



Attributes of a Competent Forensic Odontologist

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ABSTRACT

Forensic odontology has been an interdisciplinary part of forensic science for many years. In Malaysia, this forensic discipline has been practiced for more than two decades however it is still considered a new discipline as there are a limited number of specialists. To date, there are less than ten practicing forensic odontologists in Malaysia. Many dentists do not have a clear perception of this field, thus forensic odontology rarely becomes a career of choice. The purpose of this article is to highlight the attributes of a competent forensic odontologist and encourage dentists towards this challenging career path.

Key Words: Forensic odontology, Forensic dental practice, Standards, Competency

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INTRODUCTION

If you are thinking of becoming forensic odontologist, you may do well to ascertain what it takes to be one. The initial interest to become a forensic odontologist must be supported by an understanding of the accompanying responsibilities. You may think that the forensic professions are exciting based on television shows like CSI, NCIS, Law and Order, and Bones. Although these forensic-based dramas are good entertainment, they misrepresent the forensic professions in many ways. These fictional forensic programs have a huge impact on the public and members of the courtroom regarding how forensic science is carried out, what it can and cannot do, and whether every case can be solved in a timely fashion. Their perceptions are diverged from reality and this has led to the reported *CSI-effect*.¹

Although few shows portray, or even mention forensic odontology, it is a specialist field of dentistry that is recognised by the Malaysian National Specialist Register (NSR) and other regulatory bodies in Australia and the United States of America.²⁻⁴ A forensic odontologist is a dentist who specialises in the proper handling, examination and evaluation of dental evidence, which may then be presented in the interest of

justice in a court of law.⁵ In essence, the forensic odontologist has to be an experienced clinical dentist who is knowledgeable in making dental evidence meaningful in a legal context.⁶ The work scope of forensic odontologists is broad, encompassing human identification, cranio-facial comparison, age estimation, bite mark examination, handling medico-legal cases and matters of dental fraud.⁷

History

The history of forensic odontology began in AD49 during the Roman empire when Agrippina, the mother of Emperor Nero, confirmed the identity of a dead body by recognising individualising characteristics in the teeth.⁸ Jealous of a perceived rival, Agrippina had her soldiers kill Lollia Paulina, with instructions to bring back her head as proof that she was dead. Agrippina, unable to positively identify the head, examined the front teeth and on finding the discoloured front tooth was satisfied of the identity of the victim.⁹

During the United States Revolutionary War, Dr. Joseph Warren was killed in 1775 at the battle for Breed's Hill. His body was buried hastily in a common grave. When the war finished the following year his friends decided to locate and exhume his body. However, ten months after his

death, his face was unrecognisable. Paul Revere, a master silversmith who supplemented his income by performing dental work, identified his friend's dead body by a small denture that he had fabricated for him. The identification made by Paul Revere made it possible to bury Dr. Warren with full military honours.¹⁰

Forensic odontology first played a significant role in a criminal investigation and trial over 130 years ago in a homicide case in the United States. In 1849 Dr. George Parkman, a wealthy and influential Harvard-trained physician, lent money to colleague Dr. John Webster who was in a great financial trouble. The subsequent mysterious disappearance of Dr. Parkman led to a vigorous search by the police until they found dismembered human remains in the furnace at Webster's laboratory.¹¹ Dr. Nathan Keep, a dentist who had been Dr. Parkman's dentist testified that when he saw a jawbone and a partial denture that had been found in Dr. Webster's furnace;

"I recognized them as being the same teeth that I had made for Dr. Parkman three years before. The largest portion that remained, which I now hold in my hand, was that belonging to the lower left jaw. I recognized the shape and the outline as being identical with the impression left on my mind of those that I have laboured on so long. On comparing the largest fragment with the model (a plaster cast of Dr. Parkman's dentition), the resemblance was so striking that I could no longer have any doubt that they were his"¹²

This case is significant because it was the first time an America jurisdiction accepted dental evidence in the court of law. Had it not been for Dr. Keep's identification of Dr. Parkman's dental remains, Dr. Webster would not have been convicted.

In Malaysia, the discipline was established more than two decades ago following the 1993 Highland Towers Condominium tragedy and the 1995 Malaysia Airlines (MAS) Fokker 50 plane crash. Dental identification teams played a very active role in the identification processes for these events.^{13,14} Following the MH17 airplane crash in 2014, approximately 35 dental records for the 43 Malaysian victims were located and then transcribed by the dental victim identification team in order to assist the reconciliation processes. In

May 2015 forensic odontologists were responsible for the dental recording of 108 skeletonised victims involved in illegal human trafficking at the Malaysia-Thai border.

