



OPEN ACCESS

10.1136/bmjebm-2023-112576

¹Lismore Rural Clinical School, Western Sydney University, Lismore, New South Wales, Australia

²School of Medicine, Western Sydney University, Penrith South, New South Wales, Australia

Correspondence to:

Dr Natalie Edmiston, Lismore Rural Clinical School, Western Sydney University, Lismore, New South Wales 2480, Australia; n.edmiston@westernsydney.edu.au



© Author(s) (or their employer(s)) 2024. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

To cite: Edmiston N, Hegazi I. *BMJ Evidence-Based Medicine* Epub ahead of print: [please include Day Month Year]. doi:10.1136/bmjebm-2023-112576

Teaching to address overdiagnosis

Natalie Edmiston ,¹ Iman Hegazi²

The whole art of medicine is in observation... but to educate the eye to see, the ear to hear and the finger to feel takes time, and to make a beginning, to start a man on the right path, is all that you can do.

William Osler. 'The Hospital as a College' Aequanimitas. 1914:332

Learning to diagnose is a crucial skill for medical students and we propose that on this path, we need medical students to learn to make diagnoses that are both correct and useful.

What is overdiagnosis and why should it be addressed by medical schools?

Overdiagnosis is a concept that presents both opportunities and challenges in medical education. Overdiagnosis can be considered the detection or labelling of a condition that was never going to cause harm, or the application of a diagnostic label to ordinary life experiences.¹ Multiple drivers to overdiagnosis have been identified and health professionals are one of the drivers.² Doctors, in particular, play a critical role in making diagnoses, meaning they are an integral part of any pathway, leading to overdiagnosis. While including overdiagnosis in a medical curriculum has been suggested, there is no agreement about what ought to be taught.³ This lack of consensus is a reflection of the lack of clarity about overdiagnosis in general.⁴ An understanding of the terminology can be useful before considering the place of overdiagnosis within medical curriculum (table 1). Preventing overdiagnosis is a key step in reducing many of the potential harms of low-value care.⁵

Medical curricula should be concerned with addressing overdiagnosis, because it is a reality of modern healthcare. The concept of overdiagnosis is increasingly present in health media and is understood to be a potential outcome of healthcare.⁶ Our future doctors may well be asked about the risk of overdiagnosis by their patients, and they will certainly be influenced by the drivers of overdiagnosis.² Failing to address ongoing overdiagnosis risks the integrity of the medical profession, as overdiagnosis results in people not benefitting from, and potentially being harmed by healthcare. Meanwhile, medical students may develop cynicism as a result of the hidden curriculum,⁷ whereby they see overdiagnosis occurs but have no language to discuss it with clinical supervisors. However, to address overdiagnosis does not necessarily require teaching extensively about overdiagnosis. Rather medical education should be concerned with producing doctors who have the knowledge and skills to make useful diagnoses.

Teaching diagnosis differently

For medical students and educators, there is a conceptual barrier that must be overcome to recognise that not all diagnoses have utility for our patients. That is not to say that diagnoses do not have utility for others within the health system. Researchers benefit from ensuring a well-defined disease or condition is being studied and health administrators and others can understand the frequency of conditions that result in admissions, mortality and other outcomes. The fundamental concern with overdiagnosis is when the utility of the diagnosis is not accrued by the patient but by others. A second conceptual barrier is to recognise that giving a diagnosis is a part of clinical management, not a separate activity, and, therefore, as with all aspects of clinical management, there are choices. Some propose that clinical decision-making is fundamentally different for diagnosis and clinical management.⁸ However, when clinical decision-making is considered as a continuum from presentation to completion of care, the same questions that are asked of treatments can be asked of diagnosis. Will this provide a benefit for my patient? What is the best choice for this situation? Where available, evidence-based guidelines for diagnostic testing can support decision-making⁹ (box 1).

New standards for Australian medical programmes emphasise the importance of social accountability and equity.¹⁰ Hence, diagnostic teaching should incorporate the concepts of utility and choice as fundamental to ensuring accountability and equity in healthcare delivery. Medical education has a culture of diagnosis as central to healthcare delivery, by providing access to treatments or prognostic advice. Diagnosis is prioritised early in training, with problem-based learning and case-based learning focused around identification of a diagnosis. Indeed, intrinsic empowerment of learners to identify the problem is considered one of the characteristics of successful problem-based learning.¹¹ First-year medical students' identification of problems for the purpose of learning basic sciences is often the first exposure to a diagnostic framework. This activity is often occurring outside of a clinical context, unaccompanied by the very values of accountability and equity that ought to be imbued in the practice of medicine. There is a risk that this privileging of diagnosis, and the isolation of diagnostic teaching from values, may persist when medical students enter clinical practice.

