach quivered uncontrollably for five minutes following the administration of the lethal drugs. It took the Bureau of Prisons Officials at least 20 minutes to pronounce him dead.¹²¹



Alfred Bourgeois
Credit: Nueces County
Sheriff's Office

For more on the impact of secrecy and haste on botched executions, see the section on [Factors influencing botched executions](#) below.

Factors influencing botched executions

Alongside the analysis of the national and state data on botched executions, researchers also conducted qualitative analysis based on available descriptions of executions and other data gathered as part of the study. Various factors contributing to botched executions emerged from this analysis, in particular in relation to secrecy, illicit drug procurement, poor quality drugs, and haste.

Secrecy in the execution process

Analysis of the last half century of lethal injection executions shows that secrecy around the process may cause or contribute to the pain and suffering experienced in botched lethal injection executions.

The cases of Brandon Rhode in Georgia and Angel Diaz in Florida are illustrative of the harmful impact of secrecy on executions.

Georgia

Mr. Rhode, a 31 year old white man, was executed in 2010 using unapproved drugs that had been imported from a secret supplier in England. At the time, the source of the drugs was unknown; only after the execution had taken place did it emerge that the drugs had been sold by a middleman operating out of the back room of a driving school in London.¹²²

Factors influencing botched executions

Prison staff tried for 30 minutes to find a vein to inject the drugs, and after the drugs were injected they took 14 minutes to kill Mr. Rhode.

Evidence ultimately emerged that the first drug in the lethal injection, the anesthetic purchased from the driving school, had not worked effectively. This only came to light after a series of autopsy photos surfaced, showing that Mr. Rhode's eyes remained open in a fixed, paralyzed gaze at time of death. As medical experts testified, this was a sign that Mr. Rhode had not been fully anesthetized when he was executed, and would have felt the "asphyxiation...and the caustic burning" when the two subsequent drugs were administered, which "would certainly have been agonizing."¹²³

The paralytic agent (whose main purpose in the execution cocktail is cosmetic)¹²⁴ had paralyzed Mr. Rhode's voluntary muscles, meaning he was unable to signal to those conducting or witnessing the execution that he was still conscious and able to feel pain as the execution progressed. The Supreme Court has acknowledged that if a person is not sufficiently anesthetized, the administration of the following drugs would be tantamount to torture, and a violation of the Eighth Amendment's prohibition on cruel and unusual punishment.¹²⁵

Florida

Mr. Diaz, a 55 year old Latino man, was executed in Florida in 2006. His execution took over 30 minutes from the administration of the drugs. Two doses of drugs were administered during this time. Witnesses to the execution reported Mr. Diaz moved throughout the procedure, suggesting he was awake and trying to overcome the onset of paralysis.¹²⁶

The Florida DOC originally claimed that Diaz's liver problems were the cause of the prolonged execution,¹²⁷ but an autopsy later revealed that Mr. Diaz did not have liver problems, and that the execution team had erroneously pushed a needle through his veins into surrounding tissue, causing severe chemical burns. Examining autopsy photographs, experts commented that the paralytic would have worked when administered this way but the sedative and drug to stop the heart may not, leading to the person suffocating to death due to paralysis while conscious.¹²⁸

As in the case of Mr. Rhode, had Mr. Diaz not been paralyzed, he may have been able to communicate that the execution team had failed to insert the injection into a vein, and instead were injecting chemicals directly into his flesh.

Secrecy around drug sourcing, quality and administration

States have passed expansive secrecy laws prohibiting public disclosure of a wide range of information about the drugs due to be used in lethal injections, including regarding the source and quality of the drugs, and the protocol to be used. In some cases, states have simply refused to share this information, regardless of whether there is a legal basis to do so.¹²⁹

The illicit procurement of restricted and unapproved drugs for lethal injection has led to a series of issues and been associated with a number of botched executions over the reporting period.

