

Overtreatment: Is a solution possible?

Dieneke Hubbeling MRes MRCPsych^{1,2} 

¹Wandsworth Home Treatment Team, South West London and St George's Mental Health NHS Trust, London, UK

²Institute for Medical and Biomedical Education, St George's University of London, London, UK

Correspondence

Dieneke Hubbeling, Wandsworth Home Treatment Team, South West London and St George's Mental Health NHS Trust, 61 Glenburnie Road, SW17 7DJ London, UK. Email: ahubbeli@sgul.ac.uk

Abstract

Screening is a useful tool for identifying potential health issues; however, it can also lead to overtreatment. Consequently, patients are sometimes harmed by unnecessary treatments and there are cost implications. Overtreatment can also occur in other areas of medicine besides screening and sometimes medical interventions are used to improve performance rather than to treat disease. In this paper, a distinction is made between the perspectives of the patient and the government. For patients, autonomy is important, and they can refuse life-saving treatments, assuming they have decision-making capacity. They can also choose to be treated to avoid a very small risk or to improve their performance. For a government with limited funds, it is important to focus on outcomes and fund those screening programmes and other medical interventions that can potentially save the most lives or prevent severe disability. Governments also have the power to legislate to enable a level playing field by prohibiting medications that improve performance, but there is no general consensus about this, and regulations can only be applied to specific, well-defined activities. The problem with overtreatment results from the different interests involved: autonomy is the guiding idea for patients and outcome is the guiding measure for societies. A general solution will not be possible because of these inherent conflicting interests. However, medical research may improve the identification and predictions surrounding any anomalies detected during scans and reduce the problem in practice for specific conditions.

KEYWORDS

diagnosis, health policy, medical ethics, philosophy of medicine, public health

1 | INTRODUCTION

Overdiagnosis and overtreatment are related concepts. Overdiagnosis refers to the situation in which a medical abnormality is detected, but that abnormality is not harmful at the time of its discovery and may never become so. It typically occurs in the context of screening, for example, with mammograms¹ or thyroid ultrasounds.² These screening tests can discover small tumours, which may not become

dangerous cancers during a person's lifetime. However, once an abnormality is identified, there is always a possibility that it will become harmful in the future. This uncertainty may lead to overtreatment.³ Overtreatment is not the only possible harm arising from overdiagnosis, for example, the knowledge of the abnormality's presence can be stressful, even if one decides not to have treatment. However, in this paper, the focus will be on overtreatment. With overtreatment, patients suffer harm from unnecessary interventions

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2021 The Author. *Journal of Evaluation in Clinical Practice* published by John Wiley & Sons Ltd.

such as an operation or chemotherapy to treat the identified abnormality. In addition, these interventions must be paid for, either by the patient, the government, or an insurance company; hence, overtreatment should be avoided if possible.

Although typically occurring in the context of screening, overtreatment can also occur in other areas of medicine. It has been reported that children are overtreated for attention deficit hyperactivity disorder (ADHD).⁴ Likewise, in some cases, these treatment options could even be considered as cosmetic neurology⁵ or cognitive enhancement⁶; this ventures into the realm of medication being used to improve performance, rather than treat a disease. Thus, overtreatment can occur in various areas of healthcare.

The key issue with overtreatment in the context of screening is that it is not possible to know whether the identified abnormality will become a problem later in life. There are two aspects to this: first, there is a lack of predictive accuracy, we often do not know the chances of a condition becoming harmful in the future for a particular person; second, even if we were able to predict this accurately, we would still need to evaluate whether the expected level of risk or harm is acceptable and weigh the different forms of harm to determine what is acceptable.

Despite these problems with the accurate prediction and evaluation of harm, patients still need to decide whether to have treatment or not and governments need to decide which screening programmes to fund. The concept of overtreatment is therefore important for individual patients and at the societal level. Indirectly, the concept is also important for healthcare professionals because it is their role to inform both individual patients and the government.