There are increasingly calls to review the teaching of diagnostic skills and clinical reasoning, largely driven by a desire to avoid misdiagnosis and missed diagnoses.¹² In a study of third-year

Table 1 Overdiagnosis and related concepts

Concept	Definition
Overdiagnosis	A broad term, referring to making people patients unnecessarily, by identifying problems that were never going to cause harm or by medicalising ordinary life experiences. ¹
Overdetection	Identification of abnormalities that were never going to cause harm, abnormalities that do not progress, that progress too slowly to cause symptoms or harm during a person's remaining lifetime, or that resolve spontaneously eg. many prostate cancers found on screening. ¹
Overdefinition by threshold change	Lowering the threshold for a risk factor without evidence that doing so helps people feel better or live longer eg. lowering diagnostic threshold of hypertension. ¹
Overdefinition by expanding disease definitions	Expanding disease definitions to include patients with ambiguous or very mild symptoms and used to increase the market for treatments; sometimes referred to as 'disease mongering' eg. female sexual dysfunction label for low libido. ¹⁴
Overtreatment	Overtreatment occurs when the best scientific evidence demonstrates that a treatment provides no benefit for the diagnosed condition eg. antibiotic use in viral infection. ⁴
Overutilisation/overuse	Establishment of standard practice in health services or systems that do not provide net benefit to patients or citizens eg. standard blood test panels. ⁴
Low-value care	Low-value care is the use of an intervention where evidence suggests it confers no or very little benefit on patients, or risk of harm exceeds likely benefit, or, more broadly, the added costs of the intervention do not provide proportional added benefits eg. screening in low-risk populations. ⁵
Too much medicine	An umbrella term to include all of the above concepts. ⁴

medical students, participation in six online interactive modules focused on clinical reasoning resulted in an improved ability to identify the clinical reasoning skills of supervisors during clinical

Box 1 Diagnosis as part of clinical management; a hypothetical presentation.

A 52-year-old man, Brian, visits his primary care provider. He has separated from his wife with whom he has three children and recently had a short-term relationship with a woman who has been diagnosed with herpes simplex type 2 in the past. He has no symptoms but wants to have a test to see if he has genital herpes. He has heard about a blood test that can give him a diagnosis.

The doctor is aware that herpes serology is not generally an appropriate screening test in asymptomatic patients, and that before ordering the test, consideration should be given as to whether test results will influence treatment or outcomes.⁹

Brian and the doctor have a conversation about herpes and Brian understands that as he has no symptoms, there is no treatment that he would be advised to take. The doctor recommends condoms with any new sexual partners for the protection of both partners from other sexually transmissible infections but explains that there is no other behavioural advice given to a person with asymptomatic herpes simplex infection.

Brian understands that a serological diagnosis of herpes would not influence his clinical management with regards to medication or behavioural advice. The test is not ordered and potential overdiagnosis avoided.

placements compared with students who did not participate in the modules.¹³ However, most efforts to improve diagnostic teaching are focused on improving accuracy, by reducing cognitive error.¹² The key cognitive skill is to accurately classify presenting signs and symptoms as a diagnosis. There is little in the literature that considers the opportunity for improved diagnostic and clinical reasoning to avoid unnecessary diagnoses. Overcoming cognitive biases may be useful for finding correct diagnosis but may not be sufficient to find a useful diagnosis. Similarly, current models for teaching clinical decision-making teach choice in clinical management, but position medical diagnoses outside this framework, where there is no opportunity for choice.⁸ A clinical decision-making framework that included diagnosis as a clinical management decision not merely a classification problem could contribute to addressing overdiagnosis.