ATTRIBUTES OF FORENSIC ODONTOLOGISTS

Broad coverage of knowledge

A forensic odontologist must have a broad background in general dentistry, anatomy, radiology, oral pathology, restorative procedures and dental materials.¹⁵ In cases involving a deceased person (e.g., following abuse, trauma, accident, suicide, neglect, or a war crime investigation), a forensic odontologist may be involved with the identification of the individual and provide descriptions and interpretations of dental and facial injuries.¹⁶ At times dental comparison may not be possible, therefore, other craniofacial structures namely frontal sinuses, base of the cranium and palatal rugae can be considered valuable for forensic identification purposes provided radiographs or study casts taken during the individual's lifetime (ante-mortem record) are available.¹⁷⁻¹⁸ Hence, there is necessity for a forensic odontologist to have sound knowledge of oro-craniofacial anatomy (including growth and development) and vast dental practice experience.

A forensic odontologist also needs to have substantial knowledge in comparative dental anatomy.¹⁹ In some circumstances it can be a major challenge for a forensic odontologist to differentiate features of human and animals' dentition. After the Australian Bushfire catastrophe in 2009, one problem faced at the scene was the presence of commingling remains.²⁰ Mechanical disruption caused by collapse of buildings, particularly where human and animal remains were co-located, resulted in changes to the dental and bony structures of these commingled human and animal remains which significantly delayed the identification process. Ideally, odontologists along with anthropologists should be deployed to the scene to identify and separate the human from animal teeth. In the event of shark attacks, the investigations are often conducted by forensic odontologists to ascertain whether or not the marks were made by a shark²¹ and if a species of shark can be identified.²² In August 1980, there was

a famously known case called as the 'Australia Dingo Baby' case in which the disappearance of a baby was linked to an attack by an Australian native dog (dingo). A study of a dingo biting similar clothing articles that the infant wore when the tragedy occurred was conducted by odontologists to determine the possibility of animal tooth marks.²³

Competency and evidence-based practice

A forensic odontologist needs to be competent to perform practical work by following standard protocols. The Daubert ruling²⁴ has reinforced that a forensic scientist must be well versed in the methods and requirements of good science in general and the specific techniques used in the respective field being practiced.²⁵ There may be several scientifically-accepted and evidence-based procedures that could be applied to different types of cases. For example, there are various published and accepted methods available to assess dental maturation and age estimation.²⁶⁻²⁸ However, it depends on the examiner's judgement to pick the most suitable method for a specific case, according to the racial origin and sex of the person of interest.

A forensic odontologist may be required to provide an opinion on clinical cases.²⁹ For example, it may be necessary to establish the age of the perpetrator of a crime in order to determine whether the person has reached the age at which adult criminal law is applicable and therefore to deliver the appropriate sentence. The increasing size of migratory flow of legal migrants and refugees has led to an array of problems such as human rights issues, public health, disease and border control, and also the regulatory processes. A forensic odontologist may be required to perform a clinical age assessment in cases of adoption, illegal immigration, and refugee claims.³⁰ This is how a forensic odontologist plays a greater role in humanitarian service.

In cases of domestic violence, or physical or sexual abuse a forensic odontologist will be consulted by medical personnel to give an opinion on bite-mark patterns. Depending on circumstances, a bite-mark injury may be inflicted by the victim on the assailant to self-defend or imposed by the suspect on the victim. From the evidence, the forensic odontologist has to

determine whether the pattern is truly the result of human biting. Careful assessment is crucial because the report prepared by a forensic odontologist may be used in legal proceedings. In Australia, there was a sexual assault case reported by a middle-aged woman, with initial medical examination revealing an apparent bite-mark on the right buttock.³¹ The bite-mark evidence was then referred to a forensic odontologist for an expert opinion. The injury pattern failed to meet the class characteristics of a human bite; instead the injury was found to be consistent with a corrugated bottle top. Had it not been for the careful analysis of the injury pattern by the forensic odontologist, the alleged suspect would have been wrongly convicted.

