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Complete List of Authors:	Rozbroj, Tomas; Monash University, Dept of Epidemiology and Preventive Medicine; Cabrini Health, Cabrini Institute Haas, Romi; Monash University, Monash Department of Clinical Epidemiology, Cabrini Institute; Cabrini Health, Cabrini Institute O'Connor, Denise; Monash University, School of Public Health and Preventive Medicine; Cabrini Health, Cabrini Institute Thomas, Rae; Bond University, Faculty of Health Sciences and Medicine McCaffery, Kirsten; The University of Sydney, Sydney Health Literacy Lab, School of Public Health; The University of Sydney, Carter, Stacy; University of Wollongong, Australian Centre for Health Engagement, Evidence and Values Buchbinder, Rachelle; Monash University, Monash Department of Clinical Epidemiology, Cabrini Institute
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Patient and public understanding of overtesting and overdiagnosis: Protocol for thematic meta-synthesis of qualitative studies

Tomas Rozbroj (tomas.rozbroj@monash.edu) [1,2] *, Romi Haas (romi.haas@monash.edu) [1,2], Denise O'Connor (denise.oconnor@monash.edu) [1,2], Rae Thomas (rthomas@bond.edu.au) [3], Kirsten McCaffery (kirsten.mccaffery@sydney.edu.au) [4] , Stacy Carter (stacyc@uow.edu.au) [5], Rachelle Buchbinder (rachelle.buchbinder@monash.edu) [1,2].

1. Monash Department of Clinical Epidemiology, Cabrini Institute, Malvern, Victoria, Australia.
2. Department of Epidemiology and Preventive Medicine, School of Public Health and Preventive Medicine, Monash University, Melbourne, Victoria, Australia.
3. Institute for Evidence-Based Healthcare, Bond University, Gold Coast, Queensland, Australia.
4. School of Public Health, University of Sydney, Sydney, New South Wales, Australia
5. Australian Centre for Health Engagement, Evidence and Values, University of Wollongong, Australia
* Corresponding author

Correspondence

Tomas Rozbroj
Monash Department of Clinical Epidemiology, Cabrini Institute
4 Drysdale Street, Malvern
Victoria 3144
Australia

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Competing interests

None.

Abstract

Introduction

Examining patient and public understanding of overtesting and overdiagnosis (OverTD) is vital for reducing the burden of OverTD. Studies from disparate contexts, disciplines and focusing on disparate healthcare issues have examined patient and public understanding of OverTD. A synthesis is needed to bring this literature together, examine common themes, strengthen conclusions and identify gaps. This will help steer further research, policy and practice to improve patient and public understanding of OverTD. The objective of this study is to synthesise qualitative research data about patient and public understanding of OverTD.

Methods and analysis

A thematic meta-synthesis will be used to synthesise primary qualitative research and qualitative components of primary mixed-methods research about patient and public understanding of OverTD. Studies published in English from any setting and year will be included. These will be identified using systematic searches in the Scopus, CINAHL, PsycINFO and MEDLINE databases. Studies that satisfy eligibility criteria will be assessed for methodological quality using the Critical Appraisal Skills Programme (CASP) checklist. Thematic meta-synthesis will comprise three stages: i) line-by-line coding; ii) generation of descriptive themes, and; iii) generation of analytic themes. Confidence in the synthesis findings will be assessed using the Grading of Recommendations Assessment, Development and Evaluation Confidence in Evidence (GRADE CERQual) approach. A summary of GRADE CERQual results will be presented alongside the key themes. Study eligibility screening, data extraction, analysis and the CASP and GRADE CERQual assessments will be undertaken independently by two review authors.

Ethics and dissemination

Ethics approval is not required for this secondary analysis of published data. The results will be disseminated in peer-reviewed journals, and may be presented in conference papers and elsewhere.

Trial registration number

[This study was submitted to PROSPERO on the 1st November, 2019 and we are awaiting registration. The registration reference number will be included prior to publication]

Strengths and limitations of this study

- The first meta-synthesis of qualitative research about patient and public understanding of overtesting and overdiagnosis (OverTD).
- Systematic search strategy informed by up-to-date evidence about database and keyword optimisation.
- Confidence in the qualitative meta-synthesis findings strengthened by use of the GRADE-CERQual approach.
- Scope of the research limited by the exclusion of studies not written in the English language and of grey literature.

Introduction

The high prevalence of overtesting, overdiagnosis and overtreatment across a range of health conditions is a global challenge [1]. Overtesting is when diagnostic tests that are not indicated are utilised [2]. It can lead to overdiagnosis [3], which is when a diagnosis is made in line with professional standards, but when it is unlikely to benefit the patient [4]. Overtesting and overdiagnosis can lead to overtreatment [2, 5], which is treatment that does more harm than good [6].

It is vitally important to reduce overtesting, overdiagnosis and overtreatment [7, 8]. Overtesting can lead to harms including unnecessary invasive procedures, false positives and misdiagnoses [2]. Overdiagnosis can lead to unwanted behavioural and psychological responses in patients, such as reduced participation in usual activities [9], stress and anxiety [10, 11]. A diagnosis primes patients and physicians to commence treatment, even for benign conditions [6]. Overtreatment can lead to patient suffering, treatment-related complications, loss of quality of life, time off work and other burdens [6, 12]. Medical overuse is massively costly to healthcare systems and to patients and their families [2, 13, 14], and must be reduced to maintain healthcare system sustainability [15].

Improving patient and public understanding of overtesting and overdiagnosis (OverTD) is key to reducing their incidence as well as the incidence of overtreatment [15, 16]. Presently, patients and the public often drive medical overuse. They tend to expect tests and diagnoses [17], overestimate their benefits [18, 19], underestimate their risks [20] and cope with uncertainty poorly [3, 21]. Few are aware that overtesting or overdiagnosis occurs [22, 23], and those who are often find the phenomena difficult to understand [23, 24]. Research suggests that patient outcomes would be improved if they understood OverTD better [25, 26]. Patients with better knowledge about OverTD make more appropriate screening and treatment decisions [23]. Patient knowledge also influences the tests and treatments prescribed by medical practitioners [27], who in some cases overuse medical interventions [28, 29]. Patients and the public want to be informed about OverTD [19], and need to understand both risks and benefits of medical interventions in order to participate in shared decision-making [30].

