


Choosing Wisely in clinical practice: Embracing critical thinking, striving for safer care

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In recent years, the Choosing Wisely and Less is More campaigns have gained growing attention in the medical scientific community. Several projects have been launched to facilitate confrontation among patients and physicians, to achieve better and harmless patient-centered care. Such initiatives have paved the way to a new “way of thinking.” Embracing such a philosophy goes through a cognitive process that takes into account several issues. Medicine is a highly inaccurate science and physicians should deal with uncertainty. Evidence from the literature should not be accepted as it is but rather be translated into practice by medical practitioners who select treatment options for specific cases based on the best research, patient

preferences, and individual patient characteristics. A wise choice requires active effort into minimizing the chance that potential biases may affect our clinical decisions. Potential harms and all consequences (both direct and indirect) of prescribing tests, procedures, or medications should be carefully evaluated, as well as patients' needs and preferences. Through such a cognitive process, a patient management shift is needed, moving from being centered on establishing a diagnosis towards finding the best management strategy for the right patient at the right time. Finally, while “thinking wisely,” physicians should also “act wisely,” being among the leading actors in facing upcoming healthcare challenges related to environmental issues and social discrepancies.

Keywords: appropriateness, choosing wisely, less is more, medical error, medical overuse, patient safety, quality of care, quality of healthcare

Clinical vignette

A 43-year-old woman with scleroderma was admitted to the Emergency Department (ED) complaining of fever and abdominal pain in the left upper quadrant. The attending physician performed an abdominal ultrasound examination that was negative. Blood exams showed significantly elevated C-reactive protein so a urinary tract infection was suspected. Intravenous ciprofloxacin treatment was started. After 24 h, the patient felt much better, she had no pain nor fever and was discharged with the indication to continue oral antibiotic therapy. The next day, the patient returned

to the ED complaining of pain at the forearm where the peripheral vein access had been placed. Superficial phlebitis was noticed and the physician in charge decided to perform a bedside ultrasound that showed thrombosis of the antecubital vein. Treatment with fondaparinux for a week was started. The patient was discharged in good clinical conditions; however, the following day, the patient was admitted again to the ED for a severe headache. The head computed tomography scan showed a cerebral hemorrhage, and she was transferred to the neurosurgery ward.

As shown by this simple but dramatic clinical case, even the most trivial and innocent medical decision may have catastrophic consequences. This

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is the reason why any intervention we perform (treatment or test) must be preceded by relevant clinical questions. Looking back at our case: (a) was the peripheral venous access necessary? (b) Was the ultrasound examination appropriate? (c) Was the consultation with the thrombosis specialist needed? (d) Was anticoagulant therapy appropriate? No single step of the diagnostic strategy was absolutely incorrect, but a cascade of small clinical decisions snowballed into dramatic and unexpected consequences.

The rationale

The call for action inspired by Brody in 2010 [1] led to the creation of the Choosing Wisely (CW) campaign, an initiative of the American Board of Internal Medicine Foundation (ABIM) launched in 2012 that was immediately followed by the seminal article by Grady and Redberg, “Less is More” [2], calling for a shift from the traditional paradigm “more care is better” towards care tailored to the patient’s needs.

The main mission of this campaign was the promotion of conversations between clinicians and patients by helping patients to choose care that is supported by evidence, not duplicative of other tests or procedures already received, free from harm and truly necessary. This was pursued through the publication of hundreds of “top 5 lists,” created by medical societies from 25 different countries, listing unnecessary or overused medical procedures, tests, or treatments, all based on recent evidence and good medical practice. Several studies testing the efficacy of the campaign in reducing medical waste and side effects have been performed or are ongoing [3–5].

However, in our opinion, CW represents an even broader and general concept expanding the borders of healthcare and medical decisions to include a new “way of thinking” that is more respectful not only of patients but of all economic and environmental resources. To choose wisely is to choose consciously and conscientiously. We would like to propose here a “medical” revisitation of the Cartesian philosophical concept “*Cogito ergo sum*” (I think, therefore I am), which would sound, rephrasing St Augustine, like “*Dubito, ergo sum [medicus]*” (I doubt, therefore I am [a physician]).

