

Patient safety in primary care dentistry: where are we now?

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IN BRIEF

- Identifies what patient safety is in relation to primary care dentistry.
- Explains some of the frequently used models and theories behind the concept of patient safety.
- Suggests areas for further research in order to improve patient safety in primary care dentistry.
- Provides further sources of information for interested readers.

PRACTICE

In contemporary healthcare settings, ensuring patient safety must be an underlying principal through which systems, teams, individuals and environments work in tandem to strive for. The adoption of a culture in the NHS where patient safety is given greater priority is key to improvement. Recent events at Mid-Staffordshire hospitals among others have brought patient safety into the minds of the public and it increasingly demands attention from clinicians, the press and governments. However, much of the work into patient safety has been completed in the secondary care field with very little work completed in primary care settings. In primary care dentistry, improving patient safety is a relatively new concept with a distinct lack of evidence base. In this article, we discuss what patient safety is and debate its relevance to primary care dentistry. We also look at previous work completed in this field and make recommendations for future work to address the current lack of research.

INTRODUCTION

Patient safety is a fundamental aspect of quality in relation to any healthcare setting.¹ Over the past 30 years patient safety has developed from a concept coined by a few academics and clinicians to becoming a wide ranging umbrella term, which is integral to all healthcare staff and service users. Certain key documents have been published during this period which help to explain the gravitas of patient safety: The US Institute of Medicine's report *To Err is human*, published in 1999,² shocked the medical profession by revealing that more people died in the USA as a result of medical error as did from road traffic accidents. In the UK, the National Health Service (NHS) has prioritised patient safety, establishing an open access website on the subject entitled 'patient safety first',³ containing a wealth of information on patient safety accessible to staff, academics and members of the public. In 2013, the UK government pledged to make patient safety the first priority within the NHS⁴ in response to a commissioned review by the internationally renowned expert in patient safety Professor Don Berwick. The review was set up following publication of

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Table 1 Definitions of patient safety

The Institute of Medicine, 2000	The prevention of harm to patients
Vincent, 2006	The avoidance, prevention and amelioration of adverse outcomes or injuries stemming from the process of healthcare
The World Health Organisation, 2011	The reduction of risk of unnecessary harm associated with healthcare to an acceptable minimum
The National Advisory Group on the Safety of Patients in England, 2013	Avoiding harm from the care that is intended to help

the Francis report earlier that year, which documented the failings at Mid Staffordshire NHS Foundation Trust.⁵

In this article, we discuss patient safety in relation to primary care dentistry; an area that is largely unexplored. Putting patients' interests first is one of the duties of dentists as healthcare professionals; this is clearly stated in the recent General Dental Council (GDC) Standards document,⁶ therefore it is important to develop a shared understanding as to what constitutes patient safety in primary care dentistry.

WHAT IS PATIENT SAFETY?

Before we can explore patient safety in relation to primary care dentistry, it is important that we understand some of the underlying concepts of patient safety in general. Much of the work completed to date draws on expertise from medicine, psychology and the social sciences. Several definitions of 'patient safety' exist;^{2,4,7-10} some of these are listed in Table 1. A working definition is 'providing healthcare which

minimises the risk of unnecessary harm to the patient'. Recent healthcare advances have led to a situation where medicine, which used to be seen as simple, ineffective and relatively safe, is now complex, effective and potentially dangerous.¹¹ The body of literature includes some helpful tools for thinking about the concept of patient safety. Examples include:

- The 'Swiss cheese' model
- Active and latent failures
- Human factors
- Systems failures.

The 'Swiss cheese' model and active and latent failures

This method for thinking about why accidents or losses occur was described in 2000.¹² It provides a helpful model for describing conceptually how adverse events or systems failures occur. There are a series of safeguards, barriers and defences in place that work in tandem to prevent these events from occurring. Ideally, each defensive layer would be intact, but in reality, they are like

