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Use of Forensic Evidence by the Police and Courts

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Crime laboratories play an important role in our criminal justice system by examining physical evidence in support of investigations and subsequent prosecution. Yet just how frequently —and effectively—is forensic evidence actually used at various stages of the criminal justice process—charging, plea negotiations, trial, and sentencing? Is forensic science "overburdened and underutilized," as suggested by some specialists?' If so,

From the Director

Police traditionally devote considerable time and effort to searching for eyewitnesses to crimes as a lead to identifying a suspect. These efforts frequently bear little fruit, and many criminal cases are filed pending further leads.

In fact, clearance rates for crimes such as burglary and robbery have declined significantly over the past 20 years. In 1966, for example, police cleared 32 percent of the robberies reported to them; by 1986, robbery clearances had dropped to 25 percent. During the same period, clearance of burglary cases declined from 22 percent to 14 percent.

Often, however, there is a "silent witness" that can be a critical lead in identifying a suspect and linking him to the crime. Forensic evidence—carefully gathered and scientifically analyzed—can be an important step leading to arrest and conviction of a suspect. Equally important, such evidence can be unequivocal and can eliminate suspects who otherwise might be the focus of continuing investigative efforts.

Recent significant breakthroughs in forensic science have widened the potential of this valuable criminal justice tool. The National Institute of Justice has long supported forensic science research that has advanced our ability to develop an entire range of new investigative options that can literally break the case.

For the 1990's, significant gains are expected to come from what only recently were theories. Research has made a significant breakthrough in using the DNA code present in blood and other body fluids to link evidence such as bloodstains or semen specimens to a specific individual, excluding all others. In fact, researchers say the new technology is highly accurate, comparable to a fingerprint in reaching positive identification of an individual. DNA patterns are so distinguishably different between people who are not identical twins so as to provide virtually definite identification. NIJ is now supporting efforts to explore wider application of this new technology.

Despite the very real advances in forensic science, its potential is not being fully realized by criminal justice. As this *Research in Brief* points out, use of scientific evidence in serious crimes has, with the exception of fingerprints, actually declined over the 5-year period covered by this research.

To get a clearer understanding of the reasons for this stagnation and how utilization could be improved, this *Brief* summarizes two nationwide studies of when and how forensic evidence is used at various stages of the criminal justice process.

Some of the findings reported here are surprising. All should be useful to the police who oversee the collection of forensic evidence and manage the bulk of the Nation's crime laboratories, and to the prosecutors and judges who weigh and apply such evidence in criminal cases.

In some cases, the researchers point out, the very fact that a crime occurred cannot be proven without forensic testimony. Others cannot be solved without it, and even those cases where a suspect is quickly arrested are more likely to be solved when eyewitness testimony or confessions are supported by forensic findings.

In fact, police are three times more likely to clear a case when forensic evidence is used. Conviction is more likely when forensic evidence and testimony of witnesses interact, and use of forensic evidence also increases the likelihood that convicted felons are sentenced to longer periods of incarceration.

Given this intriguing picture of the use and value of scientific evidence and testimony, how can we tap its full contributions? Criminal justice professionals will want to review the findings and recommendations of this *Research in Brief* that suggest ways in which the benefits of this valuable tool can be more fully realized.

National Institute of Justice research will continue to seek out not only new and useful forensic techniques, but ways in which these techniques can function better—in the hands of police, prosecutors, and the courts—to stop crime when it occurs and to keep criminals off the streets.

James K. Stewart, Director
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Importance of forensic evidence

Forensic evidence includes such clues as fingerprints, blood and blood stains, semen stains, drugs and alcohol, hairs and fibers, and firearms and toolmarks.

In court, such evidence is characterized by the presence of a laboratory analysis and an expert prepared to interpret and testify to the scientific results, thus distinguishing forensic evidence from other forms of physical or "tangible" evidence such as stolen goods, articles of clothing, and other personal property.

Forensic evidence plays three important roles in the judicial process:

It establishes the elements of a crime. For example, testing suspected controlled substances proves they are drugs and, thus, that a crime has been committed.

