# General practitioners do not need to be certain; they need to be safe

**Jenny Doust, Mary B MacIsaac, Chuh Wah Michael Tam, Andrew Knight, David King**

**Introduction**
General practitioners (GPs) manage a high level of uncertainty when making decisions. Rural GPs experience added uncertainty due to the limited access to testing and the distance from secondary and tertiary care and other forms of assistance.

**Objective**
We review how uncertainty affects general practice and describe how models of decision making can be applied in this setting. We provide examples of techniques that experienced GPs use to manage uncertainty.

**Discussion**
The naturalistic decision-making model effectively describes general practice decision making, showing how expertise is gained through extensive experience with previous cases and high-validity feedback. GPs do not require a high degree of certainty to make decisions safely and effectively. Other clinicians and the broader public often undervalue this aspect of general practice. GPs' expert tolerance of uncertainty is actually a strength, allowing patients to be managed safely without overwhelming the healthcare system.

**BEING ABLE TO MANAGE UNCERTAINTY** is an essential skill for general practitioners (GPs). In every consultation, GPs make decisions under conditions of uncertainty, that is, where the consequences of the decisions cannot be known with 100% accuracy. There is no universally agreed definition of uncertainty, but it includes when a GP is unsure of the diagnosis; the care to be recommended and delivered; or the understanding of the patient, their problem, or its trajectory.[1] Even in a consultation where the patient presents with what seems to be a simple clinical problem, the GP needs to consider whether the patient is trying to tell them something else.

## How does uncertainty affect GPs?

Being unable to adapt to uncertainty is associated with professional burnout and loss of motivation.[2,3] Clinicians who are less tolerant of uncertainty are less likely to engage fully in tasks and more likely to make errors,[4] potentially putting patients at risk. A low tolerance for uncertainty is also a driver of over-testing and unnecessary referrals, contributing to the rapid increase in healthcare costs.[1,5,6]

## Factors contributing to uncertainty in general practice

Uncertainty in medicine is ubiquitous, as noted by clinicians from William Osler[7] to Atul Gawande.[8] GPs work in a particularly uncertain environment. No filtering occurs before patients present, meaning that patients could have one of the more than 22,000 diseases that have been identified.[9] Although 170 common conditions make up 85% of the problems managed by GPs, one in 10 consultations deals with one of thousands of rarer conditions.[10] Patients also often present at an early stage of their illness, when features are less well defined.

General practice involves considerable independence in decision making, with less immediate access to pathology and imaging results, as well as fewer opportunities for consultations with other healthcare providers than the hospital setting.[11] In addition, the remuneration structure rewards GPs for spending a limited time with each patient. Australian rural GPs face an even greater level of uncertainty than their urban colleagues. The issues of professional isolation, access to further testing and assistance from others are greater, and the vast distances from secondary or tertiary centres can make decision-making more difficult.[12]

## The types of uncertainty in general practice

There are many ways to classify uncertainty, but one common distinction is between uncertainty due to a lack of knowledge (epistemic uncertainty) and uncertainty due

to random chance that cannot be explained (aleatory uncertainty).[13] Epistemic uncertainty can be improved through gathering more knowledge, either individually or through scientific research. However, the increased complexity of knowledge also leads to conflicting information that is harder to apply to individual patients, and it is likely that advances in precision medicine will paradoxically increase uncertainty.[14]

Humans are not machines, but rather unique, complex biological organisms, constantly interacting with their environment. Even as scientific knowledge progresses, some degree of aleatory uncertainty is unavoidable.

