The Diagnosis, Prognosis, and Treatment of Medical Uncertainty

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Medicine is a science of uncertainty and an art of probability.[1]

—Sir William Osler

In an era when solutions to all of our problems seem to be at our fingertips, we physicians are frequently placed in situations where a well-defined answer does not exist. This dilemma, known as medical uncertainty, plagues physicians on a daily basis, including those with many years of clinical experience.[2,3] Learning to deal with uncertainty should be a core competency for any physician and should be addressed early in the education of medical students and residents.[4,5] We acknowledge that there is little empirical evidence to guide faculty on how best to address this topic. Nonetheless, we extrapolate information from the fields of sociology, anthropology, psychology, as well as from the authors' experience, to offer recommendations (FIGURE) in the more familiar framework of diagnosis (How does one detect uncertainty?), prognosis (What are the implications of uncertainty?), and treatment (What can we do about it?).

The Diagnosis: How Does One Detect Uncertainty and What Are the Barriers?

To begin, one must distinguish between 2 common types of uncertainty: *informational* and *intrinsic* uncertainty. Informational uncertainty results from knowledge deficits, and can be further classified into (1) conceptual uncertainty (the inability to apply abstract knowledge to specific situations); (2) technical uncertainty (the absence of scientific data or practical skill for a specific clinical situation); and (3) personal uncertainty (the lack of a relationship with patients and knowledge of their goals of care).[6]

Intrinsic uncertainty, on the other hand, is not based on any particular deficit but reflects an inherent attribute of daily clinical care—the existence of the Heisenberg uncertainty principle, which is woven into the very fabric of medicine.[7] This principle recognizes that within the complex system of health care, variability in patients, disease presentations, and clinical practices inevitably results in our inability to predict the future with certainty for any patient. How physicians deal with this intrinsic uncertainty varies. There are self-assessment scales to gauge individuals' ability to tolerate uncertainty and ambiguity.[8,9] It is unclear whether tolerance to ambiguity is a fixed genetic trait versus a malleable attribute.[10,11] Nonetheless, teaching students about this fundamental nature of medicine is critical in addressing what can be done. The medical training environment, however, rewards those who give correct answers, and often denigrates learners who admit uncertainty. In an environment where young physicians are constantly trying to prove their competency, both to themselves and to their supervising physicians, resident physicians often choose not to contact a more senior physician when faced with uncertain situations because they do not want to be seen as "weak."[12,13] Supervising faculty should take steps to acknowledge this often hidden curriculum, and work together to overcome these barriers that create a reluctance to disclosing uncertainty.[14]

The Prognosis: What Are the Implications of Uncertainty?

Uncertainty increases stress and can potentially affect problem-solving skills and decision making.[15] Today's physicians are faced with an ever-increasing demand to see more patients in shorter time frames. When confronted with an ambiguous situation, especially combined with time constraints, physicians commonly resort to ordering more tests, which inevitably leads to higher costs.[16] Unfortunately, this often relentless search for answers has led to unnecessary referrals, increased patient admissions, delays in patient care, and in some situations, patient harm.[12,17]

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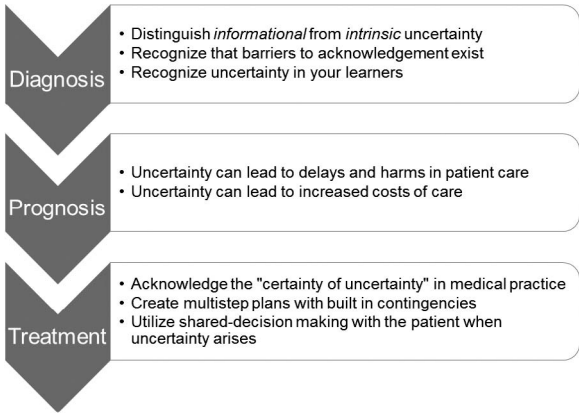

FIGURE
Conceptual Framework for the Assessment and Treatment of Medical Uncertainty

The Treatment: What Can We Do About "Curing" Uncertainty?

Like many diseases in medicine, knowing the type of uncertainty (eg, whether it is intrinsic or informational) can help guide the treatment. While the solutions to informational uncertainty are often more straightforward, we wish to highlight a few less commonly known strategies.

