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JUDICIAL GATEKEEPING: USE OF SCIENTIFIC STANDARDS & FORENSIC EXPERT
QUALIFICATION IN OKLAHOMA

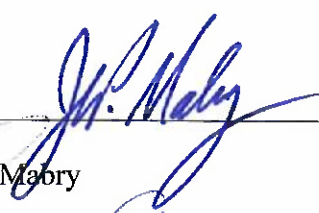
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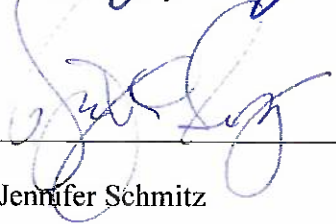
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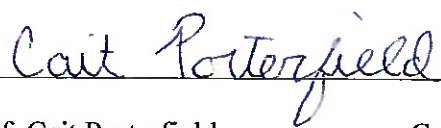
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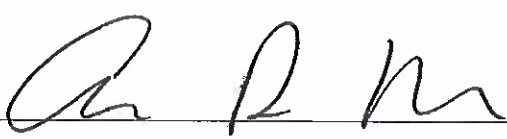
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Abstract

With the continued issue of wrongful conviction due to the misapplication of forensic science, it is imperative that the judicial gatekeeper role is continuously analyzed for effectiveness. Improvements in forensic science have been made through the development and implementation of scientific standards by the National Institute of Standards and Technology (NIST). The *Daubert* legal standard for admissibility of expert testimony requires that judges consider application of standards and controls to gauge reliability of the scientific expert. However, no previous research has directly examined whether or not judges consider scientific standards adherence during forensic expert qualification, or if judges are trained to do so. This research surveyed 35 Oklahoma district court judges that preside over criminal court dockets. The judges were surveyed regarding their training in forensics, their access to forensic resources, their familiarity with forensic scientific standards, their use of scientific standards while qualifying a forensic expert, and their perceived importance of using standards during expert qualification. The results demonstrated that forensic education is most commonly attained through continuing legal education courses with almost all participants believing that further training and more accessible resources are necessary for their judicial role. Moreover, a majority of participating judges indicated that it is important to consider scientific standards under *Daubert*, however they do not believe they have sufficient access to information on scientific standards. With the results from this research, efforts can be made to develop and improve the forensic science education and training available for judicial officers and other legal professionals in the state of Oklahoma. Creating more accessible resources to strengthen the communication between the forensic practitioner and the legal community could potentially benefit the justice system by lessening the instance of wrongful conviction.

Introduction

Imagine for a moment that you are a trial judge presiding over an important murder trial. A forensic expert is called by the state's prosecution to deliver testimony regarding the work they did to analyze the blood spatter present at the crime scene. The analyst has an extensive background in the field of blood spatter analysis and is well-regarded among their professional peers. They testify that from analyzing the evidence they were able to conclude the defendant certainly committed the crime. The analyst's explanation is filled with scientific terms and exclusive terminology to that specific discipline of forensics. The jury then becomes compelled to accept the testimony and conclusions of the expert and return a conviction of guilty. As the judge, you fulfilled your duty and justice was accomplished. Although unbeknownst to the legal professionals and jury, in this case the forensic expert failed to follow the standards of the field and offered opinions not fully based on scientific analysis. This situation is intended to be prevented by the judge's responsibility to "gatekeep" expert testimony that does not meet the legal standards for admissibility. Yet, the challenge that exists is that the judges are often not familiar with forensic standards to the extent necessary to perform this role. This scenario is an unfortunate example of the harsh experiences that at least 3,807 wrongfully convicted people have endured as a result of the faults in the American criminal legal system (1). The misapplication of forensic science has been an ongoing issue as the legal community struggles to understand the complexities of scientific expert testimony. Correspondingly, the forensic scientific community has been working to remove the invalid methodology and establish standards to uphold the integrity of the field. Therefore, it is imperative that the ability of judges to effectively gatekeep unscientific forensic expert testimony be analyzed for potential difficulties as solutions cannot be proffered without the initial assessment of effectiveness.

Literature Review

Forensic Science and the Standards

The overall goal of forensic science is to apply scientific methods and principles to the legal system through objective analysis. However, the application of forensic science differs between the various disciplines as the methodology and scientific principles necessary for examination are different. For example, the procedures for conducting a DNA analysis of a biological stain significantly contrast the procedures used when doing a digital analysis of a technological item of evidence. Therefore, since not all disciplines of forensic science follow one set of guiding principles, it would be wrong to assume that evidence from each discipline holds equal power. Single-source DNA analysis is regarded as the ‘gold standard’ of forensic science due to the accuracy and reliability of the testing methods used (2). Conversely, impression evidence such as footwear impressions are based on an examiner’s interpretation and comparison between two items rather than a scientific method of analysis. This distinction is not to say that comparison techniques in forensics are invaluable, but merely to demonstrate the diversity of the field. In fact, it was the realization of the variety in forensic science that led to the first major critiques at a national level. That scrutiny led to the important examination of the relationship between the science and the law.

In 2009, the infamous report by the National Academy of Sciences (NAS) was released and it called for a vital shift to strengthen the science in many of the dominant forensic science disciplines (3). For forensic practitioners, this meant that more scrutiny and attention would be placed on accreditation, reliability, and standardization of methods. The report began by acknowledging how faulty forensic testimony has been responsible for wrongful convictions, which presented a serious problem for the legal community to reckon with as well (3). By

analyzing the current scientific state of specific disciplines, the report laid out the issues that must be addressed by forensic scientists, legal professionals, and the government agencies with jurisdiction over science and law enforcement. An important note within the report explained that even with the few protocols already in place, such as scientific standards or accreditation boards, no regulatory body existed to enforce them (3). With forensic analyses such as bitemark comparison or fire investigations, the NAS report showed a lack of research supporting the conclusions being offered in a courtroom as scientific evidence (3). It was hopeful that this comprehensive review would inspire a dramatic adjustment into how forensic evidence is considered and used within a courtroom. A second extensive report followed in its footsteps to highlight the validity of forensic science as a substantial ongoing problem.

