



Importance of Validating Evidence Integrity in solving Crime

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Abstract

At present time, the crime rate is growing fast and this alarming rise can be controlled by using evidence as a key component. For solving any crime, evidence should be admissible in court of law by protecting its integrity. The weight of an evidence determining the truth of an issue is entirely subjected to the examination and verification of present forms of legal arguments. . It is duty of forensic practitioner to keep the integrity of evidence by not distorting any relevant information, ignoring contrary evidence and misinterpreting any available evidence. The forensic expert should advocate his outcomes with proper vigor and forcefully once he reaches to final conclusion. His credentials must be represented accurately without any misrepresentation and by maintaining his practice and specialty competence. The reporting information should be relevant to the evidence and to then case. Our society and individual can have life changing consequences from the forensic analysis interpretations and conclusions therefore scientific analytical data should be generated via reliable practices based on valid scientific principles and methodology. It is vital to validate any evidence before evaluating its weight. However, the forensic science development is dynamic process from data generation to result interpretation that is evaluated and communicated in such way that can help the court of law to make sound decisions relevant to forensic evidence admissibility.

Keywords: Evidence, Investigation, Forensic, Validation.

1. Introduction:

With the growing rate of high-tech world, the rate of the crime is increasing. The expending law is countering fast growing crime rate persistently. Evidence is collected on the committing of the crime and according to Locard's exchange principle every contact leaves a trace which may be used to show the association between the crime scene, victim and suspects. After examining and analysing the evidence from a crime scene, the criminal or perpetrator who is actually responsible for keeping the crime ratio high, are identified. For this purpose present investigation process needs to be improved to support the case proceeding. Various steps are involved in the criminal proceeding cases like those of police investigation with FIR, law enforcement process and the final verdicts. Evidence collected from the crime scene, scientific evidence which is gathered by scientific methods, is of significant value in all stages while providing information and hints in

sexual assault cases to the police department, prosecutors and to the court room. Investigators can have many type of evidence to solve the crimes such as trace evidence questioned document, impression evidence, finger print, controlled substances, firearms, toxicology, biological, electronic, digital, testimonial and hearsay evidence. The analysis of forensic evidence can be carried out by emphasizing on team work, using developed forensic skills/tools such as video image, data analyser, cell phone tracker and GPS positioning. However, a crime scene is processed by proper identification, collection and preservation of the relevant physical evidence (4, 5, 6, and 7).

To prosecute criminals in the court room, sound evidence is required. Evidences with forensic value can be analysed to solve crimes by validating its integrity. Validating of evidence integrity is protecting of potential evidence from being destroyed/damaged and to prevent introducing of false evidence in the question area. The evidence integrity can be protected by

maintaining chain of custody and making it admissible in the court of law. Where the role of forensic scientists is vital in criminal investigations and prosecution, they are also contributing to civil limitations, manmade terrorism, natural disaster, and global crime investigation (1, 4, 6 and 8). The evidence becomes inadmissible if its integrity is not proved in the court of law and it becomes questioned even if there is a doubt of being tampered, mishandled and giving it to an unauthorized person's custody. The integrity of evidence from collection till prosecution must be kept safe by making chain of custody tamperproof (2, 3, and 6).

Best practice of forensic science can be achieved by additional scientific examination and validation. For this purpose, scientific methods/practice must be reviewed and updated periodically to the recent development in the relevant field (15). Validity of the evidence integrity can differ depending on its nature, forms, types of crime scene and the scientific methods used to process relevant crime scene. Generally relevant forensic evidence is perceived to be of a weapon or a bullet found in the body of victim or the pattern of blood in a homicide case. However, to solve the crime, any particular piece of object can be proved crucial as part of physical evidence. Therefore, any type of evidence found at the crime scene can be considered as a physical evidence to help in investigating the crime (2, 3, and 8). Here in this study, a general over view of importance of validating evidence integrity will be discussed.

