Ethical issues raised by thyroid cancer overdiagnosis: a matter for public health?

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Abstract

Current practices of identifying and treating small indolent thyroid cancers constitute an important but in some ways unusual form of overdiagnosis. Overdiagnosis refers to diagnoses that generally harm rather than benefit patients, primarily because the diagnosed condition is not a harmful form of the disease in question. With thyroid cancer overdiagnosis, individual patients are harmed by the psycho-social impact of a cancer diagnosis, the experience of partial or total thyroidectomy (with or without radioactive iodine), the possible need for lifelong thyroid replacement hormone and monitoring, and potential surgical complications and other side effects. These harms seem unlikely to be outweighed by any putative benefit of knowing about a cancer that would not have caused problems if not identified or treated. In addition to harms to patients, the costs of treating and supporting large numbers of patients overdiagnosed with thyroid cancer impact upon healthcare services and have significant opportunity costs. Unlike many other overdiagnosed cancers, accurate risk stratification is possible with thyroid cancer. In theory this could facilitate informed shared decision-making at an individual patient level. We argue in this paper, however, that responses to the current problems of overdiagnosis that are grounded in conventional clinical ethics frameworks and rely on facilitating shared decision-making or informed patient choice will be insufficient to stem the rising incidence and associated harms and costs of overdiagnosed thyroid cancer. We propose that thyroid cancer overdiagnosis should be understood as a public health problem which justifies state interventions to minimise the harms.
INTRODUCTION

Thyroid cancer overdiagnosis results from the identification of small indolent cancers that, if left undiagnosed, would not lead to harm to the individual.\(^1\) Despite the excellent prognosis of small thyroid cancers, many of those diagnosed receive extensive treatment including thyroidectomy, radioactive iodine and life-long thyroid hormone replacement.\(^2\) The overdiagnosis and subsequent overtreatment are not only potentially harmful to individuals, they use considerable healthcare resources that might otherwise be directed to treating individuals with symptomatic disease.\(^3\) In responding to the problem of thyroid cancer overdiagnosis, we argue that decisions about investigations and treatment should be addressed through public health interventions rather than left to the individual choices of patients and clinicians. First, we explain overdiagnosis and how thyroid cancer overdiagnosis occurs, before discussing the harms. Finally, we explain why an ‘informed choice’ approach to thyroid cancer overdiagnosis is unlikely to reduce harm; instead we argue for a public health approach for both ethical and pragmatic reasons.

OVERDIAGNOSIS


Overdiagnosis refers to the diagnosis (and usually treatment) of a condition that, if left undetected and untreated, would not have caused a person any harm in their lifetime. Overdiagnosis refers to the diagnosis (and usually treatment) of a condition that, if left undetected and untreated, would not have caused a person any harm in their lifetime. Several cancers and other conditions such as osteoporosis, gestational diabetes, obesity, low testosterone, pulmonary emboli and aortic aneurysms are liable to overdiagnosis because current diagnostic processes fail to discriminate adequately between harmful and harmless cases.

Although debate about how to define overdiagnosis is ongoing, there is some agreement that the key features are: i) a diagnosis based upon currently accepted


criteria for identifying the presence of a particular condition; and ii) failure of that
diagnosis to track the presence of harmful disease in the individual diagnosed.7 Such
diagnoses harm rather than benefit people because the identified disease would not
lead to the usual or expected adverse health consequences in the individuals
concerned; instead individuals are harmed by the diagnosis and subsequent medical
interventions, with no concomitant health benefits.
Cancer overdiagnosis is a population-level phenomenon in that knowledge about it
comes from epidemiological studies or randomised controlled trials comparing
screened and unscreened populations.8 At the population level there is evidence of
increasing incidence of various cancers with little effect on overall disease mortality.
For some types of cancer, it is not possible to identify which individuals amongst the
diagnosed are the ones who are overdiagnosed, so all are usually offered interventions
designed to treat aggressive disease. Those whose disease would not have harmed
them will thus be overtreated (because their disease is non-threatening).
Epidemiological evidence suggests that between 10-50% of screening-detected breast

7 Note Carter et al. disagree with the distinction between harmful and harmless
disease; they define overdiagnosis in terms of a diagnosis +/- intervention that is on
balance, more harmful than beneficial. (op. cit. note 6).
605-613.
cancers are overdiagnosed.⁹ That is, they would not have harmed the diagnosed women had they remained undetected. As it is not possible to identify which particular women are overdiagnosed with breast cancer, most women receive surgery with or without chemo-or radio-therapy.