Constantly enlarging healthcare systems, where the number of actors involved and the complexity of the relationships between them keeps increas-

ing, tends to generate automated and impersonal clinical decisions. We wish for physicians to reacquire a central role in patient management, tailoring choices to their specific patients and involving them in the decisional process.

In the present review, we will discuss the fundamental issues hindering our capabilities to choose wisely, such as the difficulty in dealing with uncertainty, the fear of making errors, and the pitfalls of the evidence-based approach, and we will discuss a possible roadmap to help modify our way of thinking and to overcome what is holding us back from doing so (Fig. 1).

Factors at play

Uncertainty

Medicine is a highly inaccurate scientific field compared to other disciplines such as engineering or computer science [6]. The most accurate tests we use during a diagnostic workup boasts of a sensitivity and sensibility that is lower than 90%, leaving a great margin of error even when no human effort is involved [7, 8]. Similarly, the most effective therapies for commonly encountered illnesses do not assure treatment success, even when given promptly [9].

The minimization of uncertainty in clinical decision making has become central to biomedical research over the past 50 years, driving the development of evidence-based medicine (EBM), with millions of articles published every year.

However, the more knowledge is accumulated the more we perceive the differences in each clinical condition presented, in the underlying mechanisms and mostly, in each patient we meet [10]. The more we know, the more we understand how little of what we know is actually applicable to every single case. The concept seems obvious as this is one of the better-known postulations of Western philosophy, as expressed by the Socratic motto “I know that I know nothing” [11], but in our hyper-technological and specialistic era, sometimes we tend to forget about this concept and dismiss it.

The feeling that an outcome can be predicted leads to a sense of security that is, unfortunately, often based on wrong assumptions. As William Osler said, “medicine is a science of uncertainty and an art of probability.” Uncertainty can make the physicians uncomfortable and communicating

