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Dental Protection

Riskwise

Issue 48 | December 2023 Australia

Designing mistakes out of the system – a human factors approach

Consultant Oral and Maxillofacial Surgeon Peter Brennan unravels the intricacies of human factors in healthcare errors.

Editorial

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As we come to the end of the year, we naturally turn our minds to the mixed bag of the preceding months. We ask ourselves 'was 2023 another Annus Horribilis? And if so, is there light at the end of the tunnel?'

While there can be no doubt that 2023 brought its fair share of challenge, I hope that it has also brought you joy, success and happiness, in whatever way you measure this. I am also optimistic that we will turn the corner into a brighter 2024.

As many of our readers will be aware, Dental Protection has a strong focus on practitioner wellness, and simply put, there is a reason airlines always tell us to put our own oxygen mask on first before helping others.

One way to embed our wellness is to grow our happiness. Let's be honest, on a day-to-day basis, our own happiness is often the furthest thing from our minds, as the conflicting priorities of patient, practice and team rub against our home lives and all of the obligations that come with that and force their way to the top of our perpetual to-do lists.

Pleasingly, there are many simple steps we can put in place to promote our own happiness as we move into the festive season and beyond. Many of these can be found at dentalprotection.org/australia/wellbeing.

One simple and elegant solution that we can all start right here and now is taking a moment to reflect on what we love to do and consider whether we are spending our precious discretionary time doing what we love, or what we hate.

Do you love to read? If so, are you finding time to read every day? Is golf your passion? Do you get out on the course often? If not, why not? Can you make the time? Can you compromise and play just nine holes to get a hit in?

As practitioners, we have such a small amount of discretionary time in our week, and so often we fill this with things we don't enjoy and not with the things that are meaningful to us. Studies show us that making time for what you love increases happiness and reduces your likelihood of burnout, so its importance is critical.

The same goes for your working hours. What do you love to do? Certain procedures or patient types? Can you do more of these? What procedures do you hate? Can you refer these to a colleague (ensuring continuity of patient care). Studies are clear that in our working lives, spending 20% of your time doing something that is meaningful to you increases your happiness and is protective against burnout.

I am going to suggest that we all approach the festive season where some discretionary time may be available to us and try to do some things we love with those we love. And on return to the practice we look at our books and see if we can structure them to do work that is more meaningful to us. If we can, we will be happier and healthier and by extension, safer, and I truly believe these are things we all would want to attain, if we could.

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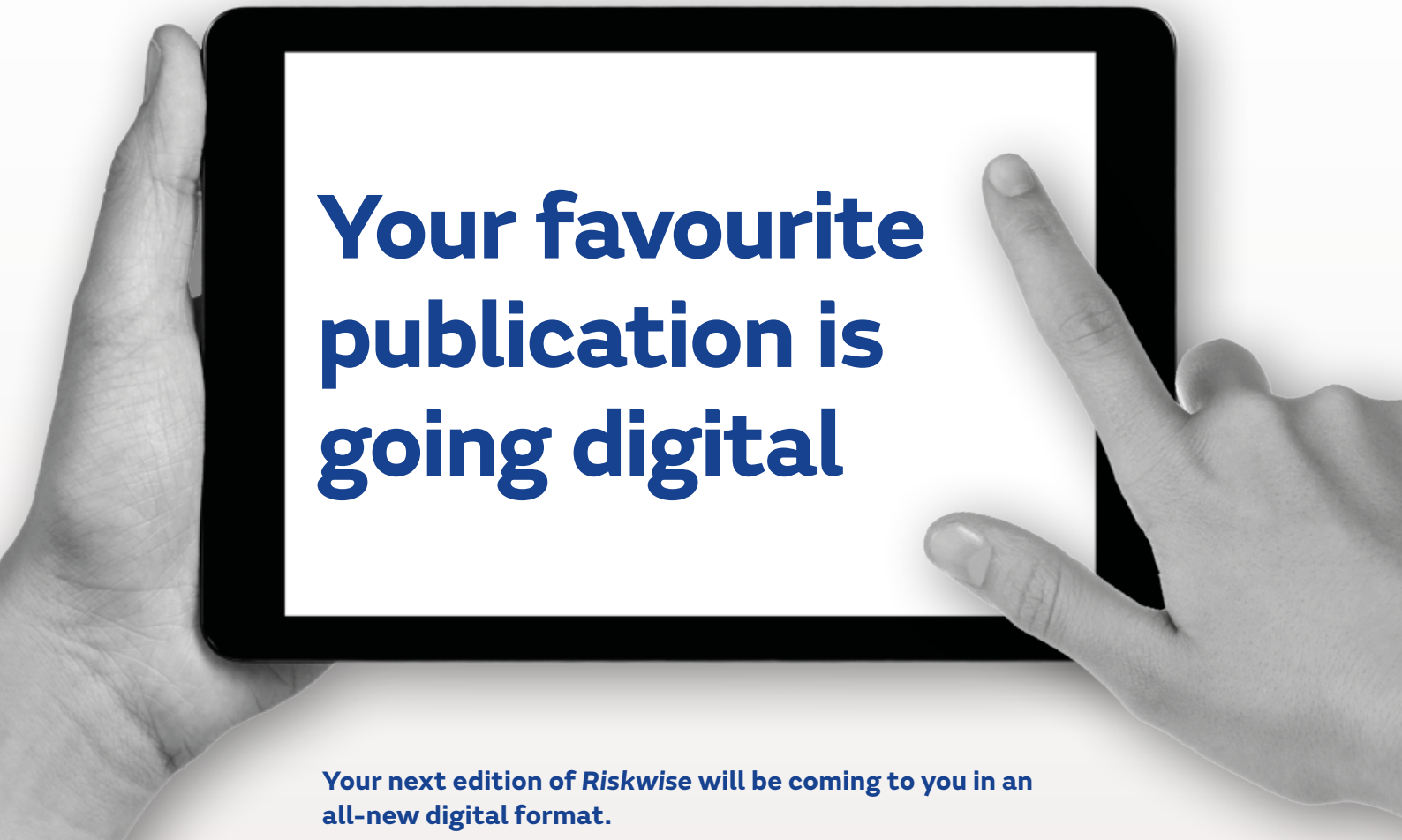