2. Review

Science and law have different nature, science seeks to develop our knowledge about natural world and the law ensures the public safety and the justice to be served properly. For achieving these goals, with the passage of time science became available as tool to the legal system. The result and conclusion obtained from forensic data can have life-changing consequences on our society. So therefore, it is important to use reliable scientific methods built from valid scientific principle and methodology to process any analytical data (16, 10). In some countries, the judge is responsible for assuring the admissibility of scientific evidence, as the advancement in forensic analysis is

dynamic, from data collection to its interpretation. As a result of this, the weaknesses in the forensic methodology due to advancement can arise issues for the legal practice. To have sound decisions for the admissibility of forensic evidence in the court of law, the advancement in the scientific methods and technology must be evaluated and validated (15).

Validation can be performed to assure the efficacy of forensic evidence and methods used. The term validity defines the extent at which a scientific test is intended to be measured or more specifically the extent at which the tests are best justified made by the examiner. Therefore validation can be defined as a process of evaluating the efficacy and reliability of the procedure carrying out forensic analysis. Reliability which is the measurement consistency can also be considered as an aspect of validity. Thus any type of measurement inconsistency indicates threat to the validity of the methods which should not be confused with internal validation and that is checking performance of test methods developed. The location and environmental conditions can also compromise adversely the efficacy or quality of the test measurements and results. The internal validation is different from developmental validation as the internal validation is carried out by forensic science service provider and the developmental validation is responsible for acquisition of the analytical data and assuring of the sensitivity, accuracy, stability, reproducibility and determination of the forensic test method conditions, limitations and evaluation. Internal validation is the accumulation of analytical data that is used to demonstrate the performance of methods and procedures established in the laboratory (13, 10, and 11).

2.1 Validation Process:

The process of evidence validation lies between the development of the test methods and strategy, its scientific acceptance and evaluation of independent reliability and specific purpose relevancy. The evidence validation primary focuses on the performance of alternative test methods developed, their detailed study and processing the analysis of data resulted. Test method validation criteria were firstly originated and developed by the European Centre for the

Validation of Alternative Methods (ECVAM) and European Chemical Bureau (ECB). These criteria were subsequently applied for the development and validation of the alternative test methods and procedure of US Interagency coordinating Committee and Organization for Economic Cooperation and Development (OECD). Now test methods validation according to ECVAM, EC or OCED criteria and principle is widely accepted as prerequisite for test methods and strategies. These criteria and principle for test method validation are periodically updated and also available for peer review (13, 9, and 12).

The validity process constructed must be based on evidence. And test method developed must undergo evidence based validation process for assuring the interpretations obtained from the results to be valid. As validity process is multilayer concept, so different types of the evidences are required to support validity test results and relevant claims. The process of validity is done by using both quantitative and qualitative research data and methods. All the evidences in the validation process should be collected, analyzed and reported methodically. The validation process is of two events i.e. before the test and after the test event. Before the test event includes the design and development phase while after test event is of obtaining data from trialing and live testing phase. As said earlier that validation is a dynamic process that may have different test methods so therefore a list of step by step requirements/guide relevant to evidence validation can be provided as following(13, 15 and 10);

2.2 Evidence collection:

Clearly, the selection and collection of different types of evidence, their source of identification either they are containing required material or not and of what quality and are they relevant or not, are of crucial issues. Once the collection of evidence is complete, it is questioned that the evidence collected is according of the prerequisite criteria without any bias and the evidence is relevant to the test methodology or not. Beside these concerns, it is also important to know that how the data was interpreted, the equipment and materials used in the test methodology are relevant or not. As it is obvious that the crime scene remains intact, the crime scene

investigator should evaluate consistencies and inconsistencies during the initial assessment of the crime scene, may be helpful to the continuation of the investigation. There are special cases where the victim is neglected, so additional crime scene need to be considered and for this purpose, the evidence must be collected and photographed using strict and approved methods in order to maintain the evidence integrity by avoiding contamination. The chain of custody should be strictly enforced during evidence collection.