## Models of decision making under uncertainty

Much of the writing on clinical decision making and uncertainty has drawn on the field of decision analysis theory. This type of quantitative analysis provides important insights for clinical decision making, but individual clinicians rarely use it explicitly. This is a form of Type 2 or 'slow' thinking. Daniel Kahneman[15] and others contrast this with the biases of Type 1 or 'intuitive' thinking, the heuristics and biases model. A more positive description of intuitive thinking is the naturalistic decision model developed by Gary Klein and others.[16] A comparison of these descriptions of decision making is presented in Table 1 and is described in a paper by these two authors.[17]

While a more quantitative approach to decision-making in general practice has been proposed, Klein's model explains why clinicians generally achieve better outcomes than quantitative models and clinical prediction rules used without clinical judgement. Clinicians often pick up on 'soft' information not included in quantitative models, and make better judgements than prediction rules used on their own, without clinical judgement.[6,18]

## How do skilled GPs manage uncertainty?

General practice has several advantages that aid in managing uncertainty. The most important of these is the relationship between the GP and their patient. Since the relationship is centred on the patient and is often longstanding, it allows GPs to build a 'stock' of trust. This trust makes it easier to share uncertainty with the patient. It lowers the barrier for GPs to change course and for patients to follow up when things do not progress as expected. The ongoing relationship also means GPs can observe how an illness evolves over time. An essential part of general practice training is learning which diagnoses must not be missed, which diagnoses are commonly missed and how to use safety netting: reviewing the patient if there is a concern and advising patients to return if 'alarm' symptoms arise (Table 2). Sharing uncertainty with patients, when done well, increases patients' trust.[1,19]

GPs do not require a high degree of certainty to determine the best course of action. In a study of patients presenting with a new issue in a consultation in British general practice, a certain diagnosis was only possible in less than half of cases.[20] The uncertainty of general practice is not a shortcoming – it is an essential feature.

As shown by Klein, 'intuition' is a great strength of experienced decision makers.[16] It is often when a story does not quite match our expectations that we detect the patient has an unusual diagnosis or something significant is happening in the patient's progress. We need to trust this instinct. This is especially important for rural practitioners, for example, when justifying the transfer of a patient.

Experienced GPs accept that they do not know everything and will never know everything. They understand that they will continue to see diseases not previously seen by them on a regular basis. They recognise that they cannot always be right and manage this fallibility by using strategies that can quickly detect errors and adjust course as needed. When junior doctors transition from hospital to general practice, they might find the uncertainty of general practice challenging, both because of the increased uncertainty they face in this setting and because they have yet to build the experience with cases that will make them skilled practitioners in this environment. Clinicians transitioning to a new clinical environment, particularly from an urban to a rural setting, will face similar challenges. More senior clinicians need to be sensitive to the needs of their junior colleagues during these periods and provide support as needed. Peer support groups are also helpful, especially in managing individual epistemic uncertainty, and can be developed informally or through more formal communities of practice.[21]

## Perceptions of GPs' management of uncertainty

Clinicians outside of general practice often lack an understanding of the skills of a GP. They see missed diagnoses and inappropriate referrals and believe that GPs mismanage a high proportion of cases. This is a base rate fallacy – they do not see the vast majority of cases that are managed well. They note the fuzzy categories of diagnosis and attribute this to less rigorous clinical thinking.[22] However, this uncertainty is essential for the healthcare system to function effectively. GPs do not need to be certain; they need to be safe. If GPs tried to second-guess every possible outcome, to rule out every diagnostic possibility and to eliminate all

**Box 1. Seven strategies for managing uncertainty in general practice (PPARRTS)**

| |
|---|
| **P**eer support – maintain good support mechanisms through informal and formal groups |
| **P**robability of diagnosis – understand how probability affects decision making in general practice, such as the influence of pre-test probability, the probability of outcomes |
| **A**ccept uncertainty as part of the job |
| **R**ecalibrate – use reflective practice and independent advice to ensure decision making is not going 'off-course' |
| **R**elationship building with the patient |
| **T**rust your judgement about when things seem wrong/off |
| **S**afety net – reduce barriers for reviewing decisions, share uncertainty with patients, describe 'alarm symptoms' and review early when concerned |

uncertainty, the health system would quickly be overwhelmed.

General practice is an example of a 'swamp' profession, a discipline where the problems that need to be solved are of crucial human concern, but where the problems cannot always be solved by technical knowledge alone.[23] 'Swamp' problems often require trial and error, intuition and muddling through. Progress in such professions often requires more 'reflection-in-action', that is, reflecting on one's actions and outcomes to consider what could be done better, than the acquisition of technical skills alone. This contrasts with 'high ground' professions, where problems are generally solved by technical knowledge, but the problems are also generally of less crucial social importance. As elegantly described by Louise Stone and Erin Walsh, the messy, confusing problems of Australian general practice frequently defy technical solutions and are becoming increasingly complex over time.[22]

Clinical colleagues, patients and policymakers often have a misunderstanding that GPs manage minor and less severe diseases. Even observing a GP (either as a student or as a patient) might not correct this perception.