It has long been recognised that screening programs detect apparently harmless cancers.¹⁰ For many cancers, there are large reservoirs of sub-clinical disease, much of which is insignificant.¹¹ The introduction and expansion of screening programs, or the use of new technologies capable of detecting earlier cases, causes an apparent increase in the incidence of the cancer in question as the sub-clinical reservoir is ‘found’.¹² If all of the newly detected cases were harmful instances of the cancers in question, there would be a subsequent drop in the incidence of advanced cases and mortality, as these would have been prevented by early diagnosis and intervention. But for overdiagnosed cancers rising rates of detection are not accompanied by substantial changes in the rates of advanced disease or mortality.¹³

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¹² Brito et al., op. cit. note 2.

¹³ Welch & Black, op. cit. note 8.
Addressing overdiagnosis is complicated by the fact that it is a difficult concept to explain and can generate much uncertainty among people encouraged to make informed choices about participating in screening programs. And in a final twist, people who have or may have been overdiagnosed often regard themselves as ‘cured’ by the treatment rather than recognising or expressing concern that they might have been treated for a cancer that did not require intervention in the first place.

THYROID CANCER OVERDIAGNOSIS

Rates of thyroid cancer diagnosis have increased substantially around the world in recent decades. In South Korea, the rate rose 15-fold between 1993 and 2011, making it that country’s commonest cancer. The British age-standardised incidence more than doubled between 1975 and 2008; likewise rates doubled in the USA between the 1990s and the 2000s. Similar rises have been observed in other countries. The vast majority of the identified cancers are well-differentiated papillary thyroid cancers

15 Welch & Black, op. cit. note 8.
18 Brito et al., op. cit. note 2.
19 Vaccarella et al., op. cit. note 1.
(PTC), including many < 1 cm in diameter, known as micro-papillary thyroid cancers (mPTC).20

There seem to be two principal sources of the extra diagnoses. In many countries, including Western Europe, the USA and South Korea, ultrasound examination of the thyroid is increasingly undertaken on a ‘routine’ basis, on people who are asymptomatic.21 Thyroid cancers are also identified incidentally when ultrasound, computerised tomography (CT) and positron emission tomography (PET) are used during investigations for non-cancerous thyroid disease, cranial arterial disease, or other pathology in adjacent organs.22 Suspected lesions are confirmed by ultrasound-guided fine needle aspiration (FNA) biopsy for histopathological diagnosis, and patients are offered intervention (partial or total thyroidectomy, with or without radioactive iodine [RAI]).

There are several reasons for interpreting this explosion in the apparent incidence of thyroid cancer as overdiagnosis. First, there has not been the fall in overall mortality from advanced thyroid cancer which would be expected if malignant cancers were

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20 Ahn et al., op. cit. note 16.
21 Brito et al., op. cit. note 2; Ahn et al, op. cit. note 16.
being identified and treated much earlier in the course of the disease. Second, autopsy data indicate a subclinical reservoir of differentiated thyroid cancer in 15-30% of the “well” population, suggesting that harmless tumours are present in many people. However, thyroid cancer differs in one important respect from other overdiagnosed cancers such as breast cancer. Risk-stratification systems for differentiated thyroid cancer can prospectively sort low risk from high risk tumours. High risk tumours are (at the time of diagnosis) either >5cm or with significant spread beyond the thyroid in patients aged over 50 (female) or 40 (male) years; or tumours with distant metastases in patients of any age. These characteristics can be assessed at the point of diagnosis (i.e. prior to post-operative pathology reports), and allow accurate predictions for individual patients regarding their likelihood of tumour recurrence and long-term survival.