Other educational approaches to address overdiagnosis

In addition to revisiting clinical reasoning, the following strategies may be useful in ensuring medical education addresses overdiagnosis; a more critical approach to evidence-based medicine, understanding of the role diagnoses play in society, and leadership skills. Critical thinking as part of clinical education is considered important to enable students to make better diagnoses and treatment plans, yet there is uncertainty about how this is best taught.¹⁴ More research into developing critical thinking skills training for medical students is needed. We need to continue to teach evidence-based medicine and ensure it has applicability for clinical practice and diagnosis. Medical students should be encouraged to use evidence critically rather than default to guidelines. Recognising that diagnosis is not a strictly empirical science but rather an integral component of the complex modern healthcare system could be achieved by reintegrating elements of history and philosophy of medicine into medical training. Not

Table 2 Key considerations in addressing overdiagnosis in the curriculum

Issue	Approach
Overcrowded curriculum	Avoid adding unnecessarily to curriculum. Adapt existing teaching elements to include overdiagnosis concepts.
Overdiagnosis concepts allocated to clinical placements	Students need to understand concepts to be able to appreciate them in the hidden curriculum. Introduce concepts early, during or before clinical placements.
Concept—diagnostic choice	Case-based learning to include diagnosis as a part of clinical management, for which there is choice.
Concept—diagnostic utility	Curriculum review to focus on the importance of useful and meaningful diagnosis as well as social accountability and equity in all aspects of medicine including diagnosis.
Appreciate drivers of overdiagnosis	Consider introducing history and philosophy of medicine particularly as related to commonly overdiagnosed conditions. Include drivers in case-based learning.
Evidence-based medicine applied to clinical practice	Critical approach to evidence-based medicine including its application to clinical diagnosis in addition to clinical management.
Overdiagnosis is a reality	Leadership skills to facilitate future doctors addressing overdiagnosis.

only can teaching history of medicine increase understanding of the structural factors influencing healthcare, it has the additional benefit of teaching critical thinking skills.¹⁵

Finally, we need to build confidence and leadership in future doctors. We need doctors to have confidence in the face of uncertainty, which is inherent to clinical practice. Instead of resorting to unnecessary diagnoses, doctors should learn to effectively manage this uncertainty. Skills developed in managing patients with medically unexplained illness¹⁶ can also support the clinical management of patients without providing a diagnosis. Leadership and importantly followship, which is the ability for relative juniors to have influence on the health system, are included in the new Australian Medical Standards.¹⁰ Supporting these attributes in medical students will allow them to make changes in the way healthcare is delivered in the future. An understanding of the implications of overdiagnosis and diagnostic skills inclusive of utility, combined with leadership skills provide the best opportunity for our future doctors to address overdiagnosis.

An Australian university experience

At Western Sydney University, before considering curriculum review, we sought to understand what medical students are learning related to overdiagnosis in the current curriculum. Interviews with medical students revealed that students rarely had heard the term overdiagnosis but were attuned to many of the concepts relevant to overdiagnosis.¹⁷ The minimal representation of overdiagnosis was confirmed by interviews with educators and mapping of the curriculum to potential competencies on overdiagnosis.¹⁸ Many of the skills and concepts that might address overdiagnosis were delegated to be taught within clinical placements with no formal teaching attached. The exception was education about overdiagnosis related to screening,¹⁹ which was appropriately included within lectures on screening. This relative silence regarding a crucial aspect of modern healthcare is also highlighted in the experiences of medical students within emergency departments.²⁰ Teaching medical students diagnostic reasoning that includes utility and choice early in their education may enable critical reflection on diagnoses observed within their clinical placements. Having identified key considerations in addressing overdiagnosis in the curriculum (table 2), Western Sydney University initiated two approaches. The first is a review of teaching within problem-based learning cases delivered towards the end of year 2, with tutors provided with guidance to

include the implications of particular diagnoses and the possibility of alternative diagnoses or not giving a diagnosis. A similar approach to reviewing other elements of the curriculum will be undertaken in 2024. The second is the development of a case-based learning activity regarding problems with diagnoses. In this session, students were presented with cases that demonstrated either misdiagnosis or overdiagnosis and asked to identify the diagnostic problem and drivers of the problem.

While it is evident that overdiagnosis is a reality, the imperative in medical education is to graduate doctors who are able to contribute to reducing overdiagnosis, not necessarily doctors who are able to define overdiagnosis, its drivers and harms. Learning that a diagnosis should not just be correct but should have utility, and that making a diagnosis is part of clinical decision-making, may be more important than understanding overdiagnosis terminology. Future doctors that appreciate this, and have skills as leaders, can help to produce a more patient-centred and sustainable healthcare system.

