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# **The Role and Impact of Forensic Evidence on the Criminal Justice System**

## **Executive Summary**

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# The Role and Impact of Forensic Evidence in the Criminal Justice System

## Introduction

The Institute for Law and Justice, Inc. (ILJ) has completed a major study on the role and impact of forensic evidence in the criminal justice system. The study was supported by a grant award from the National Institute of Justice (NIJ) in 2006.<sup>1</sup> As stated in NIJ's solicitation, the key objectives of the study were to:

- Estimate the percentage of crime scenes from which one or more types of forensic evidence are collected.
- Describe and catalog the kinds of forensic evidence collected at crime scenes.
- Track the use and attrition of forensic evidence in the criminal justice system from crime scenes through laboratory analysis, and then through subsequent criminal justice processes.
- Identify which forms of forensic evidence contribute most frequently to successful case outcomes.

The study called for tracking cases and forensic evidence through local criminal justice processes for five offense types: homicides, sexual assaults, aggravated assaults, robberies, and burglaries. The participating sites in ILJ's study were Denver, Colorado and San Diego, California. Through extensive data collection efforts, detailed information was collected on 4,049 offenses in Denver and 3,207 offenses in San Diego.

Data on forensic evidence collected at crime scenes included DNA material, weapons evidence, latent prints, ballistics, trace evidence, and other types of forensic evidence. Through crime lab reports, it was possible to determine the number of cases with requests for analysis by investigators and the results of the analysis by forensic scientists. Comparisons were then made between open and closed cases from the two participating sites.

Two smaller studies were conducted as part of ILJ's grant activities. One study was a survey of 75 police departments to obtain information on the organization placement, staffing, and responsibilities of crime lab units. The survey provided more information than currently

available on variations across the country for collecting forensic evidence from crime scenes. The second study was an analysis of an experiment in the Miami-Dade, Florida Police Department to determine whether clearance rates for no-suspect property crimes could be improved through faster processing of DNA evidence. Key results from both these studies are provided in this executive summary.

## Collection of Forensic Evidence

One of the key findings from the study is that forensic evidence is collected in almost all homicides and the majority of sexual assaults but then drops considerably for aggravated assaults, robberies, and burglaries. In Denver, only 5.1 percent of the aggravated assaults had forensic evidence, 7.4 percent of robberies, and 15.7 percent of burglaries. In San Diego, the results were 18.4 percent for aggravated assaults, 26.8 percent for robberies, and 29.3 percent for burglaries having any forensic evidence.

There are two possible explanations for the relatively low numbers for aggravated assaults, robberies, and burglaries with forensic evidence. The first is that the forensic evidence may, in fact, not exist at the scene. That is, the perpetrator did not leave DNA material, latent prints, ballistics, or other evidence at the scene. The second explanation is that forensic evidence may have been left but is never retrieved by evidence technicians. The difficulty is that it is not practical for evidence technicians to be dispatched to every crime scene in search of forensic evidence, and the challenge therefore is whether guidelines can be established to maximize the collection of evidence. Denver participated in an earlier NIJ program on the cost-effectiveness of DNA in the investigation of burglaries and other high-volume crimes. The evaluation of that program demonstrated the utility of collecting DNA evidence from these crime scenes.<sup>2</sup>

## Forensic Analysis of Evidence

When forensic evidence is collected, investigators frequently request analysis by the crime lab. Using Denver as an example with selected types of forensic evidence,

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<sup>1</sup> NIJ awarded a parallel study to the California State University, Los Angeles. See final report, *The Role and Impact of Forensic Evidence in the Criminal Justice System* by Joseph Peterson and Ira Sommers, June 2010.

<sup>2</sup> Roman, J. K., Reid, S., Reid, J., Chalfin, A., Adams, W., & Knight, C. (2008). *The DNA field experiment: Cost-effectiveness analysis of the use of DNA in the investigation of high-volume crimes* Washington, DC: Urban Institute, Justice Policy Center.