The appropriateness of stratifying patients by risk and tailoring treatment to features of individual patients has been confirmed by various studies. For example, a UK centre treated low risk patients (based on age, tumour size and spread, and histological features of tumour) with a partial thyroidectomy (lobectomy) wherever feasible and used RAI selectively for high risk patients. Long-term follow-up (for a

23 Welch & Black, op. cit. note 8; Brito et al, op. cit. note 2.


25 Lobectomy is a type of partial thyroidectomy in which a lobe of the thyroid is removed, conventionally taking the isthmus with it.
mean of thirteen years) found that patients who were deemed to be low risk and treated with only lobectomy suffered no reduction in cancer specific survival.\textsuperscript{26}

National guidelines are gradually moving towards risk-stratified approaches. British Thyroid Association guidelines recommend against ‘routine’ total thyroidectomy for tumours less than 4 cm in size; and for lobectomy only for unifocal mPTCs.\textsuperscript{27}

Likewise, the American Thyroid Association recommends lobectomy only for low risk tumours between 1-4 cm; and consideration of active surveillance for low risk mPTCs.\textsuperscript{28}

The ATA recommendation to consider active surveillance for mPTCs is based on Japanese research which suggests that any surgery may be unnecessary for patients with mPTC.\textsuperscript{29} Over a fifteen year period, researchers found no significant difference in the rate of novel lymph node metastases in a group initially treated by observation only compared to lymph node recurrence in a group initially treated with surgery.

\textsuperscript{26} W.L. Craig. Differentiated thyroid cancer: the rationale for a risk stratified approach to management. MD thesis, University of Aberdeen 2013.

http://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.577596.

\textsuperscript{27} British Thyroid Association (BTA). Guidelines for the Management of Thyroid Cancer. \textit{Clin Endocrinol} 2014; p. 33.

\textsuperscript{28} B.R. Haugen et al. American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer: The American Thyroid Association Guidelines Task Force on Thyroid Nodules and Differentiated Thyroid Cancer. \textit{Thyroid} 2016; 26: p.18 and p. 32.

Later surgery, triggered by tumour growth or clinical detection of lymph node
disease, did not affect long-term recurrence or disease-specific survival. Thus there
was no disadvantage to patients who were observed initially but whose cancer
progressed compared with those receiving surgery at the time of diagnosis. Active
surveillance did not lead to worse recurrence or survival outcomes than immediate
surgery.

Given the natural history of thyroid cancer and the reliability of risk stratification, it
might be suggested that thyroid cancer does not meet the overdiagnosis criterion of
failure to track harmful disease.\textsuperscript{30} But even though it is possible in principle to
distinguish at diagnosis those patients with very small cancers for whom observation
is a safe (and less harmful) course of action than immediate surgery, this information
has not yet been widely taken up in practice.\textsuperscript{31} Thus thyroid cancer remains very
much an overdiagnosed (and overtreated) condition.

ETHICAL CONCERNS ASSOCIATED WITH THYROID CANCER
OVERDIAGNOSIS

\textsuperscript{30} As per note 7, some scholars, eg Carter et al. (op. cit. note 6) reject the distinction
between harmless and harmful disease. Thyroid cancer would still, however, meet
their criterion for overdiagnosis.

\textsuperscript{31} W.L. Craig et al. A cross-specialty survey to assess the application of risk stratified
surgery for differentiated thyroid cancer in the UK. \textit{Ann R Coll Surg Engl} 2014; 96:
466-474.
A number of ethical issues arise regarding thyroid cancer overdiagnosis. We discuss these in three main clusters, focusing on negative implications for patients, negative implications for health services and societies, and conflicts of interest.