The President's Council of Advisors on Science and Technology (PCAST) conducted a study in 2016 to examine how scientifically established the feature comparison disciplines of forensic science were (2). The feature comparison disciplines include hair, fibers, bitemarks, bloodstain, tire impressions, fingerprints, firearms, and DNA mixture samples. In regard to these forensic methods, the PCAST study focused on foundational validity and sought to identify how reproducible and consistent the feature comparison discipline methods were (2). The PCAST report echoed similar issues, calling into concern the empirical basis for various forensic science practices. Validity in forensic science pertains to the reproducibility and accuracy of the scientific method being applied in a forensic analysis of evidence (2). Namely, a forensic method used to examine evidence needs to be reliable and based on repeated independent research studies before it can be considered generally accepted in that particular discipline. Another significant component to the PCAST report is the section written with recommendations for the judiciary in addressing this issue in science. It urged not to allow personal experiences or professional

practices of the expert to be considered a substitution for the empirical verification of reliability (2). This served as an important reminder for judges who may be misled by a forensic expert's experience in a field rather than that expert's knowledge and application of valid scientific practices. With the PCAST report now a decade old, the concerns that were emphasized continue to be the subject of efforts to advance forensic science.

At the national level, several organizations and government agencies have been developed and devoted to confronting the lack of standardization within forensic science. The National Institute of Standards and Technology (NIST) conducts research and administers the organization that is responsible for developing forensic science standards. Standards are approved practices, methods, terminology, guidelines, and protocols that forensic scientists are meant to adhere to (4). For instance, when a forensic scientist is analyzing an item of evidence, the laboratory procedures, method of testing, and the overall conclusion and verbiage within the report should be in accordance with the established standards in that forensic discipline. The Organization of Scientific Area Committees (OSAC) is the group administered by NIST that facilitates standards development through volunteer scientific members who draft and evaluate proposed forensic standards (4). Additionally, OSAC provides a list of research topics that need to be explored in order to develop reliable methods for standards development (4). Standardization is necessary in forensic science as it can alleviate the rate of wrongful conviction from the misapplication of forensic methods. Consequently, a more standardized field would allow for easier judicial assessment of forensic methods being testified to in a courtroom.

The National Institute of Standards and Technology also works to advance standards in forensic science by working in agreement with the largest forensic organization in the country, the American Academy of Forensic Sciences (AAFS). AAFS is a professional multidisciplinary

organization that promotes research and collaboration among forensic scientists (5). With 12 scientific discipline sections, the AAFS organization features a broad range of forensic interests and provides for networking opportunities at their annual conference (5). Essentially, to be well-regarded in the field of forensic science, it is imperative to have membership within the organization and be informed on the latest research and emerging technology in forensics. One subsidiary of AAFS is the Academy Standards Board (ASB) which works to develop standards that produces reliable and efficient techniques to be used in the pursuit of justice (6). The Academy Standards Board was created in an agreement with NIST to create trainings and provide resources to the thousands of forensic professionals within AAFS (6). Therefore, forensic practitioners today with membership to the foremost professional organization in the field are being more informed and educated on the ongoing evolution of scientific standards.

From the development and expansion of forensic science came the attention towards the legal issues in admitting forensic testimony in the courtroom. With the growing number of wrongful convictions, it was crucial to develop and perform a comprehensive assessment pertaining to the methods and principles guiding many forensic disciplines. This analysis on scientific procedure was a significant victory for making advancements towards a more reliable and valid forensic science. Nonetheless, the effort to standardize forensic methods fails to be fully effective due to a nonexistent regulatory body to enforce the techniques deemed valid. The need for better standards adherence should be a paramount goal of forensic science, as scientists should want better scientific practices in the field (7). An additional issue exists with the lack of knowledge that judges and legal professionals have regarding forensic scientific standards. As the field continuously progresses, maintaining adequate comprehension and adherence of scientific standards becomes tiresome for the legal community to do. Albeit it is essential for

judges in particular to be proficient in forensic scientific standards as law demands they act as a gatekeeper for forensic expert testimony.

Legal Rules of Expert Testimony

Contrary to scientific standards, legal standards are required by written law and describe the actions that are enforced and prohibited in court. Specifically, in regard to the admissibility of forensic evidence and expert testimony, the law describes what the trial judge is required to consider. This is the concept of judicial gatekeeping in which the judge controls what testimony by an expert witness is allowed. Both the prosecution and defense team can obtain experts to analyze and testify to the evidence, but the judge must first make a decision as to whether that testimony can be admitted. The initial standard for admissibility came from *Frye v. United States*, 421 U.S. 542 (1923) which stated that for an expert's opinion to be admissible, it must be generally accepted within that scientist's relevant scientific community (8). In other words, the vague test of general acceptance became the only qualifying factor for expert testimony admittance. This unsurprisingly resulted in many judges feeling unclear how to assess expert testimony and defaulting to considering an expert's experience level as sufficient basis for general acceptance (9). Decades after the *Frye* standard was established, Federal Rules of Evidence (FRE) were enacted and Rule 702 allowed those with scientific, technical, or specialized knowledge to testify in a federal courtroom regardless of general acceptance (10). Thus, in federal cases expert testimony could be admitted based on an individual's professional knowledge and experience rather than only scientific analysis. Based on Rule 702, the current legal standard followed at the federal level and in most states came from the *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993) case. According to *Daubert*, a judge must consider five criteria when deciding the admissibility of expert testimony:

1. whether the methodology has been tested,
2. the technique has been published or peer reviewed,
3. if an error rate is known,
4. the existence and maintenance of standards controlling the operations,
5. and gained widespread acceptance in the specific field (11).

In establishing a more thorough standard, the possibility of inaccurate expert testimony in the courtroom was expected to be diminished. Despite having a structured standard for assessing the reliability and relevance of expert testimony, judges still lack the scientific knowledge to meticulously evaluate using the *Daubert* standard (12). This issue is why the effectiveness of *Daubert* is in question, as the disconnect between science and the law persists.