It associates defendants with crimes or disassociates them:

- Forensic evidence (particularly fingerprint and firearms evidence) can *conclusively associate* a defendant with a crime.
- Forensic evidence such as blood, semen, hairs, and fibers can also *tentatively associate* a defendant.
- Forensic evidence can also help *exonerate* a defendant when laboratory results are inconclusive or when they definitely disassociate the defendant from the crime.

It helps reconstruct the crime or the crime scene.

The importance attached to forensic evidence varies in relation to the case, the type of evidence, and the prosecutor's perspective. Forensic evidence is regarded as more important, and more likely to be gathered and analyzed, in violent crimes than property crimes. Yet even in violent crimes its importance is affected by other aspects of the case. In a rape case, for instance, if the defense revolves around the issue of consent, the availability of forensic evidence has little value.

Forensic evidence is also seen as more important if the analysis conclusively links the defendant to the offense. Thus, fingerprints are more highly regarded than comparisons of hairs, fibers, or bloodstains.

Finally, prosecutors seem divided in their personal evaluation of forensic evidence. One group says they find other types of evidence, at some level, open to question or suspicion, but forensic evidence is "always trustworthy." The second group views forensic evidence as corroboration for other evidence—the glue that binds other evidence together but not the keystone of a case.

what can be done to improve the situation?

This *Research in Brief* explores these questions. It summarizes two extensive studies of the actual uses and effects of forensic evidence.[2]

The research surveyed crime lab directors across the Nation. In addition, more extensive analysis focused on six jurisdictions with diverse geographical, population, organization, and caseload characteristics: Chicago and Peoria in Illinois; Kansas City, Missouri; Oakland, California; and Litchfield and New Haven in Connecticut. (See page 5 for information on the methodology of the study.)

Forensic evidence in the criminal justice process

Among important findings of the research, police are on average about three times more likely to clear cases when scientific evidence is gathered and analyzed. Prosecutors are less likely to agree to enter into plea negotiations if forensic evidence strongly associates the defendant with the crime. And somewhat surprisingly, sentences tend to be more severe when forensic evidence is presented at trials.

By tracing the use of forensic evidence through the various steps of the criminal justice process, we can analyze its relative importance at each juncture.

Arrest and clearance

The research tested whether scientific evidence has an appreciable effect on the clearance rates of burglaries, robberies, and aggravated assaults. After controlling for the availability of suspects, eyewitnesses to the crime, and elapsed time between discovery of the offense and its report to police, clearance rates of offenses with evidence scientifically analyzed were found to be, on average, about three times greater than in cases where such evidence is not used.

Scientific evidence has its greatest impact in cases where the chances of solution are smallest—when suspects are neither named nor identified quickly after the crime.

Charging

While acknowledging that forensic evidence offers good corroboration, prosecutors prefer the testimony of police officers and eyewitnesses when making decisions to charge. Prosecutors point out that laboratory results are typically unavailable at the time charging decisions have to be made. This reflects both the complexity of some laboratory processing and the limited resources of many crime labs.

Prosecutors also said they would rarely file charges if *all* they had was physical evidence. There are exceptions:

1. Michael Serrill, "Forensic sciences: overburdened, underutilized," *Police* magazine, January 1979: 21-30

2. Joseph L. Peterson, Steven Mihajlovic, and Michael Gilliland, *Forensic Evidence and the Police: The Effects of Scientific Evidence on Criminal Investigations*, Washington, D.C., U.S. Government Printing Office, 1984. Joseph L. Peterson, John P. Ryan, Pauline J. Houlden, and Steven Mihajlovic, *Forensic Science and the Courts: The Uses and Effects of Scientific Evidence in Criminal Case Processing*, Chicago, Center for Research in Law and Justice, University of Illinois at Chicago, 1986

1. In those cases when forensic evidence has assisted in identifying the defendant or establishing the elements of a crime, it of course will be available at the time of the charging decision.

2. Prosecutors must defer drug or narcotic charges until results are received from the crime lab.

3. Rape cases need forensic evidence if there is a question whether intercourse actually occurred or concerning the victim's identification of the assailant.

4. Arson charges may also turn on laboratory testing of fire debris and the identification of flammable liquids or combustibles.

Plea negotiation

In many jurisdictions more than 90 percent of cases are resolved through pleas. The impact of forensic evidence at this pretrial stage depends on how strongly laboratory results associate the defendant with the offense and how well the defense can explain them away.