Oklahoma

In Oklahoma, secrecy around drug procurement practices appears to have contributed to the botched execution of Charles Warner, who was executed using the wrong drug. Evidence that the wrong drug had been purchased and used in Mr. Warner's execution only came to light many months after the execution had taken place – and officials came within hours of using the same wrong drug in another execution later that year.¹³⁰

A grand jury report later found that “the Department's failure to follow state purchasing requirements contributed to the Department's use and near use of potassium acetate” and that “the method by which the execution drugs were ordered contributed greatly to the Department's receipt of the wrong execution drugs. Indeed, the process used by the Department to acquire the necessary drugs was questionable at best. [...] Both the Pharmacist and the Department's General Counsel testified the drugs were ordered over the phone; the Pharmacist was never provided a written order, prescription, or copy of the Execution Protocol prior to ordering the drugs. Once the drugs were received by the Pharmacist, the Department's General Counsel physically went to the pharmacy to pay for the drugs but failed to verify receipt of the drugs.”¹³¹ The grand jury pointed to the “surreptitious manner in which the Department's General Counsel obtained the drugs” which contributed to the procurement errors and the use of the wrong drug in Mr. Warner's execution. Mr. Warner is reported to have cried out in pain as the lethal injection was administered.¹³²

Virginia

Ricky Gray, a 39 year old Black man, was executed in Virginia in January 2017 in what was the last execution to take place before the state abolished the death penalty, and it was botched. According to an independent expert pathologist, Dr. Mark Edgar, who reviewed the official autopsy report, Mr. Gray suffered acute pulmonary edema during the execution, with liquid in his upper airways and blood entering his lungs while he was still breathing. Dr. Edgar explained, “[t]his way of dying is intolerable. You can't control your breathing—it is terrible. [...] When it is this severe, you can experience panic and terror and, if the individual was in any way aware of what was happening to them, it would be unbearable.”¹³³

Mr. Gray had been executed using compounded drugs that had been purchased from a pharmacy whose identity was kept secret under state law.¹³⁴ Dr. Edgar noted that the autopsy findings were particularly concerning “given the fact that [...] the compounded drugs used in this case may have lacked potency or been impure.”¹³⁵

In 2020, Virginia repealed the state secrecy law that kept details of its execution drugs hidden, with then-Governor Ralph Northam (a former doctor) explaining that if the death penalty was to be administered in Virginia, it should be done “humanely and fairly and not in secret with compound[ed] medications that sometimes work and sometimes don't work.”¹³⁶ Legislators in Virginia later abolished the death penalty altogether in 2021.¹³⁷

Alabama

In the state of Alabama, secrecy extends to all aspects of the execution process: all records related to the administration of the death penalty are considered confidential state secrets,¹³⁸ the DOC has not made public its execution protocols in full,¹³⁹ Alabama law exempts those who participate in lethal injection executions from oversight or potential criminal liability;¹⁴⁰ the DOC routinely denies requests

Factors influencing botched executions

from journalists for the most basic information about visibly botched executions;¹⁴¹ and the execution protocol¹⁴² denies witnesses (who have a statutory right to “be present at the execution”)¹⁴³ access to the intravenous insertion procedure.

Secrecy around executions in Alabama creates a system that does not allow for accountability or reform, and has contributed to Alabama having one of the highest rates of botched executions in the country, as well as the most prolonged botched executions (see further [Alabama](#) jurisdiction profile above at page 15).

As noted above, Alabama does not allow witnesses or the media to view the intravenous line insertion process. The process is carried out behind closed doors, and the state discloses very little information about it. However, because a number of the executions in Alabama in the reporting period were halted midway through, and in at least one case a private autopsy was performed, information has emerged of what went on behind the curtain.