Professional standing

A forensic odontologist is obliged to uphold the reputation of the profession by being confident, composed and ethical throughout his career. The role revolves around legal authorities and experts from other areas of forensic science and the forensic odontologist must establish and maintain good rapport with them. Professional conduct and interpersonal skills are essential to deal with people of different backgrounds. A forensic odontologist needs to have an effective communication style, be able to accept peer review, and work together as a team member that consequently leads to mutual agreement and understanding. It is of importance for a forensic odontologist to liaise with the police investigators to maximise dental evidence collection.³² A forensic odontologist also works in a close liaison with specialists in other forensic disciplines, because of the need for team work to consider all available evidence and to centralise costly apparatus.³³ Occasionally, a large number of forensic odontologists from different nations may be involved in disaster victim identification (DVI) making international cooperation, prompt communication and uniform dental data interpretation necessary.^{34,35} In the aftermath of the Tsunami disaster in 2004 language barriers were a challenge faced by odontologists during the lengthy operation in Thailand.³⁶

Emotional stability

A forensic odontologist has to maintain empathic interaction with the bereaved relatives to help

them understand the complexity of the identification process and reasons for possible delays.²⁰ In addition, a forensic odontologist needs to be sensitive towards cultural and ethical issues when performing an examination of the deceased.³² Certain cultures have strict requirements on how to handle a dead body of which the forensic odontologist should be aware.³⁷ Islamic religious law requires Muslim burials to be performed as soon as possible after death, sometimes on the same day and unavoidable delays in post-mortem examination may affect this practice. A forensic odontologist must know that conventional autopsies are considered objectionable and deeply disrespectful to some religions in Malaysia. This is due to the invasive nature of the procedures. The advancement of technology has allowed a virtual autopsy to be performed using high-resolution imaging technology such as multi-sliced computed tomography (MSCT).³⁸ This technique has the advantage of being non-invasive, less time consuming and provide three-dimensional digital images.³⁹ Kuala Lumpur Hospital is the first to have the forensic post-mortem computed tomography facility in Malaysia and has officially started performing virtual autopsy since 2010. Perhaps this is another research area in which forensic odontologists can pursue as the permanent scanned images are useful in research activities.

It is undeniable that a forensic odontologist carries a huge responsibility and frequently works in a strenuous environment. However a forensic odontologist needs to keep emotions in check at all times. For an expert to have an emotional outburst in the workplace would be unprofessional and inconsiderate. According to Lake et al.⁴⁰ working in stressful surroundings such as DVI investigations can be psychologically exhausting. Tiredness, working in cluttered and poorly equipped facilities can be detrimental to both the odontology personnel and the DVI process. In order to avoid errors it is of important for a forensic odontologist to not let emotion overcome decision making.

Ability to give expert opinions and appreciation of limitations

A forensic odontologist is expected to have a vast range of knowledge, from forensic science to relevant legislation. Police, pathologists, academics and lawyers may seek consultation from a dental expert for opinions on civil, legal and criminal cases.⁴¹ Dealing with legal matters can be challenging. Many aspects such as work protocols, legal implications, and society expectations need to be taken into account prior to reaching conclusions. Certainly the forensic odontologist's job is ruled by obligation to be diligent and prudent.⁴² Hence, it is fundamental for a forensic odontologist to take an intelligent approach and to offer wise evidence-based opinions.

Person identification by means of teeth is a process whereby data recorded from dental autopsy of a deceased person are compared with the dental data that belongs to the deceased person before death. Under Personal Data Protection 2010 (Act 709),⁴³ it is unethical for a forensic odontologist to obtain the deceased person's dental records directly from the dentist nor the dentist has the right to disclose deceased patient information without a consent from the next-of-kin. Therefore a forensic odontologist should notify the police to collect the treatment records from the dentist. The police has the authority to retrieve dental records as stated under Criminal Procedure Code 2006 (Act 593).⁴⁴

Another attribute of a forensic odontologist is to be transparent and trustworthy in offering opinions and conclusions as an expert witness.⁴⁵ When a forensic odontologist has to testify on particular case, it is necessary for him to apply his special knowledge, study or practical experience of the subject matter in order to assist and guide the jury and the judge in the courts of law. However, a forensic odontologist must appreciate the limitations of his job scope because any deliberate attempt to offer information outside his area of expertise could mislead the courts and consequently cost him his professional reputation. He needs to recognise the contextual and extraneous information that potentially influence the decision-making process and to eliminate ambiguous evidence in minimising cognitive bias.⁴⁶ A forensic odontologist must always keep in mind that they do not represent the prosecutor or defence attorneys, or even the victim. The findings

must be reported in an impartial manner. The credibility of a forensic odontologist to deliver lucid and coherent evidence is vital to emphasise professionalism in the eyes of the court.⁴⁷