Group of experts, such as information technologist and scientist, should control the collection of evidence as they are familiar with methodology. Unless the data/evidence has been analyzed by subjecting to the formal set of criteria, either relevant or against the methodology, should be initially acceptable for the review. The criteria of inclusion and exclusion should be cleared before the data retrieval, transformation and analysis in report made by validation assessment. The information produced as a result of test methodology and the reference data for the assessment of test performance should include following points;

- Data should be relevant to the evidence of interest e.g. biological or other targeted object.
- Detail description of the reference material including its source and quality for the assessment of proposed test methodology.
- There should be access to the all-raw and transformed data, and to the original laboratory record.
- Data quality assessment should be performed to check if they were resulted according to good laboratory, clinical or cell culture principle and practice, and also to ensure the internal and external quality control test.
- Provide the reason of not using any relevant data.

The evidence collected should be provided in the form of peer reviewed publications. However, in some circumstances, the company report can be acceptable if they provide it as public domain after the conclusion of the study. While releasing the data, care should be taken to make bias free publication with positive findings. Any useful information should be taken into account including human response with its relevant

nature and extent.

2.3 Weighing of Evidence:

The weighing of Evidence (WoE) can be described as the consideration of the situation which is used to find out the certainty or uncertainty of the evidence collected, supporting the one side argument is greater than the other side or not. Every individual make weighing of evidence process which are used in different circumstance including educational, commercial, health, scientific and of legal interest. WoE is used in scientific literature and review publishing and is of following characteristics;

- WoE is metaphorical which refers to collection of an unspecified methodological interest.
- Methodological approach can be used to establish interpretative methodology which indicates that the WoE describe the methods that use quantitative weights of evidence or it examines all the subset of the evidence.
- WoE evidence is also used for the conceptual frame work.

The term WoE is of great value as it indicates towards different questions such as, what methods of interpretation are used and how they were applied to scientific evidence? These kind of questions are important in finding out the validation procedure which can be used for evaluation/establishment of scientific method's validity for a particular purpose.

2.4 Assessment of Validation:

Validation assessment can be made by providing clearly stated outcome, supported by detailed and reasoned arguments which should be available to the public. These outcomes or conclusions are mainly of three types that can be used for resolving the uncertainty of the methods developed and validated for a particular purpose as follows;

- The evidence is consistent and sufficient with relevant test methods and its stated purpose for which it should be accepted.
- The evidence is inconsistent and insufficient with relevant test methods and its stated purpose for which it should be accepted,

and the additional evidence of quality and quantity type should be assessed further.

- The evidence is sufficient with relevant test method but not reliable, and should not accepted for the purpose stated.

The result of the assessment should be available in peer review, also should be submitted to the validation assessment sponsors and to the relevant personals for the transparent and independent assessment as a whole peer review (9 and 12). All the stakeholder should respect the evaluation of the evidence validity with underlying forensic methods that can be used for legal and scientific purpose. The Department of Justice and National Institute of Standards and Technology (NIST) submitted two outline in support of National Commission on Forensic Science as follows;

- Research supporting the development and dissemination of methods, technical guide lines and standards should be conducted the measurement of forensic science.

- The existing forensic science practices and standards should be selected as appropriate test and validation.

NIST is distinguished as one of the internationally recognized trusted scientific and technical laboratory. The reviews submitted by the NIST can be of resolving the gap between the scientific validity and admissibility of the evidences (10).

3. What if Evidence is not validated?

Where the forensic science has been advanced and developed, problems in its some aspects also have come to light during the recent years such as false conviction by using faulty firearms and bite mark analysis, incorrect identification of fingerprint and forensic lab misconduct. By knowing these shortcomings, it can be more effective to put forensic science forward by recognizing which parts are scientifically valid or not and to have more research to validate it. Scientific validity should not be confused with admissibility but yet this difference is not clearly understood by those who are involved with court proceedings. Such as bite marks validity as identifier is still admitted by some courts but now it is reversed as DNA analysis is helping in false conviction. Therefore, the concept of admissibility falls back on past decision as the

lack of scientific validity in forensic investigation has been recognized (15).