In this paper, the arguments and factors that affect each level of decision making will be discussed: patient, government, and healthcare professionals. Traditionally, conceptual analysis has been important in the philosophy of medicine. With conceptual analysis, one investigates how a concept is used in standard cases and difficult cases with the aim of finding a set of individually necessary and jointly sufficient conditions that can be applied to contentious cases.⁷ The first step in this process is generally to agree on a definition: in this case to define 'disease' or 'treatable condition'. However, in this situation there is no generally accepted definition of disease that is suitable. Furthermore, Ereshefsky argued⁸ that relying on definitions is not useful in controversial situations with conflicting intuitions. Thus, here, the arguments will focus on the underlying reasons for overtreatment without placing emphasis on what is classed as a disease and what is not.

It will be argued that different, and often conflicting, ideas guide the reasoning at the individual patient level and the societal level. From the perspective of an individual patient, it is important—at least in western societies—that ultimately, they can make their own decision and that their autonomy is respected. From the perspective of the government, focusing on the overall outcome, that is, a consequentialist approach is most suitable. Thus, the problems with overtreatment reflect the problem that there is no generally accepted overarching moral principle balancing the interests of individuals and the state, and a general solution for the problem of overtreatment will

therefore not be possible in the foreseeable future. However, further empirical research may reduce the uncertainty about particular conditions, and thereby decrease the extent of the problem.

2 | THE PATIENT'S PERSPECTIVE: AUTONOMY IS CRUCIAL

The standard view in Western societies is that patients should be able to choose what kind of care they are going to receive,⁹ assuming they have decision-making capacity. Therefore, this discussion of overtreatment will start by investigating overtreatment from the patient's point of view.¹⁰ In general, regarding medical interventions, patients can be in three different situations:

- the patient may be suffering from a condition that normally improves with medical¹ intervention,
- the patient may be suffering from a condition for which it is not clear whether a medical intervention will be beneficial, or
- a patient may want something from a healthcare professional that is not allowed.

The decision a person makes depends on factors other than the above-mentioned categories. For example, if somebody is in pain, that person will be far more likely to ask for possible treatment, even if it is not clear that it will be beneficial. However, in the typical possible overtreatment case, at the moment of decision making, there is no discomfort, pain, malfunctioning, etc. that is so unbearable that it will push a person to try a treatment, even one with unknown effectiveness.

The least controversial condition is the situation in which the patient wants something that is not legally allowed. Patients and healthcare professionals should adhere to the law and there are limits to what a patient can demand or request from their healthcare professionals, for example, a sexual relationship with a psychotherapist is not allowed. Despite the apparent simplicity of this situation, there is still room for ambiguity and controversy, for example, with body integrity identity disorder. This is a rare condition whereby the patient thinks that their leg or arm does not belong to them. As a result, they want to have this limb amputated and sometimes even try to do this themselves. Healthy limbs have been amputated in the United Kingdom¹¹ in sufferers of this condition, but it was considered controversial when it occurred.¹² However, these are exceptional situations, and normally patients and healthcare professionals must adhere to the law.

Sometimes treatment is the best option according to medical guidelines. However, patients are allowed to refuse treatment, assuming they have decision-making capacity; autonomy means that people are allowed to make unwise decisions. It is important to realize that many advised treatments are not completely risk-free, for example, if general anaesthesia is necessary, there is a risk of death of around 1:100,000 in developed countries.¹³ However, the possibility of a bad outcome of an advised treatment is not the only reason that people



can refuse treatment; autonomy also means that even in the hypothetical scenario where treatment is completely risk-free, a person could still refuse it if they wanted to. In short, people can make their own decisions if they meet the legal decision-making capacity standard, even if those decisions are not ideal or could be considered unwise.

3 | PATIENT AUTONOMY AND MEDICAL UNCERTAINTY

The rationale behind screening is that abnormalities are detected at an early stage, so that treatment can be effective. However, not all abnormalities detected will become life-threatening conditions. For example, population data from the Netherlands suggests that the observed increased survival rate for breast cancer is probably mainly due to improved treatment options and that approximately half of the patients identified via screening were treated unnecessarily.¹⁴ Welch et al¹ analysed data from the United States of America, which suggested that of the 162 small tumours detected per 100,000 women, only 30¹ will become invasive tumours. Unfortunately, healthcare professionals currently cannot identify which breast abnormalities will become malignant.

