ARTICLE

THE COSTS AND BENEFITS OF FORENSICS

Brandon L. Garrett[*]

ABSTRACT

Supreme Court Justice Louis Brandeis famously wrote that states can be laboratories for experimentation in law and policy. Disappointingly, however, the actual laboratories that states and local governments run are not a home for experimentation. We do not have adequate information about either the costs or the benefits of forensic testing or allocation of resources. Increased spending and expansion of crime laboratories has perversely accompanied growing backlogs. Poor quality control has resulted in a series of audits and even closures of crime laboratories. In response to these problems, however, some laboratories and some entire states have developed new approaches toward oversight. In this Article, I will describe the growth of crime labs and the resources dedicated to them, but also the backlogs that have resulted from far too much in the way of quantity. Second, I will discuss the problem of resource allocation in forensics, including the differing perspectives and interests of police and forensic agencies that should both be taken into account. Third, I will describe quality control challenges that have accompanied the explosion in the use of forensics. Fourth, I will describe how regulation could better address both resource allocation and quality control, as well as how the Houston Forensic Science Center has become a model for regulating both the quality and the

* L. Neil Williams Professor of Law and Director of the Center for Science and Justice, Duke University School of Law. Many thanks to the participants at the symposium hosted by *Houston Law Review* for invaluable comments on an earlier draft. This research was partially supported by the Center for Statistics and Applications to Forensic Evidence (CSAFE), which is in turn supported by a Cooperative Agreement between the National Institute of Standards and Technology (NIST) and Iowa State University, which includes activities carried out at Duke University.

quantity of forensics. Finally, I will ask why the federal government has not done more to help improve the quality of forensics even as it has helped to encourage overwhelming and unnecessary quantity.

TABLE OF CONTENTS

I. INTRODUCTION 594

II. THE GROWTH OF CRIME LABS 597
A. Growth in Crime Lab Spending 598
B. Growth in Crime Lab Backlogs 600

III. RESOURCE ALLOCATION 602

IV. QUALITY CONTROL 606

V. THE ROLE OF REGULATION 612

VI. CONCLUSION 616

I. INTRODUCTION

Supreme Court Justice Louis Brandeis, in one of his best-known passages, described how states can be laboratories for experimentation in law and policy: "It is one of the happy incidents of the federal system that a single courageous state may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country."[1] Crime laboratories were barely in existence at the time. Disappointingly, today, the actual laboratories that states and localities run are not a home for experimentation.[2] We do not have adequate information about either the costs or the benefits of forensic testing or allocation of resources for forensic evidence.[3]

1. New State Ice Co. v. Liebmann, 285 U.S. 262, 311 (1932) (Brandeis, J., dissenting). For more information on the themes in this Article, see BRANDON L. GARRETT, AUTOPSY OF A CRIME LAB: HOW FAULTY SCIENCE LEADS TO INJUSTICE (forthcoming Nov. 2020).

2. *See generally* Jennifer E. Laurin, *Remapping the Path Forward: Toward a Systemic View of Forensic Science Reform and Oversight*, 91 TEX. L. REV. 1051 (2013) (discussing the challenges faced by state crime laboratories).

3. The field of forensic science is "the application of scientific or technical practices to the recognition, collection, analysis, and interpretation of evidence for criminal and civil law or regulatory issues." PRESIDENT'S COUNCIL OF ADVISORS ON SCI. & TECH., EXEC. OFFICE OF THE PRESIDENT, FORENSIC SCIENCE IN CRIMINAL COURTS: ENSURING SCIENTIFIC VALIDITY OF FEATURE-COMPARISON METHODS 1 (2016) [hereinafter PCAST REPORT],

Increased spending and expansion of crime laboratories has perversely accompanied growing backlogs. Poor quality control has resulted in a series of audits, scandals, and even closures of crime laboratories.[4]

Failure to link a set of fingerprints to a string of burglaries, or failure to link DNA to a single homicide, could result in crime that costs residents millions of dollars in damage and social costs that are difficult to fully assess. The costs of a wrongful conviction can be greater. Take the case of George Rodriguez, who was wrongfully convicted in Harris County, Texas based on erroneous serology and microscopic hair comparison testimony. Following his exoneration by post-conviction DNA testing, the jury in his civil rights case awarded him $5 million in compensation. The case later settled for $3.1 million, and he received another $1 million in compensation from the State of Texas.[5] That amount would pay for many years of enhanced quality controls at the Houston lab, which has, in response to errors, become independent of law enforcement and made substantial investments in quality controls.[6] The costs of errors are not normally factored into the management of a crime lab like they would be for a hospital.

More broadly, very little is known about whether spending funds on forensic work is worthwhile, and if it is worthwhile, little is known about the costs and benefits of different types of forensic work. There is a larger focus on the social costs of policing generally,[7] and far too little is known about the costs and benefits

---

https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensic_science_report_final.pdf [https://perma.cc/YCY4-3T7Z].

4. *See* NAT'L RESEARCH COUNCIL, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 44–45 (2009) [hereinafter NAS REPORT], https://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf [https://perma.cc/59PP-X864]; *see also* Melendez-Diaz v. Massachusetts, 557 U.S. 305, 319 (2009); RADLEY BALKO & TUCKER CARRINGTON, THE CADAVER KING AND THE COUNTRY DENTIST: A TRUE STORY OF INJUSTICE IN THE AMERICAN SOUTH 280 (2018); Brandon L. Garrett & Peter J. Neufeld, *Invalid Forensic Science Testimony and Wrongful Convictions*, 95 VA. L. REV. 1, 23–24 (2009).

5. *George Rodriguez*, NAT'L REGISTRY EXONERATIONS, https://www.law.umich.edu/special/exoneration/Pages/casedetail.aspx?caseid=3591 [https://perma.cc/MD2Q-M3NJ] (last visited Feb. 19, 2020).

6. Most crime laboratories, in contrast, are not independent, but rather operate as divisions of law enforcement. *See* SANDRA GUERRA THOMPSON, COPS IN LAB COATS: CURBING WRONGFUL CONVICTIONS THROUGH INDEPENDENT FORENSIC LABORATORIES 181–82 (2015).

7. *See, e.g.*, Dan A. Black et al., Commentary, *Comments on Domínguez and Raphael*, 14 CRIMINOLOGY & PUB. POL'Y 639, 641, 643 (2015); Patricio Domínguez & Steven Raphael, *The Role of the Cost-of-Crime Literature in Bridging the Gap Between Social Science Research and Policy Making*, 14 CRIMINOLOGY & PUB. POL'Y 589, 590, 603 (2015); Charles F. Manski, Commentary, *Narrow or Broad Cost-Benefit Analysis?*, 14 CRIMINOLOGY & PUB. POL'Y 647, 649 (2015); Daniel S. Nagin, *Cost-Benefit Analysis of*

of much of the public safety work done by police agencies.[8] Because it is scientific evidence, forensic science is often assumed to be evidence-based and worthwhile; yet the same questions have not been asked of forensics as have been asked (at least recently) in the area of policing. We do not have measures of the social costs of forensic testing or lack of forensic testing. Researchers have only just begun to investigate these questions; police and crime laboratories have largely been "flying blind."[9]

The problems of resource allocation and quality control should be seen as linked. Failure to test evidence and errors in testing performed both create social harms. A lack of spending on quality control can lead to costly forensic errors. Poor crime scene collection, inexpensive testing that consumes evidence, or poor resource allocation can result in unsolved crimes and harm to victims. Forensic testing may cause police officers to prioritize cases with testable evidence. New forensic technologies can be extremely expensive but may have poorly understood accuracy and efficacy. Use of forensic testing may impact privacy and cause people not to engage in socially beneficial acts, but it may also deter some types of criminal activity. We often do not know where the costs may fall and do not ask. There is very little regulation of forensic science of any kind, much less regulation informed by an understanding of costs and benefits.[10] Given limited resources, far more work should be done to understand how to better prioritize spending on forensics.[11]

Crime Prevention Policies, 14 CRIMINOLOGY & PUB. POL'Y 583, 585 (2015); Michael Tonry, Commentary, *The Fog Around Cost-of-Crime Studies May Finally Be Clearing: Prisoners and Their Kids Suffer Too*, 14 CRIMINOLOGY & PUB. POL'Y 653, 654–55, 659, 661, 666 (2015); Brandon C. Welsh & David P. Farrington, Commentary, *Monetary Value of Early Developmental Crime Prevention and Its Policy Significance*, 14 CRIMINOLOGY & PUB. POL'Y 673, 674 (2015). *See generally* Steve Aos, Commentary, *What Is the Bottom Line?*, 14 CRIMINOLOGY & PUB. POL'Y 633 (2015).