When faced with a complex clinical case, a quick and easy way to resolve it is to ask the expert [consultant], often on the phone or in the hallway. However, such curbside consultations are often inaccurate or incomplete, and can lead to improper patient management.[18,19] If one chooses this approach, be aware that when asking for advice, colleagues who could provide some proof (eg, a citation, article, or reference) were correct 83% of the time, while colleagues' advice without proof was correct only 35% of the time.[19] In addition, learners often over-rely on secondary sources, including summary evidence-based textbooks (eg, *UpToDate*, *ACP Smart Medicine*, *DynaMed*, *BMJ Best Practice*), which may not have the latest information.[20]

Other commonly quoted sources are practice guidelines, which have known limitations.[21,22] Guidelines stipulated by one professional society may drastically differ from the guidelines promulgated by another society with a different perspective.[23] Many physicians quote guidelines as if all recommendations are created equal, but studies have shown that many guidelines are largely developed from lower levels of evidence or expert opinion.[24,25] Once the faculty physician has addressed or ruled out the given learner's informational uncertainty, he or she can begin to focus on treating intrinsic uncertainty, as solutions to this type of uncertainly often are more opaque.

The first step in addressing intrinsic uncertainty should be an open acknowledgment of its inherent presence in the practice of medicine. The Physicians' Reaction to Uncertainty (PRU) scale[8] is an instrument that may give both learners and educators a sense of their own reactions to intrinsic uncertainty as well as the willingness to disclose to others. Utilizing the PRU scale at the beginning of a clinical rotation will not only help the learners quantify their level of uncertainty, but also has a dual role of allowing faculty to openly acknowledge the existence of inherent uncertainty in the everyday practice of medicine. A faculty member's willingness to disclose gaps in his or her own knowledge, and then demonstrate how to find answers to questions, has been shown to be an independent predictor of effective teaching.[26] The simple verbal acknowledgment of the certainty of uncertainty has the potential to improve health care practice, improve physician-patient communication, and prepare learners for the realities of medicine.[4,5,7] In 1 of the few empirical studies focusing on facilitating uncertainty, use of the learner-centered presentation technique known as SNAPPS (**S**ummarize relevant patient history and findings; **N**arrow the differential; **A**nalyze the differential; **P**robe the preceptor about uncertainties; **P**lan management; and **S**elect case-related issues for self-study) increased the frequency of expressions of uncertainty during clinical rounds.[27] Opportunities for reflective writing have also been shown to be an effective means for expressing and dealing with uncertainty.[28]

As practicing physicians can attest, the black-and-white world of medical school, where only 1 correct answer existed on a written examination, rarely mimics the grayish hues of the clinical environment. To combat this paradox, clinicians should create a multistep contingency plan that acknowledges uncertainty and allows for alternative assessments, diagnoses, and treatments.[29] Not only will this provide a backup plan for the inherent ambiguity in the practice of medicine, but it will also provide patients with a better understanding of potential future clinical courses.

The most important stakeholder in clinical uncertainty is, of course, the patient. Young physicians may try to disguise their uncertainty from the patient, for fear of being seen as not a good doctor or not knowing the answer. The clinical educator witnessing such behavior should recognize this as an excellent opportunity to both role model and educate learners on how best to manage uncertainty with patients. These situations allow for collaboration with the patient to understand the patient's values and concerns and find common ground on the goals of

TABLE
Practical Tips to Promote Facing the Certainty of Uncertainty

Residents and Medical Students	Teaching Physicians
Intrinsic Uncertainty	
Acknowledge when personal uncertainty arises, recognizing its inherent nature in the practice of medicine.[2,3]	Create an atmosphere that encourages recognition and articulation of uncertain moments. Personally role model uncertain moments and think out loud as one deals with uncertain situations.
Realize that failure to acknowledge uncertainty can lead to excess testing, increased costs, higher referral rates, unnecessary hospitalizations, delays in patient care, and patient harm.[11,15,16]	Recognize common circumstances where learners are reluctant to express uncertainty, and recognize the hidden curriculum barriers for admitting uncertainty, including avoiding the appearance of being weak or not always having the right answer.[11–13]
Become familiar with and practice using the SNAPPS method for case presentations.[26]	Recognize that case presentations are often a rich source of expressions of uncertainty. Encourage learners to use the SNAPPS model for case presentations[26] and consider reflective writing assignments.[27]
Assess one's own attitude to and increase awareness of uncertainty by taking a self-assessment using the PRU scale.[7]	Assess one's own attitude to and increase awareness of uncertainty by taking a self-assessment using the PRU scale.
Always keep a broad differential in mind no matter how certain one is of the diagnosis, and build contingency plans for the workup and treatment of patients.[28]	Encourage the avoidance of premature closure in arriving at only 1 diagnosis and ask for broader differentials and backup plans.
Informational Uncertainty	
When faced with uncertainty, avoid using informal (curbside) consultations and request formal written consultations.[17]	Discourage the use of informal (curbside) consultations when uncertain and instead request formal written consultations.
When discussing cases with colleagues, ask for proof (ie, a citation or reference for the source of recommendations).[18]	When consulting with colleagues, role model asking for proof (ie, a citation or reference for the source of recommendations).
Be aware of the shortcoming of guidelines, and recognize that many recommendations are based on low levels of evidence and/or expert opinion.[20–23]	Encourage the use of guidelines but acknowledge their limitations by asking learners the strength of evidence that supports the recommendations.

