Evolution and functions of Forensic Science and Law

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Abstract

"If evidence has been properly gathered and preserved, a mistake in interpretation may always be corrected. If the facts required for a correct interpretation are not preserved, the mistake is irreversible." – Alan Moritz Alan exclaims that ambiguous theory has no place in forensic medicine. Presumption is not proof and conjecture is not evidence. Science in service to the law – "…the application of science to those criminal and civil laws that are enforced by police agencies in the criminal justice system." R. Saferstein.This paper deals with the discussion and analysis of the evolution of forensic science, its need, functions, and aid to the investigation along with the disadvantages. It also includes the contribution of forensic records where it is considered as the most authentic source of evidence to meet the ends of justice.

Introduction

The relationship between law and medicine has faced two aspects. Those are:

- Forensic Medicine
- Medical Jurisprudence.

Forensic or legal medicine (forensic is the term which is equivalent to the forums of or used in the court of law) deals with the application of medical and paramedical knowledge to aid in the administration of justice.[2] It is used by the legal authorities for applying the medical

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2THE ESSENTIALS OF FORENSIC MEDICINE AND TOXICOLOGY – DR.K.S. NARAYAN REDDY & DR.O.P. MURTHY, 33rd Ed.

knowledge in deciding cases of injuries, murder, suicide, accidents, sexual offences, poisoning etc.,. In brief, it handles with the medical aspects of law.

Medical jurisprudence (juris= law; prudential= knowledge) deals with legal responsibilities of the physician with particular reference to those arising from physician-patient relationship, such as medical negligence cases, consent, rights and duties of documents, serious professional misconduct, medical ethics etc., In short, it deals with the legal aspects of practice of medicine.

The focal point of this paper is Forensic Science.

Hypothesis – Forensic Science

Forensic science is exercised mostly with crimes associated with human beings in which medical examination and evidence are required. Forensic science in criminal investigation is mainly concerned with materials and indirectly through materials with men, places and time. Investigating officer is the most important person. Materials are recognised and juxtaposed with the process of forensic science. They constitute the presence or absence of a link between the crime, the criminal, the victim, the place and time of occurrence.

Nature

Forensic science covers all branches of science and administer to the purposes of law. The authentic sources of all techniques wereborrowed from various scientific disciplines like chemistry, medicines, surgery, biology, photography, physics and mathematics. There been numerous developments in the subject which had laid foundation in its own branches, which are more or less exclusive domains of forensic science. The science of fingerprints, anthropometry, track marks, documents (examination of handwriting) and forensic ballistics belongs to forensic science alone. Some of the developments include significant advances in serology, voice analysis, odour analysis, and in studies relating to pattern recognition through computers. The utmost development of the twentieth century however is the DNA profiling for identification of human beings. [3]

3 FORENSIC SCIENCE IN CRIMINAL INVESTIGATION & TRIALS – B.R. SHARMA, Fourth Ed.

Medical evidence is not substantive evidence, but it is corroborative evidence, made by an expert which is considered as the better evidence. The corporeal evidence valuated by an expert is objective. This expert evidence is considered to be one of the scientific methods of criminal investigation.

The alternatives to scientific methods which have been in the state of the art since time immemorial are:

- ✓ Eye witness
- ✓ Confessions
- ✓ Approvers
- ✓ Stock Witnesses

Laid on the line, Forensic science is fundamental in the dissemination of justice as it has become the chief source of evidence upon which the legal decisions are made. In cases of death, the authorities will depend mostly or completely on medical evidence in establishing the cause of death, and in case if accident to determine blame.

Research Methodology

The research held with respect to this article was an applied one. Rather, several works of academic research already exist on this topic. As such, the proposed research took the form of a new research but on an existing research subject. The research was based on the information obtained and analysed from the secondary sources.