In 2018, Alabama spent two and a half hours failing to insert IV lines into Doyle Hamm before calling off his execution. During those hours, Mr. Hamm’s family and attorney attempted to speak to state officials to understand what was happening.¹⁴⁴ They were denied this opportunity. All the while, officials repeatedly slapped his skin, and inserted needles into his left and right ankles, right leg and groin. Some of these needles hit the bone and caused blood to soak into the drape covering Mr. Hamm.¹⁴⁵ Officials couldn’t establish an IV line and instead punctured Mr. Hamm’s bladder and penetrated his femoral artery. All this happened in secret.¹⁴⁶ Immediately after the execution was called off, former Alabama Corrections Commissioner Jeff Dunn said “I wouldn’t characterize what we had tonight as a problem.”¹⁴⁷

Over 4 months in 2022, Alabama carried out three executions that lasted over an hour, with one of these being the longest execution in history. In July 2022, the execution of Joe Nathan James Jr. lasted over three and a half hours, with Alabama officials reportedly spending three of those hours cutting into Mr. James’ body, attempting to insert IV lines. This was done in secret, witnessed by no one other than the executioners. When Joe James Jr. was brought into the execution chamber, witnesses reported that he appeared to be unconscious– something that state officials could neither confirm nor deny.¹⁴⁸ When pushed for an explanation of what occurred in the unaccounted for three hours, Alabama Corrections Commissioner John Hamm stated that “nothing out of the ordinary”¹⁴⁹ had happened. A private autopsy later revealed details of skin lacerations, bruising and dozens of needle insertions.¹⁵⁰

Two months later, in September, Alabama officials strapped Alan Miller to the gurney and spent approximately 90 minutes stabbing his skin repeatedly in an attempt to access a vein – slapping his skin and trying and failing to insert a needle into his neck.¹⁵¹ Mr. Miller was then put into a crucifix position and left to hang, with blood dripping from his wounds, alone for 20 minutes.¹⁵² Officials then called off the execution and sent Mr. Miller back to his cell. All this happened with such secrecy that Mr. Miller could only describe those involved in the process by the color of their medical scrubs – there was no one present to bear witness to this lengthy process.¹⁵³

Less than two months later, the state attempted a further execution of Kenneth Smith. In November 2022, officials attempted and failed to secure IV access for over an hour. During this time Mr. Smith was alone except for the execution team. During this process state officials placed Mr Smith’s gurney into an

inverted crucifix and left him for several minutes. When they returned state officials injected Mr. Smith with an unknown substance and attempted to insert IV lines – poking repeatedly into his collarbone with a large needle, forcibly grabbing his head and holding him down, whilst another official attempted to insert a central line. Eventually officials abandoned the execution and escorted a hyperventilating and dizzy Kenneth Smith out of the chamber.¹⁵⁴ Mr. Smith was later executed, in January 2024, using nitrogen gas in what was the first ever execution of this kind.¹⁵⁵

Arizona

Arizona carried out three executions by lethal injection in 2022, all of which were botched.¹⁵⁶

The state used compounded pentobarbital to carry out the executions, which it had acquired from a supplier whose identity was kept secret. The state paid \$1.5 million for the pentobarbital powder, which arrived “in unmarked vials and jars”, likely in contravention of federal law.¹⁵⁷

Correctional officials themselves later acknowledged that the lack of transparency and oversight over the lethal injection procedures was “cause for concern with the Department’s present ability to carry out an execution consistent with its constitutional and legal obligations.”¹⁵⁸

According to the Arizona Department of Corrections Director who assumed the post in January 2023, there was an “alarming lack of documentation and record-keeping” from the previous administration on where the state’s death penalty drugs came from, how they were procured, or who prepared them.¹⁵⁹ At that point, the Director had received only “anecdotal accounts from staff members,” which had given him “serious concerns about the qualification and competency of the compounding pharmacist and the process used to compound the current supply of lethal injection drugs.”¹⁶⁰

These concerns led the newly appointed Governor, Katie Hobbs, to call for an independent review of the death penalty in Arizona to “provide transparency into the [Arizona Department of Correction, Rehabilitation & Reentry’s] lethal injection drug and gas chamber chemical procurement process, execution protocols, and staffing considerations”, noting “it’s time to address the fact that this is a system that needs better oversight on numerous fronts.”¹⁶¹

State concealment of problematic executions

As can be seen in many of the examples cited in this report, state officials regularly minimize issues that occur in executions, reporting that an execution has gone smoothly where it clearly has not, and where evidence including witness testimony disproves this. This concerted effort to conceal the brutality of lethal injection executions not only masks the suffering the person executed may have endured, it also paves the way for further executions to take place without any meaningful accountability for errors or investigations of problems.