- For cases with DNA evidence, requests for analysis were made in 58.0 percent of the homicides, 82.1 percent of the sexual assaults, 37.5 percent of the robberies, and 79.8 percent of the burglaries.
- For cases with latent prints, requests were made in 96.4 percent of the homicides, all sexual and aggravated assaults, 95.2 percent of the robberies, and 84.4 percent of the burglaries.
- Requests for ballistics analysis were made in 87.8 percent of the homicides with ballistics evidence and 60.0 percent of the aggravated assaults.
- Other requests were made in a handful of cases: 18 cases had shoeprint analysis, six cases had drug analysis, and 33 cases had other types of analysis, such as glass, tape, cell phones, and hair.

In line with these results, another key finding from this study is that the majority of forensic analysis for closed cases takes place after arrest. In Denver, ten of the 38 closed homicide cases with forensic evidence had analysis prior to arrest and 36 cases had analysis after arrest. Thirty-four of the 37 sexual assault cases had forensic analysis after arrest compared to nine cases prior to arrest. From a procedural viewpoint, these results are logical because arrest of a suspect provides an opportunity for investigators to obtain DNA evidence (usually a buccal swab from the arrestee) and make requests for forensic analysis. These results show the importance of forensic analysis in supporting arrests and in preparation for prosecution.

Results from this study also show that the CODIS and AFIS databases continue to play important roles, especially in cases where investigators have exhausted all leads and no arrests have been made (sometimes called “whodunit” cases). In both study sites, about 20 percent of homicide arrests occurred at least 90 days after the incidents. Case studies of a selected sample of these cases indicate that CODIS and AFIS hits were important in moving the cases forward. An important advantage of these systems is that the DNA profile or latent print resides in the system, which increases the likelihood of a hit as profiles and prints from offenders are added to the databases.

Coordination between investigators and prosecutors is essential in the use of hits from these systems. In Denver, the crime lab notifies police investigators and district attorneys whenever a CODIS hit is made. The two agencies may then coordinate their efforts on the arrest and prosecution. Early coordination on these cases has improved the effectiveness of both agencies.

## Case Clearances

With the available data, comparisons were made on the clearance rates of cases with evidence against those without evidence. Using Denver as an example, we developed the following results:

- For homicides, 47 of the 63 cases with forensic evidence were closed for a clearance rate of 74.6 percent, compared to clearances in two of the four homicides without forensic evidence.
- For sexual assaults, the clearance rate was 32.0 percent for cases with forensic evidence compared to 10.1 percent for cases without forensic evidence. For aggravated assaults, the clearance rates were 40.6 percent with evidence and 26.7 percent without evidence.
- For robberies, the clearance rates were 30.8 percent with forensic evidence and 8.3 percent without forensic evidence, and for burglaries, 21.8 percent with forensic evidence and 3.9 percent without forensic evidence.
- Twenty-six robberies had forensic evidence and eight were solved for a clearance rate of 30.8 percent. However, for the 326 robberies without evidence, only 27 were cleared for a clearance rate of 8.3 percent.

In summary, the odds of clearance for cases with evidence versus those without evidence were 1.5 for homicides, 2.3 for sexual assaults, 1.5 for aggravated assaults, 3.7 for robberies, and 5.6 for burglaries.

## Dispositions of Defendants

With the data collected in this project, we were able to compare the dispositions of defendants in cases with and without forensic evidence. The results were similar for Denver and San Diego. In Denver, we made the following conclusions:

- Of the 57 homicide defendants with forensic evidence in their cases, 55 had final dispositions of guilty by trial, pled guilty as charged, or pled to reduced charges, for a guilty rate of 96.5 percent. The two other defendants were found not guilty at trial. There was only one defendant whose case did not have forensic evidence, and this person pled guilty as charged.
- For sexual assaults, 67.6 percent of the defendants in cases with forensic evidence had guilty dispositions, compared to 46.7 percent for defendants in cases without forensic evidence.
- For aggravated assault, the percentages were 93.3 percent for cases with forensic evidence compared to 80.6 percent for those without forensic evidence. For robberies, the percentages were 88.9 percent and 83.9 percent, respectively.

Finally, for burglary, the percentages were 91.7 percent and 87.7 percent, respectively.