Patients, therefore, must decide on the basis of limited data obtained via studies at a population level. The studies and data are often from different countries, which may well have a different baseline rate for the condition; hence, the decision becomes even more difficult as the data and findings may not be suitable for extrapolation to the patient's locale. Another factor to consider is the percentage of invasive breast tumours that could still be cured if detected later. This percentage will change over time as treatments improve, but it takes time to collect and analyse the data so healthcare practitioners often are forced to rely on out-of-date information to aid their patients in their decision making. Therefore, patients are in the unenviable position that they must make a decision based on very limited and possibly inaccurate data. The information they need for a fully informed decision is simply not available.

The decision patients must make may well be influenced by the chance of an abnormality becoming malignant, the uncertainty of this prediction and the risk involved with treatment. Sometimes, simply hearing the word 'cancer' may influence their decision¹⁵; but patients should still be informed that there is a chance that the abnormality will become malignant as they have a right to know. People may also be influenced by the possibility of regret.¹⁶ They do not want to be in a difficult (possibly life-threatening) situation that they could have prevented, even if the chance of it happening is small. The general idea of autonomy does not proscribe these kinds of perhaps less rational factors from being taken into account, and patients can make unwise decisions; although in the case of some abnormalities discovered via screening both options—treatment and no treatment—could be seen as a good decision. Furthermore, it is very difficult to avoid the influence of irrational factors. This is true not only in the medical setting as even parole

decisions by judges have been shown to be influenced by mundane factors such as lunchbreaks.¹⁷

4 | HARM OR BENEFIT FOR INDIVIDUAL PATIENTS

Death is the ultimate form of harm that can occur for any patient. Thus, it is clearly desirable to reduce the chances of finding cancers such as breast cancer in an advanced stage when a cure is no longer possible. However, in other situations, the boundary between acceptable and unacceptable harm is vague, and people will have different opinions about this.

Rogers and Walker¹⁸ asserted that an objective way to identify harm is needed to prevent overdiagnosis and indirectly overtreatment. They stated that other forms of severe harm, not only death, need to be taken into account and they referred to Feinberg's concept of welfare interests to clarify what constitutes severe harm. Welfare interests are defined as the criteria necessary to achieve a goal; health, liberty, opportunities for social interaction and maintaining friendships, are some examples. Rogers and Walker argued that a condition should be treated when there is a significant risk of welfare interests being reduced if it is left untreated.

Feinberg also describes ulterior interests as a person's ultimate goals, for example, writing a novel or being a participant at the Olympic Games, and so on. Rogers and Walker¹⁸ think that these interests should not be included when determining whether a condition is objectively harmful, even though the person may believe their life would be better if their ulterior goals were met. However, ulterior goals can still influence the decisions patients make. Athletes, for example, may undergo operations or other treatments that non-athletes would decline, or people who want to become fashion models may undergo cosmetic operations. An ulterior goal can also be a reason not to have an operation. Somebody who earns a living on the catwalk may not want to have any scars and may therefore be more in favour of a wait-and-see approach after a positive screening result. If we accept patient autonomy, patients can exercise this autonomy by basing their choices on their ulterior interests and avoiding harm will always be a subjective decision.

The line between ulterior interests and welfare interests can be vague, especially when looking at mental health. For example, ADHD is common and Merten et al⁴ mention a report in which almost 20% of the children studied were being treated for ADHD. One of the reasons for treatment is problematic behaviour. However, there is a boundary problem here as the difference between problematic behaviour and being a bit naughty is hard to define; thus, it is difficult to say if this high incidence of ADHD is a result of overdiagnosis. It could also be that the children's parents want the treatment to enhance their child's concentration span and improve their performance at school¹⁹; this could be classed as overtreatment if the child is able to perform within the normal range without treatment. Whatever the reason, any perceived benefits must be weighed against the disadvantages and side effects of the treatment such as growth retardation.

Similarly, students may want to take cognitive enhancing medication. Amphetamine-like medications may improve performance—although, this is currently not certain²⁰—in everybody, not only in people with ADHD. Such medications are intended to improve concentration and cognitive function—two factors that are significant in an exam situation. The problem with many competitive exams is that the difference between participants can be minimal and, in this context, it is very difficult to ensure that one only treats a specific deficit and restores it to a normal level rather than giving someone an unfair advantage. Take, for example, the following hypothetical situation: student A would normally perform better than student B, but if student B can take certain medications, he or she will perform better than student A. However, if both can take the medication, A will perform better. What should one do if there is only one place available on a course? Thus, healthcare practitioners may come under pressure to prescribe⁵ to help a person increase their performance, even though the symptoms of ADHD are minimal. This problem is discussed less often than the problems arising from screening, but with cognitive enhancement, it can be argued that it should also be the choice of the person involved. He or she may have to pay for the medication themselves, but it should still be their choice.