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Designing mistakes out of the system – a human factors approach

Consultant Oral and Maxillofacial Surgeon ***Peter Brennan*** *unravels the intricacies of human factors in healthcare errors. From communication pitfalls to situational awareness, Professor Brennan's insights look at the paths to error prevention and patient safety, while promoting a transformative "Just Culture" to enhance healthcare practices*

Errors and mistakes are as old as humanity and occur regularly, at work, at home, and almost everywhere in between. Over 2,000 years ago, the Roman orator Cicero wrote that anyone is liable to make a mistake, but only a fool persists in error. Sadly, in healthcare, and across medicine and dentistry, we continue to make the same mistakes time and again.

Learning and disseminating lessons from mistakes is important to try to reduce or prevent them from happening for patients. However, as humans, we can never eliminate error. In this regard, the term 'never event' – defined by the UK National Health Service as a serious incident that is wholly preventable because guidance or strong systemic protective barriers are available – is a complete misnomer.

Within the healthcare environment, approximately 1 in 20 hospital admissions have some form of error. This might be something relatively minor, like omitting some drugs on a discharge summary, or forgetting to complete one while distracted. But of these mistakes, around 1 in 20 (so approximately 1 in 400 admissions) can result in a serious medical or surgical error.[1] Many mistakes are preventable, however, by understanding various human factors (HF) in clinical practice.

> "Within healthcare, approximately 1 in 20 hospital admissions have some form of error"

What are the types of error in clinical practice?

Before discussing human factors, we need to briefly consider the different types of error seen in clinical practice. Most errors are multi-factorial, and their origin might begin long before an actual mistake happens. For example, heavily overbooked clinics or operating lists could lead to something being missed, and result in the origin of an error that occurs later. These are called latent (or organisational) failures. At an individual or clinical team level, the two main types of error are inadvertent or deliberate (violation).

Inadvertent errors happen for a range of reasons, including slips (eg using the wrong diathermy foot pedal), lapses (eg leaving a swab inside a patient due to lack of concentration, distraction,

or multi-tasking), or mistakes that can be rule- or knowledge- based. For example, a rule-based mistake could occur by prescribing a standard dose of antibiotic but misjudging the patient's weight. A knowledge-based mistake might be a wrong diagnosis due to lack of experience, and then performing the wrong procedure as a result.

Fortunately, only a very small minority of professionals go to work with the intent of causing patient harm – the UK general medical practitioner, Dr Harold Shipman, and UK breast surgeon, Mr Ian Paterson are well known names in this regard. But what might seem to be even a 'minor' violation, such as not listening to or engaging with the WHO checklist before an operation, can have serious consequences. Other violation examples include continuing to operate knowing that there is a hole in a surgical glove, or not wearing PPE visors because they interfere with vision. There are many other examples too, depending on specialty.

Human factors – what are they?

HF is a complex science, and it is regularly used as an umbrella term for many different interpretations and definitions. While some HF and ergonomics experts might object to using the term 'human factors' for various behavioural aspects – including team dynamics and hierarchical gradients between different professionals – for practising clinicians the clue is very much in the title. Human factors are about how we interact with others, and how our analysis, decision making, and behaviour can potentially adversely affect patient care, safety, and professional relationships. It is of course essential that processes and system designs – including appropriate checklists, protocols, failsafes, and other measures – are in place to help reduce error, particularly when working with complex equipment and technology.

Therefore, HF also includes systems design (having processes or systems in place to reduce error, including, for example, the WHO and other checklists), ergonomics (how we interact with equipment and technology), and human performance. HF experts may focus on one or more areas, such as designing complex systems to reduce error or having experience in the psychology of human performance. Most clinicians in healthcare will not be formally trained in HF design, but can apply the many factors that affect individual and team performance to improve patient safety and team working.

The UK's medical regulator, the General Medical Council (GMC), recognises the importance of HF education and training. Human factors are now included as part of the Generic Professional Capabilities (GPCs) needed for safe and effective medical practice. The GMC also acknowledge HF as potentially contributory causes in fitness to practise referrals to the regulator.[2] The UK General Dental Council (GDC) encourages dental teams to incorporate HF understanding into their work, looking at how these can contribute to error, and putting safety measures in place to help avoid mistakes.

What are some of the human factors relevant to clinical practice?

Some of the most important areas that affect both individual and team performance relevant to clinical practice include effective and unambiguous communication – especially during safety critical times – maintaining situational awareness (what is going on all around us), managing workload, recognising the potentially adverse effects of distraction, and looking at how performance slowly deteriorates over time.

Communication

Many mistakes occur because of poor communication between team members. Indeed, communication issues are likely to be the biggest contributor to the UK's National Health Service never events, including wrong site surgery and retained swabs.[3] As the 'sender' of information, we might assume that it has been heard – or read – and understood by the 'receiver', but this might not be the case.