For individuals, harms may be both immediate and far-reaching. Patients may experience pain, inconvenience and anxiety associated with the initial diagnostic interventions (including FNA) and cancer diagnosis. The health consequences of any subsequent treatment may be significant. Both lobectomy and total thyroidectomy are associated with surgical complications (e.g. 2% of patients suffer impaired voice quality from permanent damage to their recurrent laryngeal nerve); while postsurgical hypoparathyroidism leaves about 5% of patients requiring lifelong calcium supplementation. Most thyroid cancer patients are placed on lifelong thyroxine replacement, requiring daily medication and regular monitoring, and increasing risks of osteoporosis and atrial fibrillation. Side effects of RAI include impaired salivary gland function, reduced fertility and increased risk of secondary malignancies. Some of the broader and long-term effects experienced by individuals relate to the practical demands of attending appointments, complying with medications, and


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coping with the impact of treatments and side-effects on participation in work and other activities. The psycho-social implications of ‘having cancer’ include increased cancer worry, fear of recurrence, and threats to personal identity, social participation and relationships. These may constitute a major and persistent biographical disruption for some people. Furthermore, thyroid cancer can generate significant financial disadvantage. In the USA, people with (any) cancer have 2.65 times higher bankruptcy rates than people without cancer, but this is 3.46 times higher for those with thyroid cancer. This may reflect the fact that thyroid cancer diagnoses are made in relatively young people who may be (or become) financially insecure, due to high debt-to-income ratios, and the potential loss of employer-provided health insurance if cancer treatment impairs ability to work.

The diagnosis and treatment of thyroid cancer raise ethical issues relating to respect for patient autonomy and support for decision-making. As noted above, overdiagnosis is a potentially difficult and counter-intuitive concept to explain. People sometimes undertake tests that are likely to trigger overdiagnosis without being aware of their implications, and then accept subsequent interventions despite the potential lack of


37 C. Sturgeon. Patients with thyroid cancer are at higher risk of bankruptcy than patients with other types of cancer, or those without cancer. *Clin Thyroidol* 2013; 25: 150–151.

38 Hersch et al., *op. cit*. note 14.
benefits. The reliability of risk stratification for thyroid cancer should make it relatively straightforward to explain, but current high rates of treatment even for low risk mPTC suggest that many people currently undergo diagnosis and treatment without appreciating the likelihood and implications of overdiagnosis, or that conservative treatment options are available and safe. A recent study in Korea found that at least some women who participated in focus groups about the risks of overdiagnosis found the concept hard to understand, and would continue to be screened for thyroid cancer based on advice from trusted clinicians.

The overdiagnosis of thyroid cancer also has negative implications for health services. Perhaps most striking are the costs. As rates of diagnosis have increased, so have demands upon health services. The cost in the US of treating thyroid cancer is estimated to be nearly US$2.3 billion in 2016, rising to $3 billion by 2019. UK data for the period 1997-2012 shows a 55% increase in thyroid operations; while in

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39 This view is supported by a recent study with 20 patients recently diagnosed with mPTCs, none of whom were offered active surveillance or shared decision making (B. Nickel et al. Understanding communication, decision making and treatment preferences for papillary thyroid cancer. In European Association for Communication in Healthcare Conference, Heidelberg, 7-10 September 2016.)


41 Aschebrook-Kilfoy et al., op. cit. note 3.

42 Craig et al., op. cit. note 3.
Korea, the escalating rates of thyroid cancer are matched by escalating rates of thyroidectomy.\(^43\)

Where the costs of these extra services fall will depend to some extent upon the structure and funding of healthcare systems. Here we describe standard thyroid cancer aftercare to demonstrate the demand on health care resources, irrespective of funding model. Any low-risk patients who are offered active surveillance require regular (usually six-monthly) specialist clinical examination, ultrasounds and blood tests, for an indefinite period of time, with further investigations triggered depending on findings. Following lobectomy, most patients are given life-long thyroxine replacement; this requires regular monitoring (typically six-monthly specialist clinical examinations and blood tests for the first two years, then annually for at least five years, and possibly for life.\(^44\) Following total thyroidectomy, patients require life-long thyroxine replacement with closer monitoring than for lobectomy.

The long-term follow-up and potential cascades of further investigation and treatment add to health care costs and (to the extent that diagnoses are overdiagnoses) do not

\(^{43}\) Ahn et al., op. cit. note 16.

