Forensic Dentistry Part 2 : Bite Mark Analysis, Safeguarding, and Ethical Record Sharing

Aims: To provide dental care professionals with an understanding of the modern role of forensic odontology in bite mark analysis, safeguarding investigations, and the ethical and legal responsibilities surrounding the sharing of dental records.

Objectives: On completion of this verifiable CPD article, the participant will be able to demonstrate, through completion of a questionnaire, the ability to:

- Explain how forensic odontology contributes to the safeguarding of children and adults at risk of harm.
- Identify oral and dental findings that may indicate abuse or neglect.
- Explain how bite mark evidence is assessed and its limitations in modern forensic science.
- Understand the legal and ethical framework governing the release of dental records.
- Apply GDC, GDPR, and safeguarding principles when responding to forensic or safeguarding requests.
- Pass an online assessment, scoring over 70%.

Introduction

Forensic odontology, or forensic dentistry, is defined by the British Association for Forensic Odontology as “a branch of forensic medicine and, in the interests of justice, deals with the proper examination, handling and presentation of dental evidence in a court of law.”[1] It is the application of dental science in the interests of justice and involves the examination, evaluation, and presentation of dental evidence to assist legal investigations, particularly in the identification of deceased individuals.

Forensic odontology plays an important role not only in identifying deceased individuals but also in recognising and interpreting injuries in the living. Dental care professionals may possibly encounter cases where their clinical observations become part of a legal, investigative, or safeguarding process.[2]

This article explores how safeguarding and forensic dentistry overlap, with a focus on recognising signs of abuse, understanding clinical responsibilities, and ethically sharing dental records if required.

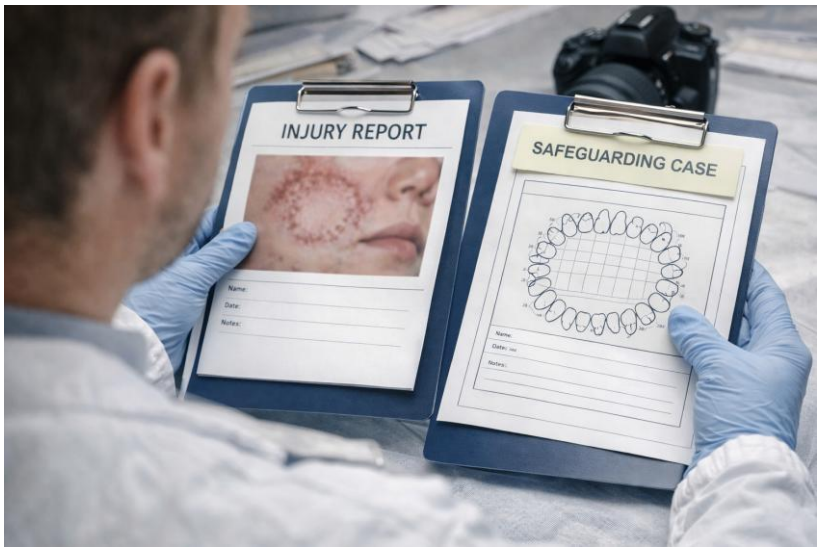
Categories of Abuse

Statutory guidance in the UK describes four main categories of abuse:

- Psychological (including emotional abuse)
- Physical
- Sexual
- Neglect[3]

These categories, along with additional types of abuse that fall within each main group, are described in detail in the safeguarding children and adults at risk of harm level 1 and 2 articles which are available on the website.

The Oral Cavity as a Site of Abuse



A 2023 literature review examining child abuse and neglect highlighted that injuries to the head, neck, face and oral cavity are among the most frequently observed manifestations of physical abuse. Studies consistently show injuries to the head, neck, and oral region occur in up to 50–70% of physical abuse cases.[4,5] Because these regions are routinely visible during dental examinations, the review emphasised that dental professionals are uniquely positioned to identify signs that may raise safeguarding concerns.[4]

Physical Abuse

Physical abuse is deliberately hurting a child or adult and may involve hitting, making someone deliberately uncomfortable (for example removing blankets), shaking, throwing, poisoning, burning or scalding, drowning, forcible feeding or withholding food, suffocation, misuse of medication, inappropriate restraint or inappropriate physical sanctions. It also includes fabricated and induced illness.[6,7]

Possible Indicators of Physical Abuse in the Head, Neck and Oral Region

Head: Skull injuries, bald spots (traumatic alopecia), bruises behind ears, facial swelling and bruising.