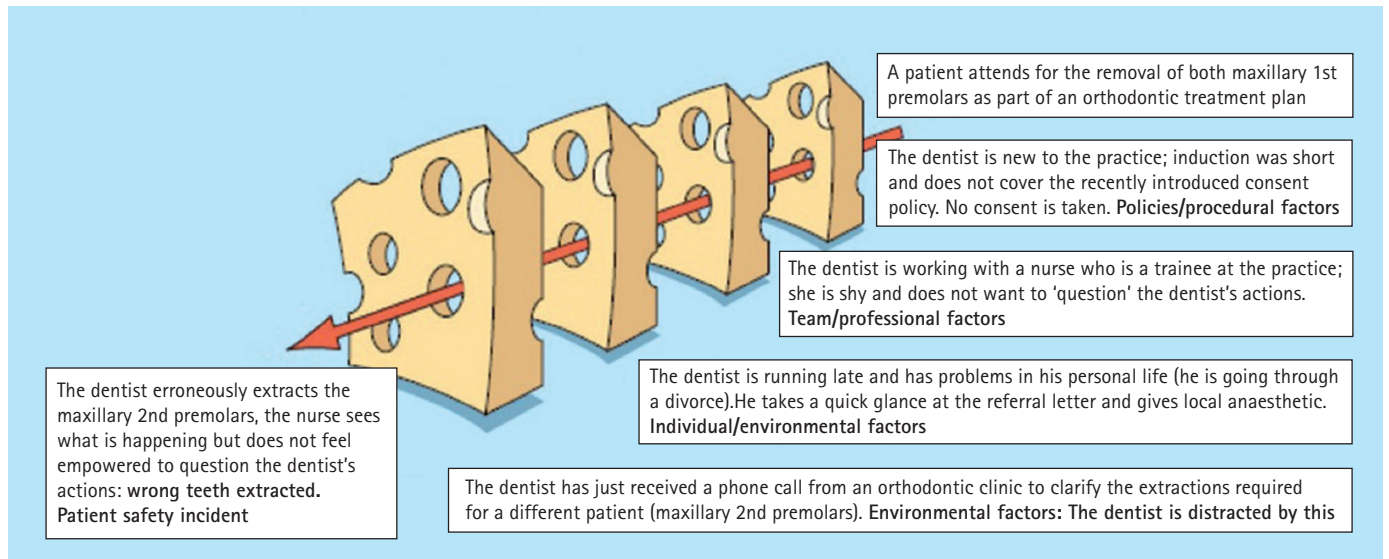


Fig. 1 Hypothetical patient safety incident occurring in a general dental practice

slices of Swiss cheese with many potential holes in each layer of defence. The presence of holes in one particular slice is unlikely to lead to an adverse outcome as the other layers will prevent its occurrence. When accidents or incidents do occur, it is due to the holes in each layer lining up so that a trajectory of accident opportunity opens up and is thus highly likely to occur.

Both active and latent failures can occur in primary dental care. Active failures encompass unsafe acts that can be directly linked to an accident (for example, dentist error); and latent failures are contributory factors that may lie dormant for a long period of time before contributing to an actual patient safety incident⁷ (for example, a lack of induction for new clinical staff at a dental practice). Latent errors were first described in the 1930s by the industrial safety pioneer H. W. Heinrich; he postulated that 'the occurrence of an injury invariably results from a complicated sequence of factors, the last one of which being the accident itself.'¹³ He also hypothesised a ratio by studying insurance claims that demonstrated that the proportion of major harms was relative to the number of 'no harm' or 'minor harm' incidents occurring. He argued that this ratio was constant. Recent research questions the validity of this constant ratio; however, his work remains useful in terms of thinking about how many 'near misses' can eventually lead to a major incident if adequate steps are not taken to address the issues causing the near misses.¹⁴

Authors of later works have modified the Swiss cheese model to specific healthcare related safety incidents and adverse events.^{7,15,16} Sanders¹⁶ gives names to the various slices that are used as barriers and safeguards to prevent adverse events occurring in healthcare. Prior to an adverse