\(^{44}\) Of note, there is no accepted best practice regarding optimal long-term follow up for differentiated thyroid cancer. As this may recur up to twenty years after the initial diagnosis, long term follow-up may be deemed necessary (C.S. Grant. Recurrence of papillary thyroid cancer after optimised surgery *Gland Surgery* 2015; 4: 52-62; Haugen et al., op. cit. note 28.) Due to lack of consistent routine follow up, it is not known whether outcomes differ between low-risk patients subject to regular surveillance versus those who re-present only when symptomatic (i.e. they or others notice a lump in their neck).
generate health gains. In the process, considerable resources are rendered unavailable for the treatment of other health problems, especially in fixed budget publicly funded systems. It is not feasible to pinpoint the opportunity costs of thyroid cancer overdiagnosis, but the rising rates of diagnosis and high costs of long-term follow up suggest this is likely a multi-billion dollar problem. Ethical concern is exacerbated because resources are thereby diverted away from the prevention or treatment of symptomatic disease. Not only do patients who miss out on their hip replacement or cataract operations have impaired quality of life, so too do those who have to live with the consequences of thyroid cancer overdiagnosis.

A third cluster of ethical concerns relate to the various conflicts of interest that arise in, and may contribute to, the overdiagnosis of thyroid cancer. Fee for service remuneration systems are likely to increase the routine use of high resolution ultrasounds and other imaging modalities, while rates of diagnosis and treatment may be exacerbated in systems in which primary care physicians, radiologists and surgeons are able to co-ordinate patient referrals to their mutual benefit (financial or otherwise). In Korea, physicians often offer opportunistic thyroid cancer screening in conjunction with mandated screening for other conditions.

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45 Aschebrook-Kilfoy et al., *op. cit.* note 3.


47 Anecdotally, in some Western European countries there are informal ‘cooperatives’ in which clinicians cross-refer patients for diagnosis, investigation and treatment, to maximise income.

48 Park et al., *op. cit.* note 40.
There may be other structural conflicts of interest. For example, British surgical associations have previously required a minimum of twenty five cases of thyroid surgery per year (not necessarily all for cancer) for accreditation as a competent thyroid surgeon. Targets based on patient volume may bias surgeons’ risk assessments and communication with patients towards investigation and operation rather than surveillance.

**CLINICAL ETHICS AND THYROID CANCER OVERDIAGNOSIS**

Prima facie, thyroid cancer overdiagnosis might look like a matter for clinical ethics, to be dealt with using accepted frameworks for considering the appropriateness of interactions between individual practitioners and patients. Within such frameworks, a focus on autonomous decision making tends to emphasise the provision of information and the need to ensure patients are: able to understand the potential benefits and harms (and perhaps the potentially conflicting interests of those offering intervention); and free to make an informed choice (perhaps supported by a process of shared decision-making). In this case attention would be directed to two key decision points: regarding an initial investigation that might lead to overdiagnosis; and regarding treatment of any identified lesions.

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49 Craig, op. cit. note 26, p. 183.

In the context of breast-cancer screening, investigators have been able to develop and deliver a decision aid that increases women’s understanding of overdiagnosis as well as of the benefits of screening and risk of false positive results.\textsuperscript{51} Theoretically, evidence about risk stratification might make decision-making about overdiagnosis easier to explain in the context of thyroid cancer. Nonetheless, the development and provision of decisions aids or other information resources about investigations with potential to trigger (over)diagnosis of thyroid cancer might be more complex than for breast cancer. In jurisdictions where thyroid scans have become a routine part of a ‘check-up’ (e.g. USA, Korea), it may be feasible and reasonable to propose the use of such resources in these contexts. However, there are multiple other pathways into the diagnosis of thyroid cancer that make information provision highly complex. For example, some investigations are clinically indicated (e.g. for neck pathology), so multiple and highly nuanced decision aids would be required. Some known barriers to the use of decision aids in practice\textsuperscript{52} are also likely to be highly salient in this context, especially if clinicians strongly favour intervention.

\textsuperscript{51} While the results were significant, even with the decision aid only 29% of the women randomised to receive the decision aid had adequate overall knowledge of the benefits of screening, overdiagnosis and false positives compared with 17% of the control group (J. Hersch et al. Use of a decision aid including information on overdetection to support informed choice about breast cancer screening: a randomised controlled trial. \textit{The Lancet} 2015; 385 (9978):1642-1652).