8. *See generally* Barry Friedman & Elizabeth G. Janszky, *Policing's Information Problem* 12 (NYU Sch. of Law, Pub. Law & Legal Theory Research Paper Series, Working Paper No. 19-39, 2019); Barry Friedman, *We Spend $100 Billion on Policing. We Have No Idea What Works*, WASH. POST (Mar. 10, 2017, 1:49 PM), https://www.washingtonpost.com/posteverything/wp/2017/03/10/we-spend-100-billion-on-policing-we-have-no-idea-what-works/ [https://perma.cc/4N6L-FVY8].

9. *See, e.g.*, Roberta D. Julian et al., *What Is the Value of Forensic Science? An Overview of the Effectiveness of Forensic Science in the Australian Criminal Justice System Project*, 43 AUSTRALIAN J. FORENSIC SCI. 217, 220 (2011) ("[T]o a large extent, the policing and forensic services community has been 'flying blind' in terms of the true impact of its work. The time saved in an investigation by information and intelligence provided by forensic examination and/or analyses is not known.").

10. *See* Paul C. Giannelli, *Wrongful Convictions and Forensic Science: The Need to Regulate Crime Labs*, 86 N.C. L. REV. 163, 211–12 (2007); Nagin, *supra* note 7, at 585.

11. *See* Jessica D. Gabel, *Realizing Reliability in Forensic Science from the Ground up*, 104 J. CRIM. L. & CRIMINOLOGY 283, 292–93 (2014).

In Part I of this Article, I describe the growth of crime labs and the resources dedicated to them, but also the backlogs that have resulted from far too much in the way of quantity. In Part II, I discuss the resource allocation challenges that have accompanied this explosion in the use of forensics, including those resulting from divergent police and forensic crime laboratory interests. Third, I discuss the different dimensions of quality control, including accreditation, certification, blind testing, and organizational psychology and human factors research. Fourth, I describe how the Houston Forensic Science Center has in many respects become a model for regulating both the quality and the quantity of forensics. Finally, I ask why the federal government has not done more to help improve the quality of forensics even as it has helped to encourage overwhelming and unnecessary quantity.

II. THE GROWTH OF CRIME LABS

In the early 1930s, when Justice Brandeis wrote about state laboratories of experimentation, Los Angeles and Chicago (and a few other major cities) had crime labs, largely created in response to gangsters operating in the wake of Prohibition.[12] Police officers operated these labs, and they were small, handling hundreds of cases a year—not the tens of thousands of cases a modern lab may process.[13] The newly-created Federal Bureau of Investigation (FBI) Technical Crime Laboratory had just begun early efforts to train federal agents to examine fingerprints, handwriting, and ballistic evidence.[14] The new FBI lab garnered early fame when analysts performed high-profile work in the Charles Lindbergh kidnapping case.[15] In time, the FBI lab became the largest crime lab in the country and the center of innovation and training on forensics in the United States.[16] However, many individual police departments set up their own crime labs. By the 1960s, every state had crime labs, although many were set up rapidly and with poor equipment, staffing, and standards.[17] Small "cop shops" within police departments were run by beat police officers who were

12. Paul C. Giannelli, *Forensic Science: Why No Research?*, 38 FORDHAM URB. L.J. 503, 506–07 (2010) (describing how crime laboratories sprang up during the "gangster era").

13. *Id.* at 507.

14. John F. Fox, Jr., *The Birth of the FBI's Technical Laboratory–1924 to 1935*, FBI, https://www.fbi.gov/history/history-publications-reports/the-birth-of-the-fbis-technical-laboratory1924-to-1935 [https://perma.cc/VVD5-ZCPL] (last visited Feb. 19, 2020).

15. *Id.*

16. Constance Holden, *FBI Crime Lab Gets Physicist Director*, 278 SCIENCE 809 (1997) (describing the FBI crime lab as the nation's largest, with over 700 employees).

17. Giannelli, *supra* note 12, at 507–08.

assigned to do forensics work. Today, more labs have people trained in forensic science. There are police crime labs, regional crime labs, crime labs that cover entire states, as well as private crime labs.

We know far too little about the work that crime labs do. The only national set of data that we have comes from several researchers at the federal Bureau of Justice Statistics (BJS), who have conducted surveys of the publicly funded crime laboratories. These data are reported by the labs themselves, and the surveys are somewhat sporadic. Over time, the BJS reports have documented a steady increase in lab size and funding. Today, there are over 400 publicly funded crime labs.[18] In 2002, there were 11,000 full-time personnel at crime labs; by 2009, there were about 13,000 and in 2014 there were 14,300.[19] Crime labs expanded in part due to drug enforcement efforts and accompanying demands to conduct drug testing. Today, drug testing constitutes the largest portion of what crime labs do. Roughly the other half of the work of crime labs relates to identifying culprits and assessing how crimes occurred. DNA testing constitutes only one-third of the work requested of public crime laboratories, and despite federal grant support, it continues to account for much of the backlog in case processing.[20]

A. Growth in Crime Lab Spending

The personnel expansion at crime labs was, unsurprisingly, accompanied by larger budgets. In 2014, the budgets totaled $1.7 billion.[21] A new BJS survey is overdue; perhaps by 2020, these budgets will have topped $2 billion. How are these labs funded, exactly? Local labs may be funded through local law enforcement with support from state funds and federal grants.[22] State labs may similarly receive funding as part of law enforcement appropriations, but also through grant funding.[23] Some laboratories provide lawmakers with fairly detailed reports

18. *See* MATTHEW R. DUROSE ET AL., BUREAU OF JUSTICE STATISTICS, NCJ 250151, PUBLICLY FUNDED FORENSIC CRIME LABORATORIES: RESOURCES AND SERVICES, 2014, at 1 (2016), https://www.bjs.gov/content/pub/pdf/pffclrs14.pdf [https://perma.cc/WW3A-MRTB].

19. *Id.* at 5.

20. *See id.* at 3.

21. *Id.* at 5.

22. *See, e.g.*, GERALD LAPORTE ET AL., NAT'L INST. OF JUSTICE, NCJ 251445, FISCAL YEAR 2017 FUNDING FOR DNA ANALYSIS, CAPACITY ENHANCEMENT, AND OTHER FORENSIC ACTIVITIES (2018) (describing federal grants to local crime labs), https://www.ncjrs.gov/pdffiles1/nij/251445.pdf [https://perma.cc/KR3U-B7HD].

23. *See id.* at 1–3.

describing budget needs, past spending, and future projections. The Virginia Department of Forensic Services is one example.[24]

Substantial federal grants have made growth in crime labs possible. Congress and federal agencies have awarded hundreds of millions of dollars in grants to eliminate backlogs, purchase new equipment, and expand DNA testing to add more information to federal DNA databanks.[25] Best known is the Paul Coverdell Forensic Science Improvement Grants Program.[26] In the 2004 Justice for All Act, Congress sought to reduce backlogs in DNA testing with half a billion dollars in funding; that section of the law was called the Debbie Smith Act, named after a Virginia woman who had to wait six years for DNA testing to be done in her sexual assault case.[27] Those federal grants have continued. For example, just in October 2017, the Department of Justice announced $119 million in grants to fund crime laboratories.[28]

Additional funding for state and local labs can come from fees charged to defendants in criminal cases. In some states, all criminal defendants are initially charged a small fixed fee (say $50) for DNA testing and will thereafter be charged a much larger fee (say $600) if a DNA test is actually conducted in connection with their case. That money may go directly to the crime lab or to the state's general operating budget from which the crime labs

---

24. *See* LINDA C. JACKSON, VA. DEP'T OF FORENSIC SCI., REPORT TO HOUSE APPROPRIATIONS PUBLIC SAFETY SUBCOMMITTEE (2019), http://hac.virginia.gov/subcommittee/public_safety/files/1-10-19/II%20-%20DFS%20Report%20to%20House%20Appropriations%20Jan2019.pdf [https://perma.cc/7R8U-7XSW].