Table 2 The role of human factors in patient safety incidents

Type of error	Definition	Primary dental care example
Slip	Occur when there is a distraction during a routine task, such as mixing up drugs to be administered because of being interrupted by an (often well-meaning) colleague	A patient with a penicillin allergy requiring antibiotics is prescribed amoxicillin by the dentist because he is distracted by the receptionist who is talking about another patient who has telephoned complaining of a reaction to metronidazole
Lapse	Occur when standard approaches or guidelines are not followed by the individual. One example of this is when faced with a complex clinical situation; the clinician decides that the guidelines do not apply to this case	An elderly patient on warfarin attends the practice with an abscess associated with a premolar. She is keen to attend her granddaughter's wedding in two days' time, but worries that she won't be able to due to the pain and swelling. The dentist removes the tooth aware that the patient's INR is 4.3 as measured that morning
Mistake	A failure of judgement, usually related to a lack of information, these can also occur when an incorrect rule is applied to solve a problem	It is a busy day in the practice; a patient attends for an OPT following referral from another practitioner. The dentist is running late and the reception desk is busy with the phone constantly ringing. The dental nurse calls the patient through for their radiograph, and takes the radiograph without checking the patient's name and date of birth. After the patient leaves the room, the nurse realises that she has exposed the wrong patient to radiation; there were two patients with the same name in the waiting room.
Violation	A deliberate attempt to not follow the agreed protocol (these occurrences are fortunately rare)	A patient with a history of COPD attends the practice complaining of toothache. The dentist does not conduct a thorough examination and decides to prescribe the patient strong opioid based analgesics on a private prescription

event occurring, triggers must pass through the following layers:

- Policies/procedural
- Professional
- Team
- Individual
- Environmental
- Equipment.

We have modified this model to make it specific to a primary care dentistry setting where an adverse event occurs due to 'holes' in the protective layers (Fig. 1). This hypothetical model demonstrates how a

hole in a single layer of the cheese will not necessarily lead to an error, but that when all of the holes are lined up in a trajectory of both active and latent failures; an error (in this case the wrong teeth being extracted) is far more likely to occur.

Human factors

In 1983, the *BMJ* published a paper by McIntyre and Popper that called on clinicians to seek out errors and to use them for educational benefit.

'To learn only from one's own mistakes would be a slow and painful process and

unnecessarily costly to one's patients. Experiences need to be pooled so that doctors may also learn from the errors of others.¹⁷

The authors proposed a new ethos in medicine in which the goal is educational and practical, linked to improvement and not a system of punishment doled out to those who err.^{7,17} This 'new' ethos is echoed in later works, where authors suggest that punishing clinicians who err is not a progressive approach to improving patient safety by reducing the frequency of clinical errors.^{15,18}

Dental professionals often find themselves at the 'coal face'; they are humans and their decisions and actions can lead to unsafe patient care.¹⁹ In any discussion of patient safety related to human (individual) factors, there has to be an appreciation that the individual may well be at work; but that they may be struggling with other aspects of their lives such as stress, family breakdown and grief.¹⁵ These human factors are incongruent with the public's perception of healthcare professionals as being infallible, trained to perfection with machine like regularity and precision whilst possessing boundless compassion.⁷ Cognitive psychologists have identified the main types of error due to human factors; these are slips, lapses, mistakes and violations (Table 2).

When human error does cause an incident, it is seldom the fault of a single individual.¹² Therefore, the introduction of rules aligned with ever harsher punishments for breaking them will not encourage an open and honest system for improving safety.⁷ Psychological research has shown that when 'rules' are introduced in institutions, the likelihood of staff following them is related to their perception of the rule being 'fair' rather than fear of punishment for disobedience.²⁰

Systems failures

Working with systems that are designed to provide safe care will help to reduce the incidence of adverse events in healthcare.⁷

A useful way of visualising systems errors and their relation to human errors is to think of a cash machine. It will only dispense cash once the user has removed their card, thus vastly reducing the odds of a person leaving their card in the machine as they may do if the money was dispensed prior to card removal.²¹ This is a good example of a system being utilised to reduce the chance of human factors (forgetfulness) leading to the card being left in the cash machine.