If forensic evidence strongly associates the defendant with the crime, prosecutors are less inclined to offer a plea bargain. Defense attorneys may then urge clients to plead guilty and seek a reduced sentence.

When laboratory resources are limited, however, some prosecutors will not ask for laboratory workups unless a case is actually going to trial. In jurisdictions with greater resources, prosecutors tend to delay plea negotiations until they receive the lab results.

Jury trials and expert testimony

While scientific examiners do not testify in the vast majority of trials, lab directors and trial attorneys agree that forensic evidence can affect the disposition of criminal cases brought to trial.

Prosecutors believe that juries are quite impressed by scientific evidence—that they "love to play detective" and that forensic evidence helps to "jazz things up." More importantly, juries consider scientific evidence trustworthy, not subject to human emotion and distortion. One prosecutor commented that if he had to choose between presenting a fingerprint or an eyewitness at trial, he would always go with the fingerprint.

Forensic evidence can prove to be a two-edged sword, however. When disappointed juries find it less than conclusive, they may surmise that the prosecution failed to make its case. Prosecutors are even more concerned about cases without forensic evidence. They sometimes feel obligated to call police officers or forensic experts to the witness stand to explain why physical evidence is absent.

Jury comprehension

Prosecutors stress the importance of jurors' understanding forensic evidence. While prosecutors have much greater faith than crime lab directors in the ability of juries to comprehend complex scientific testimony, they believe they must teach jurors about forensic evidence and lead them through the questioning of the expert.

This requires prosecutors to be knowledgeable about the scientific evidence and its significance. While articulate expert witnesses facilitate this process, understanding their testimony also depends on the prosecutor's preparation and skills in questioning. Interaction between a well-prepared trial attorney and an articulate expert witness is critical in integrating scientific findings into the case.

The research survey sought to learn how well jurors claim to understand forensic evidence, how they use the evidence in their decisionmaking, and the weight they give it compared to other evidence. The survey concluded that juries give forensic evidence serious consideration but that it is not

The use of forensic evidence

Laboratory caseloads—This nationwide survey found that only about a quarter of crime laboratory caseloads involve personal or property crimes. About two-thirds of the work is identification of drugs and narcotics and the determination of alcohol content of samples from suspected drunk drivers. In fact, forensic laboratories fight a continuing battle to manage their drug caseloads and still respond to other investigations. This reflects the fact that drug possession or sale and driving-while-intoxicated cases require a scientific analysis for prosecution.

The courts—Analysis of prosecutor case files from 1975, 1978, and 1981 in the six study jurisdictions revealed that laboratory reports were used in about one-quarter to one-third of felony cases that had survived initial screening. These percentages remained fairly consistent across the years and across cities.

More specifically:

- *Drugs and fingerprints* made up from 60 to 80 percent of the evidence described in the laboratory reports. This suggests that laboratories can expect to focus on evidence that is mandatory for prosecution of a case or can conclusively link the defendant with a crime.
- The next most frequently used types of forensic evidence are firearms, blood and bloodstains, and semen; the rates of analysis of these three categories declined from 1975 to 1981. Lower usage of scientific evidence concerning nondrug offenses may reflect that (1) examiners have less free time to take on additional cases due to increasingly sophisticated (and time-consuming) analyses on evidence like bloodstains, and (2) greater time and effort must be devoted to reanalysis and testing under new quality assurance programs.
- Virtually all murder and drug prosecution files had laboratory reports, while laboratory input to rape prosecutions varied from 30 percent in one jurisdiction to as high as 70 percent in another.
- Forensic evidence is least often used in burglary, robbery, and attempted murder or aggravated battery cases.

Laboratory directors generally agreed with prosecutors on what cases need priority. They cited forensic evidence as having its greatest impact in drug and homicide prosecutions, moderate importance in arsons and burglaries, and minimal importance in aggravated batteries, robberies, and larcenies. Lab directors also believe their examinations have substantial impact in rape cases, but prosecutors are more tentative about the value of this evidence.