Research is increasingly examining patient and public understanding of OverTD [31]. In multiple countries, patient and public understandings of OverTD have been surveyed [22, 32], and qualitatively examined in relation to a range of conditions [19, 24-26, 33]. Researchers have studied the challenges of communicating about OverTD to the general public [25, 34, 35] as well as to particular patient groups, such as patients with low health literacy [36]. Strategies are being developed to overcome these communication challenges. These include the development of decision aids, which inform patients about the risks as well as benefits of particular medical interventions [23], such as breast cancer screening [37], and assist them in making evidence-backed healthcare decisions [38]. Other research has focused on refining patient educational tools. This includes studying how different concepts of OverTD resonate with patients and the public [39], the effects of information about overdiagnosis on patient screening decisions [19], and studying patients' understandings of their own diagnoses [10]. The use of mass media to reduce OverTD has also been studied, such as how media narratives can influence cancer screening decisions [40, 41] or promote better management of back pain [42].

Despite progress in research, important gaps in knowledge remain, which prevent the development of strategies to improve patient and public understanding of OverTD [16, 43, 44]. Existing studies are scattered across disciplines, contexts and focus on disparate medical conditions [45], and it is

difficult to appraise the overall state of research or glean its collective insights. It is known that patients and the public find OverTD unintuitive, but little is known about why [15, 46]. A synthesis of qualitative data from research examining patient and public understanding of OverTD is needed to help address these gaps. The synthesis will systemise insights from disparate disciplines, contexts and topic areas to identify overall themes. Furthermore, a third-order analysis of existing research may generate new models for thinking about patient and public understanding of OverTD. The findings will be valuable for targeting future research and informing the development of potential practice and policy interventions to improve patient and public understanding of OverTD.

Objective

The objective of this study is to synthesise data from qualitative research on patient and public understanding of overtesting and overdiagnosis.

Methods

Thematic meta-synthesis will be used to examine primary qualitative research and qualitative components of mixed-methods research about patient and public understanding of OverTD.

The protocol is presented in accordance with the Preferred Reporting Items for Systematic review and Meta-Analysis Protocols (PRISMA-P) checklist [47] (available in Appendix 1), and registered on PROSPERO (reference number: ##TBC, see Abstract).

Study selection criteria

Study selection criteria and their rationale are described in Table 1.

Table 1: study selection criteria

Inclusion criterion	Rationale
Primary, published, peer-reviewed studies	Restricting the synthesis to primary, published, peer-reviewed studies matches the aims of examining primary evidence.
Studies examining understanding	Understanding is defined as objectual understanding: understanding of something, such as collection of ideas or a subject matter [48]. Studies examining participants' knowledge, perceptions, sentiments, values or experiential understanding will be included.
Among patients and/or the public	The synthesis will focus on both patients and the public, as these are often fluid, indistinct categories in relation to screening and diagnoses. For example, people in OECD countries have an average of 6.9 medical consultations per year [49]. Each time they potentially transition between being the public and a patient, making screening and diagnostic choices in reference to their broader ideas and experiences. This makes both patient and public understandings important to examine. However, patient and public involvement in healthcare differs [50]. To account for these differences, studies about patients will be differentiated from studies about the public in analysis.
Of overtesting and/or overdiagnosis	Studies about both overtesting (OT) and overdiagnosis (OD) will be included, as both are deeply interlinked and underpinned by common

	broader patient ideas about healthcare. However, patient and public understandings of OT and OD may differ. To account for this, the analysis will differentiate between studies examining OT, OD, or both. Synonymous concepts to overtesting and overdiagnosis will be included, such as "over-detection" and "overuse of diagnostic testing". The term "overdiagnosis" was popularised relatively recently [51], but it was predated by earlier terms [52], and it is important to capture these earlier studies. Studies which did not explicitly aim to understand how to inform patients or the public about OverTD are outside the scope of this synthesis and will be excluded. Studies that only address overtreatment and not overtesting or overdiagnosis will also be excluded.
Either qualitative or mixed methods study design	Mixed-methods studies will be included where their qualitative components can still be examined in the thematic meta-synthesis. Quantitative components of mixed-methods studies will be excluded, as will studies where it is not possible to differentiate between quantitative and qualitative components of analysis.
Published in the English language	Only English language studies will be included, as the authors are English speakers, and relying on translations of non-English studies could introduce inaccuracies into the analysis.
Published in any year	There will be no date restrictions: older insights may still be relevant.
Conducted in any setting	There will be no setting restrictions: studies from all settings may potentially contain transferrable insights about patient and public understandings of OverTD.
Focusing on the general concepts of OverTD and/or in relation to any condition/s or interventions	While patient and public understanding of OverTD may differ depending on medical conditions, there may be underlying themes across conditions, so it is relevant to include studies relating to any conditions. The condition/s which a study focuses on will be noted. Study themes will be compared by conditions in analysis if the sample characteristics make this viable.

Search methods

The search process will comprise first an informal scoping stage to develop search strategies, and then a formal main stage to identify and collate eligible studies.

The scoping stage will be exploratory. Its aims are to become familiar with the literature, refine search parameters, identify MeSH terms and keywords and test the preliminary search strategy.

The main stage will comprise the formal literature search. It will be informed by the scoping stage, by search strategy guidelines from the Cochrane Collaboration [53, 54], guidelines for optimising

database searches for medical qualitative research [55], and guidelines for searching the individual databases used, such as for MEDLINE [56] and PsycINFO [57]. Search filters will be identified for each of the inclusion criteria. A subject librarian will contribute to the development of the search strategy.

The following databases will be used: Scopus, CINAHL, MEDLINE and PsycINFO. These were chosen because they are most likely to index studies about patient and public understanding of OverTD: social research (Scopus); medicine/public health/health communication research (MEDLINE, CINAHL); psychological research (PsychINO) and generalist fields (Scopus). Database selection was also informed by research showing that Scopus, MEDLINE and CINAHL searches retrieve some of the largest numbers of qualitative health studies, and the largest number of qualitative health studies not listed by other databases [55]. Additionally, PsycINFO was included despite indexing relatively few unique studies [55] because psychological research may be particularly relevant for this synthesis. Examples of all provisional search strategies, including filters for each criterion and Boolean operators, are included in Appendix 2.

Even where database selection is optimised, one study shows that 7% of qualitative health studies that fit the search parameters will not be retrieved, with the majority not indexed by major databases [55]. To increase the chances of relevant studies being retrieved, the reference lists of all studies included in the final sample will be scanned for eligibility, and experts in the field will be contacted to identify studies that may have been missed. Potentially-eligible studies will be added to the data screening process (described below).