Abbreviations: SNAPPS, summarize relevant patient history and findings, narrow the differential, analyze the differential, probe the preceptor about uncertainties, plan management, and select case-related issues for self-study: PRU, Physicians' Reaction to Uncertainty.

care.[5,30,31] Verbal expressions of uncertainty to patients, such as "I don't know," are truthful responses, and adding some reassurance, such as "I'll look into it further" or "We will work together to find an answer," provides encouragement and reduces the stress patients experience when faced with uncertain clinical situations.[32,33] A selection of resources for dealing with uncertainty can be found in the TABLE.

Conclusion

While many enter medicine for its objectivity and scientific rigor, everyone eventually realizes that much of medicine is practiced in shades of gray rather than black and white. Coming to terms with this reality can be difficult and challenging, especially for younger, less practiced physicians. Medical educators are responsible for recognizing these situations and creating an open environment for discussing uncertainty with their learners and with patients. By utilizing the familiar medical framework—diagnosis, prognosis, and treatment—we hope learners, teachers, and patients will become more comfortable in situations that may not have a single perfect answer. We conclude this perspective with another aphorism from the master teacher, Sir William Osler, in an address to students about to graduate from medical school[34]: "A distressing feature in the life of which you are about to enter . . . is the uncertainty which pertains not alone to our science and art, but the very hopes and fears which make us men. In seeking out the absolute truth we aim for the unattainable, and must be content with finding broken portions."