The Forensic Expert in the Courtroom

Upon being accepted as an expert by a judge based on the *Daubert* standard, forensic experts are qualified to testify and explain the analytical process and scientific conclusions that they made. The role of being an expert witness is burdensome for forensic scientists, or rather it should be. Communicating science and scientific findings to non-scientists requires great skill, as it is necessary for the judge, attorneys, and jury to each reach the same level of comprehension. The challenge also exists in adhering to the scientific standards of allowed language in forensic conclusions while also rearticulating for a broader audience. For example, when a forensic chemist explains the testing method and the results they found, they must only use language that has been deemed appropriate by that forensic discipline, although it may be too technical for a lay person to understand. Simply, complex methods of science must be condensed to fit a wide variety of education levels while also maintaining scientific credibility. When both public comprehension and scientific integrity are not sustained, there can be confusion that leads to the

incorrect evaluation of the expert testimony by the court. Inevitably, this has led to attention being brought to the multitude of problems with forensic expert testimony.

A considerable amount of focus has been placed on the instances of wrongful conviction from the misapplication of forensic science, since it was involved in more than half of exonerated cases (13). While it may be assumed that the errors being made by forensic examiners are related to incorrect conclusions made during evidence analysis, the issue lies in how the conclusions are understood by the people within the courtroom (14). With insufficient resources to comprehend the scientific findings, greater responsibility is placed on the forensic expert to effectively communicate (14). This issue is one that must be corrected by forensic examiners through training and education on being an effective scientific communicator. Another contributing factor to forensic errors is the highly trained and over-confident forensic experts that are proposing cutting edge findings from new techniques (14). In other words, a well-experienced and highly regarded forensic expert becomes self-assured to create new methods of forensic analysis to make conclusions without first establishing the reliability and validity of the methods. From an analysis of past wrongful conviction cases, at least 34 cases involved the judge's failure to conduct a review of the novel technique and accompanying faulty testimony by a forensic expert (14). This should alarm not only the legal community, but the forensic science community to place more scrutiny on scientific standards adherence. Even with the advances in science and discovery of past faulty methodology, preventing bad forensic science from being presented in court remains an issue. Unfortunately, very few exonerations have led to the inspection and analysis of improper scientific methods (15). In fact, many previously disregarded forensic techniques remain admissible due to precedent. This occurs when a judge makes a ruling in court that is upheld on appeal and that decision gets added to a collection of other decisions

known as case law. From this, judges can refer to the past rulings as a way to guide their decision-making in subsequent rulings. Precedent can be set when a judge opts to admit a forensic analysis technique as scientifically acceptable for an expert to testify to.

A prime example of how precedent can keep faulty forensic science in the courtroom would be the case of Robert Lee Stinson. In 1986, the state of Wisconsin wrongfully convicted Stinson based on the faulty forensic testimony regarding bitemark analysis (16). Bitemark analysis has been thoroughly proven as unscientific, with the NAS and PCAST report echoing the unreliable foundations it is based on (2, 3). Stinson remained convicted in prison for over two decades before DNA evidence proved his innocence and allowed for him to be released (16). Despite recognizing that invalid forensic analysis caused an innocent man to be wrongfully convicted, the *State v. Stinson* case became precedent throughout Wisconsin. This means that a Wisconsin judge can still choose to rule that bitemark evidence is admissible in court by citing the case that cost Stinson years of freedom. While bitemark analysis may not be as commonly used, other less-scientific disciplines and methods continue to be introduced in court based on precedent. This concern was specifically named in the PCAST report in regard to feature-comparison methods being admitted as a result of longstanding precedents without regard to the changing perceived validity of those methods (2). Essentially, the testimony from the forensic expert cannot be admitted by default from reviewing case law but should be carefully considered on a case-by-case basis using the current standards in that field.

Another common trend seen within many courtrooms, is the reliance on the defense team to expose the weaknesses in the expert's testimony. Despite trial judges having the gatekeeper role, many will frequently expect the defense attorneys to address the credibility of an expert or the forensic evidence during their cross-examination of the state's expert. Many judges also

assume that forensic scientists are following scientific standards, so in the unlikely event an expert gives invalid testimony, the judge expects the defense attorney to highlight to the jury the flaws in the expert's testimony (15). One issue with this situation, is that the defense attorneys may not have any more knowledge or resources than the judge does. Public defenders are often lacking the time and resources to understand the flaws of a forensic discipline, making it hard to properly challenge the evidence being presented. State prosecutors are benefited by their ability to seek out the opinion of forensic experts that work for local or state labs, meanwhile defense attorneys may not have the financial resources to obtain a forensic expert of their own. In a review of 156 exoneration cases, it was found that it was rare for defense council to make any objections or successfully cross-examine the state's forensic experts (15). The expectation by judges that defense attorneys will challenge invalid forensic testimony has proved to be ineffective, and more accountability should be taken by the court's gatekeepers to prevent unreliable expert testimony.

By understanding that forensic experts can fail to effectively communicate and abuse their expert position to use unreliable methods, it becomes apparent how systemic the problems are. Adherence to scientific standards and developing communication skills should be of significance to a forensic expert. If these tasks are accomplished, then the responsibility of the judge to effectively gatekeep forensic testimony becomes simpler with increased scientific understanding. The strengthened comprehension of modern forensic science among judges is also beneficial as it will allow judges to consider case law from a more informed position of authority. The instance of wrongful conviction has the possibility to be lessened by increased vigilance among forensic professionals and the enhanced scientific knowledge of judges.

Judicial Knowledge of Forensic Science

Beginning with the NAS report, attention was brought towards the lack of scientific literacy among legal professionals (3). While it may be assumed that a strong educational background in science is unnecessary for an individual pursuing a career in the judiciary, the establishment of the *Daubert* standard suggests that some scientific knowledge may be needed. As *Daubert* requires judges to consider a list of various expectations relating to expert testimony, scientific wisdom may be useful in effectively doing so. Some even suggest that it is unfair to assume that judges be able to use the *Daubert* criteria successfully without scientific literacy training (12). It is important to note that this current paper is not advocating for legal professionals to also become scientists; rather, it promotes acknowledgment that the legal system presently presumes that judges have adequate scientific understanding. Recently, research has begun focusing on judicial comprehension of forensic science, despite being a complex circumstance to properly examine.