Selection of studies

Study selection will comprise the following steps:

1. All study records identified using the search strategy will be extracted with a PDF of the study manuscript into EndNote reference management software.
2. Duplicate studies will be removed from the data.
3. Study titles and abstracts will be screened for eligibility by two authors (TR and RH) working independently. Eligible studies and studies where eligibility cannot be clearly determined from the abstract and title will be included for full text review.
4. Full texts will be independently read and examined for eligibility by TR and RH using a standardised form. Ineligible studies will be screened out, and the reason for exclusion recorded. Eligible studies will be included in the analysis. Where the two authors cannot agree on eligibility after discussion, a third author (DOC) will judge whether the study should be included.
5. The final sample of full text studies will be extracted to NVIVO research software.

The screening process will be reported in a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram [58].

Data extraction

The complete study manuscript will be extracted into NVIVO. Analysis will be undertaken on the Results sections of manuscripts, including themes, sub-themes and primary data such as participant quotes.

For each study, a standardised data collection form will be completed to capture:

- Study details: authors, year of publication, journal in which study was published.
- Research question/s.

- Participants: sample size, demographic characteristics, whether they are patients and/or the public, methods of participant recruitment and selection.
- Setting: type/s of healthcare and/or conditions the study focused on, whether the study examined overtesting and/or overdiagnosis, country where study was completed, whether study was in urban or rural settings.
- Method of data collection (such as interview or survey).
- Method of data analysis (such as narrative analysis or discourse analysis).

These details will be added as classifying information to the extracted full text studies in NVIVO.

Assessment of quality of included studies

The Critical Appraisal Skills Programme (CASP) qualitative checklist [59] will be used to systematically examine the reliability, validity and usefulness of individual studies in the synthesis. The ten-item checklist comprises nine fixed-response questions that can be answered: yes/can't tell/no ("yes" indicates a positive score), and one text-response question. Two authors (TR and RH) will independently complete the CASP checklist for each study, and any disagreements in scoring will be resolved by a third author (DOC). A summary of CASP checklist results will be reported as a table and interpreted in text.

Synthesis and analysis

A thematic meta-synthesis of the Results sections of manuscripts will be undertaken. Analysis will comprise three main stages, which is consistent with thematic meta-synthesis guidelines [60] and past thematic meta-synthesis research [61-63].

The first stage of analysis will be line-by-line coding. Authors will familiarise themselves with the data. TR will inductively generate initial codes for ideas in the data, coding over several iterations until no new codes are needed to capture ideas. Single data fragments can be assigned multiple codes. Once TR is satisfied with the code frame, he will code the whole dataset, checking coding for data coverage and refining it as necessary. A second author (RH) will check a randomly generated sample of 10% of coded data for coding accuracy. A disagreement score will be calculated, and disagreements discussed and resolved, drawing on the wider team if required. An agreement score of 85% or higher will be targeted [64]. If the agreement score is low, reasons for this will be investigated, and line-by-line coding may need to be repeated.

The second stage of analysis will be the development of descriptive themes to organise existing ideas in the data. TR and RH will independently organise individual codes into broader themes. The two authors will then cooperate to develop one set of common descriptive themes, discussing them with the wider author group. Themes will be checked for data coverage and internal homogeneity [65]. External heterogeneity will not be assessed, as this is problematic where individual data can be multi-coded. Themes will be revised until their fit with data is optimised.

The third stage of analysis will be the development of analytical themes to interpret the data and generate new ideas [60, 66]. Inferential, interpretive analysis of the descriptive themes will be undertaken independently by TR and RH. They will then cooperate to determine common analytical themes, which will be discussed with the wider author group and finalised.

Descriptive and analytic thematic results will be compared across a range of classifying variables, such as whether data is from studies about patients/the public/both, and whether data is from studies investigating understanding of overtesting/overdiagnosis/both. Notable comparative

differences will be reported in the Results. Descriptive and analytical themes will be tabulated and paired with exemplary data fragments. A separate table will display how the data from each study is represented in the coding.

Assessment of confidence in findings

The GRADE-CERQual (Grading of Recommendations Assessment, Development and Evaluation-Confidence in Evidence from Reviews of Qualitative research) approach [67] will be used to assess confidence in the analytic synthesis results. GRADE-CERQual is used to consider four factors about studies contributing to review findings: i) methodological limitations; ii) relevance; iii) adequacy of supporting data, and; iv) coherence. The overall confidence in each review finding (i.e. for each theme generated) will be graded as: high, moderate, low or very low. GRADE-CERQual assessments will be undertaken independently by two authors (TR and RH). Any disagreements will be discussed until consensus is achieved. Review findings, the confidence judgement for each finding and an explanation of the judgement will be presented in a Summary of Qualitative Findings table.

Assessment of methodological limitations

Methodological limitations in the synthesis will be judged based on the aggregated CASP checklist results for all included studies (described earlier).

Assessment of relevance

Relevance is "the extent to which the body of data from the primary studies supporting a review finding is applicable to the context specified in the review question" (p. 53, [68]). Across synthesised studies contributing to each review finding, we will consider the years of publication, settings in which studies were conducted, target audiences and specificity of the findings. These will determine how relevant the body of synthesised studies is for developing knowledge about contemporary patient and public understanding of OverTD in general.

Assessment of adequacy

Adequacy is the quantity and richness of data contributing to a review finding [69]. Quantity is defined as the number of studies or data fragments supporting a theme. Richness is defined as the extent to which themes are supported by detailed, qualitative descriptions. Both parameters will be considered to judge the adequacy of data for supporting each theme in the synthesis results.

Assessment of coherence

Coherence is "how clear and cogent the fit is between the data from the primary studies and a review finding that synthesises that data" (p.35, [70]). To examine coherence, the synthesis themes will be compared against the results of individual synthesised studies, examining the extent to which the synthesis findings align with individual study findings.

Results

The Results will comprise two subsections:

1. The sample profile, describing classifying information about the synthesised studies.
2. The thematic meta-synthesis results. Both descriptive and analytic themes will be reported. The descriptive themes will form a minor part of the Results, summarised in a table and briefly interpreted in text. The analytic themes will form a main part of the Results, with all

major analytic themes tabulated, described in text and paired with exemplary data fragments and GRADE-CERQual assessment findings.

