

Forensic Technology Center of Excellence



The Forensic Technology Center of Excellence (FTCoE) is a collaborative partnership of RTI International and its FEPAC [Forensic Science Education Programs Accreditation Commission]–accredited academic partners: Duquesne University, Virginia Commonwealth University, and the University of North Texas Health Science Center. In addition to supporting the National Institute of Justice’s (NIJ’s) research and development (R&D) programs, the FTCoE provides testing, evaluation, technology transition assistance, and other services for use by crime laboratories, forensic service providers, law enforcement, and other criminal justice agencies whose mission is to combat crime. NIJ funds the FTCoE to transition forensic science and technology to practice (Award Number 2011-DN-BX-K564).



The FTCoE is led by RTI, a global research institute dedicated to improving the human condition by turning knowledge into practice. With a staff of more than 3,700 providing research and technical services to governments and businesses in more than 75 countries, RTI brings a global perspective. The FTCoE builds on RTI’s expertise in forensic science, innovation, technology application, economics, data analytics, statistics, program evaluation, public health, and information science.

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1. OVERVIEW

On September 11–12, 2014, the National Institute of Justice (NIJ) convened a meeting with crime laboratory directors from various regions of the United States to gather information on strengthening the DNA Capacity Enhancement and Backlog Reduction (DNA) and Paul Coverdell Forensic Science Improvement Grants (Coverdell) programs. The focus of this meeting was to facilitate discussions related to the DNA and Coverdell programs, which are considered to be two critical sources of funding for laboratory operations. NIJ is the federal government's lead agency for forensic science research and development, as well as the administration of programs that facilitate the improvement of laboratory efficiency and reduce backlogs. Within NIJ, the Office of Investigative and Forensic Sciences (OIFS) has the distinct role of leading efforts to address the needs of our nation's forensic science community.

The impetus of the meeting originated from internal discussions to develop new strategies for strengthening the DNA and Coverdell programs. NIJ staff have been focusing their efforts on evaluating performance measures that accurately reflect the impact of the programs; however, if NIJ were to move forward with any major changes to either program, the agency felt that it was critical to gather information from stakeholders and to carefully consider potential ramifications. NIJ made initial contact with leadership from the American Society of Crime Laboratory Directors (ASCLD), which is a nonprofit professional association of approximately 550 crime laboratory directors and forensic science managers that represent more than 250 local, state, federal, and private crime laboratories in the United States. The purpose of the organization is to foster professional interests; assist in the development of laboratory management principles and techniques; acquire, preserve, and disseminate forensic-based information; maintain and improve communications among crime laboratory directors; and promote, encourage, and maintain the highest standards of practice in the field.¹

NIJ, through the Forensic Technology Center of Excellence (FTCoE), worked with ASCLD to select a diverse and representative group of laboratory directors. The initial selection criteria was based on identifying laboratories that received both DNA and Coverdell grants. Through the DNA program, NIJ provides funding to approximately 200 accredited biology/DNA laboratories, and there is a cross-section of agencies and laboratories that also receive Coverdell funding. From this latter group (i.e., funds received from both the DNA and Coverdell programs), FTCoE selected representatives from approximately 20% of the laboratories, taking into account their geographic diversity and whether the crime laboratory was state, county, or municipal. As a result, twenty-five (25) laboratory directors were selected representing thirteen (13) states, three (3) counties, seven (7) cities, one (1) region, and the District of Columbia. It is important to note that different laboratories operate under their own jurisdictional requirements and may have varying policies and procedures related to the administration of grant funds. Therefore, the challenges identified in this document may not represent the views of all participants or the laboratories not represented.

1.1 DNA Program

The primary goals of the DNA program are to (1) provide funding to States and units of local government with existing crime laboratories that conduct DNA analysis to process, record, screen, and analyze forensic DNA and/or DNA database samples, and (2) to increase the capacity of public forensic DNA and DNA database laboratories to process more DNA samples, thereby helping to reduce the number of

¹ <http://www.asclcd.org/>.

samples awaiting analysis. Crime laboratories' capacity to process DNA evidence continues to grow due to increased automation, hiring of more personnel, use of overtime, and improved testing procedures and methods; however, the demand for DNA testing continues to rise, resulting in persistent backlogs.

Under this program, eligible applicants are given the opportunity to determine what portion of their anticipated funding should be used for capacity-building purposes and what portion should be used for analysis of forensic DNA, DNA database samples, or both. Under the current program, a peer-review process to evaluate the merits and needs of applicants is not used. Funds are allocated to States based on a formula from the number of Uniform Crime Report (UCR) Part 1 Violent Crimes reported to the FBI and a minimum aggregate amount is available to eligible applicants from each State. If the aggregate amount based on the UCR Violent Crimes reported is less than \$200,000, NIJ expects to increase that amount to \$200,000.² Once the funds are allocated to States based on this formula, eligible laboratories within the State must decide on the allocation of funds within the State.

