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Barriers to Quality Achievement in Crime Laboratory Operations

REFERENCE: Bradford, L. W., **"Barriers to Quality Achievement in Crime Laboratory Operations,"** *Journal of Forensic Sciences,* JFSCA, Vol. 25, No. 4, Oct. 1980, pp. 902-907.

SYNOPSIS: Crime laboratory output consists of both quality and faulty work. The paper discusses three areas of crime laboratory functions which require upgrading: crime scene search, crime laboratory management, and proficiency. The impact on these areas of prioritization of work together with optimization of resource and the recognition of the educational problem are discussed. Keys to gaining further insight into these problems are given and referenced.

KEY WORDS: plenary session, criminalistics, education, crime lab management, physical evidence discovery, crime scene search, education in criminalistics, proficiency optimization

The practice of criminalistics has not been with us very long. The first crime laboratory was established in the United States in Los Angeles in 1923. At that time, the methods available consisted of the most fundamental techniques of analytical chemistry, physics, and microscopy.

There was no drinking driver evidence problem; we were in an era of Prohibition and few automobiles. Counties that then had no blood alcohol evidence collections and analyses now have as many as 2000 cases per month.

The street drug problem at that time was unknown in terms of today's street drugs workload, which results from current drug abuse practice. Consequently, toxicology dealt primarily with deaths and consisted of a screening procedure for a very limited number of drugs, narcotics, and poisons.

The practice of criminalistics in the early years was simplistic in comparison with the operations currently required in terms of both magnitude and technology. Now, 57 years later, we have at our disposal all of the sophisticated methods and instruments developed in the Space Age. What have we done with it?

Crime laboratories today play a key role in the development of physical evidence throughout the world. There is some remarkable top-flight work to be found even in the least prestigious laboratories. On the other hand, gross errors, bad practices, inefficiencies, and ineffectiveness infiltrate the forensic science family like an endemic disease.

The purpose of this discussion is to identify the major problem areas and to advance some concern and hope for the quality of forensic science as it relates to the public interest. There are at least three major fundamental areas of possible constraints to the use and effectiveness of physical evidence through the medium we call criminalistics.

The opinions or assertions contained herein are the private views of the author and are not to be construed as official or reflecting the views of the American Academy of Forensic Sciences. Presented at the Plenary Session, 32nd Annual Meeting of the American Academy of Forensic Sciences, New Orleans, La., 20-23 Feb. 1980.

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Discovery, Collection, and Submission of Physical Evidence

The first area of possible constraint is the crime scene search. There is a veritable plethora of published material [*1–11*] providing concepts of, guidelines to, and instructions in the methods of crime scene search, yet there is a significant absence of information as to the degree to which these instructions are being applied.

Despite the fact that crime scene search is a highly specialized function in a very few jurisdictions, the available data on experience support a widespread and unchallenged expression that the function of crime scene search is generally seriously neglected.

The output of a crime laboratory is obviously constrained by the input. The discovery and collection of evidence are normal police investigative responsibilities. Therefore, most laboratories have no control over the discovery of potential evidence at the crime scene or the eventual submission for examination or evaluation of that which is gathered.

A National Science Foundation study published in 1972 [*12*] reports that the only cases that reach many crime laboratories are those required by law to be submitted and those that serve the political interests of the submitting agencies. Although this view is supported by reference to particular incidents, there is no way to determine whether or not these situations are typical, but the assertions remain to this day unchallenged.

Therefore, the present practices of physical evidence discovery and collection need to be investigated to establish guidelines for committing crime scene search and laboratory examination resources to the efficient and effective use of physical evidence.

Crime Laboratory Management

Operational concepts and rationale play major roles in the delivery of quality. It is important to be aware of the conceptual constitution of a crime laboratory operation and the required principles of optimization to effect the most results from the least resource. This information is available in studies sponsored by the Law Enforcement Assistance Administration [*13–15*].

The crime laboratory must be viewed as a precious resource, precious because the professional specialties cannot be easily recruited from the labor market; precious because the methods, instruments, and equipment are highly specialized in their forensic science applications; precious also because the funding of crime laboratories at the local level has always been and continues to be a worthy effort but at a low level of priority.

This precious resource should be applied most to the cases that need it most. When a representative of a police agency submits major case evidence to a forensic science laboratory, it should be understood that the submitted material might not be accepted.

To determine whether or not any laboratory resources should be committed, the laboratory staff should evaluate the potential value and priority of the evidence through the following types of queries:

- Is there sufficient overview information to describe the specific identification or problem of proof involved?
- Will some law enforcement action or decision result from the laboratory work if it confirms the suspicions of the submitter?
- Is the problem such that a conclusion can be reached from the material submitted, or will additional items have to be found by further investigation?
- Is the quality of the submitted material appropriate and adequate?
- Does the prosecutor require this work by a given date for grand jury, preliminary hearing, or trial?

If the answers to these types of questions are negative, the crime laboratory is justified in deferring or not accepting the case. The concept of deferred examination must be

adopted. Even though an evidence object is retrievable from a crime scene, it cannot be concluded that it will necessarily be of value to the disposition of the case. If all of the retrievable objects are submitted to crime laboratory work in an aimless and abstract manner, one can anticipate a severe waste of the resource without accomplishing any purpose. Many cases in which physical evidence is abundant are disposed of in an acceptable manner through other evidence of a nonphysical nature and no laboratory work is required [*7–9*].

It is the responsibility of crime laboratory management to sort out these cases at the time of submission, thus avoiding wasted effort.

Crime Laboratory Proficiency

Quality in terms of valid results is also the direct responsibility of management. The release of erroneous, misleading, or incomplete results may be easily correctable in some business operations, but in forensic science, if the error is not detected in time, the results may reach the adjudication process and there have a horrendous and irreversible impact. The reporting of bad results is invariably the responsibility of the laboratory leader and indicates a loss of supervisory control over his operation.