25. For an overview, see Kerry Abrams & Brandon L. Garrett, *DNA and Distrust*, 91 NOTRE DAME L. REV. 757, 780–82 (2016).

26. *See* Paul Coverdell National Forensic Sciences Improvement Act of 2000, Pub. L. No. 106-561, § 2(c), 114 Stat. 2787, 2788–91 (codified as amended in scattered sections of 42 U.S.C.). Grants pursuant to that program can be used for backlog reduction; they may also be available for efforts to address "emerging forensic science issues," such as statistics or new technology. NAT'L INST. OF JUSTICE, U.S. DEP'T OF JUSTICE, OMB NO. 1121-0329, PAUL COVERDELL FORENSIC SCIENCE IMPROVEMENTS GRANTS PROGRAM – FORMULA (2019), https://nij.ojp.gov/sites/g/files/xyckuh171/files/media/document/NIJ-2019-15503.pdf [https://perma.cc/7BCE-5RJX].

27. *See* Justice for All Act of 2004, Pub. L. No. 108-405, §§ 201–202, 118 Stat. 2260, 2266 (codified as amended at 42 U.S.C. § 14135) (2012)); *see also* Tom Jackman, *Advocates Implore Congress to Reauthorize Funds for Rape Kits Before Sept. 30 Expiration*, WASH. POST (Sept. 7, 2019), https://www.washingtonpost.com/crime-law/2019/09/07/advocates-implore-congress-reauthorize-funds-backlogged-dna-rape-kits-before-sept-expiration/ [https://perma.cc/BKR3-L4A7].

28. Press Release, Dep't of Justice, Department of Justice Awards More Than $119 Million to Boost Forensic Science (Oct. 4, 2017). The National Institute of Justice distributes DNA backlog and capacity grants. *See DNA Capacity Enhancement and Backlog Reduction Program*, NAT'L INST. JUSTICE (July 17, 2019), https://nij.gov/topics/forensics/lab-operations/evidence-backlogs/pages/backlog-reduction-program.aspx [https://perma.cc/U2RL-JMRA].

receive funding.[29] The fees, however, may not be a predictable funding stream; many criminal defendants cannot afford to pay them. In North Carolina, payment of the required $600 fee for certain forensic testing in criminal cases has steadily declined, resulting in loss of revenue for the state crime lab.[30] In other states, criminal forfeiture is used to fund crime lab operations.[31]

B. Growth in Crime Lab Backlogs

Despite the federal grant funding designed to reduce backlogs and the enactment of new statutes to provide new funding for crime laboratories, laboratories often have not kept up with demand. Indeed, scandals have resulted when it has come to light that labs were backlogged and simply not testing evidence. The Los Angeles Police Department is the best-known example, having faced criticism for accidentally destroying over 1,000 rape kits, but the same problems have occurred in other cities.[32] In 2009, after a Human Rights Watch report and public protests, the Los Angeles County Police Department and Sheriff's Department began to work to address these backlogs. That review also uncovered that despite receiving almost $4 million in federal grant funds for backlog elimination, much of the funding remained unspent.[33]

Innocent people have been convicted (and some exonerated) where lab analysts failed to test forensic evidence that could have cleared them at the time of their trial. For example, in the case of DNA exoneree Cody Davis, the ski mask worn by the robber was not tested before Davis's criminal trial in Florida due to backlogs

---

29. JUSTICE & PUB. SAFETY APPROPRIATIONS COMM., NORTH CAROLINA STATE CRIME LABORATORY FY2015/2016 ANNUAL REPORT 11 (2017), https://www.ncleg.gov/documentsites/committees/JointAppropriationsJPS/2017%20Session/2017-03-23%20State%20Crime%20Lab/002%20DOJ_State_Crime%20Laboratory_FY_2015-2016_Annual_Report_Presentation_2017_03-23.pdf [https://perma.cc/X6T6-6MD6]; John Stith, *Judge Makes the Call on DNA Fee Even If Defendant's DNA Is in State Databank, Some Judges Require the Fee Be Paid Again*, POST-STANDARD, Apr. 8, 2007; Kirsten D. Levingston, *The Cost of Staying out of Jail*, N.Y. TIMES, Apr. 2, 2006, at A11.

30. *See* JUSTICE & PUB. SAFETY APPROPRIATIONS COMM., *supra* note 29, at 11.

31. Paul Hammel, *Feds Lift Freeze on Drug Forfeiture Money That's Helping to Pay for New $9 Million CrimeLab in Lincoln*, OMAHA WORLD-HERALD (Mar. 29, 2016), https://www.omaha.com/news/state_and_regional/feds-lift-freeze-on-drug-forfeiture-money-that-s-helping/article_214df8c9-4f65-501e-b100-277cf4b6d97e.html [https://perma.cc/79KR-DCFT].

32. Tina Daunt, *LAPD Blames Faulty Training in DNA Snafu*, L.A. TIMES (July 31, 2002), https://www.latimes.com/archives/la-xpm-2002-jul-31-me-dna31-story.html [https://perma.cc/63T2-7NTQ].

33. HUMAN RIGHTS WATCH, TESTING JUSTICE: THE RAPE KIT BACKLOG IN LOS ANGELES CITY AND COUNTY (2009), https://www.hrw.org/report/2009/03/31/testing-justice/rape-kit-backlog-los-angeles-city-and-county [https://perma.cc/NNT6-U7FC].

at the lab. Four months after his trial, DNA results cleared Davis, who was then exonerated.[34]

Perverse allocation of resources can explain these problems. What happens when you give huge federal grants to reduce backlogs? The result may be more backlogs. After all, labs that eliminate backlogs can no longer qualify for the grants. Labs have tested more and more DNA evidence to add to the federal databases using federal funds. Like the federal government, states have passed new laws requiring that DNA be collected from all people arrested and convicted of a growing list of crimes.[35] However, the backlog of requests for crime scene DNA analysis actually grew between 2011 and 2017.[36] In addition, federal money prioritized DNA testing, and as discussed, such tests are only a small part of the casework that labs actually do.[37] Most of what labs do is toxicology or DUI cases, controlled substances testing, and fingerprint comparisons, which have not received the same grant support.[38] In recent years, particularly in response to the opioid crisis, grant funds have been directed toward expanding capacity in other disciplines.[39] However, the federal DNA funding policy has certainly not been a success; according to a 2019 Government Accountability Office report, after spending nearly a billion dollars on DNA backlog elimination, backlogs grew by 85% from 2011 to 2017.[40] The report noted that despite initiatives to uncover and reduce such backlogs, particularly in sexual assault cases, it remains unknown just how many untested sexual assault kits remain nationwide.[41]

---

34. *Cody Davis*, INNOCENCE PROJECT, https://www.innocenceproject.org/cases/cody-davis/ [https://perma.cc/GJ3Z-GN2X] (last visited Oct. 15, 2019).

35. *DNA Arrestee Laws*, NAT'L CONF. ST. LEGISLATURES, http://www.ncsl.org/Documents/cj/ArresteeDNALaws.pdf [https://perma.cc/ZH2M-37FZ] (last visited Feb. 19, 2020); NATHAN JAMES, CONG. RESEARCH SERV., R41800, DNA TESTING IN CRIMINAL JUSTICE: BACKGROUND, CURRENT LAW, GRANTS, AND ISSUES 25 (2012).

36. U.S. GOV'T ACCOUNTABILITY OFF., GAO-19-216, DNA EVIDENCE: DOJ SHOULD IMPROVE PERFORMANCE MEASUREMENT AND PROPERLY DESIGN CONTROLS FOR NATIONWIDE GRANT PROGRAM 16 (2019) [hereinafter GAO, DNA EVIDENCE].

37. *See supra* text accompanying note 18; *cf.* CRIME LAB. REVIEW COMM'N, MO. DEP'T OF PUB. SAFETY, 2018 ANNUAL REP. 8 (2019), https://dps.mo.gov/documents/2018-crime-lab-comm-annual-report.pdf [https://perma.cc/X6AX-LEQ2] ("While limited federal funding is available to reduce DNA backlogs, sustainable funding is needed to address the backlogs in other forensic disciplines such as firearms, drugs and toxicology.").