1.2 Coverdell Program

It is important to note that not only does the demand for DNA analysis continue to increase, but the vast majority of requests submitted to public forensic laboratories are for non-DNA evidence such as controlled substances, toxicology, latent prints, firearms, trace evidence, and crime scenes. The *Census of Publicly Funded Forensic Crime Laboratories, 2009*, showed that 66% of requests for forensic services are for activities not related to DNA.³ To address this need, in part, NIJ provides funding through the Coverdell program to improve the quality and timeliness of forensic science and medical examiner services, including services provided by laboratories operated by the States and by units of local government. In addition, the Coverdell program provides funding to implement new technologies and train forensic scientists.

State administering agencies (SAAs) may apply for both "base" (formula) and competitive funds. Units of local government may apply for competitive funds.⁴ The formula by which funds are distributed to SAAs is based on State population. The competitive portion is based on a peer-review process to evaluate the merits and needs of an applicant. Twenty-five percent of the available funds will be allocated among States and units of local government through a competitive process. The average annual number of Part 1 violent crimes reported to the FBI, existing resources, and current needs of the potential grant recipient are considerations in award decisions. The SAA is the agency within the executive branch that is designated to accept, plan, and distribute criminal justice funds by leveraging both state and federal grant funding to fulfill the needs of the state and local criminal justice systems.

² www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2011/crime-in-the-u.s.-2011/tables/table-5.

³ <http://www.bjs.gov/content/pub/pdf/cpffcl09.pdf>.

⁴ National Institute of Justice. (2014, August 29). *Coverdell Forensic Science Improvement Grants Program*. Retrieved from <http://www.nij.gov/topics/forensics/lab-operations/capacity/nfsia/Pages/welcome.aspx>

2. OBJECTIVES

The main objective of the meeting was to gather information from grantees that could be used to develop strategies to strengthen the DNA and Coverdell programs, and to promote the effective use and timely expenditures of grant funds. The open forum was used to facilitate discussions about understanding the needs and challenges related to the DNA and Coverdell programs.

3. TOPICS DISCUSSED

The topics outlined below were discussed at the meeting.

Topic: Overview of NIJ's programs and strategic approach to addressing the needs of the forensic science community

The meeting began with an overview of programs administered by OIFS. In past years, NIJ has received annual appropriations to be used for various DNA and other forensic science activities, including DNA analysis and laboratory capacity enhancement, as well as forensic activities such as research, development, and evaluation. These activities directly support NIJ's efforts to provide knowledge and tools to reduce crime and improve public safety by improving the quality and practice of forensic science. NIJ explained their strategic approach to allocating funds each year, which is discussed in the NIJ Report entitled, *Fiscal Year 2012 Funding for DNA Analysis, Crime Laboratory Capacity Enhancement and Other Forensic Activities*.⁵

Topic: Facilitated discussion and overview of administering the DNA Capacity Enhancement & Backlog Reduction and Paul Coverdell Forensic Science Improvement Grants programs.

A facilitated discussion began with NIJ presenting an overview of the DNA and Coverdell programs. The open dialogue was important for NIJ to better understand the needs and challenges experienced by forensic laboratories. Also, it was an opportunity for the laboratory directors to gain a greater understanding of the reasons for certain discretionary programmatic decisions and the grant management requirements for each program.

The laboratory directors were resounding in their view that the two programs are critical to their operations. Without federal grant funds from the DNA and Coverdell programs, laboratories would have significant struggles increasing capacity and, as a result, managing backlogs. However, as discussed above, forensic laboratories are faced with extensive backlogs of non-DNA evidence, but annual appropriations for Coverdell grants have not been sufficient to address this need.

Challenges Identified:

i) Jurisdictional differences with respect to procurement and administrative processes

Each laboratory has different needs requirements and different policies for procurement and administrative processes within their respective jurisdictions. In addition, some laboratory directors indicated that they must adhere to policies that do not allow for the hiring of full-time equivalents with grant funds. Although they are permitted to use funds for overtime, there are limitations with respect to effectively increasing capacity (and thereby reducing backlogs) through the persistent use of overtime hours.

ii) Period of performance (grant award period)

⁵ <https://ncjrs.gov/pdffiles1/nij/244196.pdf>

A majority of the laboratory directors also acknowledged that a short grant period, such as one (1) year, would be a challenge. NIJ has data that confirms that grantees rarely expend all of their Coverdell funds within 1 year. In fact, some of the laboratory directors acknowledged that the 2-year period of performance recently instituted in the DNA program is challenging to effectively use grant funds in a timely manner. This presents a conflicting challenge for NIJ and laboratories since appropriations for the program are made yearly. Often, it is far more effective for grantees to have longer timeframes to spend funds because of the unique challenges placed upon them by governmental infrastructures; however, it is a tremendous burden on government resources when multiple awards from multiple years by the same grantee remain open and active. In fact, NIJ data confirm that many grantees have open awards from fiscal year FY 2011, FY 2012, and FY 2013. To the contrary though, there are laboratories that are able to expend all of their funding in the allotted project period. NIJ recently implemented a 2-year period of performance for the DNA program because managing three awards per grantee was not practical or sustainable for NIJ. Limiting the period of performance means that all unspent funds will be deobligated without allowing for multi-year, no-cost extensions.