In a related situation, musicians sometimes take medications such as beta-blockers to address stage anxiety and to improve their performance²¹; this is allowed. However, people who want to participate in sporting events where concentration and a steady hand/lack of nerves are required, such as Olympic shooting events, are not normally allowed to take beta-blockers as they are viewed as artificial performance enhancers. Exceptions can be made for those requiring beta-blockers to treat cardiac conditions, but if they are prescribed for anxiety, this is not allowed.²² This seems to be a somewhat arbitrary distinction, and it has been argued for a long time that clearer guidelines are necessary for such medications and other treatments that could improve performance.²³ However, personal choice remains crucial unless there are specific rules relating to a medication's use, such as the prohibition of beta-blockers in Olympic shooting events.

Patient autonomy is essential, and patients must make their own decisions, even when it comes to possible overtreatment. If they want to take their ulterior interests into account, they can do this and if they want to make an unwise decision, they can do this as well. This applies not only to the treatment (or non-treatment) of diseases, but also to increasing their performance through medication; this is generally permitted unless there are legally binding rules to forbid it.

5 | THE GOVERNMENT'S PERSPECTIVE

Governments constantly make decisions about the life and death of their citizens. This is obvious in the case of going to war, but governments must also decide whether or not to build safer roads for pedestrians and cyclists, whether or not to allow nuclear power plants to be built, to name just a few examples. Hence, *prima facie*, a consequentialist approach focusing on the outcome would seem to be the best approach for both health and non-health-related risks.

Governments have budgetary constraints; hence, they cannot avoid setting priorities. One could argue that governments should always prioritize preserving lives as an outcome, but this may well interfere with quality of life. For example, if one wants to prevent all road traffic accidents, people should be forbidden from going out. However, as we have seen with the Covid-19 lockdowns, this reduces the quality of life for many and stifles the economy. Therefore, there is a consensus that governments cannot only focus on preventing death. However, there is no consensus about the minimum acceptable level of functioning, but an objective standard should be employed to enable clear guidelines and simple decision making that benefits the majority of society.

In establishing a minimum level of functioning, the ED-Q5 scale is often considered. This involves scoring five dimensions—mobility, ability to wash and dress oneself, anxiety/depression, pain and usual activities,²⁴ which are rated on a 3- or 5-point scale. The more basic qualities such as self-care and pain have the advantage that they are relatively easy to measure and these dimensions are useful, if not necessary, to realize other projects and goals in life. This would make them an ideal baseline level of functioning for governments to work towards within their budgetary constraints. Beyond this baseline level, it is not reasonable for the government or other public organizations to fund procedures such as cosmetic neurology⁵ or similar measures, so that people can fulfil their ulterior interests,¹⁸ although individual patients can be guided by these interests, as stated previously. However, the question remains whether governments should focus on something more than the ED-Q5 scale when establishing priorities.

One alternative is to consider welfare interests such as health, bodily integrity, opportunity for social interaction, and so on, which according to Rogers and Walker¹⁸ provide a measure of the level of harm that one should try to prevent. Welfare interests are more difficult to measure and there is no validated scale available. For example, some people with a chronic illness report that they feel healthy,²⁵ but this is not true for everybody with a chronic illness. People inherently will have different thresholds for feeling healthy. Furthermore, like ulterior interests, meeting every welfare interest will not be a realistic outcome for everybody. Rogers and Walker in their description of welfare interests refer to Feinberg²⁶; however, one could argue that Feinberg himself is not completely clear in his formulation of welfare interests, particularly when considering recent research. For example, he mentions on page 37 'the integrity and normal functioning of one's body' as one of the requirements for welfare interests, and he goes on to say that without the fulfilment of welfare interests 'a person is lost'. However, research from Lindsey,²⁵ for example, has shown that people without normal functioning of their bodies often report having fulfilling lives. For governments, promoting and financing a welfare interest-based level of functioning as suggested by Rogers and Walker¹⁸ would be very expensive; hence, when establishing what aspects governments should focus on apart from death, very basic capabilities such as the ones measured by the ED-Q5 scale are generally preferred.

