E5 A Good Look at Blind Testing: Quality Assurance Systems and Bias

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The goal of this presentation is to provide the listener with an overview of the principles of quality assurance (QA) - the systems that laboratories use to track and prevent errors - in order to explore the impact of the systems on the work itself. The individual bias inherent in addressing the issues in individual cases will be contrasted with the unexamined system bias when the scientist is working "blind". Lastly, the unattained potential of using laboratory quality assurance to address concerns of the courts and the legal system will be explored through examples. The content is ori- ented to both technical and legal practitioners.

This presentation will demonstrate how good science means doing the right thing - addressing the case issues with work that can answer questions and doing it right - with work that is rigorous, thorough, accurate, and reliable. Laboratories employ nuts-and-bolts quality control to ensure the integrity of tests and measurements, and quality assurance to ensure that work that is going out meets the laboratory standards. The very existence of quality assurance systems influence the work performed. This can introduce sources of error when the work is compliance-driven rather than question-oriented. Lawyers and judges who are concerned about the relia- bility of scientific work, when advocating for or evaluating systems to ensure the reliability of scientific work, would benefit from understanding the interplay of doing science with systems used to track what is done.

When crime laboratory errors are exposed by something other than internal laboratory scrutiny, not only the quality of work but also the quality assurance system – used to track and prevent errors – is called into question. There is usually a hue and cry for "blind testing" to eliminate examiner bias, and for a system of compliance with rigid protocols that assure minimum standards but do not permit the exercise of judgment. When this is implemented, new sources of error are introduced.

Blind testing –when the scientist either does not have information about the case issues or does not know the source of the samples being tested – is an effective quality control practice when a second opinion is solicited from another scientist on a reading of data and consequent results. The second scientist should know only whether the samples are reference samples or samples related to the crime. However, when all scientific work on a case is performed "blind", the scientist is not able to form and evaluate alternative hypotheses and test the significance of the findings. Although blind testing has seldom been implemented as crime laboratory policy, some laboratories do the equivalent by discouraging scientists from dis- cussing the case with police detectives. Scientists then make testing deci- sions based upon the requests of detectives as listed on an evidence sub- mission form. This can reduce examiner bias, but increases the effect on laboratory work of any police bias or misinformation, subverting the function of laboratory work in testing and questioning the police hypotheses and in providing objective and independent information that might not have been anticipated by police. This will be illustrated with case examples. Another effect, seldom noticed by lawyers, is that the police are deprived of investigative information that the laboratory can provide.

Testing protocols are a useful tool for performing routine analyses, and make is possible to compare data and results. However, when a scientist is required to follow the testing protocol even when it does not best address the questions in the case, useful information may be lost and the signifi- cance of the information may be skewed. This will be discussed with case examples.

Historically, the courts have turned to bodies such as the National Academy of Sciences in setting standards for DNA testing. This resulted in the forensic-scientist-based Technical Working Groups (now Scientific Working Groups) that were charged with developing guidelines for testing. The guidelines were instead implemented as protocols, and despite an initial good effort by ASCLD, the rest of the scientific process was no longer addressed in national level discussions of quality assurance. One of the models used for crime laboratory quality assurance is the medical testing laboratory, in which physicians direct and interpret the test results of medical technicians. Two major flaws in this model are that crime labo- ratory samples are far less standard than those in medical labs, and that lawyers and police, although responsible for using the information, cannot effectively direct and interpret the testing and results.

There are two general models for quality assurance: an approach that depends upon the expertise of the examiner (called the "artisan/craftsman" approach), and one that depends upon strict compliance with protocols. Although ASCLD accreditation currently emphasizes the latter, most labo- ratories would best use a blend of these approaches. Scientists can implement protocols for routine work and a written rationale for non- routine aspects of the work, allowing it to be reviewed in quality assurance checks including peer review. This could easily be implemented into standard quality assurance programs, as it is currently being done in some laboratories.

Evaluations of any type of analytical methods and testing plans – i.e., peer review of individual cases and quality assurance of laboratory systems need to answer the following: How reliable is the data? How accurate is the identification or comparison? How sound is an association or exclusion? How significant are the findings? How does the data fit together as a whole? Whether a conclusion is accurate (i.e., corresponds with reality) depends on whether the data is sound and whether the inter- pretation explains the data rigorously and completely. Whether the findings are significant depends on whether and how well the questions in a case are

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addressed. The soundness of an association or exclusion rests upon elimi- nating alternative hypotheses, and the fitting together of data into a coherent explanation is predicated upon it. A quality assurance system that addresses only some of these questions will drive scientific work away from providing comprehensive information, and will amplify the effects of outside biases on work performed and reported by the crime laboratory.

Forensic Science, Quality Assurance, Bias

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