Potential ambiguity can occur in both written information, such as prescribing dental extractions which are not absolutely clear and without doubt to the operating practitioner, or verbal instructions that are misinterpreted or even not heard due to background noise. The use of pronouns, eg it, that, they, them, are not recommended during safety critical times. It is much better to use proper nouns, especially in telephone calls, for example, "please give the vancomycin IV", rather than "please give it IV". Repeat back or some verbal interpretation by the receiver is a useful way to ensure instructions have been heard and understood. If there is any doubt, especially with written instructions, the safest option is not to proceed, apologise to the patient, and seek clarification.

Optimising our own performance

During an aircraft pre-flight briefing, we are told that in the event of a sudden cabin depressurisation, to put our own oxygen mask on before helping others. This is important, as passengers would only have limited time before becoming unconscious. Similarly, optimising our own performance first before caring for patients can improve safety and reduce error. Many staff come to work in the morning without eating breakfast, and are therefore in a fasting state, burning body fat, and generating ketones. There are studies showing that those who eat breakfast perform much better than those who do not. Similarly, missing lunch can result in the same biochemical fasting state, with reduced performance. And it is not just regular food that can make a difference. A 1-2kg loss in total body water due to perspiration or lack of rehydration can reduce analysis and decision making by up to 20%. Taking a short break every three to four hours during a long complex operation to eat, drink, and regain energy helps to maintain performance levels. Most would not drive for more than a few hours before stopping to take a comfort break, yet it seems to be acceptable to do so when caring for others.[4]

When something does not seem quite right, and when safe to do so, it can be good practice to stop, step back, and appraise the clinical situation before continuing. It sounds obvious to do so when not actually in a stressful environment, but when performing under pressure this simplest of actions can be overlooked. Where appropriate, an easily remembered mini brief called PPP (patient, procedure, people), can be useful to focus discussion.

A 1-2kg loss in total body water due to perspiration or lack of rehydration can reduce analysis and decision making by up to 20%.

Behaviour towards others

While factors including incivility, bullying, and discrimination are not HF in its purest definition, these behaviours can, and do, influence performance, decision making, and team morale, and have significant detrimental effects.[5] Similarly, anger and shouting – particularly during stressful times – significantly increases the risk of error, not to mention its effect on team working. The evolutionary primitive limbic system can 'hijack' higher brain functions in such circumstances. It is far better to stop, think, and let higher functions catch up before acting. Most colleagues who shout or belittle others subsequently regret their actions. If they had stopped for even a few seconds, these colleagues might have behaved differently, and not potentially lost respect from the team. Behaving and acting towards colleagues in a way that we would wish a member of our family to be treated is a good starting point to change culture. Similarly, lowering authority gradients so that all team members can question or challenge more senior colleagues or professionals without fear of retribution is good practice and can improve safety. Staff should be actively empowered to speak up if they have any concerns that might potentially avert a serious error, for example a dental nurse challenging a dental surgeon to prevent a potential wrong tooth extraction. Always put the patient first.

Avoiding error traps

Space precludes a proper discussion of some of the many pressures and factors that can raise the risk of error. These include time constraints, disruption to circadian rhythms, fatigue and tiredness, confirmation bias, distraction, and multitasking. Two of these deserve further attention.

Confirmation bias uses information, diagnostic tests, or relevant anatomy to confirm one's decisions or actions. This is yet another example of where good team working and asking others for their input or suggestions can help avoid potential problems or errors.

Distraction occurs frequently and can become a potential issue at safety critical times. A recent study found that fewer than half of invasive cardiac catheter procedures were completed without distraction and many of them were during high-risk stages of procedures.[6] During these times, or when intense concentration is required, minimal or no distraction is recommended. This can be conveyed to the team, or for example, during complex radiology reporting, a notice can be left on the door to reduce unnecessary interruptions.

Don't forget the value of a team brief

Whatever your area of clinical practice, the team brief is a great opportunity to help build good working relationships, and if used, actively engage with checklists as if one's own life, limb or teeth depends on it (Figure 1). It is good HF practice to think about any relevant 'what if?' scenarios to avoid potential startle reactions that can lead to mistakes and to build situational awareness (SA). The latter can be defined relatively simply as being aware of what is going on around us. It is a dynamic process that can deteriorate for both individuals and teams. Whole teams have lost SA with tragic consequences.

Finally, as with other high reliability organisations, healthcare needs a 'Just Culture', so that when problems arise, they can be discussed in an open and non-accusatory manner. The approach to learn from mistakes should be "Why did this happen?" rather than "Who was to blame?" Acknowledging our own fallibility and understanding human factors in daily practice is so important to help reduce preventable error, as well as enhancing patient safety, team working, and morale.

Figure 1 – Would you behave differently if your own life, limb or tooth depended on a team briefing? An open and empowering team brief on the flight deck of an Airbus A380 prior to departure.

Photograph courtesy of Professor Peter Brennan.

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Reflections of an expert witness

*Working for Dental Protection as an expert witness had been a dream of **Dr Beejal Patel's** since before graduation. Here he describes how the role can be demanding and challenging, but ultimately full of rewards*

In October 2020, I finally fulfilled a dream I had cherished since before my graduation. I was privileged to accept the role of an expert witness – acting in the capacity of a general dental practitioner role for Dental Protection UK.

Since that time, a myriad of cases have landed in my inbox. Dealing with these cases requires some intricate time management, as I fit the work around my busy clinical days. Each one requires a different perspective and thought process to write an impartial report – our first duty is always to the court. Every report must be clear, coherent, and understood by all parties concerned.

I have dedicated a significant proportion of my professional education and development to prepare for this role, undertaking an LLM and Bond Solon expert witness course in conjunction with Cardiff University School of Law and Politics.

But it has all been worth it.