There is some debate about what else governments should consider besides death and it was argued here that it should be a very



basic level of functioning. However, there is by no means a consensus on how the risk of death and risk of loss of function should be weighed against each other.

6 | BALANCING COST AND RISK

When it comes to screening, if there are ultimately no lives saved, the government should not fund the screening programme. However, screening typically will benefit some people and harm others. The previously mentioned example of population data from the Netherlands suggested that approximately 50% of the patients identified via screening were treated unnecessarily.¹⁴ However, one cannot identify who will or will not need treatment and hence the choice is left to the patient. Treatment is not entirely harmless as there will be the risk of dying from general anaesthesia and/or side effects to consider. For most people, undergoing treatment will not affect their long-term basic level of functioning as measured by, for example, ED-Q5 scores, although with treatment, whether necessary or unnecessary, their level of functioning will be reduced for a limited period. Hence, even with 50% being unnecessarily treated, it may still be worthwhile to offer the treatment because lives will be saved.

Overtreatment is also related to treatments provided to increase performance such as cognitive enhancers⁵ or beta-blockers.²¹ If this medication is not prescribed, the patients will not die and their ED-Q5 scores will not be significantly affected, apart from perhaps a slightly higher score on anxiety. Hence, it seems a reasonable decision for governments not to offer public funding for this, especially when the government does not have enough money to provide sufficient treatments to prevent death or severe disability. The compromise is that people can have these treatments if they want them, but they must pay for them themselves.

Governments have other responsibilities as well, apart from managing healthcare costs. In certain situations, it may be preferable for governments or similar public bodies to agree to create a level playing field, in the sense that everybody can have access to certain medical interventions, or nobody can. This is particularly relevant for sporting events. For the Olympic Games, the consensus is that natural talent, training, and practice should be tested in a competitive game, and this is not possible if medications are used by some and not others. For example, the rules of Olympic shooting events state that participants are not allowed to take beta-blockers, although exceptions can be made for participants needing them for cardiac conditions.²² Along with testing for illegal and performance-enhancing drugs, Olympians can also be tested for beta-blockers, which has resulted in people being caught and disqualified from the event (Olympics: Korean double medallist expelled for drug use | Olympics 2008 | The Guardian).

Students may want to use cognitive enhancers to improve their exam performance or concentration in general. Currently, the established practice in education is that people should not use cognitive enhancers.²⁷ However, what is widely deemed acceptable changes with time as technology and attitudes develop; for example, it was established practice that people did not use calculators in

physics exams until relatively recently, whereas they are now accepted in most exam situations. Thus, established practices can change. Furthermore, monitoring whether people have taken forbidden medications is possible during the Olympic Games and during training, but it is not feasible to check every student for the use of cognitive enhancers⁵ during the preparation time for every exam and during the exam itself. Similarly, one cannot test musicians for taking beta-blockers²¹ during every concert.

Governments can and should forbid the sale and use of medications that are too dangerous. Similarly, governments could enforce a level playing field for specific areas. This restriction is only possible in specific activities where enforcement of the rules and sufficient testing is possible and when there is a consensus about what a level playing field entails.

Politicians—at least in democratic societies—have to be chosen by the public. Therefore, their decisions are not based purely on factual information. Sometimes, it is difficult to remove something that the public has become used to, for example, screening opportunities and facilities,²⁸ even if the screening itself is not very effective. This is not the only factor politicians must consider: sometimes people want access to a new treatment,²⁹ regardless of its cost and effectiveness, for example, some cancer drugs may extend a terminal patient's life by only a few weeks, at a high financial cost, yet the patient or their family may request or demand the treatment. Because politicians want to be elected again, they are not only influenced by efficiency, but also by popular opinion. Similar to individual patients being less rational in their decision-making, we also have to accept that politicians will sometimes propose measures based on public opinion and not on the latest science. To some extent, this is the price we pay for living in a democracy.

In summary, governments and other public bodies are interested in the outcome. Hence, governments should focus on the prevention of death and severe disability. There is no priority for governments to fund treatments to improve performance. Legislation to forbid medical interventions to improve performance could be introduced by governments for activities in which having a level playing field is important and where it is possible to check that the rules are followed.