Arizona

For example, Clarence Dixon’s execution in Arizona in May 2022 was initially reported by media witnesses at an Arizona DOC press conference as having gone “as planned”. Yet these witnesses were present during a series of lengthy IV attempts where Mr Dixon grimaced in pain and which ended with officials

Factors influencing botched executions

cutting into Mr. Dixon's groin to access a vein.¹⁶² Expert analysis of witness accounts of the execution later confirmed that cutting into Mr. Dixon's leg this way and the length of time officials took to achieve IV access was unusual and concerning.¹⁶³ It later emerged that the Arizona DOC had denied requests by media witnesses from publications critical of the state's death penalty practices to witness Mr. Dixon's execution.¹⁶⁴

Arizona performed two further executions in June and November of the same year, both of which were botched, with similar complications arising as in Mr. Dixon's case.

In the case of Frank Atwood, executed in June 2022 after several failed attempts to insert IV lines, Mr. Atwood had to guide the execution team into inserting a needle into his own hand in order to stop them from attempting a more invasive procedure.¹⁶⁵ In the case of Murray Hooper, executed in November 2022, the IV team attempted and failed to insert IVs into Mr. Hooper's arms before finally inserting a line into his femoral vein. Mr. Hooper reportedly looked into the glass of the witness' viewing chamber at one point and asked, "can you believe this?"¹⁶⁶

Alabama

In Alabama, following the historic almost three and a half hour execution of Joe James Jr., state officials insisted in a statement that "there was nothing out of the ordinary" despite facing questions about the lengthy delay.¹⁶⁷ More than two weeks after the execution, private autopsy results raised further questions about what happened to Mr. James in those three and a half hours.¹⁶⁸ With answers to these questions outstanding, the state attempted two further executions in September and November 2022, those of Alan Miller and Kenneth Smith.

Both Mr. Miller and Mr. Smith suffered for over an hour behind closed doors as officials poked them with needles, before ultimately calling off the executions, due to the expiry of the execution warrant.¹⁶⁹ In a subsequent review of its lethal injection protocol the Alabama DOC made no changes to its execution protocol, beyond removing the deadline for completing executions within a single day which had halted the executions of Mr. Miller and Mr. Smith.¹⁷⁰

Oklahoma

In Clayton Lockett's execution in 2014, the state scheduled two executions in the space of one day, used an untested drug cocktail of unknown origin, and in Mr. Lockett's case, covered the IV insertion area with a sheet, meaning that officials were not aware that they had missed his vein when inserting the IV line. In an investigation that was later conducted into what happened in the botched execution, officials admitted that "if the IV insertion point had been viewed, the issue would have been detected earlier".¹⁷¹

These efforts to conceal details of lethal injections executions – whether by closing the curtain,¹⁷² using a paralytic agent,¹⁷³ taping the prisoners' hands down to prevent movement,¹⁷⁴ passing secrecy laws, minimizing problems or claiming executions went without a hitch¹⁷⁵ – serve to mask the reality of what is happening in the execution chamber, evading scrutiny of executions and accountability when things go wrong, and removing oversight from the process altogether. This all but ensures further botched executions will take place.

Hasty executions

Across jurisdictions, efforts to carry out hasty executions of multiple people appear to have heightened the risk of botched executions.

Federal government

As discussed above, between July 2020 and January 2021 the federal government oversaw a series of 13 executions in just 6 months, with the final executions taking place just days before the handover of power to a new administration. In this period the federal government executed more than three times as many people than in the previous six decades.¹⁷⁶ 23% of these executions were botched, with haste and secrecy key features of the executions.