Although we frequently read or hear about more esoteric forms of forensic evidence—e.g., hairs, fibers, glass, paint, soil, etc.—research shows they rarely appear in routine criminal cases. One reason, of course, is that prosecutors have less interest in evidence whose analysis may only partially or statistically link a defendant with a crime.

usually the key evidence. Here are the reasons for this conclusion:

- Jurors felt they understood scientific evidence as well as or better than other evidence. They claimed the best understanding of biological evidence and poorest understanding of chemical evidence.

- Although a quarter of the jurors surveyed said that without forensic evidence, their case's outcome would have been different (usually an acquittal instead of a guilty verdict), very few jurors specifically mentioned forensic evidence as crucial in their verdict. Witnesses to the crime were considered to be the most crucial.

- Rape cases involving biological (semen) evidence were usually the ones in which jurors considered forensic evidence crucial.

- In the relatively small number of cases in which forensic experts testified, they were ranked the most persuasive of all witnesses. Victims of crimes were ranked next most persuasive, defendants least persuasive.

- A multivariate analysis found that juror understanding of forensic evidence was a significant predictor of the verdict, and that persuasiveness of the scientific expert influenced the ease with which jurors reached their verdict.

Defense challenges

Defense attorneys can challenge forensic evidence (1) during pretrial evidentiary hearings and (2) during trial, either by challenging the competency of the expert witness when the court reviews the witness's qualifications, or by cross-examining or refuting the expert's testimony.

In reality, however, attempts to have physical evidence ruled inadmissible are rarely successful. Defense attorneys usually do not challenge forensic witnesses because their credentials have been accepted by the court on previous occasions. Except in rare cases, budgetary restraints keep defense attorneys from introducing their own counterexperts.

As a result, most defense challenges are done through cross-examination of the forensic expert or by admitting evidence through stipulation, thus avoiding the drama of the expert's testifying. The defense may attempt to muddle the issues and make the analysis seem extremely complex, implying that no one can trust or really understand tests of such complexity. Prosecutors generally feel these defense tactics are unsuccessful.

If, however, the forensic testimony involves an *interpretation* of forensic evidence, rather than simply an identification of a substance, the cross-examination may successfully introduce alternative explanations. Rather than attack the evidence or the expert head-on, the defense will try to "explain away" the evidence.

While defense attorneys feel at a great disadvantage in dealing with scientific evidence, practically all of those interviewed were satisfied that the results presented by the local crime laboratories were accurate and the examiners impartial.

Bench trials

Except in Chicago, nearly all the trials that occur in the study jurisdictions are jury trials, not bench trials. Thus, prosecutors could say little about judicial responses to forensic evidence and experts, but those who did noted some interesting differences in the presentation of physical evidence at bench and jury trials.

Presentation of scientific results to a judge is more streamlined. A judge who is familiar with the expert and the evidence will usually waive the qualifying of the expert witness and agree to a stipulation of the laboratory results. Still, one attorney warned that prosecutors should not downplay forensic evidence simply because the case is being heard by a judge. He believed physical evidence would make a judge take the state's case "more seriously."

Prosecutors believe judges may be more discriminating and critical of forensic testimony. Compared with a novice juror, experienced judges will have heard numerous experts testify and are able better to evaluate the evidence and the testimony. In fact, some prosecutors noted that certain judges urge that laboratory personnel be "more prompt and more professional."

If an attack on forensic evidence is a key element in defense strategy, then defense attorneys believe the case should be tried before a jury. Judges are not thought to be as persuaded by intense cross-examinations, whereas one confused or doubting juror can result in a mistrial.

Conviction or nonconviction

Since nearly all defendants were eventually convicted in four of the six jurisdictions in the study, conviction statistics do not readily reveal the relative importance of any particular factor such as forensic evidence. However, the analysis indicates that overall, forensic evidence plays a rather limited role in the decision whether to convict, especially when compared with the effects of admissions, incriminating statements, and tangible evidence associating the defendant with the crime.

Forensic evidence tends to interact with other evidence to affect case outcome, especially when forensic evidence links the defendant—conclusively or probably—with the crime scene or victim. Even when the defendant offers an alibi, scientific evidence also supports convictions on the top charge when it associates the defendant with the crime.