There is ample evidence of the existence and prevailing abundance of "unacceptable responses" in the proficiency studies recently conducted by the Foundation of the American Academy of Forensic Sciences [*16*]. In those projects, proficiency tests were administered to crime laboratories throughout the United States who volunteered to participate on a confidential basis. Participating laboratories varied in number from 65 to 205, depending on the type of evidence each felt capable of examining, and 21 different sample projects were handled over three years. None of the evidence examinations were free from unacceptable responses. The highest number of unacceptable responses occurred in evidence categories for particular samples as shown in Table 1.

In the firearms test, fired bullets and cartridge cases from two different guns were reviewed by the laboratories. Participating laboratories were sent three .25-caliber bullets, two of which had been fired by the same gun. Five laboratories incorrectly reported that the same gun had fired all three bullets. That no two bullets could have been fired by the same gun was the finding of three other laboratories. These results are especially frightening when it is realized that a criminal prosecution for first-degree murder may hinge entirely on a bullet comparison identification. This kind of error has been documented in several cases at trial in the United States in recent years through the discovery or reexamination process.

These proficiency test findings are reinforced by the work of independent forensic scientists who have the opportunity, through the discovery process in criminal law, to examine

TABLE 1—*Unacceptable responses.*

Category	Sample Number	Labs Submitting Unacceptable Responses, %
Blood identification	3	71
Paint identification	10	51
Soil identification	11	36
Paint identification	16	34
Glass identification	9	31

and evaluate prosecution evidence from many different crime laboratories. Through the process of discovery, fundamental errors in identification and faulty methods have been found in numerous cases at the trial or trial preparation phase.

The proficiency study determined that the unacceptable results could be attributed in part to these factors:

- failure to employ *adequate* methods or failure to employ *appropriate* methods, and
- misinterpretation of the test results by the examiner resulting from inadequate training, lack of experience, or carelessness.

Leading to these two features, there is a situation in the education phase that must be recognized. Unlike the preparation for the medical profession,

- there is no uniform or core curriculum or internship that leads to the practice of criminalistics,
- there are no minimum course requirements in terms of a structured program,
- there is not even a consensus of what the educational requirements should be in the specialized forensic science subjects, and
- there are no codified standards of practice, either formal or informal, in the identification aspects of criminalistics toward which an educational program can be planned.

Consequently, until such time that a formative mold of education can be developed to provide the proper foundation of knowledge, concept, and expectation to the entrant to the practice of criminalistics, quality has little chance of improving.

Remedial programs slanted to the revelations of the proficiency program have been instituted by direct support from the National Institute of Law Enforcement and Criminal Justice [*17*]. Likewise, programs of certification of examiners and accreditation of laboratories have been started. These measures are all commendable and will undoubtedly provide a significant improvement in quality. However, unless an appropriate professional educational system directed toward the entrance level is devised [*18*], remedial treatment may turn out to be little more than first aid.

The coexistence of a high degree of proficiency in many laboratories with the endemic presence of "unacceptable proficiency" in others causes both prosecutor and defense attorney to be faced with the dilemma of which laboratory is which. The defense attorney especially has no way of knowing whether he is dealing with a credible or a defective laboratory result.

To the defense attorney or to the prosecutor who desires to inspect or review his supporting criminalistics services for quality, the following guidelines may be of some preliminary help:

- Is the person in charge of the laboratory a professional scientist?
- Does the case worker appropriately mark each item of evidence for identification?
- Are case notes systematically kept, indicating what tests were made and what the results were?
- Are all significant identifications documented in notes either by narrative, sketch, or photography?
- Have identifications been located and preserved for easy demonstration, and bullet identifications indexed?
- Are all pertinent items of laboratory-generated experimental materials listed and preserved?
- Are in-laboratory proficiency tests conducted on a regular basis?

- Are methods regularly checked against blind samples or standards of reference or calibrations?
- Are all case reports subject to supervisory review before release?
- Does laboratory policy welcome and promote defense discovery procedure?

To investigate criminalistics quality, the prosecutor has at his disposal the tool of seeking consulting crime laboratory management advice together with the authority to order periodic blind sample tests. The defense attorney has the tool of discovery and the art of the knowledge of intensive cross-examination to investigate quality. All of these tools deserve to be used in the future more than they have been used in the past.

Summary

The obstacles to the attainment of quality in criminalistics appear to be surmountable with the proper efforts:

- The crime scene search function can be used much more effectively than at present.
- The strategy of application of crime laboratory resources can be significantly reoriented to provide efficiency.
- The proficiency of crime laboratory examiners can be elevated by an accredited preparatory curriculum, by remedial training on the job, and by certification of performance ability.
- The proficiency of laboratories can be improved by laboratory accreditation and by improved management practices.
- The interests of both prosecution and the defense lawyer in laboratory operations can have a significant impact on the quality of output.

In facing the quality problem our first impulse might be to say that we don't have enough money, or we don't have enough people, or we don't have enough sophisticated equipment, or we don't have management guidelines. But let's be honest, not one of these excuses is true. The problem lies in the appropriate, efficient, and effective use of what we do have. A nation that can arrange round-trip travel to the moon and create destructive forces sufficient to ruin this planet surely has enough technology and ingenuity to arrange quality in the forensic science crime laboratory activities of our society.

The most urgent question is: Can we reach a zero failure rate in laboratory findings? It must be recognized that anyone and everyone may make inadvertent mistakes at some time or another, no matter how careful, and therefore a constant trickle of errors of one sort or another can be expected in any laboratory. Yet by check and crosscheck it is possible to trap laboratory errors before findings are released. This should be a primary goal of every crime laboratory leader.

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