NATIONAL COMMISSION ON FORENSIC SCIENCE

NIST National Institute of Standards and Technology U.S. Department of Commerce

Views of the Commission Regarding Identifying and Evaluating Literature that Supports the Basic Principles of a Forensic Science Method or Forensic Science Discipline

Subcommittee
Scientific Inquiry and Research

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Commission Action

The Commission voted to adopt this Views Document on March 22, 2016, by a more than two-thirds majority vote (97% yes, 0% no, 3% abstain).

Note: This document reflects the views of the National Commission on Forensic Science, and does not necessarily represent the views of the Department of Justice or the National Institute of Standards and Technology. The portion of the document directly labeled "Views of The Commission" represents the formal Views of the Commission. Information beyond that section is provided for context. Views documents do not request specific action by the Attorney General, and thus do not require further action by the Department of Justice upon their approval by the Commission. The National Commission on Forensic Science is a Federal Advisory Committee established by the Department of Justice. For more information, please visit: https://www.justice.gov/ncfs.

Overview

Documentation of the literature that supports the underlying scientific foundation for each forensic discipline is a critical component in determining if methods, technologies, interpretation guidelines and conclusions are supported by science. Features of "scientific literature" are delineated in the approved Views Document "Scientific Literature in Support of Forensic Science and Practice;" it presented criteria by which scientific literature can be assessed for consistency with principles of scientific validity. However, meeting these criteria is only the first step in creating a compilation of core scientific literature within a field. Such compilations are vital to the forensic discipline as well as to the judicial system where it should be integral to admissibility and gatekeeping practices.

In any scientific discipline, an on-going process to evaluate the weight and merit of published materials must be established. The NCFS is aware of past and on-going efforts to establish the scientific foundation of forensic discipline through literature reviews and generation of bibliographies. As part of these efforts, it is the view of the NCFS that scientific literature must be evaluated and be vetted through an objective and critical review process using tenets

based on general scientific principles and practice. These tenets must be satisfied before any form of scientific literature is included in, and considered part of, a forensic discipline's scientific foundation.

Herein, foundational literature is intended to refer to that upon which a discipline has derived, developed, or defined practices and procedures examined and validated by a given discipline and applied within a legal, medicolegal, or judicial setting.

View of the Commission

It is the view of the National Commission on Forensic Science (NCFS) that scientific literature must be evaluated and be vetted through an objective and critical review process using tenets based on general scientific principles and practice. These tenets must be satisfied before any form of scientific literature is included in, and considered part of, a forensic discipline's scientific foundation.

Background

Methods employed while conducting basic or applied research within a given scientific discipline may vary depending on several factors such as the size and scope of the research. Academic research often explores novel methodology and instrumentation and potential forensic science applications. Forensic science service providers frequently investigate ways to offer more expeditious, inexpensive analysis to their customers; accordingly, they conduct validation studies of leading-edge analytical and technical procedures cited in the scientific literature or provide alpha and beta testing of kits, instruments and software. The studies performed usually will depend on the individual needs of the laboratory and not necessarily on those of the discipline where infrastructure, staffing and funding may be variable. Although publication of the studies is crucial, differences in approach, data collection, interpretation and presentation are inevitable. Regardless of where a research study falls on the range of basic to applied, the same general tenets of scientific review should be applied to the evaluation of resulting publications.

Evaluations of the literature using a universal systematic process will provide a means to determine which studies are truly foundational. As an on-going effort, these reviews will document the evolution of a given discipline with respect to the expectations outlined in the National Research Council Report on Forensic Science in 2009. Such an approach could allow for strengths and weaknesses of a given discipline to be discovered which could result in systematic exploration of these weaknesses through future research.

Compilations of accepted foundational literature serves additional purposes. First, compilations generated under stringent review criteria define general scientific acceptance and should be used to assist in admissibility decisions and gatekeeping functions. Second, priorities can be established for translational studies designed to bring the most promising developments into mainstream forensic practice. Third, research needs can be identified and used to develop initiatives and calls for proposals to fill these needs and to spur investigator-initiated research. Success in these endeavors depends on current and complete understanding of the foundational literature.

Recommended Implementation Strategy

The purpose of this Views document is to provide guidance relevant to evaluating status of scientific literature for specific forensic science discipline. The following tenets of literature review should be considered in a critical review process that evaluates the merit of an individual article:

- Does the publication adhere to the guidelines stated in the Views Document "*Scientific Literature in Support of Forensic Science and Practice*"?
- Is the problem or hypothesis clearly stated?
- Is the scope of the article clearly stated as appropriate (article, case study, review, technical note, etc.)?
- Is the literature review current, thorough, and relevant to the problem being studied?
- Does this work fill a clear gap in the literature or is it confirmatory and/or incremental?
- Are the experimental procedures clear and complete such that the work could be easily reproduced?
- Are the experimental methods appropriate to the problem?
- Are the methods fully validated to the necessary level of rigor (fit for purpose)?
- Are the data analysis and statistical methodology appropriate for the problem, and explained clearly so it can be reproduced?
- Are the experimental results clearly and completely presented and discussed?
- Are omissions and limitations to the study discussed and explained?
- Are the results and conclusions reasonable and defensible based on the work and the supporting literature?
- Are the citations and references complete and accurate?
- Are the references original (primary) and not secondary?
- Are funding sources and other potential sources of conflict of interest clearly stated?

Additional reading and references

[1] Foster KR, Huber PW. *Judging Science: Scientific Knowledge and the Federal Courts*.

Cambridge, MA: MIT Press; 1993. ISBN: 978-0262561204

[2] Feurer ID, Becker GJ, Picus D, Ramirez E, Darcy MD, Hicks ME. *Evaluating Peer Reviews - Pilot Testing of a Grading Instrument*. JAMA-J Am Med Assoc. 1994;272:98-100.

[3] Jones AW. *Impact factors of forensic science and toxicology journals: what do the numbers really mean?* For Sci Int. 2003;133:1-8.

[4] Jones AW. *The distribution of forensic journals, reflections on authorship practices, peer-review and role of the impact factor.* For Sci Int. 2007;165:115-28.

[5] Meerpohl JJ, Herrle F, Antes G, von Elm E. *Scientific Value of Systematic Reviews: Survey of Editors of Core Clinical Journals*. PloS one. 2012;7.

[6] Hartonen T, Alava MJ. *How important tasks are performed: peer review*. Sci Rep. 2013;3.

[7] Allen TW. *Conducting Proper Peer Review for a Journal*. Bariatr Surg Pract Patient Care. 2014;9:18-20.

[8] Azer SA, Dupras DM, Azer S. *Writing for Publication in Medical Education in High Impact Journals*. Eur Rev Med Pharmacol Sci. 2014;18:2966-81.

[9] Bowman JD. *Predatory Publishing, Questionable Peer Review, and Fraudulent Conferences*. Am J Pharm Educ. 2014;78.

[10] Wendler D, Miller F. *The ethics of peer review in bioethics*. J Med Ethics. 2014;40:697-701.

[11] Siler K, Lee K, Bero L. *Measuring the effectiveness of scientific gatekeeping*. Proc Natl Acad Sci U S A. 2015;112:360-5.

[12] NIST/SEMATECH *e-Handbook of Statistical Methods*, http://www.itl.nist.gov/div898/handbook/, July 2015.

[13] Coghill, A.M., Garson, L.R. (editors), *The ACS Style Guide: Effective Communication of Scientific Information*, 3rd edition. New York: Oxford University Press, 2006. ISBN: 978-0-8412-3999-9.

[14] Spier R. *The history of the peer-review process*. Trends Biotechnol. 2002;20:357-8.