History

Medicine and law have been related from the earliest times and the bonds which united them were religion, superstition and magic. The days of yore are as follows[4]:

The Charaka Samhita (about 7th century B.C) lays down on elaborate code regarding training, duties, privileges and social status of physicians. It gives a detailed description of various

4*Supra* note 2.

laws including punishment for various poisons and their treatment.In 4th century B.C, Manu (king and law giver) in his treatise, Manusmirithi, laid down various laws including punishment for various sexual and other offences and recognised incapacity due to intoxication, illness and age.Between the 3rd and 4th century B.C, Arthasastra of Kautilya defined penal laws and regulated medical practice. Physicians were punished for medical negligence.

Law – medicine problems are found in written records in Egypt, Sumer, Babylon, India and China dating back to 4000 to 3000 B.C. Abortion, sexual offences, kidnapping etc., was punishable offences.A Chinese "materia medica" of about 3000 B.C gives information about poisons.Imhotep (27th century B.C), Grand Vizir, Chief justice and Chief physician of King Zoser of Egypt, enacted rules for medical practice, which was brought under the law.The Code of Hammurabai, King of Babylon (about 2200 B.B) is the oldest known Medicolegal Code.

Rig Veda and other Vedas (3000 to 1000 B.C) mention about crimes like incest, adultery, abduction, killing an embryo, murder, drunkenness etc., and their punishment. Hippocrates (460- 377 B.C), the Father of the Western Medicine was born and practiced in the island of Kos in Greece, discussed the lethality of wounds. About 300 B.C, the Rabbis of the Rabinical Court, responsible for implementing the Jewish laws, sought the aid of the medical expert in the administration of justice.Later, Greek and Roman jurists and medical men collaborated in the development of principles of forensic medicine.

Shusruta – Father of Indian Surgery, between 200 to 300 A.D in his treatise Shusruta Samhita dealt with various medicolegal problems.In the 6th century A.D. the Justinian Code (Roman Emperor) and institutes regulated the practice of medicine and surgery and established the functions of the medical expert for legal procedure.The first medicolegal autopsy was done in Bologna (Italy) in 1302, by Bartolomeo De Varignana.In the 13th century, a manual was prepared to aid in the investigation of death in China.George, Bishop of Bamberg, proclaimed a penal code in 1507, where medical evidence was a necessity in certain cases.

Caroline Code was proclaimed in 1553 in Germany by Emperor Charles. This expert testimony became a requirement rather than an option to give opinions in cases of murder, wounding, poisoning, hanging, drowning, abortion, death etc.,The first book on Forensic Medicine was published in 1602 by an Italian physician, Fortunato Fedele.

The greatest of all works was the "Questiones Medicolegales" (medicolegal questions), written by PAULUS ZACCHIAS, who was the principal physician to Pope Innocent X and Alexander VII, and an expert before the Rota Romana, the Court of Appeal. This was published in 7 volumes from 1621-1635 and 2 additional volumes at Amsterdam.

PAULUS ZACCHIAS is considered the "Father of Legal Medicine" as well as "Father of Forensic Psychiatry". In 18th century, professorships in legal medicine were founded by the state in Germany.In 1843, the law regarding to criminal responsibility of insane persons was established in Mc. Naughten's Case.

Fingerprinting was one of its first applications. The ancient Chinese used fingerprints to identify business documents. In 1892, a **eugenicist** (an adherent of the often prejudiced system of scientific classification) named Sir Francis Galton established the first system for classifying fingerprints.

Sir Edward Henry, commissioner of the Metropolitan Police of London, developed his own system in 1896 based on the direction, flow, pattern and other characteristics in fingerprints. The Henry Classification System became the standard for criminal fingerprinting techniques worldwide.

In 1835, Scotland Yard's Henry Goddard became the first person to use physical analysis to connect a bullet to the murder weapon. Bullet examination became more precise in the 1920s, when American physician Calvin Goddard created the comparison microscope to help determine which bullets came from which shell casings. And in the 1970s, a team of scientists at the Aerospace Corporation in California developed a method for detecting gunshot residue using scanning electron microscopes.