The meta-synthesis will be reported in accordance with the enhancing transparency in reporting the synthesis of qualitative research (ENTREQ) statement [71].

Discussion

The descriptive phase of thematic meta-synthesis will provide an overview of qualitative research findings about patient and public understanding of OverTD, while the analytic phase will examine underlying patterns in that data and potentially offer new ideas about why that state of understanding exists among patients and the public. The Discussion will examine the implications of these findings for future research, policy and practice to promote increased patient and public understanding of OverTD, and potentially assist in patient- and public-driven reduction of OverTD.

Ethics and dissemination

Ethics approval is not required for this secondary analysis of published data. The findings may be disseminated in peer-reviewed publications, conference papers and elsewhere.

Author contributions

TR, DOC and RB conceived the study and wrote the first draft of the protocol. RH, RT, KMC and SC contributed to refining the protocol design and preparing subsequent protocol drafts. All authors approved the submitted protocol and are accountable for its content.

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Appendix

1. PRISMA-P checklist

PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol*

Section and topic	Item No	Checklist item	Description of how item is addressed in Protocol
ADMINISTRATIVE INFORMATION			
Title:			
Identification	1a	Identify the report as a protocol of a systematic review	Identified on title page and Abstract.
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	Not applicable.
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	Registered on PROSPERO: #####, as stated in Abstract and in the Methods sections.
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	Provided on title page.
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	Described in the Author contributions section. As stated, all authors are guarantors of the review.
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	Not applicable.
Support:			
Sources	5a	Indicate sources of financial or other support for the review	Disclosed on title page.
Sponsor	5b	Provide name for the review funder and/or sponsor	Disclosed on title page.
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	Disclosed on title page.
INTRODUCTION			
Rationale	6	Describe the rationale for the review in the context of what is already known	Described in Introduction section.
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	The study objectives are stated in the Objectives section. As there are no participants or interventions, a PICO framework was not appropriate. However, similar parameters (such as the types of studies, the focus on patients and the public, the methods, and

			so on) are described in the Study selection criteria section, while the expected outcomes are described in the Discussion section.
METHODS			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	Eligibility criteria and report characteristics are described in the Study selection criteria section.
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	The electronic databases are described in the Search methods section. The planned dates of coverage are described in the Study selection criteria section.
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	The draft search strategy is described in the Search methods section, and a draft of a search strategy for the electronic database MEDLINE is included in Appendix 2.
Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	The mechanisms and software that will be used to manage records are described in the Selection of studies section.
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	The process for selecting studies through each phase of the review is described in the Selection of studies section.
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	The process for extracting data from reports is described in the Selection of studies section, and in the first paragraph of the Synthesis and analysis section.
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	The data that will be sought are described in the first paragraph of the Data extraction section. There are no pre-planned data assumptions or simplifications.
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	The outcomes for which data will be sought are described for each phase of the thematic meta-synthesis in the Synthesis and analysis section.
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	Risk of bias will be assessed at the individual level using the CASP qualitative checklist, as described in the Assessment of quality of studies section. It will also be assessed at the review level, as described in the Assessment of confidence in findings section.
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	Not applicable. Data will be qualitatively synthesised.

	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I^2, Kendall's τ)	Not applicable.
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	See response to item 15d.
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	Qualitative thematic meta-synthesis will be undertaken. The summary planned is described in the Synthesis and analysis section.
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	No assessment of meta-biases is planned.
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	The strength of the body of evidence will be examined using the GRADE-CERQual approach, as described in the Assessment of confidence in findings section.

*** It is strongly recommended that this checklist be read in conjunction with the PRISMA-P Explanation and Elaboration (cite when available) for important clarification on the items. Amendments to a review protocol should be tracked and dated. The copyright for PRISMA-P (including checklist) is held by the PRISMA-P Group and is distributed under a Creative Commons Attribution Licence 4.0.**

From: Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart L, PRISMA-P Group. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. BMJ. 2015 Jan 2;349(jan02 1):g7647.

2. Draft search strategies

Concepts:

- **Primary, published, peer-reviewed research:** to be identified during manual screening, as the OVID MEDLINE "additional limits" function for study type may miss some eligible studies.
- **Examining understanding:** filtered by first set of concepts (MEDLINE: Ref 1-15, PsycINFO: Ref 1, CINAHL: Ref S1, Scopus: Ref 1).
- **Among patients and/or the public:** filtered by second set of concepts (MEDLINE: Ref 16-28, PsycINFO: Ref 2, CINAHL: Ref S2, Scopus: Ref 2).
- **Of overtesting and/or overdiagnosis:** filtered by third set of concepts (MEDLINE: Ref 29-41, PsycINFO: Ref 3, CINAHL: Ref S3, Scopus: Ref 3).
- **Either qualitative or mixed methods study design:** filtered by fourth set of concepts, taken or adapted from existing studies (MEDLINE: Ref 42, PsycINFO: Ref 4, CINAHL: Ref S4, Scopus: Ref 4).
- **Published in the English language:** filtered at end of each search strategy.
- **Published in any year:** no filter needed.
- **Conducted in any setting:** no filter needed.
- **Focusing on the general concepts of OverTD and/or in relation to specific condition/s or interventions:** no filter needed.

Medline search strategy

Ref	Search term/s	Description
1	exp attitude to health/ or health knowledge, attitudes, practice/	Filters to identify concepts related to understanding
2	belie*.mp.	
3	exp Attitude/ or attitud*.mp.	
4	exp Comprehension/ or exp Communication/	
5	experience*.mp.	
6	exp perception/ or concept formation/ or decision making/ or judgment/	
7	understand*.mp.	
8	exp Patient Acceptance of Health Care/ or patient acceptance.mp.	
9	decision making.mp. or Decision Making/	
10	expectation*.mp.	
11	exp Risk Assessment/	
12	Thinking/	
13	"health literacy".mp. or exp Health Education/ or Health Literacy/ or consumer health information/	
14	exp Patient Education Handout/ or Patient Education as Topic/	
15	exp Patient Preference/	
16	patient*.mp. or exp Patients/	Filters to identify concepts related to patients and the public
17	public.mp.	
18	exp Male/	
19	exp Female/	
20	clients.mp.	
21	community.mp.	
22	exp Spouses/	
23	consumer*.mp.	