Research and leadership qualities

Nowadays, forensic sciences are scrutinised for validity and accuracy of the performed techniques.⁴⁸ Therefore a forensic odontologist needs to have an intellectual curiosity up to the level that could kindle interest to conduct extensive research and publish the findings to fill the lack of sound data in the field of forensic odontology. In 2005, Jones⁴⁹ reported that odontology is the least cited topic amongst a number of scientific journals produced worldwide. A good publication of research can provide empirical evidence to validate the discipline's technique and recommend best practice to assimilate it into practical work. For instance, bite-mark analysis has always been a controversial area in the courts of law.⁵⁰ Even though there are many barriers to undertaking high quality research in bite-mark analysis,⁵¹ it is critical for odontologists to carry out studies that are forensically and judicially relevant.

A forensic odontologist is often appointed as a specialist in a disaster victim identification team. Thus, the forensic odontologist needs to have managerial qualities and to set a good example by being optimistic, systematic and analytical. The International Criminal Police Organisation (INTERPOL) stated in its Disaster Victim Identification guidelines⁵² that effective coordination of a disaster response can only be assured if a properly functioning command and organisational structure is implemented. A leader must lead by example; if one expects team members to have integrity, the leader has to set the tone. As the team leader, a forensic odontologist must be very constructive towards all team members to keep everyone motivated.

Passion and enthusiasm in education

The core task of a forensic odontologist is person identification by which dental data concerning a human body recovered unknown (ante-mortem) are shown to match dental data concerning a human recovered unknown are shown to match data concerning a known missing person (post-

mortem).⁵³ The establishment of the identification is dependent largely on the accuracy and sufficiency of ante-mortem data. The ante-mortem dental data that mainly consist of dental charts, treatment notes and radiographs will be transcribed into a standardised format. There may be problems in interpreting entries in the written record. Factors such as handwriting, personal abbreviations and charting mistakes may cause inaccuracy in transcription. Many dental practitioners have not adequately applied medico-legal and forensic value in their routine practices.⁵⁴ A forensic odontologist has a major role to educate dental practitioners in keeping accurate dental records and providing all necessary forensically valued information.

A forensic odontologist needs to have the readiness to educate people about forensic dentistry. Some examples include medical professionals, child or adult protective staff, and dental undergraduate students at universities. In fact, there are many opportunities for forensic odontologists to give lectures on forensic dentistry at events and functions.⁵⁵ A forensic odontologist may also be requested to give training to police officers in structured continuing education programs.⁵⁶ In keeping with the progress of forensic odontology in Malaysia, starting an accredited forensic odontology post-graduate training would be a progressive step. Many dentists have been consulted to give opinion on forensic cases and they performed the forensic tasks using their basic dental training. Much more is needed to become a forensic expert. In February 2009, the National Academy of Sciences issued a report: Strengthening Forensic Science in the United States: A path forward.⁵⁷ One of recommendations made that could be adopted is the following:

"What also is needed is an upgrading of systems and organisational structures, better training, the widespread adoption of uniform and enforceable best practices, and mandatory certification and accreditation programs..."

A forensic odontologist must fully utilise every opportunity to disseminate information on forensic odontology not only to the dental and health profession but most importantly to the community. There are many people who are

unaware about forensic odontology and to them this is a relatively new field.

CONCLUSION

A forensic odontologist plays a pivotal role in both disciplines; dentistry and forensic sciences. Through exercise of his special knowledge, the forensic odontologist can help to fulfil his profession's obligation to society and safeguarding matters of justice. Therefore, a forensic odontologist has a duty to perform the best practice possible as this kind of work demands attention to detail, passion and perseverance. Pursuing a career in forensic dentistry is a large commitment and a forensic odontologist must always uphold the pride and dignity of the profession throughout his life.

This article was written with the intention to provide a general overview on the attributes required by a forensic odontologist, especially to persons who have only a vague idea of this profession. As in all aspects of dental specialities, honesty and genuine interest to perform diligently during an investigation is the hallmark of a practising forensic odontologist. Hopefully this article could inspire readers to realise the importance of forensic dentistry to the community we live in.

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