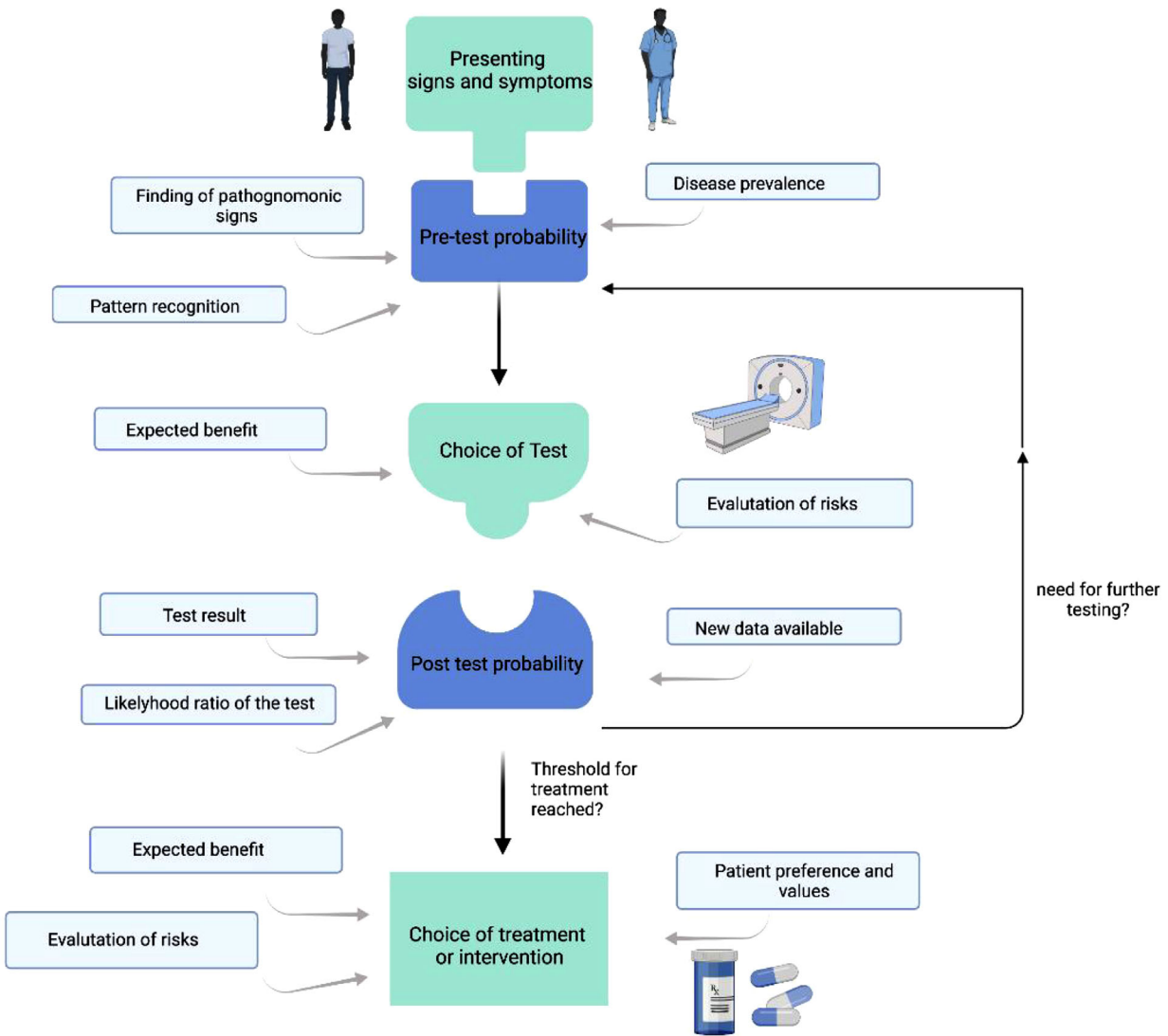


Fig. 1 Clinical reasoning—no single choice of performing tests or initiating treatment should be made without considering all the factors involved. Each test serves the purpose of increasing or reducing our probability of a diagnosis to help us choose, together with our patients, whether starting treatment could be beneficial.

uncertainty to patients can feel like letting them down and not being able to predict what is happening to them. While it can be true that patients feel safer and more satisfied knowing their doctor is certain about the evolution of their condition [12], being able to communicate uncertainty can, in the long term, lead to an improvement in the patient-doctor relationship and trust [13].

Embracing uncertainty does not represent a rejection of EBM but instead supports its best use. As soon as we accept the hindrance that pre-

cludes us to be 100% accurate in our predictions, we can start implementing this type of thinking into practical skills of evaluating a situation and describing it to our patients. The probability of a response to therapy can be expressed as a numerical range with a qualitative estimate rather than a single number. For most diagnostic tests, we should emphasize that the result can only increase or diminish the probability of a diagnosis based on the likelihood ratio of the test, and cannot provide a definitive answer [14–16]. Thus, to better engage our patients, shared decision making, using the

best available evidence as a tool, should be implemented [17], as when faced with hard choices, our patients may feel that their physician will be with them, no matter what the future holds.

Evidence-based medicine

Not all clinical research is good research [6]. EBM aims for the idea that healthcare professionals should make conscientious, explicit, and judicious use of current best evidence in their everyday practice. EBM uses systematic reviews of the medical literature to evaluate the best evidence on specific clinical topics. This is the first and easiest to apply step, called “evidence synthesis.”

Selecting treatments and procedures based on updated evidence strikes as the best to provide the best care available for a patient. This can be held only if the supporting scientific evidence is of good quality and extrinsically applicable to the patients we are currently treating. Blindly applying results of clinical trials can be extremely dangerous, and therefore even guidelines should be considered critically and not as an unquestionable Bible.

The amount of weakly designed studies, skewed analysis, and straight-up false data that gets published each year is astounding. Some of these studies present data that lacks credibility so blatantly that they earned the name “zombie trials” [18]. Moreover, even if millions of papers get published every year, the publication record is only a small part of the unpublished research data existent, with an abundance of inconclusive or controversial results, never to be shared [19].