\textsuperscript{52} G. Elwyn et al. “Many miles to go..” A systematic review of the implementation of patient decision support interventions into routine clinical practice. \textit{BMC Med Inform Decis} 2013; 13(S2): S14
Once a cancer is detected, patients are faced with further decisions. The little empirical evidence to date suggests that in at least some countries, shared decision-making is rare in the context of decisions about the management of thyroid cancer. A recent Australian study found patients were told that surgery would be ‘curative’ for their slow growing thyroid cancer; the option of surveillance was not raised, but some participants indicated that they would have been willing to accept surveillance rather than surgery.\(^{53}\) This is consistent with the finding that some patients in the Japanese trial accepted surveillance instead of surgery.\(^{54}\) In view of internationally rising rates of thyroid surgery, these findings tend to support the suspicion that doctors generally either do not offer a non-surgical option or present the choice in a way that encourages patients to opt for surgery.

Without empirical evidence, it is hard to predict the choices that more informed patients might make, but it seems unlikely that supporting informed-decision-making will stem current rates of overtreatment. Of course when ethical frameworks emphasise decisional autonomy, the options patients choose and the implications of these are sometimes taken to matter less than whether or not they reflect the patient’s preferences. However, in the context of the various pressures and potential conflicts of interest noted above, we suggest it is particularly important to recognise the challenges of informing and ascertaining patients’ preferences in ways that warrant the normative significance that this way of thinking places on them.\(^{55}\)

\(^{53}\) Nickel et al., \textit{op. cit.} note 39.

\(^{54}\) Ito et al., \textit{op. cit.} note 29.

Given existing evidence about the reliability and safety of risk stratification, and the known harms of surgery, a widespread tendency to recommend or implicitly encourage surgery seems both clinically and ethically unwarranted. Indeed doctors could be justified in advising against, or not offering, surgery to patients with low risk thyroid tumours, on the grounds that the harms will (almost certainly) outweigh any benefits they might receive, and that surgery wastes healthcare resources. There are, however, several interconnected barriers to such a significant change from current professional practice. These include the emphasis on offering choice that is encouraged by strong focus within clinical ethics on decisional autonomy, a fear of medico-legal risk (e.g. if a patient offered surveillance suffered adverse outcomes from delayed treatment), and the various conflicts of interest mentioned above.

In summary, despite the merits of shared approaches to clinical decision-making, a clinical ethics approach that focuses on supporting more informed patient choice may do little to reduce the harms associated with thyroid cancer overdiagnosis. The main problems are that this approach does nothing to address the systemic drivers of thyroid cancer overdiagnosis and treatment, risks perpetuating some of the current inclinations towards intervention, and so will fail to stem the rising tide of individual and societal burdens and opportunity costs. A public health model is potentially more valuable for generating ethical responses to thyroid cancer overdiagnosis.

A PUBLIC HEALTH MATTER?

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56 Craig et al., op. cit. note 31.
In our view, thyroid cancer overdiagnosis should be addressed more as a problem of public health than one of individual clinical care, because it is only through state or system-level intervention that both the individual and the collective benefits of decreasing thyroid cancer overdiagnosis are likely to be realised.

‘Public health’ can be tricky to define. In general terms, the phrase usually refers to co-ordinated or collective actions by social actors (governments or public bodies) to promote and protect the health of populations; to ‘what we as a society do collectively to assure the conditions in which people can be healthy’. John Coggon has recently argued that an issue is one of public health if it triggers shared concerns because these are ‘the health-related matters that are everyone’s business’. He suggested there are ‘seven separate categories of meaning that are applied to public health’ (See Box 1).

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60 Ibid: p. 45-46.
In what follows, we draw on Coggon’s understanding of public health to make the case for claiming that thyroid cancer overdiagnosis should be viewed as a public health matter; and to argue that potential strategies to decrease the harm from thyroid cancer overdiagnosis fall within activities usually taken to be those of public health.