Discussion indicated a belief that extending the grant period for both programs may allow laboratories to develop more effective strategic plans and possibly allow laboratories to hire additional staff. Furthermore, an extended period of performance would allow laboratories to better track performance metrics on the grant funding, as many of the hits in the Combined DNA Index System (CODIS) that result from grant funding occur well after the grant funding period has ended. Extensions to the periods of performance would also help both the laboratories and the grant managers by staggering grants to reduce the overall number of open awards at any given time; as multiple open awards make the process of tracking performance metrics, financial management oversight, and award impact more difficult.

iii) Limitations on the scope of funding in the DNA Program

Another challenge identified was the limitations on the scope of how funds can be used. The DNA and Coverdell programs have allowable and unallowable costs based upon legislative requirements, program objectives, and legal restrictions on the use of federal grant funds. Many participants found that the restrictions placed upon the DNA funding (e.g., limitations on the purchase of certain items or equipment) to be too confining to allow for the most beneficial use of the funding. For example, the procurement of complete Laboratory Information Management Systems (LIMS) is an unallowable expense (the purchase of upgrades and maintenance costs associated with a DNA module is allowable). Based on NIJ's past experiences, purchasing, procurement, and implementation of a LIMS for an entire laboratory operation can take several years, requiring multiple no-cost extensions, which will then result in having an award open for several years. However, it was voiced that the addition of a LIMS system would significantly benefit the laboratories in allowing them to manage work flow, which would assist with backlog reduction. There is a conflicting challenge when it comes to allowable and unallowable items. Some items like the LIMS system provide great benefit to the laboratory (e.g., extraction robots); however, a lengthy procurement for some labs has caused grantees to file for numerous extensions to their awards.

Many laboratories offer a full range of forensic services in addition to forensic biology/DNA, including drug chemistry/controlled substances; forensic toxicology; firearms and tool marks; latent prints; trace evidence; digital evidence; and crime scene. Therefore, the DNA program does provide a unique challenge because allowable activities must be directly related to DNA functions of the laboratories. DNA grants at this time cannot be used for other forensic

disciplines; however, testing in other forensic disciplines affects the turnaround time for DNA testing. In some cases, items of evidence must be analyzed in other sections of the laboratory before moving to DNA analysis, so the delay in another part of the laboratory will ultimately result in a greater delay in DNA testing.

Also, evidence submissions can often be complex such that multiple items can be submitted from the same case, but require various types of forensic testing. For example, drug-facilitated sexual assaults not only require forensic biology and DNA analysis, but may also require toxicological analysis to determine if a "date-rape" drug was ingested. Also, there are many sexually violent crimes that involve other types of evidence, such as firearms, latent prints, and trace evidence, in addition to requests for DNA testing.

The laboratory directors indicated that the greatest advantage of the Coverdell program is the breadth of discretion on how funds can be used since, unlike the DNA program, Coverdell funds can be used to improve the quality and timeliness of non-DNA forensic testing. However, the limited amount of funding associated with the Coverdell program in recent years has diminished the impact on laboratories. Several of the participants indicated that the Coverdell grant funding could have a greater impact if laboratories received larger grant awards to be used over a 3- to 5-year period to enable investment in new technology and equipment. This change would allow both small and large laboratories to invest in new equipment and implement more innovative solutions and technologies.

iv) The need for training and continuing education

Training and continuing education are critical for all laboratories and are a requirement of any accreditation program. Forensic laboratories must hire and retain qualified personnel who have the integrity necessary in the practice of forensic science. Proper training and individual certification provides confidence and assurance that the forensic practitioner can meet the stringent knowledge, skill, and ability requirements for his/her discipline(s).⁶

Most agencies faced challenges in meeting the continuing education and training needs of their staff. Agencies participating in the DNA Program may not use more than 3% of the total award funds for travel and registration expenses for appropriate continuing education or training opportunities associated with professional meetings and conferences, including workshops provided at these events.⁷ In recent years, forensic laboratories have resorted to the use of Coverdell grants for training and continuing education because of the overall reduction in national resources.

Topic: Establishing accurate and verifiable performance measures that are reflective of the impact of federal funds

In 2013, the Government Accountability Office (GAO) reported to Congressional committees its analysis of DOJ's capacity enhancement efforts and DNA Backlog Reduction Program in GAO 13-605. In addition to other questions, the GAO analysis sought to address the methods, strategies, and procedures that NIJ uses to verify data on grant results submitted by grantees and to measure the outcomes of the DNA Backlog Reduction Program.