Eyes: Retinal haemorrhage, blackened eyes.

Nose: Fractures, displacement.

Lips: Bruises, Lacerations, angular abrasions. Contusions, lacerations, burns or scars may be spotted on the lips of abused individuals.

Intra oral: Frenum tears, palatal bruising, residual tooth roots. Blunt force trauma may cause the mucosal lining of the lower lip to be torn away from the gingiva. The tongue of an abused individual may exhibit abnormal anatomy or function due to scaring or from burns or other trauma.

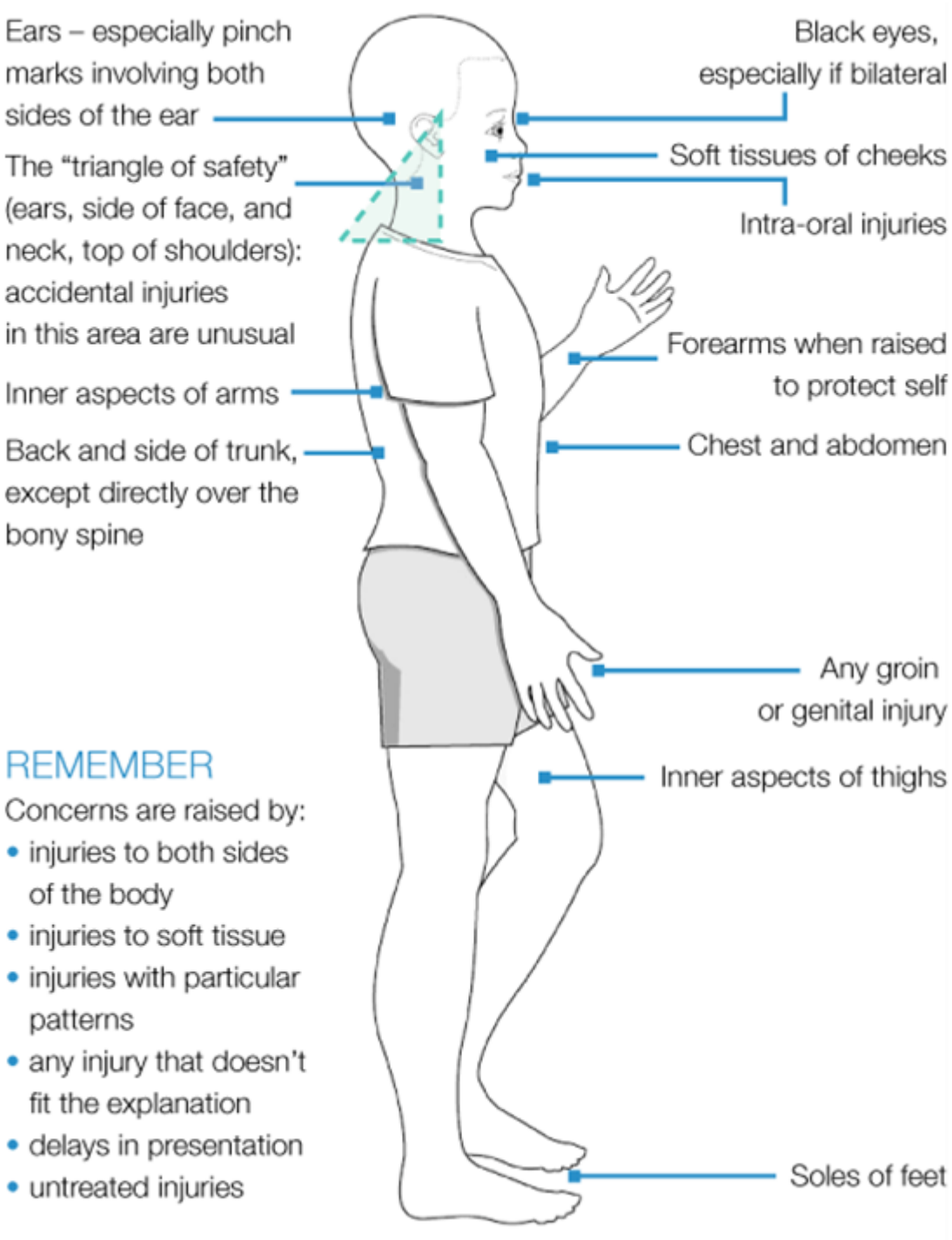
Maxilla/mandible: Fractures/improperly healed fractures, malocclusion from previous fractures.