In 1836, a Scottish chemist named James Marsh developed a chemical test to detect arsenic, which was used during a murder trial. Nearly a century later, in 1930, scientist Karl Landsteiner won the Nobel Prize for classifying human blood into its various groups. His work paved the way for the future use of blood in criminal investigations. Other tests were developed in the mid-1900s to analyse saliva, semen and other body fluids as well as to make blood tests more precise.

With all of the new forensics techniques emerging in the early 20th century, law enforcement discovered that it needed a specialized team to analyse evidence found at crime scenes. To that end, Edmond Locard, a professor at the University of Lyons, set up the first police crime laboratory in France in 1910. For his pioneering work in forensic criminology, Locard became known as "the Sherlock Holmes of France."

August Vollmer, chief of the Los Angeles Police, established the first American police crime laboratory in 1924. When the Federal Bureau of Investigation (FBI) was first founded in 1908, it didn't have its own forensic crime laboratory -- that wasn't set up until 1932.

Timeline:

- ✓ Mathieu Orfila - (1787-1853):"Father of Toxicology"
- ✓ William Herschel - (1856): Used thumbprints on documents to identify workers in India.
- ✓ Alphonse Bertillon - (1853-1914):"Father of Anthropometry"
- ✓ Francis Galton – (1822- 1911):"Father of Fingerprinting"
- ✓ A Scottish doctor by the name of Henry Faulds was a contemporary of Hershel, albeit a sworn enemy, as both men tried to solidify their place in history by claiming they each were the "Father of Fingerprinting."
- ✓ Hans Gross - (1893): Wrote the first paper describing the application of scientific principles to the field of criminal investigation. Published Criminal Investigation.
- ✓ Karl Landsteiner- (1901): Discovered the ABO blood groups, later received Nobel Prize.
- ✓ Leone Lattes – (1887 – 1954): "Father of Bloodstain Identification"
- ✓ Calvin Goddard – (1891- 1955): "Father of Bloodstain Identification"
- ✓ Albert Osborn – (1858- 1946): "Father of Document Examination"

- ✓ Walter McCone – (1916- 2002): "Father of Microscopic Forensics"
- ✓ Edmond Locard – (1877- 1966): "Father of the Crime Lab"., "Locard's Exchange Principle".
- ✓ PAULUS ZACCHIAS is considered the "Father of Legal Medicine" as well as "Father of Forensic Psychiatry".
- ✓ By the close of the 20th century, forensic scientists had a wealth of high-tech tools at their disposal for analysing evidence from polymerase chain reaction (PCR) for DNA analysis, to digital fingerprinting techniques with computer search capabilities.

Forensic science laboratory

A forensic science laboratory is the central forensic science institution. It is generally divided into the following scientific departments:

- ✓ Forensic medicine
- ✓ Forensic pathology
- ✓ Forensic psychiatry
- ✓ Forensic toxicology
- ✓ Forensic immunology
- ✓ Forensic deontology
- ✓ Forensic anthropology
- ✓ Explosives
- ✓ Ballistics
- ✓ Narcotics

- ✓ Serology
- ✓ Lie Detector Unit
- ✓ DNA Profiling
- ✓ Voice analysis
- ✓ Photography
- ✓ Instruments
- ✓ Computers
- ✓ Scene of crime

Functions of forensic science laboratory

Some of the following functions are[5]:

- To supply one or more missing links in a chain of evidence.
- To strengthen a weak link, or links, in a chain of evidence.
- To check the accuracy or otherwise of statements made either by a suspect or by material witnesses.
- To assist in the rapid clearing up of routine enquiries.
- To examine, compare and evaluate physical evidence, so as to link a suspect to the victim, or to the scene of a crime. In most cases, the laboratory supplements the work of police investigator in order to convert suspicion into a reasonable certainty of either guilt or innocence.

5 The Functions of the Forensic Science Laboratory in Criminal Investigations H. S. Holden, D.Sc., F.R.S.E.

- Training of the police investigators as to what constitutes physical evidence, how is to be found, collected, preserved and delivered to the laboratory.

Such institutes should provide three major categories of service: clinical, pathological and laboratory.Clinical services include examination of victims of assault, sexual crime, drunkenness etc.