⁶ ASCLD Position Statement #4. <http://www.asclcd.org/about-asclcd/asclcd-position-statements/>.

⁷ National Institute of Justice. (2014, April 17). *FY 2014 DNA Capacity Enhancement and Backlog Reduction Program*. Retrieved from <https://ncjrs.gov/pdffiles1/nij/sI001112.pdf>

In part, GAO noted that performance measures used by NIJ do not demonstrate actual results, nor do they accurately represent the reduction in the backlog. Therefore, one of the objectives of the forum was to gather information to help establish accurate and verifiable performance measures that are reflective of the impact of federal funds.

Further discussions involving efficiency, metrics, and budget issues were facilitated over a presentation on the FORESIGHT program. FORESIGHT is a volunteer, business-guided self-evaluation of forensic science laboratories that collects and calculates business measures about caseloads, staffing, budgets, and other important factors. NIJ invited Dr. Paul Speaker from West Virginia University—who has developed and assisted laboratories in implementing the program—to discuss the anticipated effects when laboratories demonstrate superior turnaround time and significantly reduce backlogs. The discussion focused on economic principles and indicated that laboratories demonstrating high efficiency will likely create greater demand for services, which may cause backlogs to rise again. Based on the data presented, indications were that laboratories may consider alleviating this phenomenon by developing solutions to mitigate the amount of evidence submitted to a laboratory for forensic analysis, such as charging a fee for service; triaging the number of items submitted for forensic testing (e.g., a maximum number of items is accepted by the laboratory for each submission); using outsourcing laboratories; or implementing innovative methods and technologies to expedite analysis.

Many of the laboratory directors acknowledged that providing real-time data is not necessarily cumbersome, but when NIJ makes requests for previous data within a specified interval, the data are not easily retrievable when using certain LIMS. Often, the data must be manually tabulated and transferred to a worksheet. Also, the data that NIJ requests are not always aligned with the data collected by some laboratories, thereby creating an extra step in the data collection process. An additional concern voiced by the laboratory directors is that performance metrics do not always allow for a true measure of impact because results are often realized after an award is closed.

The group also expressed the importance of measuring increased capacity and not necessarily focusing performance metrics on backlog reduction, because backlog is constantly changing and is highly dependent on the amount of evidence submitted. In 2013, NIJ published a Special report entitled, *Making Sense of DNA Backlogs, 2012 – Myths vs. Reality*, which describes the pitfalls of looking solely at backlogs.⁸ In the report, the authors show that laboratory capacity continues to grow due to increasing automation, hiring of more personnel, use of overtime, and improved testing procedures and methods. Although laboratories processed 10 percent more forensic DNA cases in 2011 than in 2009, DNA backlogs continued to increase because the demand for forensic DNA casework services in 2011 increased by 16.4 percent over 2009 demands, which continues to outpace the nation's capacity to work DNA cases.

Finally, the laboratory directors continued to emphasize the importance of using grant funds for activities that are not practically measurable, such as purchasing maintenance contracts for instruments; validating new technologies and methods; and providing training and continuing education for new and current forensic scientists. Activities such as these are critical operational requirements for any laboratory, but impractical to use as case output measures.

Topic: Other challenges

⁸ <https://www.ncjrs.gov/pdffiles1/nij/243347.pdf>

The laboratory directors discussed the formula calculations used by the DNA Program to allocate funding to the states. Currently, the formula uses the Uniform Crime Reporting (UCR) Part 1 Violent Crimes statistics reported to the FBI for the most recent available year; however, it was expressed that these data do not reflect the true burden of forensic analysis placed upon some of the laboratories. For example, a jurisdictional UCR statistic may not accurately reflect the evidentiary samples received if a laboratory receives a large number of referral cases. In addition, there was discussion about exploring other ways to distribute funds and assessing the value of using a competitive solicitation. Attendees also expressed an interest in receiving grant management training to obtain a better understanding of eligibility criteria, allowable and unallowable expenditures, reporting of performance metrics, and the grant process as a whole.

The group also discussed the implications of previously abolishing the Grant Progress Assessment (GPA)⁹ program, which was suspended due to budget constraints. Many attendees were not sure that the program needed to be reinstated, but felt that some of the outcomes could be explored.

4. SUMMARY

This report provides a summary of generalized comments and opinions from a diversified group of laboratory directors and does not represent the views of all recipients of DNA and Coverdell grants. Based on the discussion at the NIJ Crime Laboratory Director's Meeting, it was clear that the DNA and Coverdell programs are critical resources that have helped strengthen the quality of forensic science in the United States. Without these programs, laboratories would not be able to increase their capacity, and would thereby reduce the number of samples awaiting forensic analysis. NIJ is thankful to the invited laboratory directors for providing information and feedback that can be used to develop strategies to strengthen the DNA and Coverdell programs and to promote the effective use and timely expenditures of grant funds.