While addressing judicial knowledge, it is important to highlight the variances in prior legal experience. Highly successful attorneys may be elected or appointed to preside over civil, criminal, or special court cases. The court that a judge is assigned to may have no relation to the type of law that they previously practiced. For instance, an accomplished oil and gas attorney may receive a judgeship presiding over criminal court cases, despite their lack in experience with forensic evidence and criminal casework. This situation demonstrates how varied forensic knowledge may be across the judiciary. A significant concern of this discrepancy between prior legal experiences is that judges will be acting as gatekeepers for the courtroom without sufficient knowledge to do so. Moreover, the use of forensic science in court will be decided by a judge who may not have the education or experience necessary to question the admissibility of the

evidence properly. For this reason, judicial knowledge in forensic science must be examined to fully understand the extent of the issues with judicial gatekeeping of forensic expert testimony.

The interest in judges' perception of forensic evidence has highlighted many flaws in the evaluative process that is often used. In one study, it was found that the perceived general reputation of the forensic discipline played a role in admissibility considerations (17). For instance, DNA is regarded as highly reputable since it is not perceived to be relied on only human interpretation of the evidence, but scientific procedures (17). While reputation and general acceptance should be considered, some DNA analyses require greater examiner evaluation and yield less confident results. Specifically, DNA mixture samples of more than two individual's DNA are less reliable as they involve subjective judgment of the examiner (2). Therefore, judges may assume greater confidence in a forensic discipline without regard to the circumstances and exact scientific methodology involved. An additional research article examined how expert witness credibility was perceived by those within the courtroom. The results showed the disappointing reality that judges' perception of credibility is often based on showmanship, communication skills, and likeability rather than scientific adherence (18). It can be inferred that scientific review measures are less likely to be used when the expert witness is perceived to be credible due to their personality instead of their scientific ability. Simply stated, the effectiveness of the judge's gatekeeping role could be impacted based on perceived attributes unrelated to the expertise being evaluated. Subsequent research on a judge's ability to assess forensic expert qualifications suggested characteristics that would be more of value in the admissibility process. Attention to the forensic examiner's laboratory should be considered relevant when determining the scientist's adherence to standards and accepted forensic practices. In fact, many crime labs are not accredited by the American Society of Crime Laboratory

Directors/Laboratory Accreditation Board (ASCLD/LAB) since there is not a national requirement to obtain accreditation (19). The ASCLD is the largest provider for accreditation in the field of forensic science, and they provide standardized policies and procedures for operating a crime laboratory (19). Consideration of a forensic scientist's laboratory accreditation status and the operating procedures followed can help judges assess the value of scientific integrity the expert may hold. Moreover, research has called for judges to steer away from using an expert's experience level in the field and consider proficiency testing (20). A forensic examiner may have years of professional experience in relevant fields, but not a proficient level of utilizing the standard methodology and principles in that discipline. Judges could then request that an examiner provide proof of proficiency in that discipline and use those results to help evaluate the admissibility of that scientist as an expert.

Along with research into the judge's perception of forensic science methods, the extent to which judges received training on how to evaluate forensic science was also an issue addressed by the literature. In a comprehensive review, it was discovered that the majority of judges do not receive any training in forensics until it was offered as part of the required continuing legal education (CLE) courses they could choose to attend (21). That is, the availability of forensic training for legal professionals is markedly slim to the extent that it was not until after obtaining judge status that forensic training was sought after. An important recognition to make is that training and education on forensic science are available as a choice, and judges have the option to forego it altogether by pursuing other topics to meet their CLE requirement. It has also been found that only 43 out of 192 law schools offer forensic science as an elective course, and when they do, it does not teach the scientific method or statistical principles (22). Despite legal professionals being responsible for bringing forensic evidence into court, the educational

opportunities to develop this skill are exceedingly limited. Attorneys and judges share this perspective as most report that they have an average to limited amount of forensic resources available to them, with significant variance across the U.S. (21). It can be assumed that the availability of forensic education is likely impacted by the jurisdictional resources of the legal professional and not the interest in obtaining more knowledge. This can be seen by the majority of judges expressing motivation in completing forensic CLE courses for professional growth and increased ability to make an informed decision (21). Hence, judges are eager to fulfill their gatekeeping responsibilities even when access to relevant knowledge is sparse. This consequently leads to judges having difficulty in operationalizing and applying the criteria proposed in the *Daubert* legal standard (9). Without adequate knowledge of forensic science, judges cannot consider scientific standards, error rates, and methodology thoughtfully enough to assess reliability and validity. Examining error rates in particular, research discovered that judges often perceive themselves to have a better understanding of them than they actually have (23). This demonstrates the judges' inability to properly consider error rates when utilizing *Daubert*. In addition, error rates are also elusive among forensic analysts, since many of them report not knowing where the published error rates of their discipline exist and they hold unrealistically low conceptions of the error rate in their fields (24). It is also important to recognize that not all forensic science disciplines have a known error rate, which a judge should regard while assessing admissibility. In considering the lack of judicial knowledge and access to forensic science, the flaw of *Daubert* requiring the judicial role of gatekeeper is observable.

Importance of Current Research

The criminal legal system is designed with the intention that legal rules and standards control the judicial process to ensure justice. However, this intention falls short as forensic expert testimony has been responsible for a significant portion of wrongful conviction cases. While the scientific methods are still advancing and uniform standards are being developed, the legal system has attempted to set admissibility standards to limit expert testimony in the courtroom. Research has reflected that too frequently judges have inadequate knowledge of forensic science and fail to effectively assess admissibility using the *Daubert* standard. The current issue that this research aims to address, is how insufficient judicial understanding of scientific standards adherence impacts the effectiveness of the judicial gatekeeping role. Specifically, this research analyzes the judicial assessment of forensic expert adherence to the *Daubert* guideline for the existence and maintenance of standards controlling the operations.