38. *See* DUROSE ET AL., *supra* note 18, at 3 (describing requests to publicly funded crime labs; forensic biology casework accounted for 9% of requests).

39. *See, e.g.*, *Importance of Grant Funding!*, IDAHO ST. POLICE (Oct. 21, 2018), https://isp.idaho.gov/forensics/ [https://perma.cc/L6KG-D85M].

40. GAO, DNA EVIDENCE, *supra* note 36, at 1, 17.

41. *Id.* at 1.

III. RESOURCE ALLOCATION

Most crime-scene evidence is not tested using forensic analyses, and while forensic resources must be prioritized, evidence is too often lost or not tested in important cases in which it could play a useful role. Research suggests that important forensic evidence collected at crime scenes often goes untested.[42] Forensic evidence can go untested for a variety of reasons. There may be no probative evidence to test or the case may be solved through other means. There are cases, however, where due to police neglect or insufficient laboratory resources, crime-scene evidence that could be valuably tested is not. One study, for example, found that 40% of unanalyzed rape and homicide cases were estimated to have testable DNA evidence.[43] Evidence may not be collected from a crime scene in the first place; a large percentages of cases, including sexual assault cases, do not have evidence collected.[44] There has been a real focus in recent years on developing policies and procedures for crime-scene evidence collection.[45]

Failure to collect and test evidence can lead to unsolved cases as well as convictions of the innocent. There have been exonerations of innocent people who were convicted because laboratory analysts failed to test forensic evidence that could have cleared them by the time of their trial. An example is the case of Marlon Pendleton, who spent ten years in prison before he was

---

42. Joseph Peterson et al., The Role and Impact of Forensic Evidence in the Criminal Justice Process 9 (June 10, 2010) (unpublished report), https://www.ncjrs.gov/pdffiles1/nij/grants/231977.pdf [https://perma.cc/9FSJ-XRWX] ("A major finding of the study was that most evidence goes unexamined . . . ."); Kevin J. Strom & Matthew J. Hickman, *Unanalyzed Evidence in Law-Enforcement Agencies: A National Examination of Forensic Processing in Police Departments*, 9 CRIMINOLOGY & PUB. POL'Y 381, 391, 393 (2010) ("Approximately 14% of all the unsolved homicides reported during the 5-year period contained forensic evidence that was not analyzed by a crime laboratory (an estimated 3,975 cases). Approximately 18% of the unsolved rape cases were reported to contain forensic evidence that had not been submitted to a laboratory (an estimated 27,595 cases) . . . . Overall, DNA (40%) was the most common form of evidence contained in the unanalyzed cases.").

43. Kevin J. Strom et al., The 2007 Survey of Law Enforcement Forensic Evidence Processing 3-6 to 3-7 (Oct. 2009) (unpublished report), https://www.ncjrs.gov/pdffiles1/nij/grants/228415.pdf [https://perma.cc/ZW9A-XSSV].

44. Peterson et al., *supra* note 42, at 14–15, 90.

45. *See, e.g.*, NAT'L FORENSIC SCI. TECH. CTR., CRIME SCENE INVESTIGATION: A GUIDE FOR LAW ENFORCEMENT, at v (2013), https://www.nfstc.org/products/crime-scene-investigation-guide/ [https://perma.cc/A9LG-YF9D]; SUSAN BALLOU ET AL., NAT'L INST. OF STANDARDS & TECH., THE BIOLOGICAL EVIDENCE PRESERVATION HANDBOOK: BEST PRACTICES FOR EVIDENCE HANDLERS, at iv (2013), https://nvlpubs.nist.gov/nistpubs/ir/2013/NIST.IR.7928.pdf [https://perma.cc/72W8-LA82].

exonerated as a result of DNA evidence; at trial, the lab analyst incorrectly testified that there was insufficient evidence to test.[46]

As the American Law Institute draft principles from the Principles of Policing project emphasize, the limited availability of resources only underscores the need for policy on the prioritization of forensic testing. That policy must address the interaction of police agencies and forensics agencies. Police and crime laboratories may have different interests.

For example, agencies might adopt a rule providing that the analysis of complex DNA mixtures is only conducted in the most serious felony cases where such time-consuming work is justified. Police may desire exceptions to such a rule. Laboratories may encourage a policy based on when complex mixtures are scientifically amenable to analysis. Because police and forensic laboratories may have divergent interests, both should play a role in setting policy.[47]

Another example of competing interests can be found in the area of evidence submission. Clear rules are needed to govern when evidence must be submitted for forensic testing; police can overwhelm laboratories with evidence of insufficient quality for analysis, or fail to collect potentially valuable evidence. Policies can require an initial examination to reveal whether the evidence is of sufficient quality to conduct further testing. Police may desire faster results, but in higher priority cases, agencies may require greater accuracy checks such as use of a second analyst to confirm that the evidence is not of sufficient quality.

Currently, such practices may exist informally, and where written policies do exist, they are not transparent. Most forensic crime laboratories do not make their policies public.[48] Traditionally, however, there has been a lack of both policy and training for crime-scene evidence collection.[49]

---

46. *Marlon Pendleton*, INNOCENCE PROJECT, http://www.innocenceproject.org/cases/Marlon-Pendleton [https://perma.cc/GZ69-BFT3] (last visited Oct. 15, 2019).

47. PRINCIPLES OF THE LAW OF POLICING (AM. LAW INST.) (Council Draft No. 4, Chapter 9 on Forensic Evidence Gathering, Oct. 17, 2019).

48. Nicole Bremner Cásarez & Sandra Guerra Thompson, *Three Transformative Ideals to Build a Better Crime Lab*, 34 GA. ST. U. L. REV. 1007, 1025–26, 1055–56, 1059 (2018).

49. Frank Horvath & Robert T. Meesig, A National Survey of Police Policies and Practices Regarding the Criminal Investigation Process: Twenty-Five Years After Rand 75–77 (Nov. 2001) (unpublished report), https://www.ncjrs.gov/pdffiles1/nij/grants/202902.pdf [https://perma.cc/FZT6-FCV2] ("[I]n most agencies evidence-related duties are not assigned predominantly to any one type of individual or position. Rather, they are more likely to be shared among patrol officers . . . , investigators . . . , and evidence technicians . . . ."); Laurin, *supra* note 2, at 1081–82.

Some agencies implicitly prioritize: more labs in the past decade have introduced more of a business and management approach toward managing crime lab operations.[50] Laboratories may push requests forward when a policing agency tells the lab that it is a high priority investigation. They may test evidence in homicides or the most serious felonies first. They may send lab scientists to crime scenes just in homicide cases. They may conduct preliminary analyses to help decide whether more burdensome or expensive testing is necessary or useful. Agencies may develop procedures to halt work on cases that are dismissed in court, when there is no longer a need to conduct costly testing; the North Carolina State Crime Lab has developed such a process.[51] They may stop using certain forensic disciplines, such as handwriting or bite mark comparisons, because they are too unreliable and not worth the investment. They may substitute newer technologies for older labor-intensive methods.[52] They may outsource certain technical forensics to labs with more expertise.[53] In fact, this type of approach has resulted in an almost total privatization of forensic testing in the United Kingdom.[54] Some laboratories have undertaken efforts to improve their processes and efficiency.[55] However, resource allocation and design decisions are traditionally made ad hoc and without scientific input or a cost-benefit analysis.

The following example of a focus on reducing costs at the expense of maintaining benefits provides a cautionary tale. In the

---

50. Max M. Houck et al., *FORESIGHT: A Business Approach to Forensic Science Services*, 2 FORENSIC SCI. POL'Y & MGMT. 85, 86 (2009) ("The need for training and support in forensic laboratory management has been recognized for many years . . . , but little has been done to transition the tools of business to the forensic laboratory environment.").

51. N.C. DEP'T OF JUSTICE, NORTH CAROLINA STATE CRIME LABORATORY ANNUAL REPORT, FISCAL YEAR 2016-2017, at 13 (2017) ("The State Crime Lab continues its concerted effort to identify cases that have been disposed of in court ('stop-work cases') and no longer need forensic analysis."), https://www.ncleg.gov/documentsites/committees/JLOCJPS/Reports/FY%202017-18/DOJ_Annual_Crime_Lab_Report_FY_2016-17.pdf [https://perma.cc/AY9Q-YTS5].