⁹ National Institute of Justice (February 2013). The Grant Progress Assessment Program: looking back on success and moving forward. *NIJ Journal No. 271*. NCJ 240698. Retrieved from: <http://www.nij.gov/journals/271/Pages/grant-progress-assessment.aspx>.

APPENDIX A:

FORESIGHT Project: Backlog Metrics and Interpretation
Presented at the Laboratory Directors Meeting



FORESIGHT Project: Backlog Metrics and Interpretation

NIJ Laboratory Directors Meeting

Paul Speaker, Ph.D., West Virginia University



FORESIGHT: Measure, Preserve, Improve

- WVU Forensic Science Initiative
- WVU College of Business and Economics
- U.S. National Institute of Justice
- Link data from casework, budget, and personnel

Develop metrics to assess resource allocation, efficiencies, and value of services

Identify issues and provide the metrics to assess the success of strategic initiatives



FORESIGHT: Measure, Preserve, Improve

- First, find a common language and define everything
- Second, find a common way to define objectives
- Third, identify common issues/concerns

Data Collection Tool—LabRAT





FORESIGHT Definitions

- Turnaround Time (TAT): The number of days from a request for examination in an investigative area until issuance of a report.
 - TAT1: Median turn around time, days from last submission
 - TAT2: Median turn around time, days from first submission
- Backlog: Open cases that are older than 30 days
 - Arbitrary measure
 - 45 day evidence



Casework Data

- cases
- items
- items outsourced
- items examined internally
- total samples from items examined internally
- tests on samples examined internally
- reports
- Median turn around time from last submission
- Median turn around time first submission
- open area cases
- open area cases older than 30 days
- Hours in casework
- Operational Staff FTE
- Support Staff FTE



Areas of Investigation

- Blood Alcohol
- Crime Scene Investigation
- Digital evidence - Computer, Audio & Video
- DNA Casework
- DNA Database
- Document Examination (including handwriting)
- Drugs - Controlled Substances
- Evidence Screening & Processing
- Explosives
- Fingerprints
- Fire analysis
- Firearms and Ballistics
- Forensic Pathology
- Gun Shot Residue (GSR)
- Marks and Impressions
- Serology/Biology
- Toxicology ante mortem (excluding BAC)
- Toxicology post mortem (excluding BAC)
- Trace Evidence (includes Hairs & Fibers, Paint & Glass)



Budget Data

- Capital-current yr
- Capital-previous 4 yr
- Salary-operational staff
- Salary-support staff
- Personnel benefits
- Overtime/temporary
- Consumables
- QA/accreditation
- Investigation subcontract
- Other subcontracts
- Service of instruments
- Advertisements
- Leasing equipment
- Leasing facilities
- Utilities
- Telecommunications
- Overhead
- Other

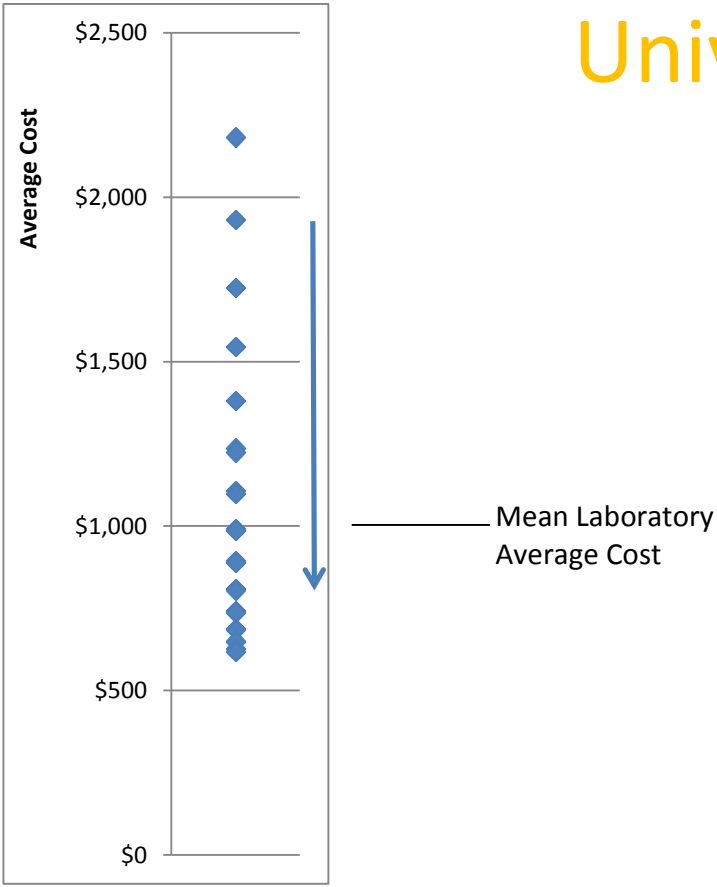


Efficiency and Cost Effectiveness

- Laws in Economics
 - Law of Diminishing Marginal Returns (LDMR)
 - Law of Demand
- Efficiency
- Cost Effectiveness