Several conclusions can be made with the results from both sites. Most defendants charged with homicides and sexual assaults have forensic evidence involved in their cases, and the largest majority of these defendants have guilty dispositions. For defendants charged with aggravated assaults, the odds are 1.14 in Denver and 1.05 in San Diego that a guilty disposition will be obtained for cases with forensic evidence. With robberies, the odds are about even, and with burglaries, the odds are 1.04 in Denver and 1.11 in San Diego of a guilty disposition for cases with forensic evidence.

## Sentences

The analysis of sentences imposed on guilty defendants showed that convicted defendants in cases with probative evidence received longer sentences.<sup>3</sup> In San Diego, there were 14 convicted homicide defendants who received life sentences, and 13 of these defendants had probative evidence in their cases. For homicide offenders who received prison sentences, the average sentence was 15.5 years for those without probative evidence compared to 23.9 years for those with probative evidence. For defendants convicted of sexual assaults, the difference is even more pronounced with average sentences of 3.3 years for those without probative evidence and 17.0 years for those with probative evidence. Interestingly, the sentences for convicted defendants of aggravated assaults were much closer with averages of 5.3 years and 4.8 years respectively. For those convicted of robbery, the average sentences were 5.7 years without probative evidence and 13.0 years with probative evidence, and for those convicted of burglary, the averages were 5.1 years and 6.1 years, respectively.

The existence of probative evidence is not directly linked to the sentences imposed on convicted defendants because judges are guided by sentencing guidelines. What appears to happen is that when probative evidence exists, prosecutors may file more severe charges and ask for longer sentences. Probative evidence provides a basis for prosecutorial actions.

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<sup>3</sup> By *probative evidence*, we mean that the forensic analysis established an evidentiary fact that may be beneficial in the investigation and prosecution of a case. Examples include a match between a DNA profile from a suspect with a DNA profile from evidence collected at the scene; an AFIS hit based on a latent print from the scene; or spent cartridges from a scene that match cartridges from a confiscated firearm.

## Evidence Collection Survey

While information about the staffing and activities of crime labs is available, the literature is scarce on the collection of forensic evidence. To fill this void, ILJ contracted with the National Clearinghouse for Science, Technology and the Law (NCSTL) to conduct a telephone survey of 75 police departments with full-service crime labs on issues related to the collection of evidence from crime scenes. We were particularly interested in determining the composition of crime scene units, where they are placed organizationally, what responsibilities they have at crime scenes, and the extent to which others (patrol officers, detectives, etc.) collect forensic evidence.

Key results from the survey were as follows:

- With regard to organizational placement, 37 crime scene units were in criminal investigation, 14 units in technical services, 6 units in field operations, two units in administrative services, and 16 units in other sections of the agency (including the crime lab).
- The 75 crime scene units had an average of 13.3 personnel assigned for collection of evidence at crime scenes. Units in criminal investigations averaged 10.2 personnel compared to 16.1 personnel for units in technical services, and 19.0 personnel for units in field operations.
- A total of 29 crime scene units employed civilian personnel exclusively and six units had sworn personnel exclusively. The remaining 40 crime scene units had mixtures of sworn and civilian personnel.
- Virtually all the crime scene units had responsibilities for evidence collection from homicide and sexual assault scenes. Sixty-nine units (92.0 percent) collected evidence from aggravated assaults, 66 units (88.0 percent) from robberies, 64 units (85.3 percent) from burglaries, and 57 units (76.0 percent) from auto theft scenes.
- Primary scene activities by almost all units include collection of biological evidence, latent prints, weapons evidence, trace evidence, and photographs of scenes. Sixty-nine units (92.0 percent) document blood spatters, 66 units (88.0 percent) conduct GSR tests, and 46 units (61.3 percent) have capabilities for video documentation of scenes.
- Investigators and patrol officers may also collect evidence. For example, 27 agencies (36.0 percent) allow investigators to collect evidence from homicide scenes and nine agencies (12.0 percent) allow patrol officers to collect evidence at homicide scenes.
- A clear trend is for greater responsibilities for patrol officers to collect evidence at property crime scenes. Fifty-five agencies (73.3 percent) allow patrol officers to

collect evidence at burglaries and 53 agencies (70.7 percent) from auto theft scenes.

In summary, as judged by these 75 surveyed agencies, there is no consistency on types of personnel, organizational placement, and number of personnel in crime scene units. Additional research is needed to determine the most efficient and effective arrangements for evidence collection.