Judges in this research were evaluated based on their knowledge and consideration of forensic scientific standards when qualifying an expert to testify. This research focused on judges within the state of Oklahoma, exploring both rural and urban areas that previous research has yet to study. From the results in this particular sample, the assessment of forensic understanding will reflect the education and resources available to legal professionals in Oklahoma. Looking at this issue in a limited geographical area would allow for solutions at the state level to increase resources and education for judges in all court districts. The findings also have the potential to demonstrate a need for more uniform scientific standards within forensic disciplines in order to increase judicial application of all *Daubert* criteria. Without proper improvement and uniformity in the science, the legal system cannot be solely responsible for correcting errors in forensic expert testimony. Altogether, it is imperative that the success of *Daubert* to minimize instances of

faulty forensic testimony be scrutinized, so that the occurrence of wrongful conviction is weakened.

Problem Statement

The advances in the field of forensic science and the development of forensic scientific standards may have a significant impact by lessening the instance of wrongful conviction due to misapplied science; however, it is not known if this progress has an impact within the courtroom. This research addresses the gap in understanding of the role forensic standards have amongst the Oklahoma judiciary and highlights the need for forensic training and accessible resources to legal professionals.

Research Questions

The gatekeeping responsibility of judges is important to the criminal legal system, since it prevents unscientific forensic expert testimony in the courtroom. However, the efficacy of this role has not been fully researched. In particular, the correct application of the *Daubert* standard has not been analyzed for its effective use and understanding among judges. With the increasing attention in the forensic science community toward improving and developing standards, it is essential to know the effect the scientific standards have in the courtroom. Therefore, this research seeks to answer the following questions:

1. How much education and training in forensic science have judges in Oklahoma received?
2. Do judges in Oklahoma believe they have access to sufficient forensic resources?
3. Are judges in Oklahoma familiar with forensic scientific standards?
4. Do judges in Oklahoma consider forensic scientific standards while qualifying a forensic expert in court?

5. Do judges in Oklahoma believe using scientific standards during expert qualification is important?

Methodology

Participants

Participants were 35 judges from 15 of the 26 judicial districts in the state of Oklahoma. Most participants indicated that they currently preside over a criminal/civil docket (57.1%), while other participants reported overseeing a criminal docket (22.9%) or a special docket (14.3%) such as drug court, juvenile court, mental health court, and guardianship court. The participating judges had served an average of six years, with most judges serving nine or more years as a judge (31.4%). More than half of the participating judges (56.7%) stated that they have a forensic expert testify in 10% of the cases presented in their courtroom. Further, a majority of judges (60%) only have a hearing on the admissibility of forensic science testimony in 10% of cases.

Individuals were selected to participate based on the judges' involvement in criminal court casework. By only including judges who preside over a criminal or criminal/civil docket, the results demonstrate how forensic evidence is used during criminal cases where wrongful conviction due to misapplied forensic science is possible. The sample pool was identified from reviewing publicly available information through the Oklahoma State Courts Network website, and their email addresses were confirmed by an individual within the Oklahoma Judges Association.

Data Collection

The participants in this survey were recruited via email request with an attached Qualtrics survey link. Following IRB approval, the data collection occurred from September 9th, 2025, to

November 9th, 2025. A reminder email was sent midway through the data collection process on October 9th, 2025, to remind the judges of the deadline to participate in the research.

Informed consent was obtained prior to survey completion. The approximate length of time for survey completion, any foreseeable discomforts and benefits to the participant, confidentiality of responses, and a statement that participation is voluntary was given before the participant began the survey. Participants were provided the contact information for the researchers, in case of any questions or concerns. The electronic data obtained from the survey responses was securely stored and password protected. All information is presented in aggregate format to maintain confidentiality.

Design & Data Analysis

The survey was divided into five pages, with each page comprised of questions to assess each research question. Questions were in multiple choice, yes or no, open-ended, and rating scale format. Following informed consent, the survey included six background questions to determine the type of court the judge presides over, length of judgeship, frequency of forensic evidence presented in their courtroom, and county in which the judge serves in. These questions were to ensure the participants oversee a criminal docket and are an accurate representation of judges across the varying judicial districts in the state of Oklahoma. The next section of the survey included four questions addressing the judge's formal training/education in forensic science. Next, the survey asked the participants to answer four questions regarding their perception of available forensic science resources. Survey questions regarding forensic education and access to forensic resources have been adapted with permission from a previous national survey examining judges across the U.S. (21). The next section of the survey asked participants to answer three questions regarding their familiarity with forensic scientific standards. Finally,

the last section of the survey included six questions regarding judicial use of the *Daubert* factor pertaining to standards during forensic expert qualification. The complete survey questionnaire can be read in the appendix of this paper. The results from the survey were analyzed using SPSS for descriptive statistics, including measures of central tendency such as mean and mode of the data.

Results

Forensic Training/Education

Judges predominately received forensic training through continuing legal education (CLE) programs, which supports previous research findings at the national level (21). The participants in this study indicated their forensic education was most often received during CLE as an attorney (74%), or during CLE while serving as a judge (66%). Topics that participants had received training on include standards for admissibility (79%), crime lab procedures (64%), and DNA technology (61%). Judges that had received training perceived it as definitely useful (48%) for their responsibilities as a judge. Furthermore, when asked if additional training would be necessary for their role as a gatekeeper, most participants agreed either probably yes (54%) or definitely yes (37%). Overall, the judges that participated in this research expressed CLE programs as being useful during their legal career with interest in obtaining further forensic training.

Forensic Science Resources

Judicial gatekeeping under *Daubert* requires multiple factors be considered regarding forensic expert qualification, so participants were asked about the accessibility of useful forensic science resources. The Oklahoma judges that participated in this research perceive that they probably have access to useful forensic science resources (56%). Only three participants (9%) indicated that they definitely have access to useful forensic science resources, demonstrating that

most participants are hesitant to confidently identify the availability of forensic resources as useful. This was further demonstrated by the participants predominantly rating the amount of resources available as moderately sufficient (53%). Finally, when asked what forensic science resources the participating judges utilize, ninety-one percent responded that caselaw is their primary resource. As mentioned previously, there are serious concerns with judges defaulting to caselaw as their resource during considerations on forensic science admissibility or relying solely on defense attorneys to expose the weaknesses in the forensic evidence.