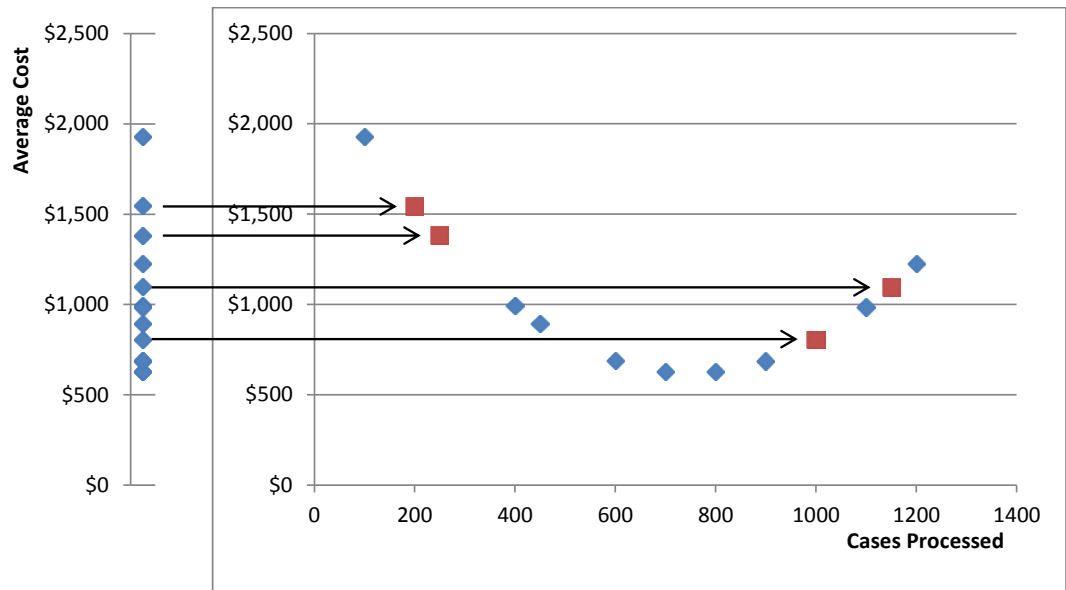


Univariate Observations



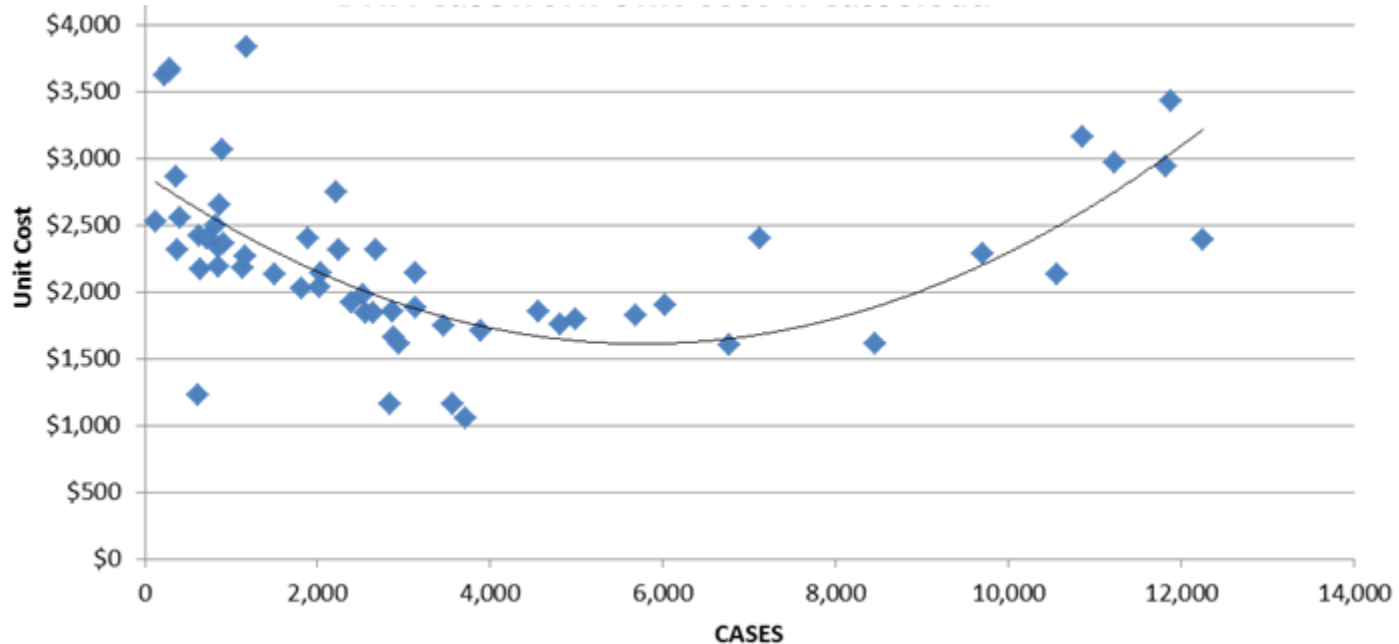


Efficiency and Cost Effectiveness: From Univariate metrics to LDMR



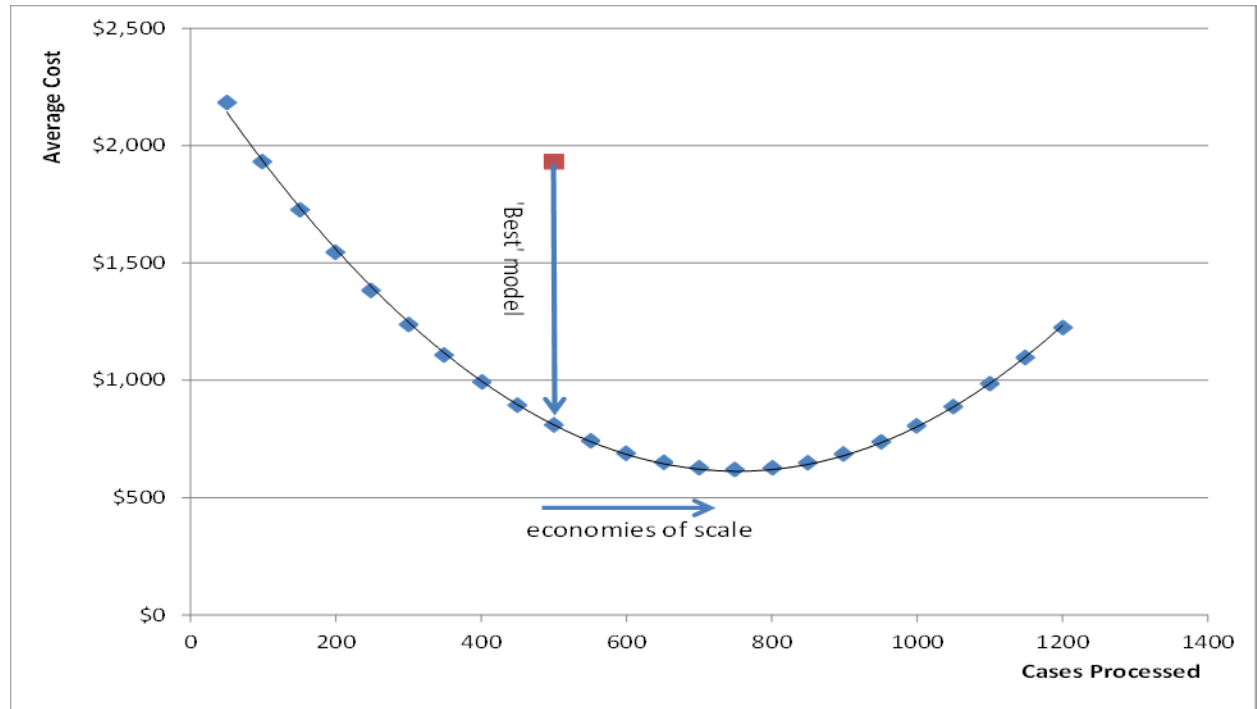