Pathology services include chemical analysis, toxicology, serology, biology, photography, ballistics etc.

Every laboratory should establish a museum containing fingerprints, bullets and cartridge cases, tyre tread patterns, animal hair, soils, type written specimens, inks, rope and cordage, cloth, photographs of various crystal poisons etc.[6]Laboratories belong to both classical and modern categories, through the following major facilities:

(*i*) Measurements;

(*ii*) Microscopy;

(*iii*) Photography;

(*iv*)Invisible rays — ultraviolet rays, infrared rays;

(*v*) Chromatography;

(*vi*) Electrophoresis;

(*vii*) Spectrography;

(*viii*) Laser techniques;

(*ix*) Spectrophotometry;

(*x*) neutron-activation analysis;

(*xi*) X-ray diffraction analysis;

6 Journal of Forensic Medicine and toxicology – O.P. Murthy, Vol.15, No. 1, Jan – June, 1998.

(*xii*) DTA, NMR Polarography.

Need

The following areas and factors have given rise to the emergence of immediate need for use, study and application of Forensic Science[7]:

(*i*) Social changes,

(*ii*) Hiding facilities,

(*iii*) Technical knowledge,

(*iv*)Widening field of criminality, and

(*v*) Better evidence.

Various systematic uses of Forensic Science would provide significant assistance in reaching the answer to the following questions:

(*i*) Has the crime been committed?

(*ii*) How and when was the crime committed?

(*iii*) Who committed the crime?

Principles

1. **Law of individuality**

"Every object, natural or man-made, has an individuality, which is not duplicated in any other object. It is unique. Neither the nature has duplicated itself, nor man can".

The law of individuality is considered as the most important principle of forensic science. Uniqueness is seen in each and every crime. There is no similarity among the crime.

7 Supra Note 2.

2. Principle of exchange

"Any action of an individual, and obviously the violent action constituting a crime, cannot occur without leaving a trace."- "Toute action de l'homme, et a fortiori, l'action violente qu'est un crime, ne peut pas se dÃ©rouler sans laisser quelque marquee.[8]"

The French scientist, Edmond Locard, first postulated it. It is also known as Locard's principle.

The primary requirement of the principle is the exact reply to the question put forth. Trace evidence is factual. Unlike humans, it cannot be confused by the excitement of the moment, and it does not forget. It's a silent witness that speaks when humans cannot.[9]

3. Law of progressive change

"*Everything changes with the passage of time".*

In other words, nothing is permanent – immutable or invariable. The rate of change varies tremendously with different objects. The criminals undergo progressive changes.

4. Principle of comparison

"*Only the likes can be compared".* It emphasises the necessity of providing like samples and specimens for comparison with the questioned items.

5. Principle of analysis

6. "The analysis can be no better than the sample analysed."

8La police et les mÃ©thodes scienifiques (1934), page 8.

9Locard's Exchange Principle – Forensic Handbook. (2012).

Improper sampling and contamination render the best analysis useless. The principle emphasises the necessity of correct sampling and correct packing for effective use of experts.

7. Law of probability

All identifications, definite or indefinite, are made, consciously or unconsciously, onthe basis of probability. Probability is a mathematical concept.

'It determines the chances of occurrence of a particular event in a particular way out of a number of ways in which the event can take place with equal facility.'

Legal procedure

Indian Penal Code, 1860: It deals with substantive criminal law of India. It defines offences and prescribes punishments.

Criminal Procedure Code, 1973: It provides the mechanism for punishment of offences against the substantive criminal law. It deals with police duties in arresting offenders, dealing with absconders etc. It provides for different class of Court. It deals with actual procedure in trails, appeals, references, revisions and transfer of criminal cases.

Indian Evidence Act, 1872: It deals with Law of Evidence and applies to all judicial proceedings in any Court. It is common to both the criminal and civil procedure.

Criminal law: deals with offences which are considered to be against the public interest or the State.

Civil law: deals with disputes between two individuals or parties. The party bringing the action in a civil case is called "plaintiff". The accused is called "defendant" in both civil and criminal cases.