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The significant increase in both the diagnosis (incidence) and treatment of thyroid cancer indicates that the aggregate health of the population (Coggon’s sense seven) has deteriorated. As we have argued above, much of the increased incidence may be attributed to the detection of sub-clinical disease rather than a sudden rise in de novo thyroid cancers. Nonetheless, because of the rate and nature of interventions for overdiagnosed thyroid cancers, it seems reasonable to claim that the aggregate health of the population is worse than prior to the rise in detection because of the burden (often life-long) of treatments and associated morbidities from thyroid cancer overdiagnosis.

As well as harms to the health of individual patients (measurable at a population level), a number of the additional harms of thyroid cancer overdiagnosis that we discussed above (especially bankruptcy, decreased workforce participation, increased overall healthcare costs, diversion of resources and opportunity costs) affect communities as they affect individuals (Coggon’s sense six of conjoined beneficiaries). In countries with public healthcare systems, the public purse is supporting considerable medical activity with little apparent benefit. In private healthcare systems, increased costs of treatment contribute to rapidly rising insurance premiums, which are a burden on the population who rely on insurance for their healthcare needs. Thinking of thyroid cancer as a community as well as an individual harm suggests solidarity-based (rather than solely self-regarding) reasons for avoiding overdiagnosis and overtreatment. This may encourage people to invoke other-
regarding reasons for abstaining from thyroid cancer screening, analogous to herd immunity arguments that people consider regarding vaccination.  

Coggon’s sense three refers to public health in terms of social infrastructure: public health both reflects and is shaped by the social context. Thyroid cancer overdiagnosis might be considered a public health issue in this sense because in part it arises from and reflects the widely shared cultural phobias about cancer, exemplified by the axiom that, with cancer, it is ‘better safe than sorry’.  

This is evident in preferences to be tested, even for very slow growing cancers that would not cause problems, and in a tendency to regard early detection as a way of minimising potential regret.  

Poor understandings of risk generally - in both medical and lay populations – can exacerbate this prevailing attitude. The culture of litigation against medical practitioners, perhaps reinforced by inadequate social welfare arrangements for those disadvantaged by poor health, that is a feature of some jurisdictions, is another social


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feature that can add to overdiagnosis by fostering medico-legal fears about missing cancers.  

At least some of the drivers of thyroid cancer overdiagnosis fall within what can be legitimately considered government business, because they are systemic factors within organised healthcare (Coggon’s sense two). While not all health systems are public in the sense of the UK National Health Service, all healthcare systems fall under government control to a greater or lesser extent, either directly or through regulation of health insurance, or licensing of therapeutic goods etc. A number of drivers of overdiagnosis are thus a matter of government responsibility and control. Additionally, some consequences of thyroid cancer overdiagnosis, such as high rates of bankruptcy, increased unemployment, and effects on the health services, are matters for which governments have responsibility.

All this suggests that health policy and regulation may be appropriate and potentially effective interventions to reduce thyroid cancer overdiagnosis and associated harms, thus meshing with the first of Coggon’s seven senses. Potential policy interventions include:

• Regulating the approval and licencing of new diagnostic technologies, as part of governmental responsibilities regarding the safety and effectiveness of therapeutic goods and services. Regulatory bodies could assess potential for overdiagnosis to inform decisions about approvals of new diagnostic technologies.

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• Regulating the use of diagnostic technologies known to contribute to overdiagnosis. Widespread uptake of high sensitivity neck imaging is a direct cause of thyroid cancer overdiagnosis, and use of this technology could be curtailed by, for example, limiting referral rights or access to rebates.  

• Incentivising the use of polices about thyroid cancer treatment based upon risk stratification, for example by withholding remuneration for practitioners who perform surgery against indications based upon stratification; or publishing audits of quality of care based on the guidelines mentioned above.

• Reviewing the organisation of surgical care, to minimise perverse incentives. In the UK, management of thyroid disease has largely been transferred from general/thyroid surgeons to otorhinolaryngologists (ENT surgeons). Recent research suggests that ENT surgeons deliver more extensive surgery than general/thyroid surgeons for the same extent of disease or patient risk. Thus the potential for overtreatment increases as the disease management becomes more specialised. As the organisation of surgical care falls within the remit of federal, national or local departments of health, these health agencies have the power and responsibility to prevent changes to care that increase harms.

