

Clinical decision making – choosing between intuition, experience and scientific evidence

R. P. Nalliah*¹

In brief

Suggests that too many dentists rely on experience and intuition when they should be relying on current evidence to make clinical decisions in our practice.

Proposes that knowledge of those exact situations where intuition can be used will empower clinicians and also help them to understand when not to use intuition but rather to rely on evidence.

Readers will understand the special circumstances in which intuition may lead to better decisions. This will empower them to use intuition appropriately and strengthen overall decision making ability.

Intuition usually results in poorer decisions than an evidence-based decision-making process. However, research has shown there are certain circumstances when intuition is equivalent or superior to evidence based decision-making. The first prerequisite is domain expertise and being a dentist is insufficient – a minimum of five years additional practicing experience is needed. Intuition allows the expert to store information in subconscious frameworks and extract that data without conscious thought at a rapid rate. Decisions that have severe time constraints, problems that are complex and ambiguous in nature, and a lack of scientific evidence are some factors that are suitable for intuition-based clinical decision-making. The objective of this article is to discuss those circumstances in which intuition may result in a better final decision than an evidence based clinical decision-making process. Recognising these special situations will empower clinicians and help them to understand when not to use intuition but rely on the evidence.

Introduction

Our brains can synthesise various, seemingly disparate, pieces of information to form one coherent idea.¹ Often, structured decision making processes can impede the brilliance of the human brain. Intuition is described as 'affectively charged judgments that arise through rapid, non-conscious, and holistic associations.'²

In the 1990s, the University of Iowa conducted a study where participants could choose from one of four decks of cards for a cash reward.^{3,4} However, the cards were rigged such that two decks had small gains but no risk, and two other decks had high risk but high gain. It took participants only 50 cards to intuitively recognise a pattern, but it took 80 cards to be able explain it. What is remarkable though is that after only ten cards there was measurable anxiety and

perspiration when participants reached for the high-risk deck of cards. Joseph LeDoux later showed that there is a subconscious emotional response that occurs faster than a cognitive process which proves that the body responds before the mind is fully aware.⁵

We understand from research that domain experts have highly sophisticated cognitive structures that allow rapid and accurate responses within their domain. These are subconscious and occur without deep thought – for example, a firefighter making a decision while fighting an intense fire.² Subconscious processing occurs automatically and doesn't need your attention. Hence, it can occur much faster than conscious thought.² It is the opinion of the author that too many dentists rely on experience and intuition when we should be relying on current evidence to make clinical decisions in our practice. However, research does provide evidence of a few circumstances in which intuition is equally as effective, or even more effective than other highly structured methods of decision-making. The objective of this paper is to outline those circumstances in which it is appropriate to use intuition for clinical decision-making in dentistry.

Perspective

Albert Einstein is reported to have said '*The intuitive mind is a sacred gift and the rational mind is a faithful servant. We have created a society that honours the servant and has forgotten the gift.*'⁶ Increasingly, mid-level providers in medicine are delivering care using algorithms rather than clinicians making expert judgments. In a healthcare environment that is moving toward standardised practice it is important not to forget the words of Albert Einstein.

In a 1973 study, chess masters were able to remember five times more randomly placed chess pieces on a chess board than non-experts.⁷ This ability has to do with pattern recognition and a high volume of experience. The first requirement for effectively using intuition is that you must be a domain expert. Experts gain a broad range of remembered patterns that enable them to react in an efficient way.⁸ In a similar manner to which high volume hospitals have better outcomes than low volume hospitals,⁹ experts have a broader range of experiences and resources to call on for rapid decision-making and better outcomes than non-experts. Researchers

¹University of Michigan School of Dentistry, Patient Services, 1011 N. University, Ann Arbor, MI 48105, United States
*Correspondence to: R. P. Nalliah
Email: romeshn@umich.edu

Refereed Paper. Accepted 3 November 2016
DOI: 10.1038/sj.bdj.2016.942
©British Dental Journal 2016; 221: 752-754

in business decision-making have said that intuition is made up of years of experience that forms ‘rules of thumb.’¹⁰ In fact, 85% of major decisions by chief executive officers studied involved intuition as a major factor.¹⁰

Learning is associated with three characteristics: duration, repetition and feedback. Experienced dentists have plenty of the first two elements of learning but little of the last. Dentists may make many decisions based on intuition, but unless you receive the feedback and recognise the outcome of your decision, you are not actually learning. Dentists must participate in case discussion study groups or have quality meetings with colleagues to gain an understanding of when their decisions are satisfactory and when they are not. Dentists should also seek feedback from patients who left the practice as this may provide key information about decisions that didn’t go well.