Registered clinical trials showing negative results (where the treatment tested showed no effect) are statistically less likely to be published, and even when published they usually take, on average, 1 year more to get released than trials with positive results. [20, 21]. It was also proven that statistically significant studies may be cited more than negative studies on the same topic, increasing the bias [22].

Another critical issue is the abundance of multiple guidelines, from different societies, on the same topic, which often cites different articles and meta-analyses supporting their recommendations, which are sometimes discordant with each other, without a clear reason to justify the discrepancies. In addition, they may be heavily influenced by

“expert” dogma and only a few of the recommendations provided are based on level A evidence [23–26].

Therefore, although being used to establish medical (and sometimes legal) standards of care, clinical guidelines are very far from being an unbiased and unequivocal tool. It’s hard to imagine an improvement in the quality of research as long as financial conflicts of interest are associated with favorable recommendations of drugs and devices in clinical guidelines, advisory committee reports, opinion pieces, and even narrative reviews [27]. The Sars-Cov-2 pandemic worked like a magnifying glass in showing the limits and weaknesses of our research system. In the rush for publication, thousands of dubious papers have been released, only increasing the rampant confusion and despair that sprung in physicians forced to work without evidence [28–30].

Plenty of resources are currently available to improve doctors’ ability to use EBM correctly, starting from critically reading manuscripts, comparing them to previously available data, all the way down to designing new trials that could improve patient outcome and satisfaction [31–33]. Critically approaching EBM means not stopping at the first step, that is, “evidence synthesis,” but rather continuing to the second one, which is “knowledge translation.” The evidence must be translated into practice by medical practitioners who select treatment options for specific cases based on the best research, patient preferences, and individual patient characteristics [34].

Medical errors

Medical errors are listed as the number three cause of death in the United States [35] and represent a huge cost in resources and a great risk for the unwilling patient finding himself a “victim” of the error. A wise choice requires active effort into minimizing the chance of making mistakes while considering that not all of them are predictable and thus preventable. Minimizing errors related to *lack of knowledge*, often only recognizable in hindsight (if not spotted at all) requires experience, continuous education, and update in the light of new available research and data. On the other hand, errors linked to inattention or carelessness could be reduced by investing in better work–life balance for healthcare providers, preserving enough good sleep, avoiding toxic workplace conditions,

and supporting doctors' own mental and physical wellbeing [36].

In the last 30 years, medicine has tried to adopt tools and procedures from other fields to manage risks and minimize errors. For instance, the aviation safety procedures approach is often being used as a model to build up a safer healthcare system. While intrinsic limits are preventing the achievement of the same extremely high level of safeness [37], the use of checklists, personnel's fatigue risk management, and specialization training are all examples of features shared by both realities that improved avoidance of errors when implemented. [38–40]. One topic that was found to be lacking in doctors' and interns' apprenticeship, while well established in other professional activities, is "cognitive bias avoidance training."

Cognitive biases (CB) are predictable, systematic patterns of deviation from the norm and/or rationality in judgment. The mind is prone to fall for these various cognitive traps especially while relying on heuristics, or mental shortcuts, using what is defined as "system 1" of cognitive process (as opposed to "system 2," representing conscious analytical thoughts) [41–43]. The most commonly encountered CB in medicine include the anchoring effect and the confirmation bias (that could together be summarized as prematurely falling in love with a diagnosis), the gambler's fallacy (that makes it seem unlikely something will happen again if it recently happened many times), and the base rate neglect (overestimating or underestimating pretest probability when working up a diagnosis, skewing the Bayesian reasoning) but a long list of biases have been described and each one plays a role in increasing the risk for error making [44, 45]. Pattern recognition is essential to clinical reasoning, especially in the context of emergencies, and one is easily tempted to think that these biases don't affect him, even if he can recognize them in others.

Learning to recognize and discuss the impact of cognitive bias from the early stage of medical education could significantly help avoid the consequences and costs of these mistakes [46].

Value-based patient-centered approach

What is important for the patients? When making choices, our perspective could be different from the patients' and we should consider patients' preferences and needs. What is important for us may be

of limited value for the patient. Sharing our views and involving patients in decision making that is truly based on their needs should be a milestone when choosing wisely [47].