24	exp men/ or patients/ or population groups/ or survivors/ or terminally ill/ or transplant recipients/ or women/	
25	women*.mp.	
26	men.mp.	
27	men's.mp.	
28	exp Adult/ or adult*.mp.	
29	exp Medical Overuse/ or Health Services Misuse/	Filters to identify concepts related to overtesting and overdiagnosis
30	over?test*.mp.	
31	over?diagnos*.mp.	
32	over?detect*.mp.	
33	"too much medic*".mp.	
34	"unnecessary screen*".mp.	
35	"unnecessary test*".mp.	
36	"low value care".mp.	
37	exp Medicalization/ or medicali*.mp.	
38	"medical over?use".mp.	
39	over?medical*.mp.	
40	over?screen*.mp.	
41	pseudo?disease.mp.	
42	((("semi-structured" or semistructured or unstructured or informal or "in-depth" or indepth or "face-to-face" or structured or guide) adj3 (interview* or discussion* or questionnaire*)) or (focus group* or qualitative or ethnograph* or fieldwork or "field work" or "key informant")).ti,ab. or interviews as topic/ or focus groups/ or narration/ or qualitative research/	Filters to identify qualitative research [1]
43	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15	Synthesis of filters: understanding
44	16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28	Synthesis of filters: patients and public
45	29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41	Synthesis of filters: overdiagnosis and overtesting
46	42 and 43 and 44 and 45, limited to English language	Final output

1: Qualitative filter developed by the University of Texas: University of Texas. Search Filters for Various Databases: Ovid Medline. 2019 [Cited 2019 24 October]; available from: https://libguides.sph.uth.tmc.edu/search_filters/ovid_medline_filters

PsycINFO search terms

Ref	Search term/s	Description
1	exp comprehension/ or exp health knowledge/ or "knowledge (general)"/ or client education/ or health attitudes/ or health education/ or health literacy/ or mental health literacy/ or "mental illness (attitudes toward)"/ or "physical illness (attitudes toward)"/ or "health liter*".mp. or exp Attitudes/ or Adult Attitudes/ or Client Attitudes/ or attitud*.mp. or exp decision making/ or declarative knowledge/ or judgement or exp risk assessment/ or risk management/ or risk perception/ or exp Perception/ or percept*.mp. or concept formation/ or perceiv*.mp. or exp Education/ or understand*.mp. or experienc*.mp. or exp Expectations/ or Social Cognition/ or expect*.mp. or exp Thinking/ or exp Consumer Attitudes/ or Consumer Education/ or Client Education/ or exp Awareness/ or belie*.mp. or exp Preferences/ or exp communication/	Filters to identify concepts related to understanding
2	exp Clients/ or exp Human Males/ or exp Human Females/ or exp Terminally Ill Patients/ or Hospitalized Patients/ or Psychiatric Patients/ or Geriatric Patients/ or Patients/ or Medical Patients/ or Surgical Patients/ or patient*.mp. or public.mp. or "men".mp. or men's.mp. or Working Women/ or women*.mp. or woman*.mp. or consumer*.mp. or communit*.mp. or exp Spouses/	Filters to identify concepts related to patients and the public
3	overdiagnos*.mp. or "over diagnos*".mp. or overtest*.mp. or "over test*".mp. or overdetect*.mp. or "over detect*".mp. or overscreen*.mp. or "over screen*".mp. or "too much medic*".mp. or "low value care".mp. or medicali*.mp. or pseudodisease .mp. or "pseudo disease".mp. or "unnecessary screen*".mp. or "unnecessary test*".mp. or "medical overuse".mp.	Filters to identify concepts related to overtesting and overdiagnosis
4	((("semi-structured" or semistructured or unstructured or informal or "in-depth" or indepth or "face-to-face" or structured or guide) adj3 (interview* or discussion* or questionnaire*)) or (focus group* or qualitative or ethnograph* or fieldwork or "field work" or "key informant")).ti,ab. or interviews as topic/ or focus groups/ or narration/ or qualitative research/	Filters to identify qualitative research [2]
5	1 and 2 and 3 and 4, limited to English language	Final output

2: Qualitative filter developed by the University of Texas: University of Texas. Search Filters for Various Databases: Ovid Medline. 2019 [Cited 2019 24 October]; available from: https://libguides.sph.uth.tmc.edu/search_filters/ovid_medline_filters

CINAHL search terms

Ref	Search term/s	Description
S1	(MH "Attitude+") or (MH "Health Beliefs+") or (MH "Public Opinion+") or (MH "Knowledge+") or (MH "Patient Education+") or (MH "Cognition+") or (MH "Life Experiences+") or (MH "Decision Making+") or (MM "Health Literacy") or (MM "Concept Formation") or (MM "Risk Assessment") or (MH "Thinking+") or (MM "Patient Preference") or (MH "Communication+") or experienc* or percept* or perceiv* or attitud* or opinion* or belie?* or understand* or accept* or expectation* or "health know*" or practic* or comprehension or communicat* or accept* or "health literacy* or "risk percept*" or aware* or prefer*	Filters to identify concepts related to understanding
S2	(MH "Patients+") or (MM "Female") OR (MH "Immigrants+") OR (MH "Male") OR (MH "Men") OR (MM "Minority Groups") OR (MH "Parents+") OR (MH "Research Subjects+") OR (MM "Spouses") OR (MH "Survivors+") OR (MH "Women+") or patient* or public or client* or wom?n* or men's or communit* or consumer* or adult* or spouse*	Filters to identify concepts related to patients and the public
S3	"over#diagn*" or "medical overuse" or "over#test*" or "over#detect*" or "too much medic*" or "unnecessary screen*" or "unnecessary test*" or "low value care" or medicali?* "medical#overuse" or "over#medical" or "over#screen*" or "pseudo#disease*"	Filters to identify concepts related to overtesting and overdiagnosis
S4	(MH "action research") or (MH "Audiorecording") or (MH "cluster sample+") or (MH "constant comparative method") or (MH "content analysis") or (MH "discourse analysis") or (MH "ethnographic research") or (MH "ethnological research") or (MH "ethnography") or (MH "ethnonursing research") or (MH "field studies") or (MH "focus groups") or (MH "grounded theory") or (MH "Historical Records") or (MH "Interviews+") or (MH "Narratives") or (MH "naturalistic inquiry") or (MH "observational methods+") or (MH "phenomenological research") or (MH "phenomenology") or (MH "purposive sample") or (MH "qualitative studies") or (MH "qualitative validity+") or (MH "questionnaires") or (MH "thematic analysis") or (MH "theoretical sample") or (MH "Videorecording+") or TX colaizzi* or TX constant comparative or TX constant comparison or TX cooperative inquir* or TX co-operative inquir* or TX cooperative inquir* or TX Corbin* TX data saturat* or TX discourse* analysis or TX emic or TX etic or TX ethnon* or TX field research or TX field stud* or TX focus group* or TX Foucault* or TX giorgi* or TX Glaser* or TX grounded analysis or TX grounded research or TX grounded studies or TX grounded study or TX grounded theor* or TX heidegger* or TX hermeneutic* or TX heuristic or TX human science or TX husserl* or TX life experiences or TX life stor* or TX lived experience* or TX merleau ponty* or TX narrative analysis or TX qualitative or TX participant observ* or TX phenomenol* or TX purpos* sampl* or TX questionnaire* or TX semiotics or TX spiegelberg* or TX Strauss* TX van kaam* or TX van manen*	Filters to identify qualitative research [3]
S5	S1 AND S2 AND S3 AND S4 , limited to English language	Final output