Efficiency and Cost Effectiveness: Average Total Cost for DNA Analysis





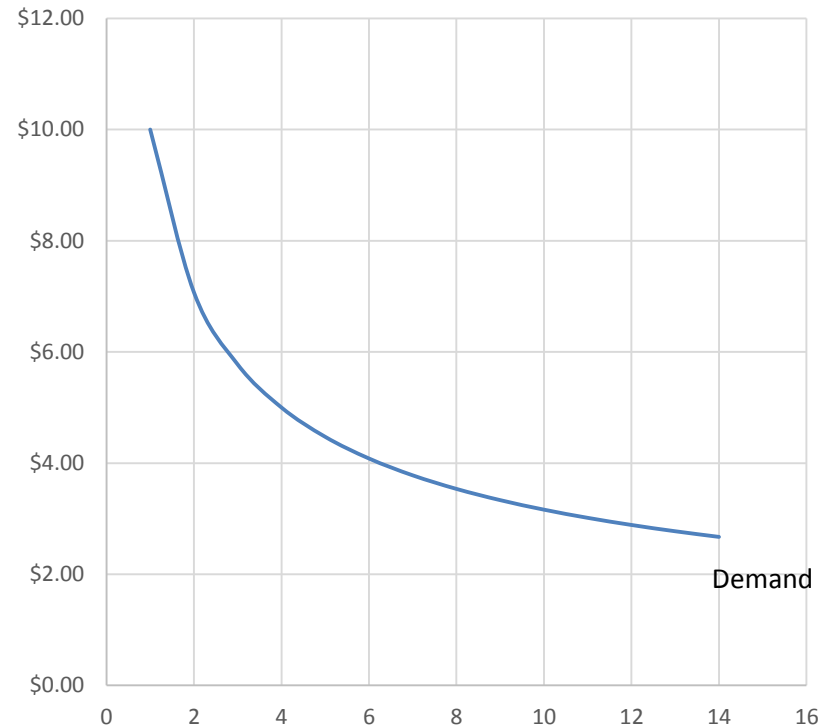
Anticipated Effects from Backlog Reduction— Size Matters (and so does efficiency)