Common law: is made by judges when they deliver decisions in individual cases.[10]

Inquest

10 Opinions from Journal of Indian Academy of Forensic Sciences, Vol.19, No.2, 1980.

An inquest is an inquiry or investigation into the cause of death. It is conducted in cases of suicide, murder, killing by an animal or machinery, accidents, deaths due to torture or ill treatment, occupational diseases, suspicious deaths etc.,

Medical evidence

Evidence means and includes: (1) all statements which the Court permits or requires to be made before it by witnesses, in relation to matters of fact under inquiry, (2) all documents produced for inspection of the Court.[11] For the evidence to be accepted by the Courts, it must be properly identified as to what it is, and where it was found. The evidence of eyewitnesses is positive. The evidence of doctor or an expert is only an opinion which is corroborative.

Types;

(I) **Documentary**: It includes all documents produced for the inspection of the Court. Sections 61 to 90 of Indian Evidence Act, 1872, deal with documentary evidence. The contents of the documents may be proved either by primary or by secondary evidence (S.61. I.E.A.). Primary evidence leans the document itself produced for inspection of the court (S.62, I.E. A). Documents must be proved by primary evidence except in certified copies, copies made from the original by mechanical processes, copies made from or compared with original, oral account of the contents to the matters in issue, and is admitted on the basis of relevance and admissibility.

(II) Oral:

(A) Direct: Evidence of fact which is actually in issue.
(B) Indirect: It is not the direct testimony of an eye witness.
(C) Hearsay: IT is any statement made by any person about what he did not personally witness.

Documentary evidence: It is of three types.

(1) **Medical Certificates**: They refer to ill-health, insanity, age, death, etc. They are accepted in a Court of law, only when they are issued by a qualified registered medical practitioner. The certificate of ill-health should contain exact nature of illness, and probable period of expected absence. The signature or left thumb impression of the patient should be taken at the bottom or top of the certificate. Two identification marks should be noted. The doctor should retain a duplicate of the certificate issued

11 Sec 3 of Indian Evidence Act, 1872.

for 2 years. A medical practitioner is legally hound to Dive a death certificate, stating the cause of death without charging fee. if a person whom he has been attending during his last illness dies (Registration of Births and Deaths Act, 1970). Death certificate should not be issued by a doctor without inspecting the body and satisfying himself that person is really dead. The certificate should not be delayed. Even if the doctor's fees is not paid.

(2) **Medico-legal Reports**: They are reports prepared in a doctor on the request of the investigating officer. Usually in criminal cases, e.g., assault, rape, murder etc. The examination of an injured person or a dead body is made, when there is a requisition from a police officer or Magistrate. These reports consist of two parts: (1) the facts observed on examination (all relevant. objective descriptions including important negative findings). (2) The opinion drawn from the facts. These reports will be attached to the tile relating to the case and the file is produced in the Court. The report will be open to the scrutiny of the defense lawyer. It will not be admitted as evidence, unless the doctor attends the Court and testifies to the facts under oath. Great care should be taken in writing the reports to avoid any loose wording or careless statement. The report should give the date, time and place of examination and the name of individuals who identified the person or the dead body. Exaggerated terms, superlatives, etc. should not be used. The opinion should he based on the facts (3) observed by himself, and not on information obtained from other sources.

(3) **Dying declaration**: It is a written or oral statement of a person, who is dying a result of some unlawful act, relating to the set material facts of cause of his death or bearing on at the circumstances (S.32. 1.17.A.). If there is time, Executive magistrate should be called to record the declaration. Before recording the statement, the doctor should certify that the person is conscious and his mental faculties are normal. If the condition of the victim is serious and there is no time to call a Magistrate, the doctorshould take the declaration in the presence of aim witnesses. The statement can also be recorded by the village headman, police or any other person, but its evidential value will be less. While recording the dying declaration, oath is not administered, because of the belief that the dying person tells the truth.

Investigation of the scene of death:

The basic rules for investigation of any scene of crime are

(1) Verify that a crime has been committed.