Teeth: Fractures, mobile, avulsed or discoloured teeth. Severe trauma may loosen teeth or displace them from their alveolar sockets.[5]

While the above signs may be associated with physical abuse, it is important to recognise that many of these findings can also arise from accidental trauma, underlying medical conditions, or behavioural habits. Dental professionals should therefore evaluate each case carefully. Abuse or neglect may be particularly suspected when the injury is part of a pattern of repeated incidents, when the explanation provided is inconsistent with the nature or severity of the injury, when there is an unusual delay in seeking care, or when family members or carers appear evasive or unwilling to discuss the circumstances surrounding the injury.[5]

Injuries located within the “triangle of safety”, which is the area encompassing the ears, side of the face, neck and top of shoulders, are of particular concern.[8] This

region is naturally well-protected during accidental falls or everyday activities, meaning that bruising, abrasions or patterned injuries here are less likely to occur unintentionally. Consequently, trauma within the triangle of safety should prompt heightened suspicion, especially when accompanied by an inconsistent history, repeated injuries, or delays in seeking care.



Department of Health produced chart showing typical features of non-accidental injuries in children.

Sexual Abuse

Sexual abuse involves forcing or enticing an adult, child, or young person to take part in sexual activities, including prostitution, whether or not the individual is aware of what is happening. It can involve:

- Rape, attempted rape, or sexual assault.
- Inappropriate touch anywhere.
- Any sexual activity that the person lacks the capacity to consent to.
- Inappropriate looking, sexual teasing or innuendo or sexual harassment.
- Sexual photography or forced use of pornography or witnessing of sexual acts
- Indecent exposure.[6,7]

Intraoral signs associated with sexual abuse may include erythema, ulceration, and vesicle formation resulting from gonorrhoea or other sexually transmitted infections, as well as erythema and petechiae at the junction of the hard and soft palate, which may be indicative of oral sex.[8]

Neglect

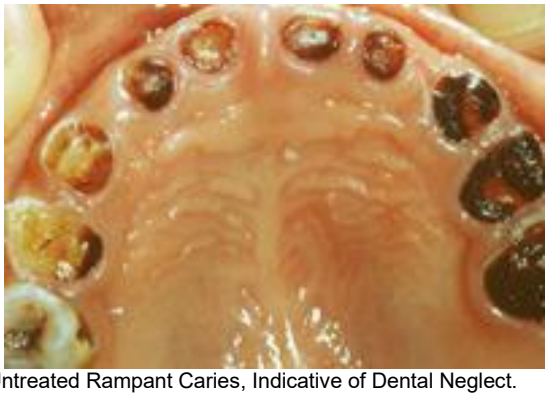
Neglect is the persistent failure to meet a child or adult at risk of harm's basic physical, educational, emotional and/or medical need. It is likely to result in the serious impairment of the child or adult's health or development and includes failing to ensure access to appropriate medical care or treatment. This includes dental treatment.

Types of Neglect and Acts of Omission

- Failure to provide or allow access to food, shelter, clothing, heating, stimulation, and activity, personal or medical care.
- Substance abuse during pregnancy (for example drugs, alcohol, smoking).
- Providing care in a way that the person dislikes.
- Failure to administer medication as prescribed.
- Refusal of access to visitors.
- Not taking account of individuals' cultural, religious, or ethnic needs.
- Not taking account of educational, social, and recreational needs.
- Ignoring or isolating the person.
- Preventing the person from making their own decisions.
- Preventing access to glasses, hearing aids, dentures, etc.
- Failure to ensure privacy and dignity.[7]

Dental Neglect

Dental neglect is defined by the British Society of Paediatric Dentistry as the persistent failure to meet a child's basic oral health needs, likely to result in the serious impairment of a child's oral or general health or development.