As physicians, we tend to make a diagnosis based on a disease-centered point of view and then provide the best available cure. This may, nevertheless, be far from coinciding with what matters to the patient, particularly when multiple chronic conditions co-exist [48]. For instance, from the perspective of a patient with chronic heart failure, the number of days spent at home may be a more accurate outcome for evaluating the quality of the provided cures rather than the rate of hospital admission [49]. Potentially, even the most extreme medical decisions may benefit from a positive confrontation. Is there any doctor that would raise doubts on the benefits of adrenaline in cardiac arrest? In a highly debated randomized controlled trial (RCT) published in *New England Journal of Medicine* on the use of epinephrine in out-of-hospital cardiac arrest [50], the authors actively involved patients and the public in the planning and development of the trial. The study showed a benefit of epinephrine use on short-term survival but no significant differences in survival with favorable neurologic outcomes. Interestingly, when the community was involved in defining the priority of outcomes, 95% of respondents prioritized long-term survival with favorable neurological outcomes instead of short-term survival. There are several resources that clinicians could use to inform their patients of the risk and benefits of treatments, tests, and procedures. In a recent meta-analysis, patients exposed to decision aids for screening or health treatment decisions showed increased knowledge, while the accuracy of risk perceptions and congruency between informed values and care choices did not show differences in terms of health outcomes compared to controls [51]. Some patients may be keen to discuss potential therapeutic options while others prefer not to be involved in decision making [52].

Involving patients in decision making does not mean giving up responsibility but rather including personal preferences into the physician's final decision on the matter.

Clinical decisions and consequences

Each time we make a clinical decision such as prescribing a treatment or a test, we expect benefits for our patients, but we must keep in mind that with

every choice we may cause harm. Most of the time, we acknowledge direct potential adverse events but hardly identify potentially indirect risks, the long term, and social consequences of our choices. Several studies indicate that patients consistently overestimate the benefits and underestimate risks of the screening procedure, tests, and treatments [53] and there is still uncertainty about how good physicians are at understanding and communicating to patients the benefits and harms of tests and procedures [54, 55].

Each time we make a decision, we set in motion a chain of reaction of which we should be aware. Even the cheapest, low-risk test can have tremendous consequences for patients and healthcare. In a recent study, the American College of Cardiology highlighted the importance of avoiding preoperative routine electrocardiogram (EKG) in low-risk noncardiac surgery [56], including such recommendations among its Choosing Wisely top five list. In another study [57] on over 110,000 patients undergoing cataract surgery in the USA, 16% of those who received a preoperative EKG underwent a series of further testing that accounted for an extra cost of \$565 per patient and \$35 million without evidence of disease. Incidental findings account for the largest part of inappropriate testing. In a study conducted by the American College of Physicians, 90% of interviewed physicians reported a cascade of tests after incidental findings that caused significant psychological, financial, and even physical consequences for their patients [58]. Cancer screening through prostate-specific antigen (PSA), which is now no longer advised, has been estimated to have caused between 2.9% and 88.1% of prostate cancer overdiagnosis [59]. These findings are just a tiny dot in a much bigger picture since limited data are available on the impact of overdiagnosis and overtreatment [59]. The proposed CW approach has the first downstream effect of increasing the safety of our patients, balancing the risks and benefits of each intervention at the single-person level.

The physician should never stop asking himself: “Why am I prescribing this test/treatment to my patient? Am I fully aware of the consequences of the result on my next clinical decisions?”

Diagnosis- versus management-centered approach

Providing answers to our patients is a cognitive process passing through a critical appraisal of

clinical information, checking the best available evidence, and considering the external factors involved (values, available resources, environmental factors, etc.). This clinical-reasoning process should not just focus on providing a diagnosis. As brilliantly illustrated by a recent review on the subject by Cook et al. [60], reaching a diagnosis is not the final outcome a physician should seek; it is, in fact, the successful management of the patient. Nevertheless, most of the available literature focuses on the cognitive processes that lead ultimately to a diagnosis (diagnostic reasoning). Management reasoning, that is, the process of making decisions about patients’ treatment, follow up, need for hospitalization and resource allocation, is a less explored path with multiple aspects. Cook et al. [60] pointed out the main differences between the two approaches, as summarized in Table 1. Focusing on patient management rather than reaching a diagnosis could possibly reduce overtesting and increase patient involvement in the decision process.