Trepidation

There was a great deal of trepidation when I started in this role, and I asked myself many questions about how my case reports would be received. Would they be suitable for the case workers, solicitors, and counsel at Dental Protection who rely on the information within these reports to decide whether a case has a chance of being settled early or will advance to trial or whether there is a case to answer at all?

Having been taught by some of the top-level UK barristers, and having completed written and oral examinations, along with all the coursework, I know that my report writing has achieved the standard required for an expert witness.

Initially, I went straight to the team at Dental Protection for guidance. They were extremely patient and gracious with their time and taught me the intricacies of report writing. Even though I had passed the Bond Solon course, it was imperative that my case reports would be accepted by my instructing solicitors and meet the requirements of these colleagues.

Every case is different and offers new lessons to learn and reflect on.

I begin each one by reading a letter of approach which offers a small narrative about one of our members who has received correspondence directly from a patient or their legal team about treatment they have carried out.

I then need to enquire about the issue directly with Dental Protection to see if the case falls within my remit of a general dental practitioner, and whether I am available to write the report within a specified time frame – generally four weeks.

If I accept, a formal letter of instruction follows.

Challenges and rewards

Report writing is challenging but rewarding at the same time. I have to assign numerous hours to reading the bundle of documentation that is sent via email. This includes a letter of claim from our opponents, case notes, letters of correspondence, radiology, and so forth.

The smallest details cannot be overlooked or dismissed – they can make a vast difference to the outcome of a case.

A call to the instructing solicitor at Dental Protection is the next step. I enquire about any issues raised and update them on the timeline for submitting my report.

Only a very small proportion of cases end up in court – most are settled long before this happens.

After submitting my report, I always ask for feedback and try to learn as much as possible. The art of reflection allows me to have a better understanding of my experiences and further tailor my case writing skills.[1,2]

This is a particularly honoured role, and I am working alongside some great people who are genuinely passionate and concerned about the welfare and professional lives of our members.

No-one sets out in the morning with the intention of performing bad clinical work and upsetting their patients. The key is to be honest, humble, caring, and have the intention of doing the right thing daily.

The bulk of cases tend to occur years after the event. The best advice I can offer is what I tell my recent graduates: 'the worst ink survives the best memory' when it comes to clinical notes.

Your recollection of what occurred may have been distorted by time, so having it in 'black and white' will highlight your actions and omissions, along with any conversations and questions that were discussed.

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The risk cube

Risks in dentistry rarely appear in isolation. There is often a ripple effect that can extend to the outer reaches of even the best-run practices. ***Dr Raj Rattan****, Dental Director at Dental Protection, offers some advice on managing this interdependence*

Risk interdependence refers to the connection between risks in a particular environment. In dental care, risks are seldom isolated, and the connections can extend into many areas of everyday practice.

The different categories of risks include:

- Clinical risks – related directly to the patient. Examples include misdiagnosis, treatment errors, and procedural complications.
- Operational risks – related to the functioning of day-to-day work.
- Financial risks – concerned with financial sustainability.
- Business/strategic risks – high-level risks that relate to the broader objectives and goals of the practice.
- Legal and regulatory risks – legal repercussions due to non-compliance, ethical oversight, and regulation breaches.
- Reputational risk – associated with image, social media complaints, and adverse publicity. This impacts how patients and the general public perceive your practice.

A pattern of interdependency

I have previously presented these risk categories as faces of a Rubik's Cube. The same metaphor illustrates the interdependencies. Each time you turn any face of the cube, a new configuration results that is unique. The mixed faces create a pattern of interdependency (see fig.1).

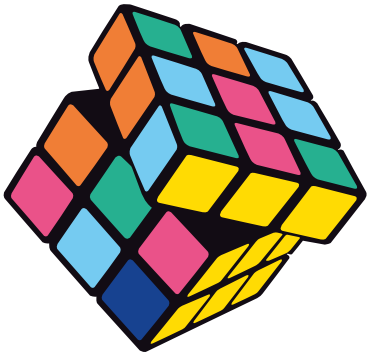

Figure 1: Rubik's Risk Cube

This interconnectedness means that the impact of one risk may be contingent on another risk. In other words, there is always a blend of risks that are intertwined and do not operate in isolation.

Identifying risks that have a positive interdependence with others is a highly effective approach to risk management.

There is inherent synergistic value. Managing the risk of running late is a good example as good time keeping can minimise the risk of human error seen when people work under time pressure.

We have often highlighted the risks associated with ineffective communication. The risks are cumulative and additive, and there is the threat of rapid, exponential escalation.

Where the risk cube shows a familiar and recognisable pattern, experience offers a solution. Pattern recognition, like in chess, is the key.

This is where the experience of our dentolegal teams comes into play. Recognising the interdependencies allows them to offer the best advice and course of action. For example, offering patients a refund of fees to avoid exponential escalation.

Areas of risk

A report commissioned by the General Dental Council on *Risk in Dentistry* sought to analyse the main competency, conduct, and contextual risk factors that affected the likelihood of a registrant departing from the GDC's standards.[1]

The main risks as summarised in Table 1.

Table 1: Risk areas

Competency risk factors	Contextual risk factors	Conduct risk factors
These relate to knowledge and skills that might affect a departure from standards.	These are related to the environment, settings, and systems that people work with.	These are related to behaviour and attitudes.
Poor communication. Inadequate record keeping. Poor treatment.	Work overload. Isolated practice. Financial incentives and pressures. Gender.	Health issues. Lack of professionalism.

Although the GDC report is informative, there is no specific mention of interdependency, even though many of the risks listed are connected.