Untreated Rampant Caries, Indicative of Dental Neglect.

Dental neglect may occur in isolation or may be an indicator of a wider picture of child maltreatment.

To maintain optimal oral health, children need:

- Fluoride- usually supplied by using a fluoride toothpaste twice daily.
- A good diet- limited frequency of sugary foods and drinks.
- Facilities, supervision and assistance to practice good oral hygiene.
- Regular dental visits.

Chapter 14 of the Care Act provides guidance of adult safeguarding cites neglect and acts of omission as behaviour which could indicate a safeguarding concern. This includes:

- Ignoring medical, medical emotional or physical care needs.
- Failure to provide access to appropriate health, care and support or educational services.
- Withholding the necessities of life such as medication, adequate nutrition and heating.[9]

Therefore, when examining the mouth of an adult at risk of harm, the above needs to be taken into consideration when questioning the possibility of dental neglect.

Impact: When assessing a child or adult with dental disease, it is important to assess the impact of the disease on the individual. Severe untreated dental disease can cause:

- Toothache.
- Disturbed sleep.
- Difficulty eating or change in food preferences.
- Absence from school and interference with play and socialisation.

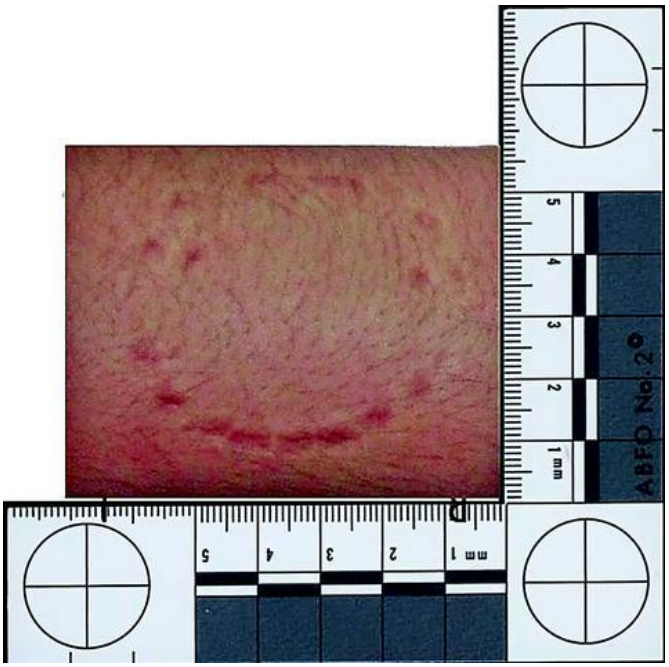
Dental Neglect: cause for concern

Dental problems should be explained to parents or carers and appropriate and treatment offered. There are factors that should be considered that give cause for particular concern. These are:

- Severe untreated dental disease, particularly that which is obvious to a layperson or other non-dental health professional.
- Dental disease resulting in a significant impact on the child or adult at risk of harm.
- Parents or carers have access to but persistently fail to obtain treatment for the child or adult at risk of harm, as may be indicated by:

➢ Irregular attendance and repeated missed appointments.
➢ Failure to complete planned treatment.
➢ Returning in pain at repeated intervals.
➢ Requiring repeated general anaesthesia for dental extractions.[8]