52. *See* Julian et al., *supra* note 9, at 220 ("The questions of how effective one methodological approach is over another or the synergistic effects of combined methodologies have yet to be answered. Investment in infrastructure, personnel and future research into new techniques can be more effectively allocated if the value it will obtain can be predicted.").

53. Chris Maguire et al., *Efficiency and the Cost-Effective Delivery of Forensic Science Services: Insourcing, Outsourcing, and Privatization*, 3 FORENSIC SCI. POL'Y & MGMT. 62, 67–68 (2012).

54. Julian et al., *supra* note 9, at 226.

55. Paul J. Speaker, *Process Improvement and the Efficient Frontier: Forecasting the Limits to Strategic Change Across Crime Laboratory Areas of Investigation*, 8 FORENSIC SCI. POL'Y & MGMT. 109, 109 (2017).

United Kingdom, as previously noted, crime laboratory functions were largely privatized over the past two decades. In the course of adopting a "fully marketized approach," there was an estimated 60% reduction in spending on forensic testing.[56] The focus in England and Wales has been on the cost of each forensic test and turnaround times, rather than on the quality of analysis or on research, as documented by the House of Lords Science and Technology Committee in a 2019 report.[57]

A second example illustrates the connection between resource allocation and quality control in considering whether to adopt a new forensic technology, as well as the tension between law enforcement and laboratory interests. Congress enacted the Rapid DNA Act of 2017 to subsidize the use of rapid DNA testing, which can cost as little as half of what a lab-based DNA test costs.[58] As it increases in use and scale, the costs may continue to drop. Rather than requiring a lab analysis, rapid DNA testing machines can be used at a crime scene by a fairly untrained police officer. Police may prefer to get a rapid DNA result without having to wait and consult a lab. Yet, these rapid DNA tests are of unknown reliability; the few studies done to validate the equipment suggest an inability to examine mixed samples and a high percentage of cases in which evidence is consumed.[59] The result could harm serious investigations. Laboratories would be correct to raise scientific concern regarding such tests. Indeed, a number of agencies (including the entire State of Texas, based on a decision by the Texas Forensic Science Commission) have declined to use rapid DNA tests for that reason; it may be fast and cheap, but it risks accuracy and integrity of evidence.[60]

---

56. R.M. Morgan & E.A. Levin, *A Crisis for the Future of Forensic Science: Lessons from the UK of the Importance of Epistemology for Funding Research and Development*, FORENSIC SCI. INT'L, Sept. 9, 2019, at 243, 244.

57. *Id.* at 244–45 (citing SELECT COMMITTEE ON SCIENCE AND TECHNOLOGY, FORENSIC SCIENCE AND THE CRIMINAL JUSTICE SYSTEM: A BLUEPRINT FOR CHANGE, 2017–19, HL 333, at 7, 17 (UK)).

58. Ian Brown, *The Literal and Figurative Costs of Rapid DNA*, N.C. J.L. & TECH. (Sept. 13, 2017), http://ncjolt.org/literal-figurative-costs-rapid-dna/ [https://perma.cc/FZS4-HRVL].

59. *See* Heather Murphy, *Coming Soon to a Police Station Near You: The DNA 'Magic Box,'* N.Y. TIMES (Jan. 21, 2019), https://www.nytimes.com/2019/01/21/science/dna-crime-gene-technology.html [https://perma.cc/4GN8-TW5Y].

60. *Id.* (noting opposition by the National District Attorneys Association, which said that it "does not support the use of Rapid DNA technology for crime-scene DNA samples unless the samples are analyzed by experienced DNA analysts"); Paul J. Weber, *Texas Says DNA Technology Jeopardizes Cases*, SEATTLE TIMES (June 19, 2019, 9:57 PM), https://www.seattletimes.com/business/apnewsbreak-texas-says-rapid-dna-supplier-jeopardizes-cases/ [https://perma.cc/626N-XPBR] (noting that the Commission "sent a letter

Legislation can help to redirect crime lab policy and inform both police and crime laboratories. In specific settings, legislation has already done so, although not always by considering costs and benefits. In response to the serious problem of the nontesting of evidence in sexual assault cases, and with federal grant support,[61] twenty-six states have enacted statutes requiring inventories of untested evidence from sexual assault cases.[62] All but two of these statutes were enacted after 2014.[63] Inventories conducted under these laws have uncovered thousands of cases with untested evidence.[64] The concern regarding untested sexual assault kits may reflect not only the seriousness of the crimes, but the relatively low cost of DNA testing. One analysis suggests a high societal return from a policy that requires DNA testing in sexual assault cases.[65] Indeed, in some states, submitting DNA tests in sexual assault cases is required.[66] Such a rule may avoid the nontesting of DNA caused by negligence or a mistaken view that a test could not provide probative information. On the other hand, the rule may result in needless testing in cases in which DNA tests would be irrelevant.

It is noteworthy how often legislation and policy do *not* address decisions of whether to test evidence, when to audit testing, how to prioritize testing, and how to allocate costs. If empirically informed decisions were already being made, then we could have some confidence that further oversight is unnecessary. At the present time, we cannot have such confidence.

IV. QUALITY CONTROL

The National Academy of Sciences summarized the state of affairs facing forensics in the United States in 2009: "Forensic science facilities exhibit wide variability in capacity, oversight,

asking ANDE to 'cease any project in Texas involving the use of its Rapid DNA technology'").

61. The SAFER Act of 2013 authorizes the use of grants under the Debbie Smith DNA Backlog Grant Program to conduct audits of sexual assault evidence and requires the Attorney General to publish information from audits online. SAFER Act of 2013, Pub. L. No. 113-4, § 1002, 127 Stat. 127, 127–29. *See also Sexual Assault Kit Initiative (SAKI)*, BUREAU JUST. ASSISTANCE, https://www.bja.gov/ProgramDetails.aspx?Program_ID=117 [https://perma.cc/2ASV-N5LF] (last visited Oct. 13, 2019) (explaining how federal grant programs, such as SAKI, help to address crime lab backlogs).

62. GAO, DNA EVIDENCE, *supra* note 36, at 24.

63. *Id.*

64. *Id.* at 45.

65. Paul J. Speaker, *The Jurisdictional Return on Investment from Processing the Backlog of Untested Sexual Assault Kits*, FORENSIC SCI. INT'L, Feb. 20, 2019, at 19, 21.

66. GAO, DNA EVIDENCE, *supra* note 36, at 26 n.47.

staffing, certification, and accreditation across federal and state jurisdictions."[67] The focus here is not on the reliability or validity of particular forensic techniques, but rather on quality control systems for laboratories. There is a lack of "rigorous mandatory certification and accreditation programs, adherence to robust performance standards, and effective oversight."[68] The result has been a series of quality control crises in which entire laboratories have been shut down or audited in a range of jurisdictions around the country due to lack of standardization, failure to disclose probative results, rampant errors, and outright fraud. A number of labs have had to conduct substantial retrospective audits due to such quality control failures.[69] Wrongful convictions have resulted from these failures.[70] Too many laboratories "lacked quality control measures that would have detected the questionable evidence."[71]

There is little federal regulation of quality control in crime laboratories despite extensive federal grant support for those labs. To participate in the federal DNA databank, laboratories must meet quality assurance standards.[72] Such standards do not exist as a barrier to receiving federal funding generally, except that for Coverdell grants, labs are required to put in place independent auditing mechanisms.[73] However, an audit by the Office of the Inspector General found that the Office of Justice Programs (OJP) was not requiring recipients to actually comply with those requirements.[74] There was no response to this audit, except that the federal government reacted by providing labs with examples of how they could meet the requirement in the future.[75]

---

67. NAS REPORT, *supra* note 4, at 14.

68. *Id.* at 6.

69. *See id.* at 44–45.

70. *See id.*

71. *Id.*

72. *See* FBI, QUALITY ASSURANCE STANDARDS FOR FORENSIC DNA TESTING LABORATORIES (Sept. 1, 2011); FBI, QUALITY ASSURANCE STANDARDS FOR DNA DATABASING LABORATORIES (Sept. 1, 2011).