Research has suggested that ten years of repetitious experience in a field is necessary to become an expert.¹¹ The field of cognitive psychology has presented a theory that 10,000 hours in a field are necessary to become an expert.¹² This would take five years of 40 hours a week of work. However, the scope of a general dentist is so expansive that, in order to become an expert in one area (for example root canal treatment), it may take much more than five years to reach the 10,000 hour mark. Specialists, who have a narrower scope of practice, may reach that pre-requisite sooner. Intuitive decisions made by those who surpassed the 10,000 hours experience pre-requisite will have a higher level of quality.

Explicit learning is an active process by which one seeks out the structure of information that is presented. Whereas, implicit learning is the passive process by which one gains knowledge and places it into frameworks subconsciously. When you

encounter a similar problem again, your subconscious mind is able to sense the solution before you have gone through a structured thought process.² In this way, intuition enables you to think through problems rapidly and draws from a mix of experience and pattern recognition. But caution must be used because reliance on pattern recognition can lead to errors in cases that present unusually (ie don’t fit the ‘pattern’).

Even once you are an expert, using intuition is not always the best option. Several investigators have concurring findings that using intuition for decision making generally results in worse outcomes.¹³⁻¹⁵ However, what happens in circumstances when there is limited evidence to guide clinical decision-making? Research has shown that, for experts in certain circumstances, intuition actually produces equally good or even better decisions than a highly structured thought process.¹⁶⁻¹⁸

Research has shown that positive mood and self-confidence is associated with a greater use of intuition.¹⁹ Cultural factors also play a role in whether or not people trust their intuition. Some cultures are more willing to take risks than others – the International Monetary Fund has published literature that demonstrates firms in certain countries are more willing to take risks than other countries.²⁰ Life experience also affects willingness to take risks.²¹ There is a lot of anecdotal evidence and limited research²² demonstrating that dentists are risk averse, which doesn’t bode well for the profession to capitalise on their intuition – dentists must remain open to using intuition in appropriate circumstances. Additionally, medico-legal fears may also prohibit dentists from using their intuition – facts and figures will hold up in a court of law but intuition may not.

Complex problems may not provide all the data that the dentist needs in order to make an

evidence-based decision. Intuition is suitable for complex and ambiguous problems with short timelines.²³ Additionally, situations where there is insufficient scientific evidence to make a clinical decision are also suitable for intuition. Medicine and dental medicine are evolving rapidly and science can barely keep up. Sometimes, treatment options that are available don’t have long-term clinical studies to demonstrate efficacy. Occasionally, new technology has been proven in controlled and standardised research environments but will their effectiveness remain in the hustle and bustle of a private dental office?

How are clinical decisions made in dentistry? Sometimes, while the patient is still describing their pain we are able to make a treatment plan. For example, when the patient reports that they had toothache overnight that was severe at times and a dull throbbing at other times you already know a root canal is needed. A prudent dentist then seeks clinical and radiographic evidence to support or contradict their intuition.

Intuition is the factor that distinguishes dentists from midlevel providers. Clay Christenson and colleagues say that health-care must move toward matching provider training level with complexity of condition,²⁴ which implies that midlevel providers should be available to manage straightforward conditions while following algorithms and guidelines with little use of intuition. This would enable dentists to focus their expertise on more complex cases which would make our work more meaningful and rewarding. Yet, our profession is fighting to exclude midlevel providers when we should be empowering them to manage the straightforward cases so dentists can focus on cases where our experience and intuition are indispensable.

Evidence-based medicine and dentistry are not new concepts. In 1990 at McMasters University in Canada, Gordon Guyatt developed the first curriculum entitled Evidence-Based Medicine.²⁵ This was based on the idea that scientific evidence should guide clinical decision making. Research in medicine has shown that guidelines and procedural checklists reduce poor outcomes and actually reduce mortality rates.^{9,26-28} However, dental medicine has been extremely slow to capitalise on these known benefits of structured standardised care. We choose, instead, to rely on the experience and intuition of dentists. This article has highlighted the specific circumstances under which intuition is highly effective and Table 1 is a summary of the same.

Circumstances where intuition can be effective	Circumstances where highly structured clinical decision-making is most effective
You must be a domain expert	Not necessarily a domain expert
Insufficient scientific evidence that is comparable or relatable to the current clinical situation	Sufficient, relatable scientific evidence
A decision is needed rapidly and there are time constraints	There is adequate time
Complex, unstructured problem that doesn’t follow normal rules	Simple, well structure problem
Ambiguous problems that provides conflicting information and confuses normal decision making processes	Sufficient unambiguous and concordant information to make decision
Decision maker must have confidence in their own decision making process built on feedback driven practice	Decision maker lacks confidence in their own intuition

Conclusion

Intuition is not an abstract concept, but the development of subconscious frameworks to hold years of experience in a knowledge domain. When necessary, experts are able to draw from that experience to build rules of thumb and make intuitive decisions rapidly. This skillset can be used to deliver high quality clinical decisions in certain circumstances. While this paper has highlighted those specific circumstances where intuition can result in better decisions, other situations should use a structured, evidence-based approach to clinical decision-making.