**Table 1. A comparison of models of decision making**

| | Naturalistic decision making[15] | Heuristics and biases[14] | Quantitative methods[14] |
|---|---|---|---|
| **Description** | Decision makers use a repertoire of patterns learnt from accumulated experience to make decisions, matching situations against these patterns to choose the best course of action | Decision makers use mental short cuts (heuristics) to make intuitive judgements in a wide variety of circumstances to avoid cognitive overload and when under time pressure | Decision makers develop quantitative models to conceptualise a problem and optimise a decision, for example selecting the option with the highest probability of a beneficial outcome or the lowest probability of an adverse outcome |
| **Type 1 and Type 2 thinking** | These two models describe Type 1 thinking, that is, 'intuitive' decisions that are automatic, involuntary and almost effortless | | These methods describe Type 2 thinking and require an understanding of probability and data to make decisions |
| **What defines expertise** | Expertise is based on experience of successful outcomes, often as judged by peers | Studies compare experts' judgements with real-world outcomes | The predictions of statistical models can be compared with real-world outcomes |
| **Key findings** | Experts are often unable to articulate how they make decisions, making it appear that their decisions are based on 'intuition', but this is a skill acquired with practice from seeing many cases and after receiving high-validity feedback | Humans are prone to systematic biases in their thinking that can lead to errors in decision making | Decision analytic and statistical models can determine solutions to problems that involve large amounts of data or that are too complex for intuitive decision making alone |
| **Types of studies** | Mostly based on observations of experts in real-world settings | Mostly based on studies occurring in psychology laboratories | Based on large datasets, models require validation against observed outcomes |
| **Explanations of errors in these models** | The decision maker cannot always judge if their decision making is performing well or not<br>Confidence in judgement in one area might lead to over-confidence in skills in another area | Multiple biases in decision making have been identified, for example neglect of base rate<br>Biased thinking can also occur as a result of previous bad experiences, fear of litigation, etc<br>Decision makers often believe their judgement is better than it is (the illusion of validity)<br>Even skilled decision makers are prone to inconsistency | Quantitative models might not be able to include 'soft' data that might be included by experts<br>The data used to develop models might be biased |
| **Methods recommended by these models to improve decision-making** | Decision makers develop expertise by having the opportunity to learn from many cases and receiving high-validity feedback | Awareness of common biases might help to limit errors in decision making<br>When a decision appears to be off course, the decision maker can use Type 2 thinking, replacing intuition with careful and effortful reasoning | Insights from decision analytic models can provide guidance to clinicians, for example the importance of pre-test probability in interpreting test results |
| **Applications to general practice** | This model explains why routine practice requires less effortful thinking over time, and how experienced general practitioners recognise when a clinical case does not fit a familiar category | This model explains why systematic errors in general practitioners' decision making can occur and can suggest methods to overcome these | More complex methods are likely to be helpful when assessing a complex task, for example when deciding whether a new test should be used in a clinical setting |

For example, a student observes that the patient presents with a sore throat, and the GP diagnoses the patient as having a viral infection, recommending symptomatic treatment with over-the-counter medication. What is not observed are the cognitive assessments that the GP has made to ensure that the patient does not have a more serious issue, such as a peri-tonsillar abscess. Patients present with problems, not labels, and determining who can be treated within the primary care setting, who needs referral, and who simply needs reassurance, is a highly developed skill.

## Conclusion

Medicine values certainty.[24] This value is misplaced and is detrimental to both GPs and to patients. For many reasons, GPs can never be certain, and uncertainty needs to be both managed and embraced. Having a primary care health system that can manage this degree of uncertainty, and do it well, reduces the risk of overdiagnosis and overtreatment and allows the delivery of high-quality care at a reasonable cost.