Arkansas

In 2017, the state of Arkansas became the subject of controversy after it sought to undertake the executions of eight men over the course of 11 days.¹⁷⁷ Four executions ultimately went ahead. At least three (75%) of these executions were botched – two of these took place within three hours of each other,¹⁷⁸ and the third occurred three days later. Arkansas officials had purchased execution drugs using secrecy and deceit, and rushed the executions through ahead of the expiration of one of the drugs.¹⁷⁹

Oklahoma

Officials in executing states have themselves recognized that the pressure and tensions created when executions are carried out in haste can cause problems to occur. In an investigative report released following the botched execution of Clayton Lockett in Oklahoma, for example, state officials acknowledged that the pressure of carrying out two executions in one night placed all the staff involved under “extra stress.”¹⁸⁰ The recommendations from the report included that executions be paced further apart to avoid the pressures and stress that contributed to Mr. Lockett’s horrifically botched execution.¹⁸¹

Conclusion

Proponents of lethal injection have long declared it to be quick, peaceful, and painless. This new analysis of botched lethal injection executions in the modern era comprehensively debunks this claim, finding botched lethal injection executions to be both prolonged and painful. Many botched executions were found to have spanned hours, with people choking, vomiting and bleeding in the execution chamber.

The report further reveals Black people had much higher odds of suffering a botched execution than their white counterparts. It is well-established that the death penalty is infected with racial bias at every stage of the process. This report reveals that the racial disparities in capital punishment extend all the way into the execution chamber.

This report has also found that the risk of a botched execution increases with age, a deeply troubling finding with an ageing population on death row, suggesting botched executions may increase if lethal injection continues to be used in coming years.

Research into the factors causing botched executions have revealed concerning trends. In their efforts to carry out executions at any cost, state officials have evaded oversight at every stage of the execution process and have engaged in illegal and underhanded practices which have contributed to botched executions.

Recommendations

In light of the fundamental legal, constitutional and ethical issues identified in this report, it is recommended that:

- An immediate moratorium should be imposed on all lethal injection executions at both the state and federal levels.
- The Federal Government should consider the findings of this research – including the concerning racial disparity in botched lethal injections – in its ongoing review of how capital punishment is carried out at the federal level, as well as all future actions with respect to the federal death penalty, and eliminate any remaining policies or guidance which contribute to the risk of botched executions.
- Governors in executing states should follow the lead of their counterparts in Ohio, Arizona and Virginia and halt executions and commission independent investigations into the significant issues in how lethal injection executions are carried out in their states.
- Legislators in executing states should seek the repeal of any secrecy law, or secretive practice or policy, that has prevented proper oversight of how capital punishment is carried out.

- Departments of Corrections should allow witnesses to be present from the time the person is prepared for execution, not obstruct witnesses, and share a transparent account of all executions, with detailed timestamps. The start time of an execution should be clearly recorded as the moment when officials begin to prepare the person for the lethal injection. No part of the execution should be hidden from view.
- The Food and Drug Administration and Drug Enforcement Administration should (i) enforce existing federal drug regulations, taking action against entities violating these regulations in secret lethal injection drug deals; and (ii) examine the impact of laws, policies and practices in states carrying out lethal injection executions that pre-empt or undermine federal drug regulations or hinder federal oversight of the drug supply chain.