Bite Marks and Analysis

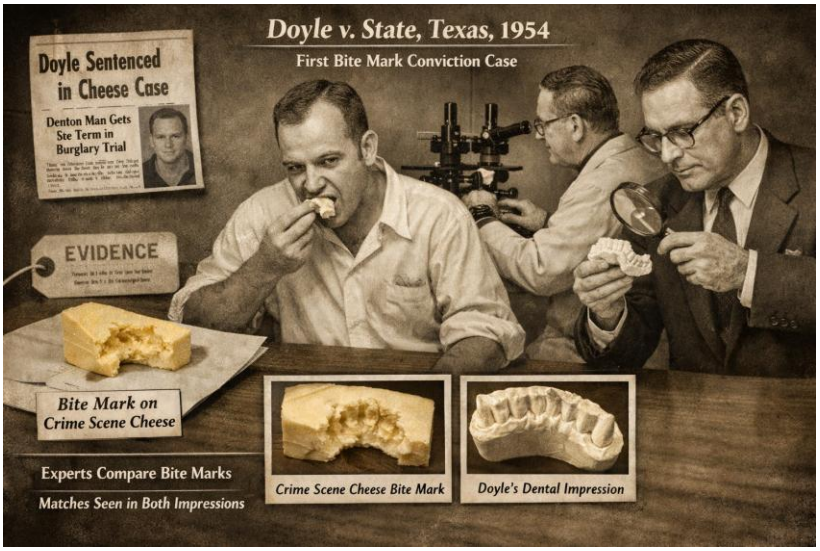


A bitemark has been defined as “a physical alteration or representative pattern recorded in a medium caused by contact of teeth.”[10]

Bite marks are most commonly encountered in cases of sexual assault, murder, and child abandonment, where an assailant employs the teeth as a means of attack, producing impressions on the victim’s skin or on items associated with the crime scene. On the assumption that each individual’s dental arch exhibits unique characteristics, these impressions may be compared with the dentition of a suspect, potentially providing evidence linking the individual to the offence.[11]

Historically, forensic investigators viewed them as a distinctive and reliable form of evidence.[12] However, bite mark analysis has since undergone significant scientific scrutiny and ethical debate.[13]

Historical Background



The earliest published case in which a conviction relied on bite mark evidence was in the case of Doyle v State, in Texas in 1954. In this case, a bite mark was identified on a piece of cheese recovered from the scene of a burglary. The suspect was subsequently requested to bite into a separate piece of cheese for comparison purposes. A firearms examiner and a dentist independently examined the two bite patterns and each concluded that they had been produced by the same dentition. This conviction contributed to the subsequent acceptance of bite marks on both objects and human skin as admissible evidence in later criminal proceedings.[2]

People v. Marx (California, 1975) is a landmark case in the history of bite mark evidence. The victim, a young woman, was assaulted and sustained a bite injury to her nose during the attack. A forensic odontologist compared the bite mark on the victim's nose with dental impressions taken from the defendant, Theodore Marx, and testified that the pattern was consistent with his dentition. The court admitted this testimony, and Marx was convicted of voluntary manslaughter.[2]

The conviction of serial killer Ted Bundy is one of the most widely cited examples of bite mark analysis in criminal proceedings. In 1979, during Bundy's trial in Florida for the murder of Lisa Levy, forensic odontologists testified that bite marks found on the victim's body were consistent with Bundy's dentition. The court admitted this evidence, and it played a contributory role in securing Bundy's conviction, reinforcing the perception at the time that bite mark analysis could provide powerful forensic identification evidence.[2]

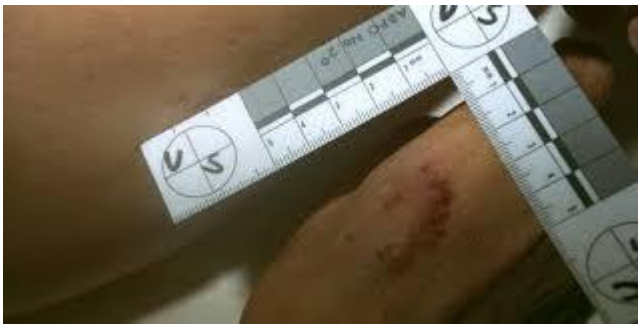
Over subsequent decades, bite mark evidence was admitted in many cases and became widely used in courts. However, later DNA exonerations and wrongful convictions linked to bite mark testimony prompted serious re-evaluation. The US National Academy of Sciences (NAS) 2009 report highlighted major concerns about the reliability and subjectivity of pattern comparison evidence, including bite marks.[14]

In response to growing scientific scrutiny, professional guidance from the American

Board of Forensic Odontology and British Association for Forensic Odontology, and scientific foundation reviews, emphasised the limitation of bite mark evidence and the need for a cautious approach.[1,15]

More recently, a 2024 literature review has suggested that bite mark analysis may still hold value as a supportive tool in forensic identification, provided that a rigorously standardised and internationally accepted protocol for data acquisition, analysis, and interpretation is developed and implemented. The authors note a growing body of contemporary research aimed at addressing historical criticisms by advancing quantitative, objective, reproducible, and scientifically robust methodologies for bite mark comparison.[16]