73. 42 U.S.C. § 3797k(4) (2012).

74. *See Oversight of the Justice for All Act: Hearing on S. 110-873 Before the S. Comm. on the Judiciary*, 110th Cong. 4–6 (2008) (statement of Glenn A. Fine, Inspector Gen., U.S. Dep't of Justice); OFFICE OF THE INSPECTOR GEN., U.S. DEP'T OF JUSTICE, I-2008-001, REVIEW OF THE OFFICE OF JUSTICE PROGRAMS' PAUL COVERDELL FORENSIC SCIENCE IMPROVEMENT GRANTS PROGRAM 7 (2008), http://www.justice.gov/oig/reports/OJP/e0801/final.pdf [https://perma.cc/L6EZ-AUR4].

75. *See* NAT'L INST. OF JUSTICE, U.S. DEP'T OF JUSTICE, OMB NO. 1121-0329, SOLICITATION: PAUL COVERDELL FORENSIC SCIENCE IMPROVEMENT GRANTS PROGRAM 5–8 (2010), http://www.ncjrs.gov/pdffiles1/nij/sl000921.pdf [https://perma.cc/2QJH-F6RX].

Accreditation is an essential part of quality control, although it is also not sufficient by itself to ensure minimally adequate quality. Accreditation means that "the laboratory adheres to an established set of standards of quality" and procedures. "An accredited laboratory has in place a management system that defines the various processes by which it operates . . . , monitors that activity, and responds to deviations from the acceptable practices using a routine and thoughtful method."[76] Accreditation can also require periodic proficiency testing of individual examiners.[77]

No federal accreditation system exists in the United States. Some states require that their labs be accredited, but it is otherwise voluntary.[78] The National Commission on Forensic Science (NCFS) strongly recommends that all Forensic Science Service Providers (FSSPs) become accredited. Doing so can promote compliance with industry best practices, promote standardization, and improve the quality of services provided.[79] The American Bar Association similarly has recommended that "[c]rime laboratories and medical examiner offices should be accredited, examiners should be certified, and procedures should be standardized and published to ensure the validity, reliability, and timely analysis of forensic evidence."[80] Accreditation has become far more common among crime laboratories in the United States. In 2014, nearly nine in ten (88%) of "the nation's 409 publicly funded forensic crime laboratories were accredited by a professional forensic science organization." This number was up from "82% in 2009 and 70% in 2002."[81] Eighty-three percent of crime labs held an international accreditation standard in 2014.[82] "International accreditation programs are based on the

76. NAS REPORT, *supra* note 4, at 195.

77. *See id*.

78. *See, e.g.*, OKLA. STAT. ANN. tit. 74, § 150.37 (2017) ("All forensic laboratories . . . shall be accredited . . . ."); MINN. STAT. § 299C.157 (2019) ("A forensic laboratory . . . must (1) be accredited by an accrediting body . . . ."); NEB. REV. STAT. § 71-683 (2001) ("[A]ll forensic DNA laboratories performing work on behalf of the state or a political subdivision shall be accredited . . . .").

79. *See* NAT'L COMM'N ON FORENSIC SCI., U.S. DEP'T OF JUSTICE, UNIVERSAL ACCREDITATION 1 (2016), https://www.justice.gov/archives/ncfs/page/file/624026/download [https://perma.cc/ED84-72SL].

80. AM. BAR ASS'N, CRIMINAL JUSTICE SECTION, ACHIEVING JUSTICE: FREEING THE INNOCENT, CONVICTING THE GUILTY 47 (2006).

81. ANDREA M. BURCH ET AL., BUREAU OF JUSTICE STATISTICS, NCJ 250152, PUBLICLY FUNDED FORENSIC CRIME LABORATORIES: QUALITY ASSURANCE PRACTICES, 2014, at 1 (2016), https://www.bjs.gov/content/pub/pdf/pffclqap14.pdf [https://perma.cc/G2WZ-P9C8].

82. *See id.* at 3.

International Organization for Standardization (ISO) and have more rigorous requirements than noninternational standards."[83] "Since 2009, the proportion of crime labs with an ISO-based accreditation standard increased from 27% to 83%."[84]

Sound quality control also requires that forensic practitioners be "certified in all categories of testing in which examinations are performed . . . provided a certification examination is available."[85] The certification of individuals complements accreditation, and like accreditation, it is a useful step but not sufficient to ensure that proficient examiners are conducting forensic work. Other professionals in the fields of science and technology, such as "nurses, physicians, professional engineers, and some laboratorians, typically must be certified before they can practice."[86] The idea of certification finds support in the forensics community, including the Technical Working Group on Forensic Science Education and the International Association for Identification.[87] Analyst certification is more common. In 2014, 72% of "crime labs employed at least one externally certified analyst," up 12% from 2009.[88]

Cognitive bias is only now becoming a central part of quality control at crime laboratories. Psychological research has shown that, where forensic techniques involve some degree of judgment and interpretation, experts are vulnerable to cognitive bias.[89] Adoption of procedural protections can reduce such bias. For example, a linear sequential approach has been developed for comparative pattern disciplines. The PCAST Report recommends this approach for latent fingerprint comparisons: "Examiners should be required to complete and document their analysis of a latent fingerprint *before* looking at any known fingerprint and should separately document any additional data used during their comparison and evaluation."[90] A second protection is to ensure

83. *Id.* at 2.

84. *Id.* at 3.

85. NAT'L COMM'N ON FORENSIC SCI., U.S. DEP'T OF JUSTICE, VIEWS OF THE COMMISSION: CERTIFICATION OF FORENSIC SCIENCE PRACTITIONERS 2 (2016).

86. NAS REPORT, *supra* note 4, at 208.

87. *Id.* at 209.

88. BURCH ET AL., *supra* note 81, at 1.

89. PCAST REPORT, *supra* note 3, at 31 ("Studies have demonstrated that cognitive bias may be a serious issue in forensic science.").

90. *Id.* at 10; *see also* Itiel E. Dror et al., *Context Management Toolbox: A Linear Sequential Unmasking (LSU) Approach for Minimizing Cognitive Bias in Forensic Decision Making*, 60 J. FORENSIC SCI. 1111, 1111 (2015) (describing how to manage potential bias in examining reference samples); Dan E. Krane et al., *Sequential Unmasking: A Means of Minimizing Observer Effects in Forensic DNA Interpretation*, 53 J. FORENSIC SCI. 1006,

that potentially biasing task-irrelevant information is not passed on to lab analysts.[91] As the NCFS explains: "Information is task-irrelevant if it is not necessary for drawing conclusions about the propositions in question, or if it assists only in drawing conclusions from something other than the physical evidence designated for testing or by some means other than an appropriate analytic method." Separation of roles within a laboratory can help keep task-irrelevant information from biasing analysts.[92]

Blind testing can provide an integral part of an effective quality assurance program. It is one of many measures used by laboratories to monitor performance and to identify areas in which improvement may be needed. A testing program is a method of verifying that the laboratory's technical procedures are valid and that the quality of work is being maintained. As the NAS Report explains:

> There are several types of proficiency tests, with the primary distinction among them being whether the examiner is aware that he or she is being tested (an open or declared test) or does not realize that the sample presented for analysis is a test sample and not a real case (a blind test). Tests can be generated externally, by another laboratory (sometimes called an interlaboratory test), or internally. Another type of testing involves random case reanalysis, in which an examiner's completed prior casework is randomly selected for reanalysis by a supervisor or another examiner.[93]

Blind testing can determine the performance of individual analysts, monitor laboratories' continuing performance, and "identify problems in laboratories and initiate remedial actions." Such actions may, for example, relate to individual staff performance or systemic issues such as the calibration of instrumentation or "the effectiveness and comparability of new tests or measurement methods."[94]

The following illustrates the state of testing in U.S. crime labs during the last two decades:

> In 2014, 98% of crime labs conducted [staff] testing, which was similar to 2009 (97%) and 2002 (97%). As in previous

1006 (2008) (explaining that analysts' exposure to information about the suspects may give rise to confirmatory bias).