Acknowledgements The authors would like to acknowledge the important contribution of the following WSU MD students in researching and understanding this topic; Lucinda Colbert, Ollie Wong, Gisung Ko and Minh Le. Dr Thanya Pathirana is also acknowledged for her contribution to WSU curriculum mapping.

Contributors NE prepared the manuscript, in consultation with IH. IH reviewed and contributed to the final manuscript.

Funding NE received funding from University Centre for Rural Health, Lismore, Australia to attend and present at the 2023 Preventing Overdiagnosis International Conference.

Competing interests IH is the Director of Medical Education in the School of Medicine at Western Sydney University. NE is employed by Western Sydney University as the School of Medicine Rural Research Lead, Lismore.

Patient consent for publication Not applicable.

Ethics approval Not applicable.

Provenance and peer review Commissioned; externally peer-reviewed.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to

distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

Natalie Edmiston <http://orcid.org/0000-0001-7252-0791>

References

- 1 Brodersen J, Schwartz LM, Heneghan C, *et al*. Overdiagnosis: what it is and what it isn't. *BMJ Evid Based Med* 2018;23:1–3.
- 2 Pathirana T, Clark J, Moynihan R. Mapping the drivers of overdiagnosis to potential solutions. *BMJ* 2017;358:j3879.
- 3 Ekhlās S, Lang E, Dickinson J. 60 optimizing overdiagnosis education for medical students. *BMJ Evid Based Med* 2023;28:A29–30.
- 4 Carter SM, Rogers W, Heath I, *et al*. The challenge of overdiagnosis begins with its definition. *BMJ* 2015;350:h869.
- 5 Scott IA, Duckett SJ. In search of professional consensus in defining and reducing low-value care. *Med J Aust* 2015;203:179–81.
- 6 Pickles K, Hersch J, Nickel B, *et al*. Effects of awareness of breast cancer overdiagnosis among women with screen-detected or incidentally found breast cancer: a qualitative interview study. *BMJ Open* 2022;12:e061211.
- 7 Kachel T, Huber A, Strecker C, *et al*. Development of cynicism in medical students: exploring the role of signature character strengths and well-being. *Front Psychol* 2020;11:328.
- 8 Cook DA, Durning SJ, Sherbino J, *et al*. Management reasoning: implications for health professions educators and a research agenda. *Acad Med* 2019;94:1310–6.
- 9 Australasian Chapter of Sexual Health Medicine. Top five recommendations on low value practice. 2018. Available: www.evolve.edu.au/recommendations/achshm [Accessed Nov 2023].
- 10 AMC Limited. Standards for assessment and accreditation of primary medical programs. ACT, Australia; 2023.
- 11 Ghani ASA, Rahim AFA, Yusoff MSB, *et al*. Effective learning behavior in problem-based learning: a scoping review. *Med Sci Educ* 2021;31:1199–211.
- 12 Croskerry P. A universal model of diagnostic reasoning. *Acad Med* 2009;84:1022–8.
- 13 Bonifacino E, Follansbee WP, Farkas AH, *et al*. Implementation of a clinical reasoning curriculum for clerkship-level medical students: a pseudo-randomized and controlled study. *Diagnosis (Berl)* 2019;6:165–72.
- 14 Chan ZCY. A systematic review on critical thinking in medical education. *Int J Adolesc Med Health* 2018;30.
- 15 Steere-Williams J, Barr J, Clark CD, *et al*. Remaking the case for history in medical education. *J Hist Med Allied Sci* 2023;78:1–8.
- 16 Stone L. Managing medically unexplained illness in general practice. *Aust Fam Physician* 2015;44:624–9.
- 17 Colbert L, Hegazi I, Peters K, *et al*. Medical students' awareness of overdiagnosis: does medical education prepare students to practice high-value care? Australian and New Zealand Association for Health Professional Educators Conference; Gold Coast, Queensland.2023
- 18 Edmiston N, Colbert L, Charaf S, *et al*. Diagnosis and overdiagnosis in the medical curriculum. Preventing Overdiagnosis; Copenhagen, Denmark.2023
- 19 Bulliard J-L, Chiolero A. Screening and overdiagnosis: public health implications. *Public Health Rev* 2015;36:8.
- 20 Vigna M, Vigna C, Lang ES. Overdiagnosis in the emergency department: a sharper focus. *Intern Emerg Med* 2022;17:629–33.