References

1. Bean WB, ed. *Sir William Osler Aphorisms From His Bedside Teachings and Writings*. Springfield, IL: Charles C. Thomas; 1961.
2. Han PK, Klein WM, Arora NK. Varieties of uncertainty in health care: a conceptual taxonomy. *Med Decis Making*. 2011;31(6):828–838.
3. Cristancho SM, Apramian T, Vanstone M, Lingard L, Ott M, Novick RJ. Understanding clinical uncertainty: what is going on when experienced surgeons are not sure what to do? *Acad Med*. 2013;88(10):1516–1521.
4. Katz J. Why doctors don't disclose uncertainty. *Hastings Cent Rep*. 1984;14(1):35–44.
5. O'Riordan M, Dahinden A, Aktürk Z, Ortiz JM, Dağdeviren N, Elwyn G, et al. Dealing with uncertainty in general practice: an essential skill for the general practitioner. *Qual Prim Care*. 2011;19(3):175–181.
6. Beresford EB. Uncertainty and the shaping of medical decisions. *Hastings Cent Rep*. 1991;21(4):6–11.
7. Seely AJ. Embracing the certainty of uncertainty: implications for health care and research. *Perspect Biol Med*. 2013;56(1):65–77.
8. Gerrity MS, White KP, DeVellis RF, Dittus RS. Physicians' reactions to uncertainty: refining the constructs and scales. *Motiv Emot*. 1995;19(3):175–191.
9. Budner S. Intolerance of ambiguity as a personality variable. *J Pers*. 1962;30(1):29–50.
10. Luther VP, Crandall SJ. Commentary: ambiguity and uncertainty: neglected elements of medical education curricula? *Acad Med*. 2011;86(7):799–800.
11. Hancock J, Mattick K. Increasing students' tolerance of ambiguity: the need for caution. *Acad Med*. 2012;87(7):834; author reply 835.
12. Farnan JM, Johnson JK, Meltzer DO, Humphrey HJ, Arora VM. Resident uncertainty in clinical decision making and impact on patient care: a qualitative study. *Qual Saf Health Care*. 2008;17(2):122–126.
13. Kennedy TJ, Regehr G, Baker GR, Lingard L. Point-of-care assessment of medical trainee competence for independent clinical work. *Acad Med*. 2008;83(suppl 10):89–92.
14. Loo L, Puri N, Kim DI, Kawayeh A, Baz S, Hegstad D. "Page me if you need me": the hidden curriculum of attending-resident communication. *J Grad Med Educ*. 2012;4(3):340–345.
15. Lally J, Cantillon P. Uncertainty and ambiguity and their association with psychological distress in medical students. *Acad Psychiatry*. 2014;38(3):339–344.
16. Newman-Toker DE, McDonald KM, Meltzer DO. How much diagnostic safety can we afford, and how should we decide? A health economics perspective. *BMJ Qual Saf*. 2013;22(suppl 2):ii11–ii20.
17. McKibbon KA, Fridsma DB, Crowley RS. How primary care physicians' attitudes toward risk and uncertainty affect their use of electronic information resources. *J Med Libr Assoc*. 2007;95(2):138–146, e49–e50.
18. Burden M, Sarcone E, Keniston A, Statland B, Taub JA, Allyn RL, et al. Prospective comparison of curbside versus formal consultations. *J Hosp Med*. 2013;8(1):31–35.
19. Schaafsma F, Verbeek J, Hulshof C, van Dijk F. Caution required when relying on a colleague's advice; a comparison between professional advice and evidence from the literature. *BMC Health Serv Res*. 2005;5(1):59.
20. Jeffery R, Navarro T, Lokker C, Haynes RB, Wilczynski NL, Farjou G. How current are leading evidence-based medical textbooks? An analytic survey of four online textbooks. *J Med Internet Res*. 2012;14(6):e175.
21. Sniderman AD, Furberg CD. Why guideline-making requires reform. *JAMA*. 2009;301(4):429–431.
22. McAlister FA, van Diepen S, Padwal RS, Johnson JA, Majumdar SR. How evidence-based are the recommendations in evidence-based guidelines? *PLoS Med*. 2007;4(8):e250.
23. Burgers JS, Bailey JV, Klazinga NS, Van Der Bij AK, Grol R, Feder G, et al. Inside guidelines: comparative analysis of recommendations and evidence in diabetes guidelines from 13 countries. *Diabetes Care*. 2002;25(11):1933–1939.
24. Tricoci P, Allen JM, Kramer JM, Califf RM, Smith SC Jr. Scientific evidence underlying the ACC/AHA clinical practice guidelines. *JAMA*. 2009;301(8):831–841.
25. Feuerstein JD, Gifford AE, Akbari M, Goldman J, Leffler DA, Sheth SG, et al. Systematic analysis underlying the quality of the scientific evidence and conflicts of interest in gastroenterology practice guidelines. *Am J Gastroenterol*. 2013;108(11):1686–1693.
26. Litzelman DK, Stratos GA, Marriott DJ, Skeff KM. Factorial validation of a widely disseminated educational framework for evaluating clinical teachers. *Acad Med*. 1998;73(6):688–695.
27. Wolpaw T, Côté L, Papp KK, Bordage G. Student uncertainties drive teaching during case presentations: more so with SNAPPS. *Acad Med*. 2012;87(9):1210–1217.
28. Nevalainen MK, Mantyranta T, Pitkala KH. Facing uncertainty as a medical student—a qualitative study of their reflective learning diaries and writings on specific themes during the first clinical year. *Patient Educ Couns*. 2010;78(2):218–223.
29. Hewson MG, Kindy PJ, Van Kirk J, Gennis VA, Day RP. Strategies for managing uncertainty and complexity. *J Gen Intern Med*. 1996;11(8):481–485.
30. Politi MC, Han PKJ, Col NF. Communicating the uncertainty of harms and benefits of medical

interventions. *Med Decis Making*. 2007;27(5):681–695.
31. Politi MC, Street RL Jr. The importance of communication in collaborative decision making: facilitating shared mind and the management of uncertainty. *J Eval Clin Pract*. 2011;17(4):579–584.
32. Srivastava R. Dealing with uncertainty in a time of plenty. *N Engl J Med*. 2011;365(24):2252–2253.
33. Ogden J, Fuks K, Gardner M, Johnson S, McLean M, Martin P, et al. Doctors expressions of uncertainty and patient confidence. *Patient Educ Couns*. 2002;48(2):171–176.
34. Osler W. *Aequanimitas: With Other Addresses to Medical Students, Nurses, and Practitioners of Medicine*. Philadelphia, PA: K. Blakiston's Son & Co; 1905.

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