7 | DOCTORS' AND OTHER HEALTHCARE PROFESSIONALS' PERSPECTIVE

Healthcare professionals must inform both patients and the government. Patients and the government will ask different questions as they have different interests.

In the case of possible overdiagnosis after screening, patients need adequate information and doctors or other healthcare professionals must explain the problem clearly, including discussing the limitations of the available data. Patients must make their own decisions and when it comes to screening, in typical overdiagnosis cases, there is something to be said for both decisions: treatment or no treatment. Patients may ask their doctor, 'what would you do?'. It is probably best for the doctor not to answer this question directly, but to discuss

with the patient the issues behind the question, namely that nobody knows the right answer and that there are arguments in favour and against treatment and that you, as a doctor, do not have access to special knowledge.

Patients may also ask healthcare professionals for treatments to increase performance. If it is legally allowed, there are no reasons against healthcare professionals prescribing or offering such treatments, but patients need to make an informed decision and it should be explained that, currently, the evidence for their effectiveness is limited.

Healthcare professionals can also be asked to give governments advice regarding screening and possible treatments. Governments will determine the priorities and they normally decide to fund the screening programmes that save the most lives. To reduce the chance of overtreatment, future research should focus on identifying which minor lesions are going to become malignant, because that would solve the problem of overdiagnosis and overtreatment and indirectly save costs.

Governments may also ask for advice regarding the funding of treatments that improve functioning but do not reduce death or severe disability. Governments may want a level playing field in certain areas, but this is ultimately a decision for the government not for healthcare professionals. For the sporting competitions such as Olympic shooting events, there are resources available to check for medication use. However, providing these resources to ensure a level playing field for academic activities or other performance-based events represents a significant investment for governments, to the extent that this may never be possible for every competitive exam or orchestral performance.

In summary, healthcare professionals can advise patients, governments, and other public bodies about the present state of medical knowledge; however, they cannot solve the problem of whether an individual patient should have treatment, if the data are unclear. They can advise a government which screening programme is most likely to save lives, but ultimately it remains a decision for the government whether or not to fund it.

8 | SUMMARY AND CONCLUSION

Overtreatment is a problem after screening because some patients get interventions that they do not need. Patients may also ask for treatments not to prevent death or severe disability, but to improve their performance in competitive exams or sporting events.

In this paper, a clear distinction was made between the perspective of the patient and that of the government or other public bodies. From these different perspectives, it becomes clear that a patient can make their decision based on a variety of factors, including the proven advantages and disadvantages, potential harm and benefits or simply not liking something. For public bodies, it is essential to look at the outcome: prevention of death and severe disablement and sometimes also creating a level playing field. Furthermore, both individual patients and governments can sometimes be influenced by less

rational factors, but this must be accepted in order to maintain a democracy and respect patient autonomy.

There is no general solution for the problem of overtreatment because of the different guiding ideas for patients and society: autonomy and outcome. However, the government or other public bodies can legislate against overtreatment in some specific situations and scientists may be able to offer much better predictions based on the screening results to reduce overtreatment in the future.

FUNDING

There was no funding for this study

ENDNOTE

¹ In this article, a broad concept of medical interventions will be used, which includes psychological interventions.

DATA AVAILABILITY STATEMENT

Data sharing not applicable - no new data generated.