How Bite Marks are Examined



A forensic odontologist examining a suspected bite mark follows a structured process:

1. Documentation of the Injury

In the United Kingdom, the examination of a suspected bite mark begins with detailed documentation of the injury. High-resolution photographs are taken using appropriate lighting, measurement scales, and colour calibration to ensure accurate and reproducible recording of the injury. Where indicated, impressions of the bite mark may be taken using dental materials, or the injury may be captured using digital three-dimensional imaging techniques to preserve surface detail and morphology for subsequent analysis.[17,15,19]

2. Collection of Biological Samples

Biological samples may be collected from the injury site, as bite marks can retain saliva or epithelial cells suitable for DNA analysis. Swabbing is performed in accordance with established forensic protocols to minimise the risk of contamination. All samples are handled and stored under strict chain-of-custody requirements, ensuring continuity, integrity, and admissibility of evidence in legal proceedings.[17]

3. Comparison with Suspect Dentition

Where a suspect is identified, dental impressions, intra-oral scans, or dental models of the suspect's dentition are obtained for comparison with the bite mark. The comparison process prioritises objective and reproducible methods, including digital

overlays, three-dimensional modelling, and evaluative or statistical approaches, rather than relying solely on subjective visual pattern matching. This approach reflects current UK professional guidance and addresses recognised limitations within bite mark analysis.[18,15]

4. Reporting

The forensic odontologist prepares a written expert report detailing the methods used, observations made, and any limitations affecting interpretation. In line with UK forensic reporting standards, conclusions are expressed using graded evaluative terminology. This graded approach promotes transparency, avoids overstating evidential value, and supports the court in assessing the weight of the evidence.[15,20]

Bite Marks and Safeguarding

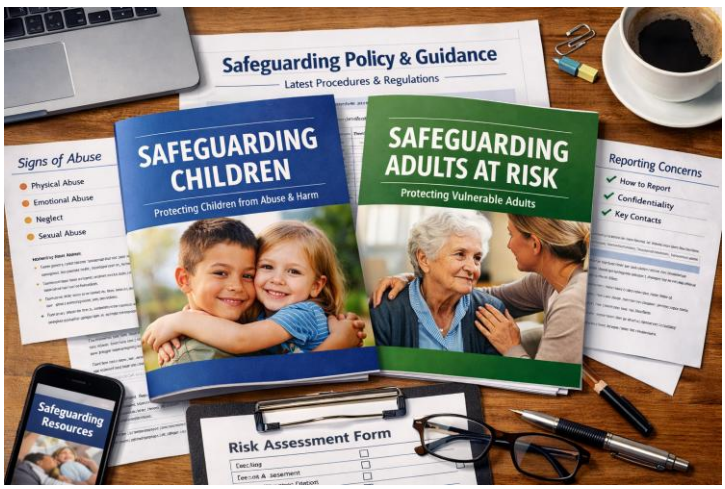
Bite marks can occur in various forms of abuse, including child abuse, sexual assault, or domestic violence. This evidence often goes unrecognised by an untrained person, and any curved bruise should be treated as suspicious. In these cases, the dentist's or hygienist's first responsibility is to safeguard the patient, not to perform a forensic analysis.

When a potential bite mark or other suspicious injury is observed:

1.Document carefully. Record size, shape, location, and colour. Body charts/diagrams may be used to document the injuries.
2. Take clinical photographs (if consent and policy allow).
3. Record the patient's explanation in their own words.
4. Report concerns following safeguarding protocols.
5. Do not attempt comparison or speculation about who may have caused the injury.

The forensic interpretation of any mark should only be carried out by trained forensic odontologists under police instruction. However, the initial recognition and documentation by a dental professional can be vital in preserving evidence and protecting the patient.