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- 4 Due to the unwillingness of medical associations to be involved in executions, legislators in Oklahoma looking for a new method of execution in 1977 turned to Oklahoma's chief medical examiner, Jay Chapman. He was upfront about his lack of expertise saying he was an "expert in dead bodies but not an expert in getting them that way." Deborah W. Denno, *The Lethal Injection Quandary: How Medicine Has Dismantled the Death Penalty*, *Fordham Law Review* (2007), p. 49, available at: <https://ir.lawnet.fordham.edu/flr/vol76/iss1/3>.
- 5 Logistic regression is used to measure the impact of each dependent variable on the odds ratio of the observed event of interest. The odds ratio is the ratio of odds of an event in one group versus the odds of the event in the other group. For example, if the odds ratio for men is 1.5 compared to women, the odds of an event occurring are 1.5 times greater for men than women (i.e., there is a 50% increase in the odds of the event for men). This is not the same as the overall likelihood or probability of the event occurring. This report only features significant findings from the regression analysis with a p-value of ≤ 0.05 , which is typically deemed to be significant. The p-value is the probability that random chance created the effect discussed. P-values for each significant finding are provided in endnotes.
- 6 Barbara O'Brien, Catherine M. Grosso, George Woodworth & Abijah Taylor, *Untangling the Role of Race in Capital Charging and Sentencing in North Carolina, 1990-2009*, *North Carolina Law Review* (2016), available at: <https://scholarship.law.unc.edu/nclr/vol94/iss6/4/>.
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- 8 *McCleskey v. Kemp*, United States Supreme Court (1987), available at: <https://supreme.justia.com/cases/federal/us/481/279/>; David Baldus et al., *Equal Justice and the Death Penalty: A Legal and Empirical Analysis* (1990).
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- 10 Death Penalty Information Center, 'Execution Database', updated daily, available at: <https://deathpenaltyinfo.org/database/executions>. Those five execution attempts were: Romell Broom (execution attempt on Sept. 15, 2009 in Ohio); Alva Campbell (execution attempt on Nov. 15, 2017 in Ohio); Doyle Lee Hamm (execution attempt on Feb. 22, 2018 in Alabama); Alan Eugene Miller (Sept. 22, 2022 in Alabama); and Kenneth Eugene Smith (execution attempt on Nov. 17, 2022 in Alabama).
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- 16 Death Penalty Information Center, 'State-by-State Execution Protocols', available at <https://deathpenaltyinfo.org/executions/methods-of-execution/state-by-state-execution-protocols>. Researchers analyzed the indicators for a botched execution in the context of the relevant protocol, for example the indicators for evidence of consciousness are different in a 3-drug protocol as compared to a 1-drug protocol.
- 17 The full length of an execution for the purposes of this report was measured to commence at the time when witnesses to the execution reported that the person being executed was brought into the execution chamber, secured to the gurney and/or had the intravenous lines inserted, and ends with official time of death. The U.S. Court of Appeals for the Ninth Circuit has held that the public has a First Amendment right to view executions in their entirety, including IV insertion. *First Amendment Coalition of Arizona v. Ryan*, United States Ninth Circuit (2019), available at: <https://law.justia.com/cases/federal/appellate-courts/ca9/17-16330/17-16330-2019-09-17.html>. This is not the practice across all executing states. In a number of executing states, witnesses are only allowed to view the execution after IV insertion. Additionally, many states withhold information about when the lethal drugs are being administered. This means it is not possible to estimate the full length of all executions identified as botched and that issues occurring during attempts to secure IV access are likely to go unwitnessed and unreported.
- 18 Where media reporting noted that the person being executed moved during or after the administration of the drugs but limited information was available as to the timing and nature of the movement, researchers coded this as a possible or probable botched execution due to anomalous movement. Where IV access was delayed but no further detail was available researchers coded this as a possible or probable botched execution due to anomalous IV issues. Where an execution was reported to take over 20 minutes from the injection of the drugs to reported time of death and no indicators of a botched execution were present, researchers coded this as a possible or probable botched execution due to anomalous length.
- 19 Myriad Research, available at: <https://myriadresearch.co.uk/>.
- 20 The p-value is the probability that random chance created the effect discussed. Typically, a p-value of ≤ 0.05 is deemed to be significant. We have only reported significant findings from the regression analysis along with the appropriate p-values.

- 21 Research by the Cornell Center on the Death Penalty Worldwide has found that women often receive death sentences in proceedings inflicted by gender bias, and that the death penalty exacerbates pre-existing gender inequalities. Cornell Law School, The Alice Project, available at: <https://deathpenaltyworldwide.org/project/the-alice-project/>.
- 22 $p < .001$, this report only features significant findings from the regression analysis with a p-value of ≤ 0.05 , which is typically deemed to be significant. The p-value is the probability that random chance created the effect discussed.
- 23 Evidence of consciousness: $X^2(1, N = 65) = 1.581, p = .209$; IV access: $X^2(1, N = 65) = .014, p = .905$; Unanticipated reaction: $X^2(1, N = 65) = 1.961, p = .161$; Excessively lengthy $X^2(1, N = 65) = .014, p = .905$.
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