ORCID

Dieneke Hubbeling  <https://orcid.org/0000-0002-3460-3139>

REFERENCES

1. Welch HG, Prorok PC, O'Malley AJ, Kramer BS. Breast-cancer tumor size, overdiagnosis, and mammography screening effectiveness. *N Engl J Med*. 2016;375(15):1438-1447.
2. Ahn HS, Kim HJ, Welch HG. Korea's thyroid-cancer "epidemic"—screening and Overdiagnosis. *N Engl J Med*. 2014;371(19):1765-1767.
3. Moynihan R, Doust J, Henry D. Preventing overdiagnosis: how to stop harming the healthy. *BMJ*. 2012;344(7859):1-6.
4. Merten EC, Cwik JC, Margraf J, Schneider S. Overdiagnosis of mental disorders in children and adolescents (in developed countries). *Child Adolesc Psychiatry Ment Health*. 2017;11(1):1-11.
5. Chatterjee A. The promise and predicament of cosmetic neurology. *J Med Ethics*. 2006;32(2):110-113.
6. Schermer M, Bolt I, De Jongh R, Olivier B. The future of psychopharmacological enhancements: expectations and policies. *Neuroethics*. 2009;2(2):75-87.
7. Cooper R. The concept of disorder revisited: robustly value-laden despite change. *Aristot Soc Supplementary Volume*. 2020;94(1):141-161.
8. Ereshefsky M. Defining "health" and "disease". *Stud Hist Philos Sci Part C Stud Hist Philos Biol Biomed Sci*. 2009;40(3):221-227.
9. Department of Health and Social Care. Guidance NHS Choice Framework. Accessed August 14, 2021. <https://www.gov.uk/government/publications/the-nhs-choice-framework>
10. Hofmann B. Getting personal on overdiagnosis: on defining overdiagnosis from the perspective of the individual person. *J Eval Clin Pract*. 2018;24(5):983-987.
11. Dyer C. Surgeon amputated healthy legs. *BMJ*. 2000;320:332.
12. Fisher K, Smith R. More work is needed to explain why patients ask for amputation of healthy limbs. *BMJ*. 2000;320:1147.
13. Irwin M, Kong V, Bidinger. Quantifying and communicating perioperative risk. *Anesthesia*. 2014;69(9):1299-1313.
14. Autier P, Boniol M, Koechlin A, Pizot C, Boniol M. Effectiveness of and overdiagnosis from mammography screening in The Netherlands: population based study. *BMJ*. 2017;359:j5224.



15. Hurley R. Overdiagnosis and the cancer label. *BMJ*. 2018;362:3528.
16. Connolly T, Zeelenberg M. Regret in decision making. *Curr Dir Psychol Sci*. 2002;11(6):212-216.
17. Danziger S, Levav J, Avnaim-Pesso L. Extraneous factors in judicial decisions. *Proc Natl Acad Sci U S A*. 2011;108(17):6889-6892.
18. Rogers WA, Walker MJ. Précising definitions as a way to combat overdiagnosis. *J Eval Clin Pract*. 2018;24(5):1019-1025.
19. Kortekaas-Rijlaarsdam AF, Luman M, Sonuga-Barke E, Oosterlaan J. Does methylphenidate improve academic performance? A systematic review and meta-analysis. *Eur Child Adolesc Psychiatry*. 2019;28(2):155-164.
20. Advokat C, Scheithauer M, Quednow BB. Attention-deficit hyperactivity disorder (ADHD) stimulant medications as cognitive enhancers. *Front Neurosci*. 2013;7:1-8.
21. Fernholz I, Mumm JLM, Plag J, et al. Performance anxiety in professional musicians: a systematic review on prevalence, risk factors and clinical treatment effects. *Psychol Med*. 2019;49(14):2287-2306.
22. Fitch K. Proscribed drugs at the Olympic games: permitted use and misuse (doping) by athletes. *Clin Med J R Coll Physicians London*. 2012;12(3):257-260.
23. Greely H, Sahakian B, Harris J, et al. Towards responsible use of cognitive-enhancing drugs by the healthy. *Nature*. 2008;456:702-705.
24. Devlin NJ, Brooks R. EQ-5D and the EuroQol group: past, present and future. *Appl Health Econ Health Policy*. 2017;15(2):127-137.
25. Lindsey E. Health within illness: experiences of chronically ill/disabled people. *J Adv Nurs*. 1996;24(3):465-472.
26. Feinberg J. *The Moral Limits of the Criminal Law Volume 1: Harm to Others*. Oxford: Oxford University Press; 1987.
27. Schermer M. On the argument that enhancement is "cheating". *J Med Ethics*. 2008;34(2):85-88.
28. Hubbeling D. Rationing decisions and the endowment effect. *J R Soc Med*. 2020;113(3):98-100.
29. Hofmann B. Internal barriers to efficiency: why disinvestments are so difficult. Identifying and addressing internal barriers to disinvestment of health technologies. *Heal Econ Policy Law*. 2021;16(4):473-488.

How to cite this article: Hubbeling D. Overtreatment: Is a solution possible? *J Eval Clin Pract*. 2022;28:821-827.
<https://doi.org/10.1111/jep.13632>