1. Raidl M H, Lubart T. An empirical study of intuition and creativity. *Imag Cogn Pers* 2001; **20**: 217–230.
2. Pratt M G, Dane E. Exploring Intuition and its role in managerial decision making. *Acad Manag Rev* 2007; **32**: 33–54.
3. Lehrer J. *How we decide*. Publisher Houghton Mifflin Harcourt: New York, 2009.
4. Bechara A, Damasio H, Tranel D, Damasio A R. Deciding advantageously before knowing the advantageous strategy. *Science* 1997; **275**: 1293–1295.
5. LeDoux J. Rethinking the emotional brain. *Neuron* 2012; **73**: 653–676.
6. Quote Investigator. Website. Available online at <http://quoteinvestigator.com/2013/09/18/intuitive-mind/> (accessed August 2016).
7. Chase, W G, Simon H A. The mind's eye in chess. In Chase W G (ed) *Visual information processing*. pp 215–281. New York: Academic Press, 1973.
8. Simon HA. 1996. *The sciences of the artificial. Third edition*. Cambridge MA: Massachusetts Institute of Technology Press, 1996.
9. Bhatia R S, Austin P C, Stukel T A *et al*. Outcomes in patients with heart failure treated in hospitals with varying admission rates: population-based cohort study. *BMJ Qual Saf* 2014; **23**: 981–988.
10. Maidique M A. Decoding Intuition for more effective Decision-making. Harvard Business Review. 2011. Available online at <https://hbr.org/2011/08/decoding-intuition-for-more-ef> 2011 (accessed November 2016).
11. Ericsson K A, Charness N. Expert performance: Its structures and acquisition. *Am Psychol* 1994; **49**: 725–747.
12. Chase W, Simon H. Perception in chess. *Cogn Psychol* 1973; **4**: 55–81.
13. Dawes R M, Faust D, Meehl P E. Clinical versus actuarial judgment. *Science* 1989; **31**: 1668–1674
14. Kahneman D, Slovic P, Tversky A. *Judgment under uncertainty: Heuristics and biases*. Cambridge: Cambridge University Press, 1982.
15. Schoemaker J H, Russo J E. A pyramid of decision approaches. *Cal Manag Rev* 1993; **36**: 9–31.
16. Blattberg R C, Hoch S J. Database models and managerial intuition: Fifty percent model plus fifty percent manager. *Manag Sci* 1990; **36**: 886–899.
17. Dreyfus H L, Dreyfus H L. *Mind over Machine: The power of human intuition and expertise in the era of the computer*. New York Free Press, 1986.
18. Prietula M J, Simon H A. The experts in your midst. *Harvard Business Review* 1989; **67**: 120–124.
19. Weiss H M, Cropanzano R. Affective events theory: A theoretical discussion of the structure, causes and consequences of affective experiences at work. *Res Org Behavior* 1996; **18**: 1–74.
20. Mihet R. Effects on Culture and firm risk taking: a Cross-country and cross-industry analysis. International Monetary Fund. 2012. Available online at <https://www.imf.org/external/pubs/ft/wp/2012/wp12210.pdf> (accessed August 2016).
21. Hryshko D, Luengo-Prado M J, Sorensen B E. Childhood determinants of risk aversion: The long shadow of compulsory education. *Quantitative Eco* 2011; **2**: 37–72.
22. Hansen Saral S. What factors determine risk taking behavior of liberal professionals in healthcare? *Swiss Dent J* 2015; **125**: 975–980.
23. Judge T A, Robbins S P. *Organizational behavior. Twelfth edition*. Canada: Prentice Hall, 2006.
24. Christensen C M, Bohmer R, Kenagy J. Will disruptive innovations cure healthcare? *Harvard Business Review*, 2000. Available online at <https://hbr.org/2000/09/will-disruptive-innovations-cure-health-care> (accessed November 2016).
25. Sur R L, Dahm P. History of evidence-based medicine. *Indian J Urol* 2011 Oct; **27**: 487–489.
26. Arriaga A F, Bader A M, Wong J M *et al*. Simulation-based trial of surgical-crisis checklists. *N Engl J Med* 2013; **17**; **368**: 246–253.
27. Enchev Y. Checklists in neurosurgery to decrease preventable medical errors: A review. *Balkan Med J* 2015; **32**: 337–346.
28. Ragusa PS, Bitterman A, Auerbach B, Healy W A 3rd. Effectiveness of surgical safety checklists in improving patient safety. *Orthopedics*. 2016; **39**: e307–e310.