While the presence of forensic evidence tends to help yield a conviction primarily when cases are otherwise weak (e.g., no incriminating statements), the *absence* of such evidence leads to lower conviction rates. Prosecutors in our hypothetical case reviews believe it is principally the absence of forensic evidence—usually in combination with the absence of a confession or other strong evidence—which pushes cases toward dismissal or acquittal. In rape cases, the lack of a laboratory report leads to significantly *lower* conviction rates when defendants have offered alibis.

Sentencing

Sentencing in felony courts involves two distinct, if related, considerations: (1) whether or not to incarcerate a defendant, and (2) if so, for how long.

The defendant's prior record overwhelms most other factors in the incarceration decision, followed by the seriousness of the crime of which the defendant is convicted. Laboratory reports interact with seriousness in maintaining high rates of convictions to top charges.

A very important (and somewhat unexpected) finding of this study is the strong link between forensic evidence and sentence length. Lab directors believed forensic evidence had its major impact in determining guilt or innocence and that its impact on sentencing was inconsequential. Yet the subsequent research showed that forensic evidence is the only type of evidence found to influence the severity of sanctions, while controlling for a range of other variables. Longer sentences are given defendants where laboratory reports are present.

One possible explanation of this strong influence might be that scientific evidence serves as particularly graphic and convincing corroboration of the prosecution's case, reduces any doubt in the judge's mind, and frees the judge to give the defendant a prison term in the high end of the allowed range. (Laboratory results often document vividly the character and degree of violence associated with the crime.)

A related explanation might be that the most serious and violent offenses are more likely to generate forensic evidence and laboratory analysis.

Policy recommendations

One of the most significant findings in this research was the fact that rates of usage of scientific evidence did not increase appreciably in six jurisdictions over the 1975–1981 time period. Based on these findings, this section recommends steps to promote greater utilization of forensic science in the judicial fact-finding process.

1. Courts and prosecution must press for greater funding of crime laboratories.

Of the more than 300 crime laboratories in the United States, 80 percent are located within police agencies. Crime labs act as independent outside experts, serving largely the court and the prosecutor, yet funded by police departments. Most crime labs are chronically underfunded, receiving on average less than one-half of 1 percent of the police budget, and the court and prosecutor have little or no voice in these budgetary decisions.

Contributing to the problem are the economic woes of most State and local governments, the limitation of Federal funds to assist expansion, and the limited view some police take of their role in the disposition of arrests. Prosecutors and courts that value the contributions of forensic scientists must find ways to influence the budgetary process so that crime labs can expand their size and scope.

Police departments may provide greater support for forensic laboratories if they consider two of the studies' principal findings: (1) cases where scientific evidence is analyzed are cleared at significantly higher rates, and (2) forensic evidence stands out as the only form of evidence influencing the severity of sentencing. It may be argued, therefore, that scientific evidence increases the likelihood that convicted felons are sentenced to longer periods of incarceration.

2. Increased funding should be used primarily to broaden and intensify the caseloads of crime labs beyond predominant analysis of drug and alcohol evidence.

In many laboratories, any growth in personnel or resources has been justified by the proliferation of drug and alcohol cases. Typically representing more than 50 percent of all cases handled by a lab, this work often displaces other types of evidence. This attitude in turn tends to undermine the perceived value and potential of forensic evidence in other types of criminal cases.

3. Advocates of forensic science must recognize not only current resource limitations, but the complexity of the criminal justice process and the numerous decision-makers (outside the crime lab) who determine whether or not scientific evidence will actually be available, requested, and used.

Police officers and detectives must call for the services of evidence technicians; there must be enough technicians to respond rapidly, and they must have the skill to know what to collect and how to collect it; laboratories must have the resources to examine the evidence; and prosecutors must integrate scientific results into their cases.

If there are any deficiencies at any stage in this process, scientific evidence will not be productively used.

4. There must be greater pressure for prosecutors to use forensic science.

The impact of forensic evidence in the criminal justice process is limited by the *extent* to which it is used. It has substantial impact on cases in which it is used, but if it is used in only a small minority of cases, then its effect on criminal case processing as a whole will be limited.