Several methods for reducing errors through systems changes have been proposed²¹⁻²⁶ (Table 3 outlines details and examples relevant to primary dental care). It is important to be aware that designing

Table 3 Reducing errors through systems changes

Method for reducing errors	Definition	Primary dental care example
Reduce complexity	Efforts to reduce the number of steps in a task may reduce the risk of error, this is not always possible in complex clinical situations	There should be a system in place to ensure that all emergency drugs are in date and ready for use at any time; with the route of administration made obvious to all staff
Optimise information processing	Increasing understanding and reducing reliance on short term memory alone. The use of checklists and protocols will be of use here	Introducing a correct site surgery protocol and checklist for use during dental extractions
Automate wisely	Hospital discharge summaries are now largely computer based, this reduces errors in drug prescribing as the clinician's handwriting is withdrawn from the equation, and the clinician can only prescribe doses as per the pre-defined system	The use of electronic patient records in dental practices
Use constraints	Physical constraints, for example it is impossible to place a three prong earthed electrical plug into a two pin socket. Or removing a stronger concentration of drug from a treatment clinic	The 2009 National Patient Safety Agency advice against the use of high concentrations of midazolam for conscious sedation
Mitigate the unwanted side effects of change	When new drugs, equipment or procedures are introduced, it is important that staff members are trained in these; otherwise the incidence of errors has been shown to increase	When a new x-ray machine is introduced to the practice, staff training on the use of the machine is essential

safe systems is an ongoing challenge for all healthcare organisations.

WHAT IS PATIENT SAFETY IN RELATION TO DENTISTRY?

The majority of literature relating to patient safety is found in the medical field, with most of that relating to secondary care rather than primary care.²⁷⁻²⁹ However, primary care dentistry differs from primary medical care for a number of significant reasons. A large proportion of patients seek primary medical care sporadically due to symptoms they are experiencing, whereas a primary care dentist will see patients regularly with a significant number of those being totally asymptomatic.¹

The dentist's lineage goes back to the town barbershop, whereas the physician's ancestor was the tribal witch doctor;³⁰ both professionals have a responsibility to tend to their patient's health and wellbeing, but this care will take different forms and modalities. Dentistry is a surgical discipline, whereas general medical practitioners are predominantly concerned with diagnosing, coordinating care for chronic conditions and acting as gatekeepers to specialist care. Dentistry is predominantly focused on the management of two diseases (caries and periodontal), which will cause vast amounts of tissue damage, but are largely predictable and do not occur at random.³¹ The management of surgical complications are also part of the dentist's remit; these include post-operative bleeding,

infections, oro-antral communications and fistulae, tuberosity fractures and damage to adjacent teeth.

Dentists administer and prescribe a limited number of drugs to their patients, whereas prescribing and medicines management form a large part of general medical practice. Full knowledge of the patient's medical history is crucial for the safe practice of dentistry as certain drugs can have adverse effects on dental procedures, and medication for chronic conditions can interact with drugs prescribed by dentists. Patients attending dental surgeries are frequently exposed to ionising radiation in the form of x-rays; this is not the case in medical practice. Cross infection control is a fundamental part of both practises, but there is greater emphasis on this in the dental field, as dentistry is largely (surgical) procedural-based. Another peculiarity to dentistry is that the manifestation of a complication caused by dental treatment is frequently treated by other healthcare providers such as paramedics and hospital emergency departments. Due to this, the dental practitioner may not be aware that an adverse event has occurred.³² In light of the nature of care, patient safety has a comparatively greater significance in medical care;¹ however, this is not to say that safety can be overlooked in dentistry.³³

In secondary care dental settings (dental hospitals and oral and maxillofacial surgery departments), systems have been introduced to reduce the incidence of patient safety

incidents. The World Health Organisation (WHO) devised the 'Surgical safety checklist' during 2008;²³ the aim of this checklist is to reduce the incidence of wrong site surgery. The checklist identifies three phases of an operation, each corresponding to a specific period in the normal flow of work: before the induction of anaesthesia ('sign in'), before the incision of the skin ('time out') and before the patient leaves the operating room ('sign out'). In each phase, a checklist coordinator must confirm that the surgical team has completed the listed tasks before it proceeds with the operation. Modified versions of the WHO checklist are now in use in secondary dental care settings, mainly in relation to oral surgical procedures.³⁴

Few authors have looked at interventions to reduce the incidence of wrong tooth extraction. Chang *et al.*³⁵ describe the use of an educational intervention, which led to the decrease in number of incorrect teeth extracted at the National University Hospital in Taiwan. The authors initially performed a root cause analysis of wrong site tooth extraction cases from 1996 to 1998. Using this data, guidelines were produced and a specific educational intervention was developed and implemented between 1999 and 2001. The intervention involved the introduction of a 'time out' phase immediately prior to the extraction taking place to ensure that the team were definitely removing the tooth as planned. This intervention led to a reduction in the number of wrong tooth extractions in the hospital from approximately two or three per year to zero during the 3 years following on from the induction of the intervention. Lee *et al.*³⁶ also describe the development and dissemination of dental correct site surgery guidelines. However, the authors do not give specific details as to how the policy was implemented or any evaluation by the target audience.