Safeguarding Responsibilities in Dental Practice



Safeguarding is a core component of professional duty for all dental care professionals. The GDC Standards for the Dental Team state that every registrant must raise concerns if they believe a patient is at risk of harm, abuse, or neglect.[21]

Dental professionals must also be familiar with:

Working Together to Safeguard Children (HM Government, 2023)
The Care Act 2014 (for safeguarding adults)
Local safeguarding procedures established by NHS England and local authorities

It is essential to maintain an up-to-date safeguarding policy within the practice and ensure all team members are trained to the appropriate level. Dental Professionals should complete Safeguarding level 2 and this is available on the website, along with annual refreshers.

Forensic Odontology and Safeguarding Collaboration

In serious safeguarding cases, such as suspected physical or sexual abuse, forensic odontologists may be asked to assist in assessing patterned injuries. Their expertise ensures that observations are interpreted accurately and that reports stand up to scrutiny in court.[19]

Dental professionals who initially identify such injuries play a crucial part in this process. The quality of their documentation, such as accurate notes, clear photographs, and timely referrals, can make a significant difference in protecting victims and supporting investigations.

Forensic odontologists may also support child protection cases involving suspected neglect, non-accidental trauma, or failure to thrive, helping to differentiate between accidental and inflicted injuries.[19]

Confidentiality and Information Sharing

All members of the dental team, whether clinical or not, have an ethical and legal responsibility to keep patient information confidential. When a patient allows you to share information about them, make sure the patient understands:

- What you will be releasing;
- The reasons you will be releasing it; and
- The likely consequences of releasing such information.[21]

When sharing information, it is important to consider the Caldicott Principles of information sharing, which are:

Principle 1 - Justify the purpose(s) for using confidential information

Principle 2 - Don't use personal confidential data unless it is absolutely necessary

Principle 3 - Use the minimum necessary personal confidential data.

Principle 4 - Access to personal confidential data should be on a strict need-to-know basis

Principle 5 - Everyone with access to personal confidential data should be aware of their responsibilities

Principle 6 - Comply with the law

Principle 7 - The duty to share information can be as important as the duty to protect patient confidentiality

Principle 8- Inform patients and service users about how their confidential information is used [22]

Principle 7 is especially important, since dental professionals should have the confidence to share information in the best interests of their patients within the framework set out by these principles. If requested to keep a secret, it should be explained to the patient that information may need to be shared and with whom and when it will be shared. If the individual has the ability to consent, and disclosure is considered to be necessary to protect the individual from harm, concerns should be escalated through the safeguarding process. The child or adult at risk's safety is the priority. If discussing concerns with parents or carers will put the individual at greater risk, then the intention to refer or share information should not be discussed. It is important to document your reasons for this.

It is important to remember that the Data Protection Act, 2018, is not a barrier to sharing information, but provides a framework to ensure that personal information is shared appropriately.

The General Dental Guidance for dental professionals' states that you may share confidential information without consent if it is in the public interest. This may be the case if a patient discloses, or if you suspect, that the patient's health or safety is at risk or if you have confidential information which would help prevent or detect a serious crime. It is recommended that you consult with a senior colleague and your defence union for further advice. If you decide to release confidential information, it is important to document your reasons why so that you are able to explain and justify your actions.[21]

Conclusion

Even though most dental care professionals will never attend a mortuary or crime scene, their contribution to forensic readiness is significant.

By keeping accurate, clear, and secure records, maintaining up-to-date safeguarding training, and understanding their ethical responsibilities, every dental professional strengthens the link between dentistry and justice.

A well-maintained record could one day help identify a missing person, support a victim of abuse, or clear an innocent suspect. Conversely, incomplete or illegible notes could hinder justice and prolong distress for families.

Personal Development Plan and Reflective Learning

This CPD is linked to the following GDC Enhanced CPD Development Outcomes:

A. Effective communication with patients, the dental team, and others across dentistry, including when obtaining consent, dealing with complaints, and raising concerns when patients are at risk.
B. Effective management of self and others
D. Maintenance of skills, behaviours and attitudes which maintain patient confidence in you and the dental profession and put patients' interests first.

Reflective learning is a requirement of the GDC Enhanced Professional Development Scheme. As such, you will now be given the option of answering some reflective learning questions, before your certificate is generated. Examples will be provided. Please remember that you can update this at any time from your CPD log. If you take a few moments to write your reflection on completion, you will have fulfilled the Enhanced CPD requirements.

Further Reading

British Association for Forensic Odontology

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