For example:

- *Competence and Context:* Even the most skilled clinicians may make mistakes in poorly managed or resourced settings.
- *Context and Conduct:* The culture (context) in a practice can promote or discourage ethical behaviour (conduct). This results in ethical blind spots.
- *Conduct and Competence:* Ethical attitude may tempt clinicians to take unacceptable shortcuts due to time pressures or financial constraints. This can lead to errors and nullify the benefits of having skilled and competent clinicians.

Active and latent failure

Coined by James Reason, the terms "active failure" and "latent failure" are commonly used to describe error types.

Active failures stem from the actions (or inactions) of operators who are in the front line and often in direct contact with patients. An active failure can lead to a series of adverse outcomes – for example, an error in diagnosis can lead to inappropriate treatment. Latent failures are unsafe conditions that lie dormant for long periods until, under certain conditions, they are triggered to contribute to an adverse outcome, highlighting the interdependency.

Summary

Silo-based risk management is less effective when risks are considered in isolation. It is important to recognise the interdependency that helps us to see the bigger picture and how risks relate to each other. If the risk interdependencies are overlooked or unrecognised, it can result in what appear to be unrelated risks, triggering more severe risk events.

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In career as in life, look before you leap

A dental career rarely follows a linear path. More common is a series of phases, allowing practitioners to explore new areas, to grow and to learn new skills. The key to success is knowing when to leap from one phase to the next. Dentolegal Consultant, ***Dr Colm Harney****, offers some advice*

In his 1995 book, *The Empty Raincoat*,[1] Charles Handy developed the idea of the sigmoid curve to chart the trajectory of every successful human system. The curve plots performance against time and rather than being a linear path, he suggests it is a series of sigmoid curves (a stretched-out S shape lying at an angle) – the undulations of the shape representing a starting point, learning/growth, maturity and a decline phase.

In business terms, the key to long-term sustainability is knowing when the business has matured to 'peak growth' and then leaping from the curve to renew and start on another venture. Knowing when to leap is hard enough to do in isolation. However, when the leap is made in the knowledge that the business will go from doing well to the bottom of another curve, this makes it additionally challenging.

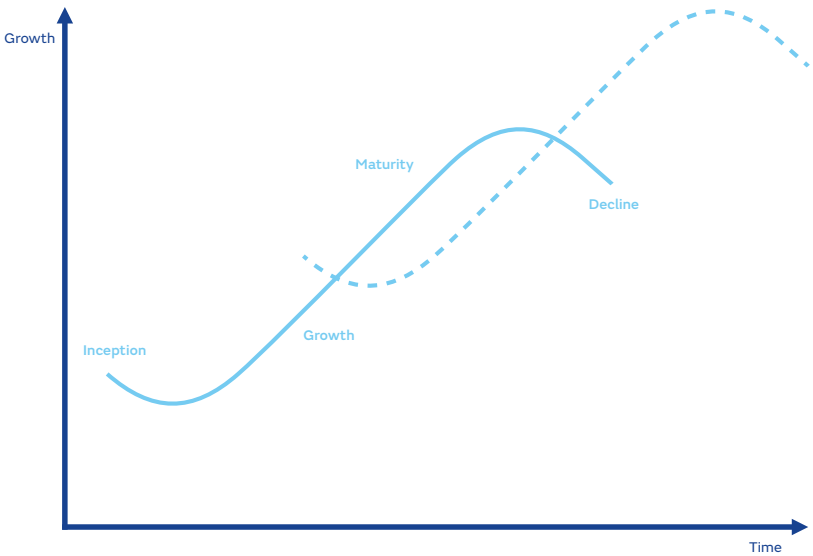

Figure 1 - Sigmoid Curve (Charles Handy, 1995)

Model for human life

Handy also used the curve to describe different stages of a person's life and career – the metaphor fits well both as a birth/growth/maturity/decline model for human life, and also to describe the various stages of a person's educational and professional journey.

So how does this translate to the practice of dentistry (and risk) across the arc of a career?

The first stage of the sigmoid curve is the growth phase. This is the stage when the practitioner is learning new skills and developing knowledge and expertise, both in early days at dental school and then in the first few years of practice. It is a time of balancing familiarisation and discovery, all while exploring the outer boundaries of one's capabilities. During this stage, a person is typically full of energy and enthusiasm, eager to learn and grow.

Part of the package at this phase might be 'Impostor Syndrome', where the practitioner feels paralysed by fear and risks falling behind their peers. The other side of the coin is the practitioner who 'flies too close to the sun', rushing headlong to progress their skillset and career – the risk being that they take on cases outside their competence without the oversight and assistance of a suitable mentor.

The maturity phase

The second stage of the sigmoid curve is the maturity phase. This is the stage when a person has reached a high level of proficiency in their area of practice. They have developed a deep understanding of their field and are viewed as highly competent by others. This is typically a well-established general dental practitioner, considered to be at the top of their game. They will feel an appropriate sense of satisfaction and achievement and many processes and procedures start to become second nature.

This point in the career path is often when the leap is made – when a practitioner reinvents themselves and begins a new journey of growth and development. They may refine and develop existing skills or explore new areas of interest. This phase can be a time of great excitement and creativity, as new passions and perspectives are discovered.

In dentistry this often entails seeking new professional or business challenges – for example, moving from being an associate to practice owner, or expanding one's scope of practice into areas such as implants or even just taking on more complex aesthetic or restorative cases.

This, of course, carries the obvious risk of the practitioner starting at the bottom of the curve again – the risk might be compounded by a potential blind spot with a perception of themselves as being highly proficient and perhaps not requiring the assistance of mentors or appropriate training.