Never events

The concept of never events was coined by the UK Department of Health in 2009; it is a phrase reserved for serious, largely preventable patient safety incidents that should not occur if the available preventative measures have been implemented by healthcare providers.³⁷ There are 25 well defined 'never events' (as of 2012), an increase from the original eight coined by the National Patient Safety Agency in 2009. Several of these 'never events' are potentially relevant to the practise of dentistry (although some are peculiar to conscious sedation techniques). These include:

1. Wrong site surgery (biopsy, radiological procedures)
 - A. The guidance³⁷ states that some wrong

tooth extraction procedures will count as never events, but that they only qualify if they are considered to be surgical procedures, that is:

- Does the procedure involve sedation or general anaesthesia?
 - Does the procedure involve permanent alteration to physiology?
 - Does the patient consider the procedure to be surgical?
 - Will scarring result (no matter how minor)?
- B. If the answer to all or most of the above is yes, then the procedure is considered to be 'surgical'.
2. Retained foreign object post-operation (includes swabs, needles and instruments but excludes incidents where further actions to locate and/ or retrieve the item would cause more harm than leaving it *in situ*)
 3. Overdose of midazolam during conscious sedation (death or severe harm caused by using the high strength concentrations of midazolam: 5 mg/ml or 2 mg/ml for sedation). This was also the subject of a rapid response report in 2009²⁵
 4. Failure to monitor and respond to oxygen saturation (where conscious sedation is used; failure to use monitoring and to act on relevant information)
 5. Misidentification of patients (use of wristbands, this is only relevant if there is a wristband policy in place at the institution).

Of these 'never events', wrong tooth extraction is the most frequently reported. The Dental Defence Union in the UK issued a media release in September 2013 due to a rise in the number of extraction error claims filed.³⁸ They dealt with 57 cases in 2011 compared to 21 in 2006. It is interesting to note that 24 cases were patients requiring extractions for orthodontic reasons; diligence was requested from practitioners.

These findings are echoed by Thusi and colleagues,²⁷ who looked at the NHS National Patient Safety Agency (NPSA) database and identified those reports that were related to dentistry and/or dental interventions. They found that during 2009, 36 cases of wrong tooth extraction were reported; 16 of these occurred when the patient was under a general anaesthetic and may well have been recorded as being 'surgical' and therefore 'never events'.

PREVIOUS STUDIES AND FINDINGS

A recent article from Finland²⁹ highlighted the need for further studies to be undertaken into patient safety in dentistry. The authors

conducted a survey of dental professionals to quantify the number of patient safety incidents occurring in primary dental care; they found that nearly one third of the dentists reported an incident occurring during the past 12 months. Incidents were found to be related to materials, equipment and drugs. There was suspicion of under reporting of incidents and a lack of education in patient safety was noted. The same authors assessed patient safety incident prevention measures utilised by Finnish dentists;³⁹ a questionnaire was sent out to all dental registrants in Finland. Only 31% of dentists were using an incident reporting system, with 7% planning to introduce one; 71% of dentists reported having some social support after patient safety incidents occurred, with approximately half of these respondents discussing incidents at team meetings. The authors called for more educational programmes for dentists to understand the importance of patient safety and the role of reporting incidents in order to aid learning and to reduce the risk of incidents reoccurring.

From the three papers that have been published on patient safety specific to primary care dentistry,^{27,29,40} patient safety incidents included the following:

- Adverse reactions to materials and drugs (including latex)
- Local anaesthetic injections causing nerve damage⁴¹
- Damaging intraoral soft tissues with overheating handpieces
- Unintentional inhalation or ingestion of drugs, burs, crowns and materials
- Clerical errors
- Incorrect site surgery (mainly wrong tooth extraction)
- Equipment failures.