91. NAT'L COMM'N ON FORENSIC SCI., U.S. DEP'T OF JUSTICE, ENSURING THAT FORENSIC ANALYSIS IS BASED UPON TASK-RELEVANT INFORMATION 4 (2015), https://www.justice.gov/archives/ncfs/file/818196/download [https://perma.cc/GE4F-S552].

92. *See* Dror et al., *supra* note 90.

93. NAS REPORT, *supra* note 4, at 207.

94. *Id*.

> years, nearly all (95%) crime labs evaluated the technical competence of employees through declared examinations. The percentage of crime labs that conducted random case reanalysis in 2014 (35%) was similar to that reported in 2009 (34%), but a decrease from 2002 (54%). The proportion of crime labs conducting blind examinations decreased from 27% in 2002 to 10% in both 2009 and 2014.[95]

All accredited DOJ FSSPs are required to participate in a proficiency testing program.[96]

Much of the existing testing is not rigorous enough. "Although many forensic science disciplines have engaged in . . . testing for the past several decades, several courts have noted that . . . testing in some disciplines is not sufficient[]."[97] Labs themselves often do not have good information about the performance of their analysts. Performance testing can assess the methods used, the accuracy of individual examiners, and lab systems and processes.[98] For tests designed to measure accuracy, in particular, it is important for tests to be representative of the challenges of forensic casework. It is equally important for test takers to utilize standard operating procedures when performing testing. Test results can be a valuable tool in guiding new research. Test providers should be willing to share their data in the aggregate. They also should strive to collect demographic data and method/process information and should employ standard report wording to enable a meaningful review of the population's results as an indicator of the strength of the proficiency test or the competence of the forensic community as it relates to that test (e.g., methodology or technology used).[99]

Moreover, some crime laboratories have not assumed responsibility for carefully correcting all errors, such as notifying legal actors that errors were made. Errors include inaccurate results, failures to follow procedures, and nonconformities, as well as misconduct by staff. The quality control process is intended to help a lab identify problems. In response to errors, one important international standard, ISO 17025, recommends only that the lab

---

95. BURCH ET AL., *supra* note 81, at 4 (citation omitted).

96. NAT'L COMM'N ON FORENSIC SCI., U.S. DEP'T OF JUSTICE, RECOMMENDATION TO THE ATTORNEY GENERAL: PROFICIENCY TESTING 1 (2016).

97. NAS REPORT, *supra* note 4, at 206.

98. *See* HUMAN FACTORS COMM., ORG. OF SCI. AREA COMMS., DRAFT GUIDANCE ON TESTING THE PERFORMANCE OF FORENSIC EXAMINERS 1–2 (2018), https://www.nist.gov/sites/default/files/documents/2018/05/21/draft_hfc_guidance_document-may_8.pdf [https://perma.cc/NP7P-F59B].

99. *See id.* at 8–18.

"address the consequences."[100] An agency, however, should go beyond addressing the consequences of an error in some undefined way by adopting an explicit rule that staff must remediate the error, nonconformity, or misconduct. This must include notifying counsel and the court to ensure justice.

V. THE ROLE OF REGULATION

The problems of resource allocation and quality control should be viewed as connected. Each of these quality control efforts—from policy and procedures concerning testing and prioritizing evidence to crime scene collection, accreditation, and blind verification and testing—cost something. We often know not what they cost but must consider the alternative cost of poor resource allocation and inadequate quality controls, which may result in untested or poorly tested evidence. False negatives, where no correct match is made, are a common forensic error, as are false inconclusive results.[101] The failure to connect evidence to crimes may go undetected but can create enormous social costs.

The costs of errors are not normally factored into the management of a crime lab as they are for a corporation, medical laboratory, or hospital. Indeed, information about errors typically does not exist for crime laboratories as it does for clinical laboratories. In 1967, Congress enacted the Clinical Laboratory Improvement Act (CLIA) to ensure that all federally funded medical labs conducted accurate tests.[102] Over the years, the blind testing requirements of that legislation have been strengthened.[103] Nothing of the kind exists for forensics in the United States, although other countries have adopted testing regimes.[104]

An exception is Dr. Peter Stout from the Houston Forensic Science Center (HFSC), who has posed the question of how

100. INT'L ORG. FOR STANDARDIZATION, ISO/IEC 17025:2017(E), GENERAL REQUIREMENTS FOR THE COMPETENCE OF TESTING AND CALIBRATION LABORATORIES, at 8.7.1.a (2017).

101. *See* Brandon L. Garrett & Gregory Mitchell, *The Proficiency of Experts*, 166 U. PENN. L. REV. 901, 919–20, 930 (2018) (discussing results from commercial proficiency tests).

102. Clinical Laboratories Improvement Act of 1967, Pub. L. No. 90-174, 81 Stat. 536 (1967) (codified as amended in scattered sections of 42 U.S.C.).

103. *See* Clinical Laboratory Improvement Amendments of 1988, Pub. L. No. 100-578, 102 Stat. 2903; 42 C.F.R. § 493.1 (2014) (establishing regulatory requirements laboratories must meet to perform human specimen testing); CTRS. FOR MEDICARE & MEDICAID SERV., WHAT DO I NEED TO DO TO ASSESS PERSONNEL COMPETENCY? 2 (2012), https://www.cms.gov/Regulations-and-Guidance/Legislation/CLIA/Downloads/CLIA_CompBrochure_508.pdf [https://perma.cc/VFB4-RTFD].

104. *See* Garrett & Mitchell, *supra* note 101, at 955, 957–58.

accurate a crime laboratory must be to justify its costs. He has asked whether a system that makes an error one in a hundred times is good enough. Given the stakes, Stout has described how he is aiming for a one in five thousand system.[105] Conducting blind tests, which the HFSC seeks to do in 5% of its cases, costs between $500,000 to $1 million per year.[106] However, as Stout explains, crime labs seek to prevent both costly crimes and wrongful convictions. And these accuracy checks mean that he can say with 95% confidence that the error rate is less than 0.2%.[107] Further, a single error that results in a wrongful conviction, like the George Rodriguez case, could cost $9 million, and a murder that occurs due to delay in testing could result in costs of $5 million to $14 million.[108] While making all of these improvements to processes and quality controls, the HFSC has made quality related documents and its processes public.[109] Rebuilding the lab from the ground up as an independent corporation permitted the lab to adopt a more management-oriented approach toward forensics.

Regulation could help guide forensics by requiring that such costs and benefits be used in a more considered fashion. Funding could be allocated in ways that satisfy public priorities for police agencies and crime laboratories. Funding could support the use of such quality programs to both improve accuracy and prevent backlogs or failure to test evidence due to shoddy work. Currently, the priorities are largely focused on expanding capacity for certain types of testing at the expense of others and without making quality control or research a priority. Tellingly, federal funds may not be used for such quality controls, or more generally, for research that might improve the use of forensics. Many of the existing federal grants can only be used to reduce backlogs and implement new technologies and processes.[110] As a result, the percentage of crime labs that do any research is small; in 2014, only 14% of publicly funded crime labs had any resources dedicated to research.[111]

105. Dr. Peter Stout, President & CEO, Hous. Forensic Sci. Ctr., The Recovery of Houston at the 2017 International Forensic Science Error Management Symposium (July 24, 2017), https://www.nist.gov/news-events/events/2017/07/2017-international-forensic-science-error-management-symposium [https://perma.cc/S64G-A44Z].

106. *Id*.

107. *Id*.

108. *Id*.

109. *Id*.

110. *See* NAT'L INST. OF JUSTICE, *supra* note 26, at 4–5.