67 We note professional concern about thyroid cancer overdiagnosis and the development of discussion papers and/or guidelines to address this (e.g. Haugen et al., op. cit. note 28; BTA, op. cit. note 27; Hoang et al., op. cit. note 22.) but in our view, a regulatory framework is likely to be necessary to give force to professional initiatives.

68 Craig et al., op. cit. note 31; Haugen et al., op. cit. note 28.

69 Craig et al., op. cit. note 31;
• Identifying and responding to population level patterns of overdiagnosis. For example, physician age affects rates of thyroid cancer overdiagnosis, demonstrated by a lower incidence of thyroid cancer in areas with higher concentrations of older physicians.⁷⁰ This might lead to targeted interventions to curb overdiagnosis in younger physicians.

In our view, taking a combination of public health approaches is likely to reduce the harms from thyroid cancer more effectively than taking an approach that relies on patients shifting patterns of professional practice via shared decision making or other interventions to support informed choices at an individual level. In addition to reducing harms, other ethical considerations in favour of organisational level approaches include commitments to protect people who are vulnerable to overdiagnosis and its consequences, and to the fair distribution of benefits and burdens. Vulnerability to overtreatment for thyroid cancer can stem from a number of factors including fear of cancer, lack of knowledge about the risks, direct and indirect pressures to accept surgical intervention and so forth. These are unlikely to be adequately remediated through shared decision-making or informed choice type processes. A framework of policies and regulations aimed at minimising thyroid cancer overdiagnosis could, in contrast, protect against this vulnerability without exposing potential patients (or anyone else) to harm.

Systemic, organisational level approaches to reduce overdiagnosis will not impose undue burdens on any group of (potential) patients. The individuals who avoid overdiagnosis (through e.g. withholding of thyroid screening) are not thereby

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disadvantaged or harmed, and efforts could be made to ensure the benefits that accrue to individuals and communities from the decreased diversion of resources to thyroid cancer overdiagnosis are fairly distributed.

Strategies that involve placing restrictions on the use of screening/diagnostic strategies and/or on the circumstances in which surgery for thyroid cancer can be provided may raise a number of concerns. These include worries about denying access to medical interventions, limiting the independence of doctors, and governmental and/or medical paternalism. But while a population level approach would curtail the freedom of medical practitioners to operate on low risk patients, it is not clear that this is a freedom that should be protected, given what is known about the drivers of thyroid cancer overdiagnosis and the consequences of overtreatment. Such a limitation is consistent with evidence-based practice and the move to high value care by avoiding interventions of low or doubtful value; and with the use of clinical audits to determine quality of care. Both of these currently shape and

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constrain medical practice in ways that are generally deemed acceptable.\textsuperscript{73} Likewise, limiting exposure of individuals to investigations that precipitate overdiagnosis does not seem to be a worrying infringement of liberty, as this would not impede access to clinically indicated investigations. And offering patients in whom thyroid cancers are detected only those treatment options that are based on robust risk assessments seems consistent with good clinical care rather than an unwarranted restriction.

Under a public health-type approach, patients would be free to accept or reject proffered treatment (including surveillance), but they would not be free to request treatment that is not indicated by their level of risk, and therefore highly likely to be much more harmful than beneficial to them and their communities. We do not see this as undue rationing or undue paternalism, as the usual assumption in healthcare is that people are offered only effective treatments that are proportionate to the risk of their underlying condition. Most healthcare services are based on need and do not permit patients to choose treatments that are outside clinical indications. In addition, the reasons for limiting choice are not solely directed at the welfare of individual patients (although this is part of the motivation); as we have argued above, the public health is harmed by thyroid cancer overdiagnosis and this supports independent justifications for intervention.

**CONCLUSION**

In summary, there are several reasons to consider thyroid cancer overdiagnosis as a public health matter and therefore suitable for systemic or population level

intervention, rather than a matter solely to be considered at the level of individual clinical care. An approach based upon organisational policy and option-constraining regulation is likely to be more effective in shaping practice than voluntary professional regulation or a reliance on informed patient choice. In addition, since thyroid cancer overdiagnosis damages the public health, and many of the drivers are systemic, governments have a duty to take action rather than leaving decisions in the private realm.

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