This list is unlikely to be comprehensive, as further research is carried out; more issues are bound to be identified. Thusi and colleagues²⁷ collected data from the voluntary National Reporting and Learning System (NRLS), housed at the National Patient Safety Agency (NPSA). This national recording database was established in 2003 and can be used to identify a representative sample of safety incidents and provide adequate data on the causes, outcomes and preventability of these incidents.⁴² The key finding of note from these papers is that there is currently no compulsory database for reporting patient safety incidents in primary dental care. This should be an area of concern for patients, clinicians, managers and regulatory bodies, yet it is an area where little work has been completed. It is known that there is a dearth of knowledge about the type and

frequency of adverse events in dentistry.⁴³ In June 2012, the NPSA was reorganised into the NHS Commissioning Board Special Health Authority,⁴⁴ (now NHS England); however, the NRLS system continues to be in operation and records safety data. We therefore have little or no understanding of the epidemiology of patient safety in primary dental care and no established systems to provide this information.

Learning from errors: incident reporting in dentistry

In 2000, the UK government issued a report entitled *An organisation with a memory*.²² In this document the expert working group chaired by the chief medical officer at the time outlined a range of recommendations for the future of the NHS. One of these recommendations was the introduction of a mandatory reporting scheme for adverse healthcare events; this was supposed to be comprehensive and cover all NHS organisations including general practitioners and dentists treating NHS patients in primary care. As of 2014, 14 years after the report, no such mandatory system exists. As previously discussed, it is detrimental to patients' health and wellbeing to rely solely on learning from one's own mistakes.¹⁷ Adequate incident reporting and the adoption of a 'no blame' culture in dental practices are progressive methods for reducing the incidence of patient safety incidents. At present, there is a fear of litigation in dentistry; these fears can be contributory to how dentists reach treatment decisions.⁴⁵ These decisions have the potential to influence safe patient outcomes. Dental practices are disparate small businesses⁴⁶ with no ready mechanisms available to enable them to meet and discuss processes to improve patient safety through research.⁴⁷

On a positive note, the culture of reporting does appear to be changing, in part due to legislation. Root cause analysis is being used as a tool in some general dental practices,⁴⁸ along with the auditing of significant events. Recent GDC documents state that as a dental professional, one 'must record all patient safety incidents and report them promptly to the appropriate national body'.⁶ The Medicines and Healthcare products Regulatory Agency (MHRA) requires practitioners to report adverse incidents in relation to medical devices and medication errors: their website is regularly updated with medical device alerts and drug safety updates.⁴⁹ The Care Quality Commission (CQC) require the implementation of safety programmes in dental practices as described in outcomes 7-11 of their standards document.⁵⁰

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE WORK

It should be clear from reading this paper that patient safety must be a pillar of any contemporary healthcare system. Much of the work so far on patient safety has been undertaken in medicine and targeted at secondary care institutions (hospitals). This work has extended to dental hospitals and oral and maxillofacial departments with the introduction of correct site surgery procedures prior to dental extractions based around the WHO surgical safety checklist,^{23,34} along with online anonymous incident reporting systems (Datix and Ulysses are examples), which can empower clinical staff to report on any safety incidents they witness.⁵¹ These protocols are seldom used in the primary care dental setting and no literature was found to demonstrate their use. The potential barriers to patient safety initiatives in primary care are not known; however, the authors feel that these may be cost or lack of knowledge.

The authors have embarked on an National Institute for Health Research (NIHR) funded programme of research into patient safety in primary dental care. The project is composed of four elements:

- Complete a scoping review into previous research and interventions used in relation to patient safety in dentistry
- Complete a scoping exercise to determine the applicability of safety tools developed in medicine for dentistry.
- Develop an initial PPI programme to understand key safety issues from a service user's perspective.
- Hold focus groups with dental clinicians who work in various settings to identify their views on key safety issues.

FURTHER SOURCES OF INFORMATION FOR GDPS

- General Dental Council. *Standards for the dental team*. London: GDC, 2013. A regulatory framework for all UK dentists and dental care professionals
- Medicine and Healthcare Products Regulatory Agency. *Dentistry: a one-stop resource for dental practitioners*. MHRA, 2014. Online information available at <http://www.mhra.gov.uk/Safetyinformation/Healthcareproviders/Dentistry/index.htm> (accessed July 2014)
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