3: Qualitative filter developed by the University of Washington: University of Washington. Finding Qualitative Research Articles, CINAHL: University of Washington Health Sciences Library. 2019 [Cited 2020 23 January]; available from: https://guides.lib.uw.edu/hsl/qualres/cin

Scopus search terms

Ref	Search term/s	Description
1	TITLE-ABS-KEY (Attitud* OR perception* OR perceive* OR opinion* OR think* or belie* OR experienc* OR "decisionmaking" OR "decision making" OR understand* or accept* OR aware* OR know* OR "health litera*" OR educat* OR comprehen* OR communicat* or "risk assess*" or prefer* or expect*)	Filters to identify concepts related to understanding
2	TITLE-ABS-KEY (*patient* OR client* OR wom?n* OR men OR men's OR caregiver* OR "care giver*" OR relatives OR carer* OR public* OR consumer* OR community OR survivor* OR "terminally ill" OR recipient* OR persons OR sufferer* OR spouse* OR partner OR participant*)	Filters to identify concepts related to patients and the public
3	TITLE-ABS-KEY ("medical overuse" OR overdiagn* OR "over diagn*" OR overtest* OR "over test*" OR overdetect* OR "over detect*" OR "too much medic*" OR "low value care" OR medicali?ation* OR medicali?ed OR overutiliz* OR "over utiliz*" OR "choosing wisely" OR "medical overus*" OR overscreen* OR "over screen*" OR "over medicali*" OR overmedical* OR "unnecessary screen*" OR "unnecessary test*" OR pseudodisease OR "pseudo disease")	Filters to identify concepts related to overtesting and overdiagnosis
4	TITLE-ABS-KEY(qualitativ* OR ethnol* OR ethnog* OR ethnonurs* OR emic OR etic OR leininger OR noblit OR (field PRE/1 note*) OR (field PRE/1 record*) OR fieldnote* OR (field PRE/1 stud*) or (participant PRE/1 observ*) OR hermaneutic* OR phenomenolog* OR (lived PRE/1 experience*) OR heidegger* OR husserl* OR "merleau-pont*" OR colaizzi OR giorgi OR ricoeur OR spiegelberg OR (van PRE/1 kaam) OR (van PRE/1 manen) OR (grounded PRE/1 theory) OR (constant PRE/1 compar*) OR (glaser PRE/1 strauss) OR (content PRE/1 analy*) OR (thematic PRE/1 analy*) OR (unstructured PRE/1 interview*) OR (semi?structured PRE/1 interview*) OR (action PRE/1 research) OR (focus PRE/1 group*) or (mixed PRE/1 method*))	Filters to identify qualitative research [4, *]
5	#1 AND #2 AND #3 AND #4 AND (LIMIT-TO (LANGUAGE,"English"))	Final output

4: Qualitative filter developed by the American University of Beirut: University of Beirut. Systematic Reviews: Search Filters / Hedges: University of Beirut. 2020 [Cited 2020 23 January]; available from: https://aub.edu.lb.libguides.com/c.php?g=329862&p=3023731

**: Filter modified to increase yield of qualitative research*

BMJ Open

How do patients and the public understand overtesting and overdiagnosis? A protocol for a thematic meta-synthesis of qualitative research

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2020-037283.R1
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Complete List of Authors:	Rozbroj, Tomas; Monash University, Dept of Epidemiology and Preventive Medicine; Cabrini Health, Cabrini Institute Haas, Romi; Monash University, Monash Department of Clinical Epidemiology, Cabrini Institute; Cabrini Health, Cabrini Institute O'Connor, Denise; Monash University, School of Public Health and Preventive Medicine; Cabrini Health, Cabrini Institute Thomas, Rae; Bond University, Faculty of Health Sciences and Medicine McCaffery, Kirsten; The University of Sydney, Sydney Health Literacy Lab, School of Public Health; The University of Sydney, Carter, Stacy; University of Wollongong, Australian Centre for Health Engagement, Evidence and Values Buchbinder, Rachelle; Monash University, Monash Department of Clinical Epidemiology, Cabrini Institute
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How do patients and the public understand overtesting and overdiagnosis? A protocol for a thematic meta-synthesis of qualitative research

Tomas Rozbroj (tomas.rozbroj@monash.edu) [1,2] *, Romi Haas (romi.haas@monash.edu) [1,2], Denise O'Connor (denise.oconnor@monash.edu) [1,2], Rae Thomas (rthomas@bond.edu.au) [3], Kirsten McCaffery (kirsten.mccaffery@sydney.edu.au) [4] , Stacy Carter (stacyc@uow.edu.au) [5], Rachelle Buchbinder (rachelle.buchbinder@monash.edu) [1,2].

1. Monash Department of Clinical Epidemiology, Cabrini Institute, Malvern, Victoria, Australia.
2. Department of Epidemiology and Preventive Medicine, School of Public Health and Preventive Medicine, Monash University, Melbourne, Victoria, Australia.
3. Institute for Evidence-Based Healthcare, Bond University, Gold Coast, Queensland, Australia.
4. School of Public Health, University of Sydney, Sydney, New South Wales, Australia
5. Australian Centre for Health Engagement, Evidence and Values, University of Wollongong, Australia
* Corresponding author

Correspondence

Tomas Rozbroj
Monash Department of Clinical Epidemiology, Cabrini Institute
4 Drysdale Street, Malvern
Victoria 3144
Australia

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Competing interests

None.