**Table 2. Some examples of strategies used to manage uncertainty in clinical scenarios and how general practitioners might discuss this uncertainty with patients**

| Strategy | Scenario | Method of communicating to the patient/caregiver |
|---|---|---|
| **Safety netting** | A parent presents with a toddler who has a fever but no obvious concerning features | 'This seems to be a mild viral infection, but please return if the child seems to be getting worse or if you are at all concerned.' |
| **Early review** | A man aged 43 years presents with shoulder pain that appears to be related to starting tennis | 'I would like to make sure that nothing else is going on, so I would like to see you again in a week.' |
| **Red flags** | A man aged 63 years presents with new onset back pain (raising the probability of cancer as a diagnosis) | 'I am not certain of why you have the pain, but I think we need to do some investigations to find out why this is happening.' |
| **Restricted rule out** | A woman aged 34 years presents with right lower abdominal pain. The diagnoses of appendicitis, ectopic pregnancy and diverticulitis need to be ruled out | 'One possible reason for the pain is appendicitis, but there are a number of other possible reasons. We will need to do more tests to try to determine the cause.' |
| **Ensuring patients do not feel abandoned even when a diagnosis is uncertain** | A woman aged 26 years has ongoing pelvic pain, but no signs of endometriosis have been shown on laparoscopy | 'Although we haven't found a specific reason for your pain, I know that it is causing you distress and we will keep trying to find ways for you to better manage the pain you have been having.' |
| **Focus on alleviating symptoms and problem-solving rather than a definitive diagnosis** | A woman aged 24 years presents with low mood (first presentation) and anhedonia related to problems at work | 'I think you would benefit from some counselling to help you manage your current situation. Would you like me to refer you to someone you can talk to?' |
| **Test of treatment** | A patient presents with a rash where the cause is not certain, but the rash appears to be an allergic urticaria | 'I think the most likely cause is some form of allergic reaction. I'd like you to try this cream for a few days, but please come back if the cream is not working or you have any new symptoms.' |
| **Acknowledging lack of expertise in a particular disease** | A patient requires ongoing care for a rare chronic disease | 'I've not had a patient with this particular disease before, so I'm not so familiar with the treatments being used. I will leave that up to your (rheumatologist, neurologist, ...), but I can be here to help and make sure you receive the care that you need.' |
| **Prioritisation** | A patient presents with multiple symptoms that do not seem to be part of one disease | 'From what I can see, your most important problem at the moment is your shortness of breath. Let's see what we can do for that, and we'll come back to the other problems later.' |
| **Sharing decision making with patients** | A woman aged 66 years has recently been diagnosed with hypertension and would like to consider lifestyle changes prior to commencing medication | 'It is a good idea to make changes to your diet and to your physical activity levels and see how much this can bring down your blood pressure. We can keep measuring your blood pressure and see how much it comes down and then decide if that is enough or you will need medication.' |
| **Acknowledging uncertainty about how to treat a certain condition** | A man aged 77 years presents with early symptoms of dementia | 'Some people think it is important to treat this condition early and others do not. I'm afraid the evidence isn't settled, so it is hard to say which is the right answer.' |

## Key points

- GPs do not need a high level of certainty to determine the best course of action.
- Techniques to better manage uncertainty can be learnt and include sharing uncertainty with patients, knowing which diagnoses must be ruled out, and safety netting.
- The appropriate tolerance of uncertainty in general practice is one of its core strengths and allows high-quality care to be delivered at a reasonable cost.
- Low tolerance of uncertainty can be a source of burnout and errors in general practice and can drive inappropriate testing and referrals.
- Rural GPs face particularly high levels of uncertainty due to the distance from further testing and professional assistance.