111. BURCH ET AL., *supra* note 81, at 6.

Federal and state regulations can create and monitor quality standards. The NAS Report described an urgent need for forensic science research, national scientific standards, and stronger oversight and quality control of our entire system of forensics. The report called for Congress to create and fund a National Institute of Forensic Science. Those recommendations were never followed. To be sure, a full cost-benefit analysis concerning the creation of the National Institute of Forensic Science was never conducted by the National Academy of Sciences Committee, which admitted that it was "not in a position to estimate how much it will cost to implement the recommendations in this report."[112]

In recent years, however, the federal government has increased funding for forensic science research through the National Institute of Standards and Technology (NIST).[113] NIST created a large research collaborative named the Center for Statistics and Applications in Forensic Evidence (CSAFE) that conducts research on everything from fingerprint and shoe print statistics to jury behavior, and has formed new collaborations with crime labs.[114] NIST also began to convene a large set of scientific working groups to develop standards for all of the forensic disciplines called the Organization of Scientific Area Committees (OSAC), but that process has proceeded fairly slowly and resulted in few standards.[115] The NCFS "provided an essential forum . . . to improve the forensic sciences[,]" and issued many

112. NAS REPORT, *supra* note 4, at 13, 53, 81–82, 203, 206; Rebecca McCray, *Jeff Sessions' Rejection of Science Leaves Local Prosecutors in the Dark*, SLATE (June 7, 2017, 9:45 AM), https://slate.com/news-and-politics/2017/06/disbanding-the-ncfs-will-lead-to-worse-outcomes.html [https://perma.cc/KF3Y-R4U2] (reporting on the defunding of the NCFS which was created partially in response to the report before enacting recommended standards).

113. *See NIST Appropriations Summary FY 2017 – FY 2019*, NAT'L INST. STANDARDS & TECH. (Mar. 11, 2019), https://www.nist.gov/director/congressional-and-legislative-affairs/nist-appropriations-summary-fy-2017-fy-2019-0 [https://perma.cc/5MGY-HQ6T].

114. Alicia Carriquiry, *CSAFE: Center for Statistics and Applications in Forensic Evidence*, NAT'L INST. STANDARDS & TECH., https://www.nist.gov/system/files/documents/2016/12/05/csafe_center_for_statistics_and_applications_in_forensic_evidence.pdf [https://perma.cc/FAD6-9XZJ] (last visited Feb. 19, 2020); Susan M. Ballou, *Focus on the Evolution of Forensic Evidence*, 6 VA. J. CRIM. L., no. 2, 2018, at 14, 17.

115. *The Organization of Scientific Area Committees for Forensic Science*, NAT'L INST. STANDARDS & TECH., https://www.nist.gov/topics/organization-scientific-area-committees-forensic-science [https://perma.cc/2BXP-4MLE] (last visited Feb. 19, 2020); *ASA's Comments on Forensic Science in Response to Request for Information on the Development of the Organization of Scientific Area Committees (OSAC) for Forensic Science 2.0*, AM. STAT. ASS'N (Oct. 30, 2017), https://www.amstat.org/asa/files/pdfs/POL-OSAC2_RFI_FINAL.pdf [https://perma.cc/GP87-ZZAJ].

recommendations until it was shut down in January 2017 with "work to be done."[116]

At the state level, thirteen states and Washington D.C. have created forensic science commissions: Arkansas, Delaware, Maryland, Minnesota, Missouri, Montana, New York, New Mexico, North Carolina, Rhode Island, Texas, Virginia, and Washington.[117] Few of these groups, however, actually conduct oversight of forensic methods and work. Only the Missouri, Texas, and Washington commissions and the Washington D.C. Science Advisory Board, themselves review complaints.[118] Others delegate the investigatory responsibilities, conduct accreditation, or consist of advisory bodies that meet infrequently.[119] Most recently, Massachusetts and Michigan are considering creating commissions that would set standards, investigate the validity of forensic techniques, and investigate and report on any errors or

116. NAT'L COMM'N ON FORENSIC SCI., U.S. DEP'T OF JUSTICE, REFLECTING BACK—LOOKING TOWARD THE FUTURE 5, 10 (2017), https://www.justice.gov/archives/ncfs/page/file/959356/download [https://perma.cc/75YB-5J3T].

117. *See* ARK. CODE ANN. §§ 12-12-301 to 302 (creating a State Crime Laboratory Board); D.C. CODE ANN. §§ 5-1501.02, .11–.14 (West Supp. 2012) (creating a Science Advisory Board and Stakeholder Counsel to supervise the Department of Forensic Sciences); DEL. CODE ANN. tit. 29, § 4714 (2019); MD. CODE ANN., HEALTH–GEN. § 17-2A-12 (LexisNexis 2009) (establishing a Forensic Laboratory Oversight Committee); MO. ANN. STAT. § 650.059.1 (West Supp. 2013); N.C. GEN. STAT. § 114-61 (LEXIS through Session Laws 2018-146 of the 2018 Regular Session and the 1st, 2d, and 3d Extraordinary Sessions of the General Assembly); N.M. STAT. ANN. § 29-16-5 (Supp. 2013) (establishing the DNA identification system oversight committee); N.Y. EXEC. LAW § 995-a(1) (McKinney 2013); R.I. GEN. LAWS § 12-1.1-3 (2002) (establishing the State Crime Laboratory Commission); VA. CODE ANN. §§ 9.1-1109(A), -1110(A)(1), (4) (2012); TEX. CODE CRIM. PROC. ANN. art. 38.01 § 1; WASH. REV. CODE § 43.103.030 (2019) (establishing the Washington state forensic investigations council); MINN. STAT. ANN. § 299C.156 (West 2007) (establishing a Forensic Laboratory Advisory Board) (repealed 2014); FORENSIC SCI. DIVISION, MONT. DEP'T OF JUSTICE, ANNUAL REPORT 5 (2017), https://media.dojmt.gov/wp-content/uploads/2017-FSD-Annual-Report-1.pdf [https://perma.cc/7TNK-V4GK].

118. D.C. CODE § 5-1501.12(1) (West Supp. 2012) (providing that the Science Advisory Board shall "[r]eview all reports of allegations of professional negligence, misconduct, or misidentification or other testing error that occurred . . . at the Department [of Forensics]"); MO. ANN. STAT. § 650.059.1 (West Supp. 2013) (providing for "independent review of any state or local Missouri crime laboratory receiving state-administered funding"); TEX. CODE CRIM. PROC. ANN. art. 38.01 § 4(a)(3) (stating that the commission shall "investigate, in a timely manner, any allegation of professional negligence or professional misconduct that would substantially affect the integrity of the results of a forensic analysis conducted by a crime laboratory"); WASH. REV. CODE § 43.103.090(1)(g) (2019) (providing the state forensic investigations council the power to "[d]o anything, necessary or convenient, which enables the council to perform its duties and to exercise its powers").

119. For an overview of responsibilities of state forensic science commissions, see FORENSIC TECH. CTR. OF EXCELLENCE, STATE FORENSIC SCIENCE COMMISSIONS 14, 16, 32–35, 38 (2016), https://www.txcourts.gov/media/1440422/nij-report-state-forensic-science-commissions.pdf [https://perma.cc/QGS4-4DKZ].

negligence at crime labs.[120] Such commissions could take on a larger guiding and regulatory role, and could ensure that more information is released concerning quality incidents, case flow, and budgets. In the past, such commissions have not done so.

VI. CONCLUSION

A very small fraction of the approximately $2 billion spent annually on forensics just at public crime laboratories is dedicated toward quality controls and improving processes in forensics. Instead, funding has been directed toward expanding capacity, reducing backlogs, and increasing submission to federal forensics databanks.[121] The result has been predictable: growing capacity but larger backlogs and insufficient quality control. Labs have grown bigger, all too often without becoming better. Instead, resources should be directed to studying which forensic techniques produce benefits that justify their costs. We should know far more about how crime labs are performing and what their budgets consist of. Crime labs and forensics work is a prominent part of the criminal justice system. Its costs, benefits to the public, and quality should all be the subject of far more study and public information.

We cannot improve laboratories if they remain a black box regarding methods, performance of analysts, budgets, and results. Police agencies, which for too long were not evidence-informed, provide the wrong entity to supervise crime laboratories, as many have observed.[122] However, public safety and law enforcement interests should be taken into account just as those of crime laboratories. Without information about cost and benefits or policies in place to guide decision-making, we cannot begin the process of making forensic management more evidence-informed. We expect sound science from our forensic laboratories. The same scientific methods should inform how we manage laboratories to best serve the interests of justice.

120. S. 2371, 189th Gen. Court (Mass. 2018); H.R. 6026, 99th Leg., Reg. Sess. (Mich. 2018).

121. For a discussion of the federal interest in database expansion, see Abrams & Garrett, *supra* note 25, at 778–83.

122. *See, e.g.*, NAS REPORT, *supra* note 4, at 44; *see also* THOMPSON, *supra* note 6, at 86–87.