Abstract

Introduction

Examining patient and public understanding of overtesting and overdiagnosis (OverTD) is vital for reducing the burden of OverTD. Studies from disparate contexts, disciplines and focusing on disparate healthcare issues have examined patient and public understanding of OverTD. A synthesis is needed to bring this literature together, examine common themes, strengthen conclusions and identify gaps. This will help steer further research, policy and practice to improve patient and public understanding of OverTD. The objective of this study is to synthesise qualitative research data about patient and public understanding of OverTD.

Methods and analysis

A thematic meta-synthesis will be used to synthesise primary qualitative research and qualitative components of primary mixed-methods research about patient and public understanding of OverTD. Studies published in English will be included. These will be identified using systematic searches from inception to March 2020 in the Scopus, CINAHL, PsycINFO and MEDLINE databases. Studies that satisfy eligibility criteria will be assessed for methodological quality using the Critical Appraisal Skills Programme (CASP) checklist. Thematic meta-synthesis will comprise three stages: i) line-by-line coding; ii) generation of descriptive themes, and; iii) generation of analytic themes. Confidence in the synthesis findings will be assessed using the Grading of Recommendations Assessment, Development and Evaluation Confidence in Evidence (GRADE CERQual) approach. A summary of GRADE CERQual results will be presented alongside the key themes. Study eligibility screening, data extraction, analysis and the CASP and GRADE CERQual assessments will be undertaken independently by two review authors.

Ethics and dissemination

Ethics approval is not required for this secondary analysis of published data. The results will be disseminated in peer-reviewed journals and may be presented in conference papers and elsewhere.

Trial registration number

This study was submitted to PROSPERO on the 1st November 2019. Registration is pending.

Strengths and limitations of this study

- The first meta-synthesis of qualitative research about patient and public understanding of overtesting and overdiagnosis (OverTD).
- Systematic search strategy informed by up-to-date evidence about database and keyword optimisation.
- Confidence in the qualitative meta-synthesis findings strengthened by use of the GRADE-CERQual approach.
- Scope of the research limited by the exclusion of studies not written in the English language and of grey literature.

Introduction

The high prevalence of overtesting, overdiagnosis and overtreatment across a range of health conditions is a global challenge [1]. Overtesting is when diagnostic tests that are not indicated are utilised [2]. It can lead to overdiagnosis [3], which is when a diagnosis is made according to professional standards, but when it is unlikely to benefit the patient [4]. Overtesting and overdiagnosis can lead to overtreatment [2, 5], which is treatment that does more harm than good [6].

It is important to reduce overtesting, overdiagnosis and overtreatment [7, 8]. Overtesting can lead to harms including unnecessary invasive procedures, false positives and misdiagnoses [2]. Overdiagnosis can lead to unwanted behavioural and psychological responses in patients, such as reduced participation in usual activities [9], stress and anxiety [10, 11]. A diagnosis primes patients and physicians to commence treatment, even for benign conditions [6]. Overtreatment can lead to patient suffering, treatment-related complications, loss of quality of life, lost productivity and other burdens [6, 12]. Medical overuse is massively costly to healthcare systems and to patients and their families [2, 13, 14], and must be reduced to maintain healthcare system sustainability [15].

Improving patient and public understanding of overtesting and overdiagnosis (OverTD) is key to reducing their incidence as well as the incidence of overtreatment [15, 16]. Both patients and the public need to be aware of OverTD, as people regularly transition between being in and out of medical care [17], and their medical decision-making is informed by beliefs that are formed and reformed across contexts [18]. Presently, patients and the public often drive medical overuse. Some patients and members of the public tend to over-rely on tests and diagnoses [19], overestimating their benefits [20, 21], underestimating their risks [22] as they cope with uncertainty poorly [3, 23]. Few are aware that overtesting or overdiagnosis occurs [24, 25], and those who are often find the phenomena difficult to understand [25, 26]. Research suggests that patient outcomes would be improved if they understood OverTD better [27, 28]. Patients with better knowledge about OverTD make more appropriate screening and treatment decisions [25]. Patient knowledge also influences the tests and treatments prescribed by medical practitioners [29], who in some cases overuse medical interventions [30, 31]. Patients and the public want to be informed about OverTD [21], and need to understand both risks and benefits of medical interventions in order to participate in shared decision-making [32].

Research is increasingly examining patient and public understanding of OverTD [33]. Patient and public understandings of OverTD have been surveyed [24, 34], and qualitatively examined, in relation to a range of conditions and in multiple contexts [21, 26-28, 35]. Researchers have studied the challenges of communicating about OverTD to the general public [27, 36, 37] as well as to particular patient groups, such as patients with low health literacy [38]. Strategies are being developed to overcome these communication challenges. They include the development of decision aids, which inform patients about the risks as well as benefits of particular medical interventions [25], such as breast cancer screening [39], and assist them in making evidence-backed healthcare decisions [40]. Other research has focused on refining patient educational tools. This includes studying how different concepts of OverTD resonate with patients and the public [41], the effects of information about overdiagnosis on patient screening decisions [21], and studying patients' understandings of their own diagnoses [10]. The use of mass media to reduce OverTD has also been studied, such as how media narratives can influence cancer screening decisions [42, 43] or promote better management of back pain [44].

Despite progress in research, important gaps in knowledge remain [16, 45, 46]. Firstly, existing studies are scattered across disciplines, contexts and focus on disparate medical conditions [47]. It is difficult to appraise the overall state of research or glean its collective insights. Secondly, while it is known that patients and the public find OverTD unintuitive, little is known about why [15, 48]. A meta-synthesis of qualitative data from research examining patient and public understanding of OverTD will help address these gaps. It will systemise insights from disparate disciplines, contexts and topic areas by identifying descriptive themes in the body of literature. The synthesis will also identify analytic themes about the reasons for poor public and patient understanding of OverTD. These findings will inform future research by highlighting priority areas for further enquiry. An increased understanding about why patients and the public struggle to understand OverTD may inform the development of educational interventions and other practice to improve their understanding.

Objective

The objective of this study is to synthesise data from qualitative research on patient and public understanding of overtesting and overdiagnosis.

Methods

Thematic meta-synthesis will be used to examine primary qualitative research and qualitative components of mixed-methods research about patient and public understanding of OverTD.

The protocol is presented in accordance with the Preferred Reporting Items for Systematic review and Meta-Analysis Protocols (PRISMA-P) checklist [49] (available in Appendix 1), and submitted to PROSPERO for registration.