The leap may take many different forms, within and outside the practice of dentistry. For example, I have made many leaps across the arc of my 30-year career since leaving university. I have completed postgraduate studies in communication skills and conflict resolution which has led to me becoming an accredited mediator working in healthcare dispute resolution. This has given me valuable exposure to how healthcare systems operate, and experience in some of the most serious and high-level disputes I could have imagined.

Later, I applied for a role as a presenter – I didn't get the role and was given feedback that I could take this as an opportunity to develop my skills in this area. This was my catalyst for making a new leap and starting at the bottom of the curve – I took some courses, built up my skills and ended up lecturing for five years at university to dental and medical students in communication skills.

There is by no means a single path of progression and my experience demonstrates there are many opportunities to leap, from volunteering to specialisation, from buying a practice to starting a 'side hustle' business, and everything in between.

The decline phase

The third stage of the sigmoid curve is the decline phase and is reached, inevitably, if the practitioner fails to make some form of leap. This is the stage when a practitioner stagnates, and their practice becomes outdated. They may begin to feel bored or disillusioned in their work, increasingly disengage from their (ever evolving) professional community and their performance may start to decline relative to their peers.

At this stage, a practitioner who sees the world moving on without them, may feel frustrated and increasingly demotivated. The literature indicates they are also at much higher risk of burnout (with the associated risk to both themselves and their patients).

This stage can be used to explain why some successful people fade away when they reach the peak of their careers. As they become experts in their field, they may become complacent and stop learning and growing. One constant in life is change and they may resist evolution and new ideas, which can lead to their slow demise. However, if they lift their head and look to the horizon for growth opportunities (either professionally or personally) they can reinvent themselves and continue to thrive and develop.

Embrace the excitement

In conclusion, the leaping curve, rather than considering development and growth as a linear progression, is a very instructive way to view a pathway through dentistry. To be successful we must continue to evolve and reinvent via small leaps over the short term, with a few significant leaps over the course of a career. With this leaping analogy in mind, we know that it entails an intentional time 'in the air' when our feet are not grounded – we should embrace the excitement but also be aware of the risk – to ensure that when we land on the bottom of the new curve, on the other side, we proceed with humility and that fresh learning and growth mindset to conquer the next challenge.

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Tooth surface loss

Not only is the prevalence of tooth surface loss (TSL) growing, but clinicians are increasingly finding themselves facing criticism and challenges regarding its diagnosis and management

A clinician's failure to investigate TSL adequately, which can lead to an incorrect diagnosis and inappropriate treatment (especially where such treatment is unnecessarily interventive), is the most common problem encountered. A clinician's ability to withstand such challenges will rely, in part, on the extent to which the clinical records can demonstrate each of the stages in the diagnostic and treatment process. Excluding tooth tissue loss through trauma, caries, or interventive procedures, TSL can arise from three main factors, either alone or – as often occurs – in combination. These are erosion, attrition, and abrasion.

The ten-point checklist below serves to highlight key questions and areas to consider when diagnosing and treating TSL. Use it to assess and improve the quality of your own clinical records next time you are treating a patient who has presented with TSL. Remember also that TSL may not be static – a review appointment following initial assessment and treatment is an ideal opportunity to build upon whatever information you have gathered previously, and this may also lead you to explore additional or alternative etiological factors or different treatment approaches.

1. Medical history

Where the TSL primarily affects the palatal surfaces of the maxillary (especially anterior) teeth, the records should demonstrate specific enquiries regarding any acid regurgitation resulting from hiatus hernia or gastric conditions (such as ulcers). Any eating disorders, such as anorexia or bulimia, should be considered as a possibility, especially if the patient's body weight and physique support this. Any medication currently, or recently, taken by the patient also needs to be discussed and recorded.

2. Dental history

Patients may or may not be aware of TSL. Where symptoms are reported, the history of the presenting complaint can be important in establishing the rate at which the TSL is occurring. Try to distinguish between teeth that are symptomatic and those that are not, and make this clear in the records. It is relevant to establish whether TSL has been discussed with any previous clinician, and if so, when and what diagnosis and treatment was suggested. Has any treatment been successful?

3. Social history

Occasionally, a patient's occupation or hobbies may be a relevant contributory factor. Sporting activities may be associated with the consumption of sports drinks or even with dehydration (depriving the tooth surface of the buffering capacity of saliva). Recreational drugs can sometimes induce bruxing with an associated loss of tooth tissue.

4. Examination and charting

In cases of TSL, it is important to establish a baseline against which the subsequent progression (or otherwise) of the condition can be compared. Record the affected teeth, the surface(s) involved, and the severity of any TSL. Also relevant here is the surface profile – a dull, matt surface, rounded edges of any lesion, and a general loss of surface anatomy will often be suggestive of erosive TSL. On the other hand, a highly polished/burnished appearance and lesions with sharper edges are suggestive of attrition and abrasion – sometimes exacerbating an underlying erosive element by accelerating the rate of tooth tissue loss.

5. Investigations

It is arguably in this area, in particular, that the clinical records need to be sufficient to demonstrate the reasonable skill and care that the clinician has exercised when assessing, diagnosing and monitoring TSL. The relevant investigations might include:

- Study models, which provide a definitive record of the surface profile and characteristics of the affected teeth, as well as the occlusion at different moments in time. These are particularly valuable when comparing the situation from one visit to the next.
- Clinical photographs
- Dietary assessment – especially where the TSL is generalised, or limited to the buccal surface of anterior teeth
- Tooth vitality
- Radiographs where periapical involvement is suspected
- Toothbrushing – enquiries regarding the type/hardness of toothbrush and toothpaste, and the technique used.

6. Diagnosis

The records should show the differential diagnosis considered by the clinician, as well as the conclusion reached, and be consistent with the records of the preliminary stages outlined above.