Anticipated Effects from Backlog Reduction— Understanding the Law of Demand

- Law of Demand → As prices fall, quantity demanded increases
- Price rations in the private sector
- Private sector management anticipates the degree of reaction to a price change via the price elasticity of demand





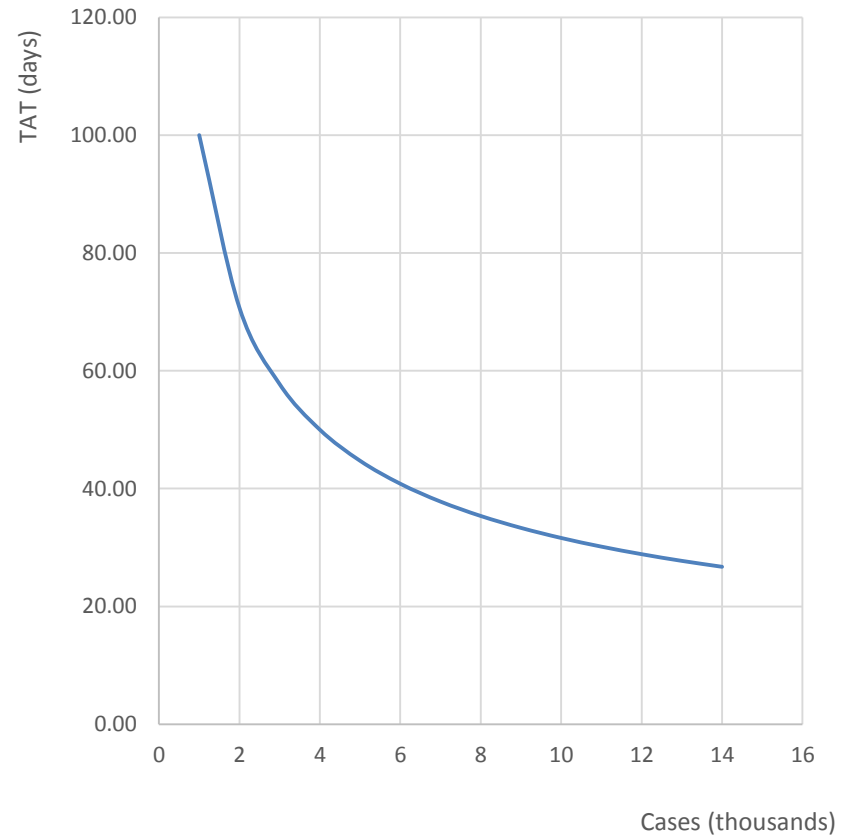
Will Backlog Reduction Programs Eliminate Backlog?

- No, in fact such programs are likely to increase backlog as perceived laboratory effectiveness increases
- Must understand the demand phenomena when price does not serve as a rationing mechanism
- Consider standard tools in the private sector that are adapted for the interactions in the public sector
- Cost-benefit analysis of the societal impacts suggest that DNA analysis is severely underfunded



Anticipated Effects from Backlog Reduction— Understanding the Law of Demand with Queuing

- As TATs fall, quantity demanded increases
- Queuing rations in the public sector
- Effective planning for backlog reduction requires the determination of TAT elasticity of demand
- Backlog is a dynamic issue, not a static target





Anticipated Effects from Backlog Reduction— Demand for DNA Analysis

- $f(\text{TAT}_{\text{DNA}}, \text{TAT}_{\text{FI}}, \text{TAT}_{\text{TRACE}}, \text{Budget}, \text{Grants}, \text{Politics})$
- Elasticities allow anticipation of outcomes and standards for performance
- Metrics, such as FORESIGHT standards, offer means to assess success and perform strategic audits
- Allows evaluation of cross-disciplinary effects
- Provides detail on the cost side of cost-benefit analysis



Anticipated Effects from Backlog Reduction— Measuring the Societal Benefit

- Each addition to the DNA Database provides a societal benefit of approximately \$27,600
- The marginal cost of that addition is a mere fraction of the benefit

Doleac, Jennifer. The Effects of DNA Databases on Crime. Working Paper. University of Virginia, Frank Batten School of Leadership and Public Policy. 2012 (<http://www.batten.virginia.edu/content/2013-001-effects-dna-databases-crime-jennifer-doleac-860>)



Project Foresight—Research Output

<http://www.be.wvu.edu/forensic/publications.htm>

Project FORESIGHT is voluntary and a free service to participating laboratories. For more on the project visit

<http://www.be.wvu.edu/forensic/foresight.htm>

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