Familiarity with Scientific Standards

Scientific standards, such as those implemented and maintained by NIST, are meant to be evaluated under *Daubert* by judges. The participants in this research were asked about their familiarity with scientific standards, and more than half stated that they are not familiar (59%). The judges were then additionally asked to indicate their level of familiarity with scientific standards. As represented by Figure 1, the familiarity level of acceptable was the one most selected by participants. However, 52% of participants selected a familiarity level within the none to poor range. The judges were then asked where they locate scientific standards, and once again caselaw was the primary source used by participants (64%). Despite standards being one of only five factors judges are encouraged to consider under *Daubert*, these results highlight a gap in knowledge and resources pertaining to forensic scientific standards amongst legal professionals.

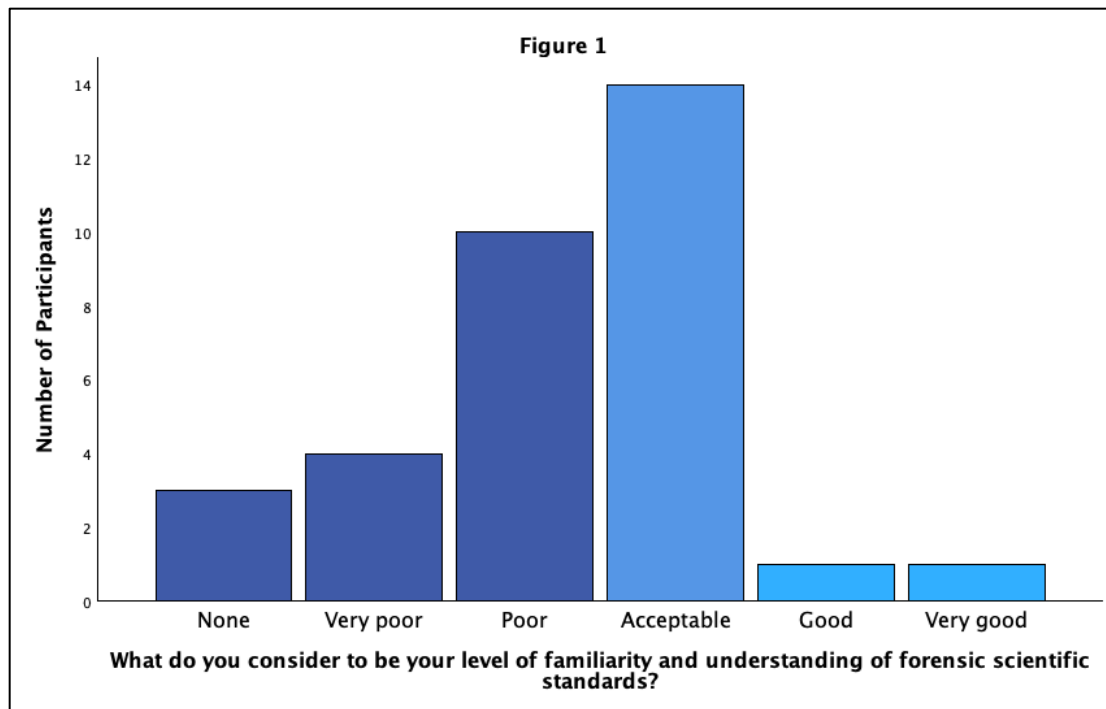


Figure 1. Familiarity and Understanding of Forensic Scientific Standards

Use of Scientific Standards Under *Daubert*

The last section of the survey questionnaire examined judicial use of standards under *Daubert*. Participants were first asked whether or not they consider each of the five factors outlined in the *Daubert* legal standard. Although it is not mandatory to consider each factor, the participants overwhelmingly indicated that they consider each factor during an admissibility hearing (91%). Yet, when participants were asked specifically about the standards factor of *Daubert*, only 59% of judges stated that they have utilized that factor during admissibility. One possible reason for lack of standards consideration under *Daubert*, is the accessibility of information on forensic science standards. This idea is supported by the 53% of participants that indicated that they probably do not have access to sufficient information on standards. Another possible reason for why there is a lack of standards consideration under *Daubert*, is the ability to understand and apply the *Daubert* factor pertaining to standards. Although, this was shown to be

unlikely due to a majority of participants stating they find the standards factor to be understandable and straightforward to apply (69%). Almost all judges (97%) that participated in this research indicated that they expect a forensic expert to state their adherence to scientific standards. Moreover, when asked if they believe that standards are important to consider under *Daubert*, the participating judges answered either definitely yes (63%) or probably yes (38%).

Discussion

Conclusion

The results from this research reflect the need for additional forensic education and accessible resources for the Oklahoma judiciary. Similar to previous research, participants expressed the importance of CLE programs in providing the forensic trainings they find most useful. Despite most participants indicating that their access to forensic resources is satisfactory, the primary resource almost all judges cited was caselaw. This is a serious concern, due to the fact that the forensic science documented in caselaw, may not be an accurate source to use to assess reliability or admissibility. Additionally, forensic experts have been accepted to testify to now discredited forensic techniques, so reliance on caselaw does not allow for the scrutiny and critiques that modern research and scientific advancements have offered.

Participating judges were asked if there were any additional resources that would be useful for them to assess forensic science admissibility. The most common response was having more CLE opportunities on forensic topics, and for those programs to be taught by a forensic expert, online, and individualized. Some participants even suggested specific topics they would like to receive training on, such as forensic methods, changing science, acceptable error rates, reliability, chain of custody, forensic conclusions, and drug/blood test conclusions. Many of these

topics directly relate to the *Daubert* factors used by judges to assess admissibility, so training has the potential to impact the admissibility of forensic evidence.