Similarly, improper handling during a forensic investigation can result in unsuitable analysis in solving a crime and lead to false conviction. A high quality database management can be achieved by maintaining some important conditions such as correct sample collection, chain of custody, safe transportation and storage of evidence, and proper standard analytical procedure. Following these standards leads to high level of confidence which results in good credibility and reliability. Credibility is often compromised due to contamination problems as strong and severe reason. Contamination chances are high at any level of analytical procedure as in sample collection, chain of custody, transportation and analysis. Contamination can be minimized by estimating errors but never can be prevented (1, 14). Analytical procedure of forensic evidence that how it was analyzed is now questioned in many highly technical testimony trails. Questions like these can lead to case failure technically if not prevented and eliminated. Evidence collected from the crime scene such as shoeprint, latent finger prints and biological samples should be identified and explained before they go to the court proceedings else they can lead to false conviction as in the following cases;

- Adam Scott twenty year old was charged in a rape case of a woman as his saliva was reused which the police collected from in a previous case from plastic tray during a street fight. This evidence should have been disposed of even the case was ended. This faulty case proceedings by a worker jailed Adam Scott for five months before the mistake was recognized.

- A woman who was murdered in 1997 was taken to the laboratory for forensic analysis. The investigator found another women profile as suspect to be her killer after searching under her nails. The woman was thought to be suspect or killer, was also murdered herself three weeks prior to the incident. The investigators were confused due to not finding any correlation between these two murdered women but finally they came to conclusion that during taking DNA samples, they used same pair of scissors for cutting their nails though they were washed but lead to contamination due to presence of DNA.

- Similarly, Cory Carroll was charged for murder in a head on collision in which one

person was killed, he and two others were injured. In this case the evidence was determined inadmissible and he was released. His urine sample was found with high levels of THC (tetrahydrocannabinol) which were considered invalid as these type of results were never sent to the state lab for further confirmation. The case was dismissed as there was not enough evidence against Cory Carroll.

The evidence integrity also has been compromised due to scientific misconduct which involved the fabrication of data and falsification of the results as in following cases (14);

- Larry Benedict, 45 year Xerox engineer was sentenced for four years in trafficking of child pornography case by the federal judge. The evidence in this case was electronic which found to be helpful towards his innocence after he hired a computer expert who proved it that the evidence presented in court was allegedly tempered before or after in government custody.

- Jodi Arias in Arizona was sentenced to death after she found to be guilty in Travis Alexander murder case. Similarly, she also hired a computer expert to examine the victim computer as thousands of files were deleted during in custody of Mesa police department (6).

Development in the scientific experimentation and observation contribute to the advancement in the field of research with peer review and publication, and theories. Science is always attracted towards values and forward progress. In field of science, what is known to day may be proved invalid tomorrow that would be discussed as a progress and innovation. This may be of current controversy and concern that the forensic discipline that were not known in the field of science may go through crucial scientific methodology and review check list but it is not considered to be of no scientific value or invalid. Despite this, they are to be demonstrated as such and for this purpose, they must pass the scientific enquiry of present time. For example, since 1900s the finger prints have been used in legal processes as source of identification. In 1911, the decision was made to admit finger prints as evidence in the court by cooperative and judicial system that did stem from 21st century scientific standards. The scientific analysis that applies to every forensic science methods from DNA evidence to pattern evidence, is an ongoing process that is not fixed once done.

4. Conclusion

It is concluded that the validation process for every scientific discipline is essential including forensic science. The importance of validation should be described by means of parameters in the methods development. Validation should include the context and purpose of why it is being validated. For validating process, case by case approach is followed as different kind of evidence have different level of value in overall assessment of validation. The evolution of the evidence validation involves the probability, relevancy, stability, capacity and strength of evidence. Validation assessment can be made by use of available information including systematic, independent and transparent review which can conclude that test methods/practice are reliable for intended purpose without a dedicated practical study. After assessment, the outcome should be clearly stated by means of support and reasoned detailed argument available publically. The assessment outcome should be published in peer review journal by submitting it to the validation assessment sponsor as whole study i.e. from methods design, evidence collection, and chain of custody, validation, assessment and final reporting.

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