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### References

*References are available online only.*

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## References

1. Scott IA, Doust JA, Keijzers GB, Wallis KA. Coping with uncertainty in clinical practice: A narrative review. Med J Aust 2023;218(9):418–25. doi: 10.5694/mja2.51925.
2. Cooke GP, Doust JA, Steele MC. A survey of resilience, burnout, and tolerance of uncertainty in Australian general practice registrars. BMC Med Educ 2013;13(1):2. doi: 10.1186/1472-6920-13-2.
3. Wasfy JH. Learning about clinical uncertainty. Acad Med 2006;81(12):1075. doi: 10.1097/01.ACM.0000242576.25803.65.
4. West CP, Tan AD, Habermann TM, Sloan JA, Shanafelt TD. Association of resident fatigue and distress with perceived medical errors. JAMA 2009;302(12):1294–300. doi: 10.1001/jama.2009.1389.
5. Saini V, Garcia-Armesto S, Klemperer D, et al. Drivers of poor medical care. Lancet 2017;390(10090):178–90. doi: 10.1016/S0140-6736(16)30947-3.
6. Armstrong K. If you can't beat it, join it: Uncertainty and trust in medicine. Ann Intern Med 2018;168(11):818–19. doi: 10.7326/M18-0445.
7. Bean RBBW. Sir William Osler: Aphorisms from his bedside teachings and writings. Henry Schuman, 1950.
8. Gawande A. Complications: A surgeon's notes on an imperfect science. Profile Books Ltd, 2008.
9. LifeMap Sciences, Weizmann Institute of Science. MalaCards: The human disease database. LifeMap Sciences Inc, 2026. Available at www.malacards.org [Accessed 22 September 2025].
10. Cooke G, Valenti L, Glasziou P, Britt H. Common general practice presentations and publication frequency. Aust Fam Physician 2013;42(1–2):65–68.
11. Tran M, Prentice S. Transitions, adaptation and uncertainty in general practice training. Aust J Gen Pract 2025;54(11):774–77. doi: 10.31128/AJGP-12-24-7496.
12. Young L, Peel R, O'Sullivan B, Reeve C. Building general practice training capacity in rural and remote Australia with underserved primary care services: A qualitative investigation. BMC Health Serv Res 2019;19(1):338. doi: 10.1186/s12913-019-4078-1.
13. Senge R, Bösner S, Dembczyński K, et al. Reliable classification: Learning classifiers that distinguish aleatoric and epistemic uncertainty. Inf Sci 2014;255:16–29. doi: 10.1016/j.ins.2013.07.030.
14. Lohse S. Mapping uncertainty in precision medicine: A systematic scoping review. J Eval Clin Pract 2023;29(3):554–64. doi: 10.1111/jep.13789.
15. Kahneman D. Thinking, fast and slow. Farrar, Straus and Giroux, 2011.
16. Klein GA. Sources of power: How people make decisions. MIT Press, 2017.
17. Kahneman D, Klein G. Conditions for intuitive expertise: A failure to disagree. Am Psychol 2009;64(6):515–26. doi: 10.1037/a0016755.
18. Sanders S, Doust J, Glasziou P. A systematic review of studies comparing diagnostic clinical prediction rules with clinical judgment. PLoS One 2015;10(6):e0128233. doi: 10.1371/journal.pone.0128233.
19. Gordon GH, Joos SK, Byrne J. Physician expressions of uncertainty during patient encounters. Patient Educ Couns 2000;40(1):59–65. doi: 10.1016/S0738-3991(99)00069-5.
20. Heneghan C, Glasziou P, Thompson M, et al. Diagnostic strategies used in primary care. BMJ 2009;338:b946. doi: 10.1136/bmj.b946.
21. Sommers LS, Morgan L, Johnson L, Yatabe K. Practice inquiry: Clinical uncertainty as a focus for small-group learning and practice improvement. J Gen Intern Med 2007;22(2):246–52. doi: 10.1007/s11606-006-0059-2.
22. Stone L, Walsh E. Down here in the GP swamp, we need help. Medical Republic. 28 April 2023. Available at www.medicalrepublic.com.au/down-here-in-the-gp-swamp-we-need-help/17083 [Accessed 21 September 2025].
23. Schön DA. The reflective practitioner: How professionals think in action. Arena, 1995.
24. Simpkin AL, Schwartzstein RM. Tolerating uncertainty – The next medical revolution? N Engl J Med 2016;375(18):1713–15. doi: 10.1056/NEJMp1606402.