7. Preventive advice/counselling

In the initial stages of treating TSL, it is not unusual for the clinician to give the patient advice regarding the preventive management of the TSL through alterations in diet, toothbrushing, or perhaps the use of fluoride or alkaline solutions in certain situations. It is important to record the details of what advice was given and when, and what response this elicited from the patient. If the patient seems reluctant or unwilling to follow a course of action recommended by the clinician (for example, discontinuing the use of sports drinks), this fact should similarly be recorded in the clinical notes.

If anything is done to protect the at-risk surfaces (for example, the topical application of fluoride), this needs to be recorded on each occasion. The same applies where the patient is advised to return at a specified interval for such treatment to be repeated.

8. Consent

When treating TSL, it is important that the patient understands its cause, and the reasoning behind the treatment approach adopted, as well as agreeing to any specific treatment that is proposed. Where the success of any treatment will depend to a large extent upon patient compliance/co-operation, the patient must be told this and they must fully understand the consequences of not following the advice given. Such discussions need to be clearly recorded in a dated entry in the patient's notes.

9. Provisional treatment

Where palliative or provisional treatment is carried out, perhaps in order to protect surfaces at risk while a diagnosis is confirmed and/or a definitive treatment plan is agreed and embarked upon, the records should make clear both the temporary nature of the treatment provided, and also the fact that this has been explained to and understood by the patient.

10. Definitive treatment

In recent years, thinking has changed regarding the management of TSL. As a general rule, minimum intervention procedures should be tried before considering a more radical or interventive approach. If in doubt, or when faced with complex cases, it may be sensible to consider, or suggest to the patient, a second opinion from a specialist in restorative dentistry or from a more experienced colleague. Any such consideration or discussion with the patient should be recorded in the notes, and copies of any relevant referral correspondence retained safely.

Summary

Any failure to recognise or manage TSL in an appropriate fashion, which then results in the condition deteriorating unnecessarily, can leave a clinician open to criticism. Where TSL has been present for some time, and is not progressing, it is sufficient in most cases to record the fact that it has been recognised and pointed out to the patient, and is being kept under observation. On the other hand, proceeding too hastily – or with insufficient prior assessment and investigation – with extensive restorative treatment, can be difficult to justify and defend if this treatment subsequently proves to be unsuccessful.

Case study

Gap year ends in painful return

*By **Dr Nuala Carney**, Dentolegal Consultant, Dental Protection*

Continuity of care is one of the cornerstones of good dental practice. This requires effective communication between members of the dental team and a meticulous approach to record keeping. In an age when dentists work in complex teams, often from a variety of locations, it is crucial that patient records are kept up to date, are readily available and are reviewed before any intervention.

This was illustrated in a recent case where a 19-year-old patient presented to his usual dental practice for a routine check-up.

The case

The patient had been treated in this practice for many years and had a low caries rate.

The GDP took a set of bitewings and noted that there was an early lesion beginning on the distal of his lower right second molar, where the 48 was now mesio-angularly tilted and causing some food impaction.

It appeared as if the 48 might upright in time and there was space for it to erupt. The patient had had no symptoms at all and so, having discussed the fact that it was important to keep the area clean, a decision was made to monitor it for the time being.

The patient next presented two years later, having just completed his formal university studies. He was planning on taking a year out to travel around the world.

The patient saw the practice associate for a cleaning as the principal was on holiday and a new set of bitewing radiographs were taken. The associate advised the patient that the radiographs looked perfect.

Unfortunately, the associate did not realise that there were two film bite wings in a paper chart from two years earlier. The practice had converted to a new software system and on the day in question, the old chart was missing as it had been misfiled.

The associate was therefore unable to compare his own bitewings with those taken previously, and he did not see the handwritten note from the practice principal, noting the early lesion on the distal of the 47.

Given that he saw a perfect dentition with only three very small restorations, he was not concerned and did not insist that the admin staff chase up the handwritten records.

The patient next contacted the practice 18 months later, having just returned from his travels in South East Asia. He advised the receptionist that he had had a lot of pain on the lower right while he was travelling and presumed it was his wisdom tooth giving problems.

He had been given some antibiotics which had settled things at the time, but he wanted to get this checked out now. He was booked in to see his usual dentist, whom he had last seen when he was 19 – 3.5 years earlier. The paper chart was now available again.

The GDP was delighted to see him and immediately took a periapical of the 47/48 area and a new set of bitewings. To his horror he saw that the 48 had continued to cause food packing which had led to a very significant distal lesion on the 47, and there was now a small periapical area on the distal root.

He noted that there had been digital bitewing radiographs taken before the patient had headed off on his travels. When he reviewed these carefully, he realised that the associate had unfortunately missed the distal portion of the 47, and the distal lesion and impacted 48 were not apparent at all.

It was now clear that the patient was going to need a root canal treatment and potentially a crown on the 47 long term, as well as extraction of the 48. He advised the patient that a root canal was going to be needed and explained how the food packing had led to the caries progressing.

The claim

The following day the practice received a formal complaint from the patient seeking his records and wanting to know why he had been told that 'everything was perfect' before he set off on his travels, when clearly everything was not perfect at all.

He wanted to know if the practice would be covering the cost of the root canal treatment and crown as he felt he had not been made aware that this was likely to occur and would have followed it up while overseas had he known.

What did Dental Protection do?

The dentist contacted Dental Protection for assistance with the response as the principal dentist recognised that it would also need input from the associate.

It was clear when the case was reviewed carefully that the associate might be vulnerable to criticism if the matter were to escalate, and that the practice might also be vulnerable to criticism for the questionable filing system and follow up.