Forensic scientific standards have been created to address issues of reliability in forensic science, and the legal standard of *Daubert* asks that judges consider the existence of standards. However, more than half of the participating judges are unfamiliar with forensic scientific standards and use caselaw as their source for information on them. Yet again, judges are commonly seeking out forensic guidance not from the scientific community, but from the previous judicial officers. One issue with this, is that standards implemented by NIST/OSAC or a similar recognized standards organization in forensic science, have often been published within recent years and may not be present in the caselaw judges are utilizing. The majority of participants did express the need for more information on standards, since they believe the standards factor of *Daubert* is important to consider. This finding supports the need for forensic training on locating and interpreting forensic scientific standards under *Daubert*.

Vicki Behenna, who is the current Oklahoma County District Attorney and former Executive Director of the Oklahoma Innocence Project, provided testimony in 2019 to a United States House Committee on needs for forensic science, where she outlined the actions that would benefit our legal system (25). The recommendations offered were to prioritize forensic science standards development and implementation, as well as provide judicial training to prevent invalid forensic evidence from being admitted as evidence (25). The reforms that DA Behenna suggested are further supported by the findings from this research, since judicial education in Oklahoma on scientific standards still needs to be improved.

Limitations

The conclusions that can be made from these results are limited by the sample size and the survey itself. With only 35 participants, the results cannot be representative of every judge within Oklahoma. Some judges may have more time to seek out forensic education or have a background that assists them in their judicial role over a criminal docket. It is also unknown whether or not the survey questionnaire can be used as a valid measure for the research questions. For instance, the questions regarding forensic scientific standards only provided “e.g. NIST/OSAC standards” as an example to cue participants on the topic. The participating judges may not be familiar with NIST/OSAC specifically, but may have recognized other common abbreviated standardizing bodies in forensic science such as the ASB, International Organization for Standardization (ISO), or American National Standards Institute (ANSI).

Recommendations

The most beneficial action that can be taken as a result of this research is to create additional forensic training opportunities and resources for the Oklahoma judiciary. With Oklahoma being fortunate to have one of the leading accredited institutions for forensic science education in the state, the Forensic Science Institute (FSI) at the University of Central Oklahoma should be considered to assist in this effort. The faculty and resources that the FSI has could be used to help the legal system in Oklahoma by offering the online and individualized training taught by forensic experts that the judges are seeking. This resource would be further benefited by a collaboration between the FSI and the Oklahoma Bar Association, to make these trainings eligible for CLE credit.

In addition to increased education and forensic resources, there are larger scale actions that can be taken to address the previously mentioned issues in our criminal legal system. One

measure that can be taken to confront the use of faulty forensic evidence in Oklahoma courtrooms, is to establish a regulatory body on forensic science and develop more postconviction opportunities. Other states have created a dedicated regulatory body to address forensic errors and aide legal professionals with the use of forensic evidence in court. The Texas Forensic Science Commission (TFSC) is a prime example of how a regulatory body can benefit the criminal legal system through a collaborative effort to strengthen the justice system. Since 2005, the TFSC has investigated claims of forensic laboratory misconduct and has expanded to also engage in the development of forensic education for those in the criminal legal system (26). One priority of the TFSC is accreditation and standards implementation, with helpful links on their website to the NIST/OSAC registry and relevant forensic reports (26). The creation of an Oklahoma commission to provide similar assistance would potentially be extremely beneficial. A dedicated forensic science commission in Oklahoma could not only investigate misconduct allegations but also provide resources for legal professionals seeking out information on standards or other forensic science related information.

Along with a regulatory body on the use of forensic science in the state of Oklahoma, the development of a conviction integrity unit could also strengthen Oklahoma's criminal legal system. A conviction integrity unit would facilitate the review of wrongful conviction claims, which largely include forensic errors. These units are commonly comprised of attorneys and forensic experts who work together to review claims of prosecutorial misconduct as well as investigate wrongful conviction claims (27). In conjunction with the development of a conviction integrity unit, Oklahoma's legal system would benefit to adopt a statute that would allow a change in science as grounds to seek postconviction relief. With a "changed science" statute, Oklahoma courts could acknowledge and remedy instances of wrongful conviction due to

misapplied forensic science. Adopting a changed science statute would allow innocent but incarcerated individuals the opportunity to challenge now-discredited scientific evidence, such as bitemark analysis or shaken baby syndrome (28). Currently, DNA testing is the primary postconviction relief opportunity in Oklahoma, however, not every case has evidence that can be tested to demonstrate innocence. By instituting a conviction integrity unit and a changed science statute in Oklahoma, it will allow wrongfully convicted individuals to not only challenge their conviction, but it would afford our system the opportunity to acknowledge its failures and prevent future use of faulty forensic evidence in court.

Lastly, it should be recommended that *Daubert* hearings be held more frequently in Oklahoma criminal courtrooms. The *Taylor v. State* case in Oklahoma marked the transition from the *Frye* legal standard to the *Daubert* legal standard, and it stated that only novel forensic evidence has to be reviewed and previously admitted methods do not have to be reconsidered under the new standard (29). Therefore, any evidence that had previously been ruled as admissible, may continue to be allowed in without a *Daubert* hearing to assess admissibility under the newer standard. The participants in this research indicated that in only 10% of cases an admissibility hearing is held. Considering the amount of scrutiny various forensic disciplines have faced in recent decades due to unreliable methods, it is worth reevaluating the admissibility of previously allowed evidence. In particular, it should be encouraged for Oklahoma courts to hold *Daubert* hearings for forensic disciplines that have received significant critiques and those often involved in wrongful convictions.

Future Research

While the first step should be implementing more forensic CLE programs, it is necessary to then follow that with research on which programs are most beneficial for judges specifically.

Other research also focused on judicial education in forensic science could provide further insight on how to best help the court's gatekeepers be effective under *Daubert*. In relation to scientific standards, future studies should examine how the standards factor of *Daubert* is currently being applied. More than half of the participants in this study indicated that they had utilized this factor, but this research did not look further into how this factor has been used.

With the recommendations that have been suggested, it would be useful for future research to explore how the judiciary in other states compares to Oklahoma. Furthermore, it would be helpful to see how states that have a forensic science commission or a conviction integrity unit, such as Texas, differ in their understanding and use of forensic scientific standards. This research would help demonstrate if these solutions are effective at addressing the disconnect between the science and the law and the wrongful convictions that result from this.