A practical example of the implications of using these two approaches is the management of patients with potential pulmonary embolism (PE). Several trials found a higher-than-expected prevalence of PE in patients admitted for syncope or exacerbation of chronic obstructive pulmonary disease (COPD) in the ED, suggesting a possible role for algorithms dedicated to the identification of PE in these groups of patients [61, 62]. Further studies raised doubt on this potential approach. On one side, the study by Costantino et al. [63], collecting data from real-world scenarios, concluded that not all patients warrant a diagnostic algorithm to exclude it, and the algorithm may increase false-positive results and overtreatment, resulting in more adverse events. On the other side, the study by Jiménez et al. [64] on exacerbating COPD found no differences in terms of major clinical outcomes when randomizing patients for either standard care or an active strategy for diagnosing PE, showing how investing more into searching for a diagnosis might not be beneficial for patients.

The physician and the community

We assume to treat every patient the same way and give everyone the same care, but is this actually happening?

Access to education, housing, food and water quality, as well as inequity in wealth distribution are

Table 1. *Diagnosis versus management*

Diagnosis-centered approach	Management-reasoning approach
Primarily a classification task, assigned labels help clinicians understand the underlying condition and simplifies communication between peers and patients	Primarily a matter of prioritization focused on shared decision making, monitoring, and flexible planning
A simpler, more direct approach	More complex requires greater experience and nonprofessional skills
Gives (theoretical) definitive answers when a diagnosis is established	This leads to the development of multiple defensible options, with diversified outcomes
Not influenced by values or preferences	Influenced by preferences, resources, values, and trammels of patients, physicians, and institutions
A diagnosis can be made solely relying on data	A management plan requires interaction between the parties involved
The struggle for a yes/no answer might lead to overtesting and an increased rate of false positives	Testing for which results would not change the management can be discouraged, reducing the risks involved with overdiagnosis
Diagnosis is but a means to an end (that is proper management) and requires time to be made	Patient management starts with the first encounter with the clinicians and incorporates the (eventual) diagnosis in the decision-making process, when available
The cognitive process involved and the effectiveness of the method are well studied	Requires further studying of the cognitive mechanisms involved, will need RCT targeted at proving its effectiveness on patient-relevant outcomes

RCT, randomized controlled trial.

among the main determinants of patients' health and have been related to the development of several diseases. [65, 66]. These factors must therefore be considered in the frame of preventive medicine. A conscious physician incorporates in his thinking process the needs of his community. The devastating effect of population inequities in terms of socioeconomic determinants of health was highlighted by the Sars-Cov-2 pandemic, with enormous differences in patient outcomes based on social status. [67, 68]. We cannot afford anymore to ignore these discrepancies among our population of patients.

Social determinants strictly correlate with the resilience of a population in tackling health and safety challenges. In this respect, one of the biggest threats we will face in the upcoming years is the impact of climate change on global health.

The 2020 edition of the yearly Lancet Countdown report on Health and Climate Change [69] showed alarming data on the direct effects of rising temperatures, with a drastic increase in heat-related death (+53% for people aged 65 and above in the

last two decades), a rise in exposure to wildfires, aggravating heart and lung conditions [70], and the diffusion of unhealthy diets, increasing cardiovascular risk [71]. We must realize that the voice of healthcare professionals is essential in driving forward progress on climate change and realizing the health benefits of responding strongly to the issue. In this regard, we, as authors, strongly endorse the call for emergency action recently published by a large team of editors of some of the most important health journals worldwide [72].

As physicians, we must act not only as healthcare providers but also as citizens' advocates.