In conjunction with the dentolegal consultant at Dental Protection, a letter of apology and explanation was provided to the patient, along with an offer to cover the remedial treatment required including the endodontic treatment and the crown on the 47.

The outcome

The patient was willing to accept this and decided not to take the matter any further. The 48 was removed prior to the crown being provided. Both staff members involved, who were both members of Dental Protection, were very grateful for the assistance provided as they recognised that had the matter progressed, it could potentially have resulted in a successful claim or a complaint to AHPRA.

Learning points

- Dentists have a responsibility to review patients' previous notes and radiographs (presuming they are in the same practice) if they are reporting on a current radiograph, to ensure continuity of care. This is maybe even more important where they have not met the patient before. If the notes are not available on the day, it is important to make a note to follow up on this.
- Dental teams are becoming increasingly complex and dentists now often work in multiple locations and move jobs more frequently than in the past. Team members must be aware of their responsibilities in carefully reviewing the patient's previous dental records and radiographs where these are available in the practice, even if they have never met the patient prior to this occasion.
- Maintaining a high level of communication between team members is absolutely essential, particularly where there is room for error.
- Dentists should be aware of their responsibilities and duty of care to patients and familiarise themselves with the Code of Conduct **www.dentalboard.gov.au/Codes-Guidelines/Policies-Codes-Guidelines/Code-of-conduct.aspx#**
- It is important to always bear in mind that the high-risk areas such as distal of lower molars beside impacted wisdom teeth or crown margins underneath bridgework at both abutments need to be visible on a bitewing radiograph and this is a reasonable justification for taking a second view. The justification should be indicated in the notes when taking the second radiograph.

The cues and tells of anxiety

Can dentists learn the cues and manifestations of anxiety and thereby monitor the stress levels of their patients? ***Professor Mona Nasser*** *describes a fascinating simulation project, funded by the MPS Foundation, which is set to find out*

The dental care environment can be a significant source of stress and anxiety for both patients and dentists. Anxiety often leads patients to avoid dental practices altogether or to only seek treatment when they are in pain.

The ability to monitor and manage these stress levels could therefore offer significant benefits for patients and dentists alike.

The AngsT project launched earlier this year at the University of Plymouth, England, aims to improve dentists' perception of stress by identifying verbal and non-verbal cues that offer insights into a patient's mental state.

During treatment, patient anxiety can manifest through physical reactions, such as hand or foot movements, which can, in turn, cause frustration, irritation, and anger in dentists. This poses challenges for dentists in terms of effectively responding to these reactions and can contribute to increased stress and burnout.

While the importance of patient-directed empathy in creating a calm clinical atmosphere has long been recognised, the focus in dentistry has primarily been on verbal communication.

Non-verbal cues

As previous studies have demonstrated, non-verbal cues or 'tells', including facial expressions, eye gaze, tone of voice, non-verbal sounds, changes in posture, and other micro-movements, can convey more accurate information about the mental states of both patients and dentists than the words they use.

It is evident that overlooking or misinterpreting these behavioural cues, failing to consider environmental factors that may exacerbate the situation, or inadvertently communicating their own anxieties can negatively impact the emotional dynamics of dental treatment.

AngsT is a collaborative project involving researchers in dentistry, medical simulation, and art and media technology at the University of Plymouth.

The project was initiated in response to a collection of video recordings of dental treatments used for a previous dentistry research project employing video ethnography. Our team, which had previously collaborated on medical simulation projects, was intrigued by what insights could be gleaned from this footage regarding the development of simulated experiences for dental training.

We were particularly interested in understanding the manifestations of patient anxiety and identifying cues that could help predict the level of anxiety experienced by individuals. The MPS Foundation has provided us with funding for the next stage of our project, enabling data collection.

During our initial public engagement sessions with patients and dentists, a clear divide emerged between patients who were comfortable with being recorded and those who were not. Dentists responded much more positively to the idea of video recordings, with some expressing a desire for ongoing video documentation to serve as evidence in potential future complaints. Dentists were also optimistic about the potential of these videos to provide educational material for young and inexperienced dentists, helping them develop skills that may not be as easily acquired through trial and error in practice.

Humour and storytelling

We initially received a small seed grant from the SHAP(E)ing Health Collaboration Fund 2020/2021 at the Plymouth Institute of Health and Care Research, which we used to analyse videos captured during a separate research project. The videos revealed various ways in which patients communicate their anxiety, ranging from hand positioning to attempts at distracting the dentist through humour and storytelling, as well as changes in breathing.

The analysis also highlighted the impact of the treatment environment on interactions. Our initial study had limitations, as we only had one camera positioned at a single angle during video capture, which limited our ability to observe different non-verbal cues.

Nonetheless, the results were promising enough to attract funding from the MPS Foundation, enabling us to further explore how to recognise and train other dentists in identifying anxiety-related tells.

Improved dentists' wellbeing

The AngsT project will begin with a pilot study using video recordings of dental treatment, which will be used to analyse patients' emotional experiences during dental visits.

A methodology for filming in the dental clinic will be refined and documented, and used to produce a toolkit for reflexive training of dental clinicians that can be used beyond dental practice.

This will enable the researchers to design and pilot a training model that will enhance the ability of junior dentists, clinical staff, and patients themselves to be sensitive to the emergence of anxiety in the dental clinic.

The ultimate aim is to reduce anxiety, and thereby improve the provision and take-up of dental care, and the wellbeing of dentists.

Mona Nasser is Professor in Clinical Epidemiology and Oral Health Research at the Dental School, Faculty of Health, University of Plymouth. She is the principal investigator on the AngsT project.

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