## **Faster Processing of DNA Evidence**

As part of ILJ's grant project, we conducted an evaluation of an experiment in the Miami-Dade, Florida Police Department to determine whether clearance rates for no-suspect property crimes could be improved through faster processing of DNA evidence. No-suspect property crimes are primarily burglaries and robberies for which no arrests have been made. They are difficult to solve because of the lack of witnesses and identifiable suspects.

Prior to the experiment, the crime lab at the department had obtained an NIJ grant that provided funds to outsource development of DNA profiles to Bode Technology Group, Inc., in Springfield, Virginia. The aim was to reduce a backlog of DNA evidence that had accumulated from property crimes. In total, forensic scientists at the Bode Technology Group analyzed biological evidence from 582 cases from offenses that occurred during 2005 and sent results back to the crime lab on a regular basis. Of the 582 samples, a total of 342 DNA profiles were obtained for upload into CODIS. From these uploads, 181 CODIS hits (52.9 percent of profiles) were obtained and follow-up by investigators resulted in 51 cases cleared by arrest and 13 exceptional clearances.<sup>4</sup> Therefore, there were a total of 64 clearances for a 29.8 percent clearance rate (based on the 181 CODIS hits).

A weakness in this process was the time required for the different steps to be accomplished. It was not unusual for the time between crime commission and the upload of DNA profiles into CODIS to exceed one year. Delays occurred at several steps in the process: submission of the DNA samples to Bode Technology Group, turnaround time back to the crime lab, review of results, and uploading DNA profiles into CODIS. The crime lab was interested in

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<sup>4</sup> An exceptional clearance is a closure in which the perpetrator is known but is not arrested for a variety of reasons. These cases include offenders who are already in prison, offenders who were killed during the course of the offense, and other circumstances.

whether the process could be improved under the hypothesis that lower processing times would lead to higher clearance rates.

Through the efforts of NIJ, an experiment was developed in which the Marshall University Forensic Science Center (MUFSC) in Huntington, West Virginia, agreed to develop DNA profiles under a separate grant that the center had received. A process was put in place that shortened each step in the process. The time between crime occurrence and submission to MUFSC averaged 43 days, the turnaround time back to the crime lab averaged 35 days, and the time for checking the results and upload of qualified DNA profiles was 28 days. Under this arrangement, the MUFSC analyzed 602 DNA samples from no-suspect property crimes that occurred between January 2007 and July 2008. A total of 356 DNA profiles (59.1 percent) were obtained and uploaded into CODIS.

The results from these “Fast Track” cases were virtually the same as for the Bode cases. Of the 356 uploaded profiles, a total of 170 CODIS hits (47.8 percent) were obtained. Follow-up investigation resulted in 45 cases (26.5 percent of CODIS hits) cleared by arrest and five cases (2.9 percent) exceptionally cleared. In total, there were 50 clearances (29.4 percent of CODIS hits) from these cases.

As judged by the case clearance statistics, the results of the experiment are disappointing. The total clearance rate for the Fast Track cases at 29.4 percent was virtually the same as the Bode Cases at 29.8 percent. However, the experiment provides important insights into the processing of DNA evidence for no-suspect cases. First, the overall clearance rate for property crimes in the police department was 10 to 12 percent during the years of the experiment. The clearance rates for both groups are about three times higher. The result is even more impressive given that these cases are the most difficult to solve. All investigative leads had been exhausted prior to the DNA analysis and it was only through the analysis that arrests and clearances were obtained.

A second point is that even the Fast Track cases had long processing times. The average time from crime occurrence to upload of a DNA profile into CODIS was 106 days. The experiment shows that (1) analysis of the DNA evidence is the important step to take, (2) higher clearance rates can be obtained by conducting the analysis, and (3) the length of time for the analysis does not significantly impact the final clearance results.

A corollary is that the experiment does not answer the question on how much higher the clearance rates might be if the processing times were significantly reduced to a few days or a few hours. The technology for developing DNA profiles is improving each year and much shorter processing times are a realistic possibility. Further experimentation with shorter processing times is warranted on the basis of this experiment.