Faced in most instances by a crime laboratory that is understaffed and overworked, many prosecutors elect not to employ the full range of scientific services because they are perceived to be costly and an impediment to rapid case disposition. Too often prosecutors believe that they should only request analyses of evidence

Research methods

Data for this research came from the court systems and crime laboratories in the six site jurisdictions—Chicago, Peoria, Kansas City, Oakland, Litchfield, and New Haven. These were selected on the basis of their range in population, geographical location, crime rates, volume of caseflow, and resources devoted to the collection and analysis of physical evidence.

A mail survey of the Nation's crime laboratories provided a profile of the scope and sophistication of forensic laboratory services, including the types of evidence routinely examined and the frequency of expert trial testimony.

Felony case filings were compared from the six jurisdictions through a random sampling from three calendar years (1975, 1978, and 1981) in order to assess the rates at which forensic evidence was used and its impact on case outcomes. The data were gathered from prosecutorial files.

Interviews with prosecutors and defense attorneys in the six locales measured their perceptions of the importance of forensic evidence relative to other types of evidence.

Hypothetical felony cases administered to prosecutors in Chicago tested the relative effects of eyewitnesses, confessions, tangible evidence, and forensic evidence. The prosecutors predicted charging levels, case outcome, and likely sentence of convicted defendants, based on the hypothetical crimes (attempted murder, rape, robbery, burglary) and the strength of various types of evidence.

Researchers surveyed about 300 Chicago jurors who had just returned verdicts in felony trials. Questions focused on types of evidence introduced during the trial and on the credibility and comprehensibility of various forms of evidence and testimony presented.

where it is essential, and as a result, some examinations of evidence will be deferred, only partially completed, or never completed. (Of course, this perception by prosecutors that scientific resources should be used sparingly is certainly justified in jurisdictions where there are indeed severe budgetary and workload constraints.)

5. Prosecutors need to become more comfortable using scientific evidence—e.g., by having more face-to-face contact with scientists and more experience in the direct examination of experts and the presentation of results to judges and juries.

This research revealed, for example, concern among some prosecutors that they really don't understand the scientific procedures used to examine evidence and find working with experts difficult and frustrating. Prosecutors and jurists need to devote more attention to understanding what scientific examinations can yield and how to present those results in an accurate and nonbiased fashion. More training, greater exposure to scientists, and fewer organizational barriers to reach the laboratory would be a significant beginning.

6. Justice officials should devote greater attention to the content of laboratory findings and their proper interpretation.

The research data, particularly at the point of sentencing, showed that decisionmakers rely more on the *presence* of a laboratory report than its *content*. Although findings that identify substances and reconstruct a criminal offense can be important, the more critical question would be, "Is the defendant involved?"

7. Many prosecutors need to take a more aggressive approach in the use of scientific evidence by considering the potential utility of such information in all cases where such evidence is available.

The main reason to use forensic evidence should be its contribution to the determination of guilt or innocence. Prosecutors should seek out scientific evidence for what it may contribute to their cases, and not simply feel obliged to use it for fear they may lose the case if it is absent.

Interviews with prosecutors found that although they might often stress the added value of scientific evidence in a case, they would as often if not more note the potential danger of proceeding without it when judges or jurors might expect it. A classic situation is one in which the prosecution already lacks a confession or an eyewitness, but *also* lacks tangible or scientific clues. It is then that the prosecutor truly faces the likelihood of losing.

We believe some users of forensic evidence support its use because it is the "professional" thing to do. Others cast it in even more pragmatic terms: "If that's what the jury expects, and it can help my case, then that's what I'll give them." When this attitude prevails, when prosecutors look to laboratories as a means to save a losing case, or merely to comply with judge or jury expectations—then such practices limit the potential value and impact of such evidence.

While scientific evidence is clearly not the single most important determinant in predicting a conviction, law enforcement agencies should still place emphasis on laboratory procedures to derive detailed information comparable to the emphasis they place on gathering physical evidence in the first place. Police, prosecutors, and defense attorneys must also strive to increase their understanding of forensic results and take a more systematic approach to its use in the adjudication of criminal cases.

This *Research in Brief* is based on the work of Joseph Peterson, John Ryan, Pauline Houlden, Steven Mihajlovic, and Michael Gilliland. The author was assisted by staff of Abt Associates Inc., including William Bruns, Jan Chaiken, and Sarah Colson.

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