How to change the way we think

Acquiring the mindset necessary to choose wisely is a learning journey where we recognize the actors in a play, share our knowledge, and act consequently. We should work to set in motion an educational process that, directly and actively, involves students, physicians, stakeholders, and the public. The discussion and acquisition of these concepts and critical thinking should start during the first

Table 2. Steps towards choosing wisely

What stands between us and better care	Proposed solution	Possible benefits
Fear of uncertainty	<ul style="list-style-type: none"> Understanding that uncertainties are an unavoidable part of medicine Investing in communication skills 	<ul style="list-style-type: none"> Reduction of physician's frustration Better acceptance and understanding for patients
Cognitive biases	<ul style="list-style-type: none"> Including cognitive training in medical education Learning from other fields of work Implementing systems for reporting errors 	<ul style="list-style-type: none"> A better understanding of their own thinking process Reduction of medical-error-related risk
Applying low-quality evidence	<ul style="list-style-type: none"> Training in critical reading/writing Involving patients in trial design Acknowledging conflicts of interest 	<ul style="list-style-type: none"> Improved knowledge translation with better use of available data Increase the quality of new published data
Overfocusing on diagnosis	<ul style="list-style-type: none"> Discussing management with patients from an early stage Pondering expected benefits and risks involved for each prescribed test Understanding the impact of overdiagnosis Considering that a diagnosis might not always be necessary for patient management 	<ul style="list-style-type: none"> Reduction of costs and waste of resources Reduced risks of overdiagnosis and overtreatment Better patient-tailored outcomes

years of training of medical students and trainees. Spreading these ideas to patients, and to a greater extent also to the general public, will benefit feedback and increase trust between the parts. And first and foremost, educating ourselves as physicians will allow us to transpose these conceptual cues to clinical practice, supporting more conscious and safer care.

To initiate this process, we think we should focus our educational interventions on the following issues (Table 2):

- I. rediscussing our diagnosis-centered approach in favor of a management-reasoning approach, including choices about treatment, follow-up visits, further testing, and allocation of limited resources, involving patients and their personal needs in making the choice [60, 73];
- II. embracing uncertainty in the healthcare profession, grasping the concept of probability of disease and threshold for treatment, and acquiring the communication skills and

empathy needed to transmit these concepts to patients.

- III. disputing the “publish or perish” dogma, to strive for better, more reliable, patient-centered research. We should learn and teach how to write accurately, read critically, and research conscientiously.
- IV. accepting that anyone, with no exceptions for healthcare providers, is bound to make mistakes. We should support systems that monitor medical errors, their consequences, and near-miss cases with the aim of developing ways to avoid the same mistake rather than punishing the actors involved [74]. This will help stop the growth of a medical class terrified of legal consequences and prone to make decisions that protect themselves from malpractice lawsuits at the expense of patient safety and resource saving [75, 76].

These primary steps will lead to a new way of thinking that will eventually allow the physician to get an advocate role within the society, trusted by the

community as observers and reporters of the population's physical and mental wellbeing. Hence, acknowledgement of social discrepancies, environmental factors, and their role on global health will then become part of the clinical reasoning and the everyday practice of the physician of tomorrow.

Conclusions

The mission of the Choosing Wisely movement is not only to raise awareness in physicians of the risks of overdiagnosis and overtreatment but also to give the opportunity to rethink the way we treat patients.

Embracing such philosophy goes through tackling of several issues, including difficulty in dealing with uncertainty and medical errors, the limits of EBM, and shifting towards patient-centered clinical reasoning focused on management rather than on diagnosis. Physicians should regain a central role in patient management and could be leading actors in facing upcoming healthcare challenges related to environmental issues and social discrepancies.

Thinking that doing more means doing better is perhaps a comfortable, but often dangerous, momentary lapse of reason.

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The authors have no conflict of interests to declare.

Author contributions

Ludovico Furlan: conceptualization; data curation; investigation; resources; writing – original draft; writing – review and editing. Pietro Di Francesco: conceptualization; data curation; investigation; resources; writing – original draft; writing – review and editing. Nicola Montano: conceptualization; investigation; project administration; resources;

supervision; writing – original draft; writing – review and editing. Giorgio Costantino: conceptualization; investigation; project administration; resources; supervision; writing – original draft; writing – review and editing.

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