(2) Look for signs of how it was committed.

(3) Recover and preserve evidence that might lead to the arrest and conviction of the guilty.

Conduct and duties of the doctor at the scene of crime:

Crime scene investigation aids in identification of suspects or victims prove or disprove alibi, identify a modus operando, establish the corpus deficit and establish associations among victim, Suspect, scene and evidence. It is the responsibility of the police to preserve and protect the scene of crime. The doctor should carry with film a hand lens, measuring tape and ruler, gloves, slides, swabs, chemical thermometer, and envelopes if possible. Complete and accurate recording of the scene as it was found IS very important and undress this can be done by accurate diagrams, photography. The scene may show evidence of n struggle the, and on the body vital trace evidence may be present. Examination at the scene should be limited to a search for such evidence which might be dislodged or possible lost during the transfer of the body to the mortuary. Ira doctor sees the dead body for the first time in the autopsy room, he may form incorrect opinions about the origin of various injuries. Seeing the body at the scene of crime with the various surrounding objects, helps to avoid such mistakes. The visit to the scene of death is snore valuable if the body shows a patterned injury. the origin of which is in doubt. Even a retrospective visit to the scene enables the doctor to have a true appreciation of the nature of the surroundings, which are usually found to differ from the impression formed from the descriptions of other persons, and will be of help in interpretation of the findings in the victim. The scene of a violent death usually shows significant findings for understanding and solving problems.

Body lifting and moving:

The dead body should he carefully lifted and placed on to a bed sheet, length of plastic or body hag and wrapped for transport. With heavy bodies decomposed or fragile remains, the body should be rolled on its side and the plastic stuck underneath the body.

Photographs:

They should show the following:

(I) General relations or the scene of body to its surroundings.

(2) Special relationships between the deceased and weapon or blood stains overturned furniture.

(3) Means of possible entrance to and exit front the scene.

(4) Positionand posture of the victim.

Photographs of all injuries:

Major and minor, are essential. The skin should be cleaned of blood, dirt or foreign material. A ruler and case number or other Identifying information must be present in the photograph of the injury. The ruler should be placed on the skin surface adjacent to the injury at the same height as the injury. The photograph must be taken with the camera perpendicular to the skin surface. Close up photograph should be taken so that injury should fill most of the picture area. To Indicate Important Natures, markers or pointers can he inserted. If the powder residues arc on the victim's skin, a scaled photograph should be made, including the entire area over which the powder residues exist. Photographs help the Investigating officer and the doctor to refresh their memories for giving evidence in the Court. They also convey essential facts to the Court.

Disadvantages of the doctor not visiting the scene:

(I) When the body is transferred to mortuary, fresh abrasions may he produced on It during transit.

(2) Clothing will be disarranged; blood stains will form on parts of clothes originally free from them. When the body is lying on the back with a stab wound on the front of the chest or abdomen, the external blood loss is minimal or absent. When the body is turned, large amount of blood may escape through the wound and stain the clothes.

(3) Fresh tears in clothes may be produced from rough handling. (4) Existing rigor mortis may be broken down at least partially.

Basic Rules for Preservation of Medico Legal Evidence, for evidence to be legally accepted by the Courts.

(1) It must he obtained in a legal manner.

(2) It must be relevant to the issue.

(3) It must be evaluated by qualified experts.

Conclusion

There is urgent need and wide spread need for the application of forensic science in the criminal justice delivery system. The present day scenario of crime investigation and prosecution of criminals, in India is a sad sight. A large percentage of the trials, in heinous crimes ultimately,end in acquittals. The official figure (1998) for the acquittal is 93% whereas unofficial figure is even above 96%. It is estimated that the prosecution agency spends lakhs of rupees on each trial. Thus, not only a dangerous criminal goes scot-free but the huge amount of public-money is also wasted. These frequent acquittals also embolden the criminals and escalate crime and multiply criminals. The need for application of science in the dissemination of justice is pressing. Many factors, including the following are responsible for the same.