While this research centered on Oklahoma's judiciary, research should be done across the country to examine the use of forensic evidence in the criminal legal system. It is imperative that the forensic science community and the legal community work together to identify and improve any barriers preventing justice, as major changes cannot take place until the issue has first been identified and understood through collaborative research. Oklahoma has the ability to lead this effort of change by enhancing the education and resources for judges, establishing a regulatory body to address forensic errors, and instituting more opportunities to acknowledge the failures of the criminal legal system.

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Appendix 1: Survey Questionnaire**Start of Block: Demographics**

What type of docket do you currently preside over?

- ☐ Criminal Court
- ☐ Criminal/Civil Court
- ☐ Special Court (explain in box below)
-

☐ Civil

Which Oklahoma Judicial District do you serve as a judge in?

▼ District 1 (Beaver, Cimarron, Harper, and Texas) ... District 26 (Canadian)

How many years have you served as a judge?

▼ 1 ... 9+

Approximately what percentage of criminal cases do you have forensic expert testimony presented in your courtroom?

Not Applicable

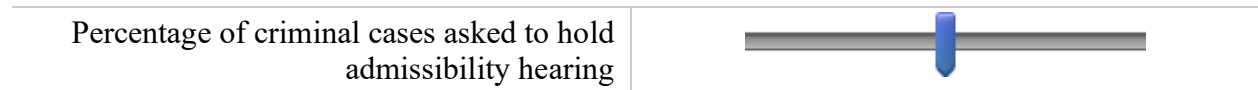
0 10 20 30 40 50 60 70 80 90 100



Approximately what percentage of criminal cases are you asked to hold a hearing on the admissibility of forensic expert testimony?

Not Applicable

0 10 20 30 40 50 60 70 80 90 100



Approximately what percentage of criminal cases do you hold a hearing on the admissibility of forensic science testimony?

Not Applicable

0 10 20 30 40 50 60 70 80 90 100



Select the option that best reflects your view of the judicial role regarding forensic science expert testimony in criminal cases:

- ☐ Should routinely be used without significant judicial role
- ☐ Should sometimes be scrutinized by a judge
- ☐ Should often be scrutinized by a judge
- ☐ Should always be scrutinized by a judge

End of Block: Demographics

Start of Block: Education in Forensics

Where have you received formal training/education about forensic science? Check all that apply:

- ☐ College (Undergraduate, Graduate studies)
 - ☐ Law school
 - ☐ CLE (as a lawyer)
 - ☐ CLE (as a judge)
 - ☐ I have not received any
 - ☐ Other _____
-

Do you perceive the training/education on forensic science as being thorough and useful for your responsibilities as a judge?

- ☐ Definitely not
 - ☐ Probably not
 - ☐ Probably yes
 - ☐ Definitely yes
-

For which of these types of forensic evidence issues have you received specific training/education? Check all that apply:

- ☐ Standards for admissibility
 - ☐ Statistical methods
 - ☐ Cognitive methods
 - ☐ Cognitive bias and human factors
 - ☐ Measurement of error rates
 - ☐ Standards and terminology for expressing conclusions
 - ☐ Crime lab procedures
 - ☐ DNA technology
 - ☐ Privacy issues concerning forensic tests
 - ☐ Other _____
-

Do you think it is necessary for you to receive additional training/education on forensic science to perform your duties as a judge?

- ☐ Definitely not
- ☐ Probably not
- ☐ Probably yes
- ☐ Definitely yes

End of Block: Education in Forensics

Start of Block: Access to Forensic Resources

Do you think that in the state of Oklahoma that judges have access to useful forensic science resources?

- ☐ Definitely not
 - ☐ Probably not
 - ☐ Probably yes
 - ☐ Definitely yes
-

How sufficient would you consider the amount of available resources in understanding forensic science as a judge in Oklahoma to be?

- ☐ Nonexistent
- ☐ Limited
- ☐ Moderate
- ☐ Sufficient
- ☐ Excellent
-

What resources do you currently use to evaluate and understand forensic science methods? Check all that apply:

- ☐ Case law
- ☐ Scientific research
- ☐ Other _____
-

What additional resources, if any, would be helpful for you to evaluate and understand forensic science evidence?

End of Block: Access to Forensic Resources

Start of Block: Familiarity with Forensic Scientific Standards

Are you familiar with forensic scientific standards (e.g. NIST/OSAC standards)?

☐ No

☐ Yes

What do you consider to be your level of familiarity and understanding of forensic scientific standards?

☐ None

☐ Very poor

☐ Poor

☐ Acceptable

☐ Good

☐ Very good

Where do you locate forensic scientific standards or information about forensic scientific standards to utilize for judicial responsibilities? Check all that apply:

☐

Case law

☐

Scientific research

☐

Other _____

☐

I have not looked for forensic scientific standards or information regarding forensic scientific standards

End of Block: Familiarity with Forensic Scientific Standards

Start of Block: Judicial Use of Standards

When qualifying a forensic science expert to testify, do you consider each factor of the *Daubert* standard?

☐ Yes

☐ Sometimes

☐ No

Do you believe the *Daubert* factor of "the existence and maintenance of standards controlling the operations" is understandable and straightforward to apply?

☐ Yes

☐ No

Have you utilized the *Daubert* factor of "the existence and maintenance of standards controlling the operations" while qualifying a forensic expert?

☐ Yes

☐ No

Do you expect a forensic scientist seeking expert qualification to state their adherence and use of scientific standards?

☐ No

☐ Yes

Do you believe that the use of scientific standards by a forensic expert is important to consider when qualifying a forensic expert?

- ☐ Definitely not
- ☐ Probably not
- ☐ Probably yes
- ☐ Definitely yes
-

Do you think judges have sufficient access to information regarding forensic scientific standards?

- ☐ Definitely not
- ☐ Probably not
- ☐ Probably yes
- ☐ Definitely yes

End of Block: Judicial Use of Standards

Start of Block: Free Response

Additional comments or feedback concerning any of the topics within the survey:

End of Block: Free Response