Study selection criteria

Study selection criteria and their rationale are described in Table 1.

Table 1: study selection criteria

Inclusion criterion	Rationale
Primary, published, peer-reviewed studies	Restricting the synthesis to primary, published, peer-reviewed studies matches the aims of examining primary evidence.
Studies examining understanding	Understanding is defined as objectual understanding: understanding of something, such as collection of ideas or a subject matter [50]. Studies examining participants' knowledge, perceptions, sentiments, values or experiential understanding will be included. This reflects that understanding can be developed through experiential learning [51], emotional learning [52] as well as abstract learning.
Among patients and/or the public	The synthesis will examine understanding among both patients and the public. People regularly transition between being one or the other [17], and make diagnostic and screening decisions drawing on understanding they developed overtime and in either role. So it is appropriate to examine understanding of OverTD among both groups.

	It will be distinguished whether studies are about patients, the public or both. People have a differing engagement with health decision-making when they are patients or the public [53]. To account for this, synthesis results for each group will be compared, and important inter-group considered in study outcomes.
Of overtesting and/or overdiagnosis	Studies about both overtesting (OT) and overdiagnosis (OD) will be included, as both are deeply interlinked and underpinned by common broader patient ideas about healthcare. However, understandings of OT and OD may differ. To account for this, studies will be classified based on whether they examine OT, OD, or both. The synthesis results will be compared by these classifications, and important differences will be accounted for. Synonymous concepts to overtesting and overdiagnosis will be included, such as "over-detection" and "overuse of diagnostic testing". The term "overdiagnosis" was popularised relatively recently [54], but it was predated by earlier terms [55], and it is important to capture these earlier studies. Studies which did not explicitly aim to understand how to inform patients or the public about OverTD are outside the scope of this synthesis and will be excluded. Studies that only address overtreatment and not overtesting or overdiagnosis will also be excluded.
Either qualitative or mixed methods study design	Mixed-methods studies will be included where their qualitative components can still be examined in the thematic meta-synthesis. Quantitative components of mixed-methods studies will be excluded, as will studies where it is not possible to differentiate between quantitative and qualitative components of analysis.
Published in the English language	Only English language studies will be included, as the authors are English speakers, and relying on translations of non-English studies could introduce inaccuracies into the analysis.
Published in any year	There will be no date restrictions: older insights may still be relevant.
Conducted in any setting	There will be no setting restrictions: studies from all settings may potentially contain transferrable insights about patient and public understandings of OverTD.
Focusing on the general concepts of OverTD and/or in relation to any condition/s or interventions	While patient and public understanding of OverTD may differ depending on medical conditions, there may be underlying themes across conditions, so it is relevant to include studies relating to any conditions. The condition/s which a study focuses on will be noted. Study themes will be compared by conditions in analysis if the sample characteristics make this viable.

Search methods

The search process will comprise first an informal scoping stage to develop search strategies, and then a formal main stage to identify and collate eligible studies. The main stage will identify English language studies indexed in four databases from inception until March 2020.

The scoping stage will be exploratory. Its aims are to become familiar with the literature, refine search parameters, identify MeSH terms and keywords and test the preliminary search strategy.

The main stage will comprise the formal literature search. It will be informed by the scoping stage, by search strategy guidelines from the Cochrane Collaboration [56, 57], guidelines for optimising database searches for medical qualitative research [58], and guidelines for searching the individual databases used, such as for MEDLINE [59] and PsycINFO [60]. Search filters will be identified for each of the inclusion criteria. A subject librarian will contribute to the development of the search strategy.

The following databases will be used: Scopus, CINAHL, MEDLINE and PsycINFO. These were chosen because they are most likely to index studies about patient and public understanding of OverTD: social research (Scopus); medicine/public health/health communication research (MEDLINE, CINAHL); psychological research (PsychINO) and generalist fields (Scopus). Database selection was also informed by research showing that Scopus, MEDLINE and CINAHL searches retrieve some of the largest numbers of qualitative health studies, and the largest number of qualitative health studies not listed by other databases [58]. Additionally, PsycINFO was included despite indexing relatively few unique studies [58], because it may index studies about psychosocial factors related to understanding OverTD. Examples of all search strategies, including filters for each criterion and Boolean operators, are included in Appendix 2.

Even where database selection is optimised, one study shows that 7% of qualitative health studies that fit the search parameters will not be retrieved, with the majority not indexed by major databases [58]. To increase the chances of relevant studies being retrieved, the reference lists of all studies included in the final sample will be scanned for eligibility, and experts in the field will be contacted to identify studies that may have been missed. Potentially eligible studies will be added to the data screening process (described below).

The search may be re-run and results updated at a future date if required (i.e. after 12 months if study is not yet published).

Selection of studies

Study selection will comprise the following steps:

1. All study records identified using the search strategy will be extracted with a PDF of the study manuscript into EndNote reference management software.
2. Duplicate studies will be removed from the data.
3. Study titles and abstracts will be screened for eligibility by two authors (TR and RH) working independently. Eligible studies and studies where eligibility cannot be clearly determined from the abstract and title will be included for full text review.
4. Full texts will be independently read and examined for eligibility by TR and RH using a standardised form. Ineligible studies will be screened out, and the reason for exclusion recorded. Eligible studies will be included in the analysis. Where the two authors cannot

agree on eligibility after discussion, a third author (DOC) will judge whether the study should be included.

5. The final sample of full text studies will be extracted to NVIVO research software.

The screening process will be reported in a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram [61].

Data extraction

The complete study manuscript will be extracted into NVIVO. Analysis will be undertaken on the Results sections of manuscripts, including themes, sub-themes and primary data as reported in the manuscripts, such as participant quotes. Primary data included in tables and appendix sections of manuscripts may also be analysed.

For each study, a standardised data collection form will be completed to capture:

- Study details: authors, year of publication, journal in which study was published.
- Research question/s.
- Participants: sample size, demographic characteristics, whether they are patients and/or the public, methods of participant recruitment and selection.
- Setting: type/s of healthcare and/or conditions the study focused on, whether the study examined overtesting and/or overdiagnosis, country where study was completed, whether study was in urban or rural settings.
- Method of data collection (such as interview or survey).
- Method of data analysis (such as narrative analysis or discourse analysis).

These details will be added as classifying information to the extracted full text studies in NVIVO.

Assessment of quality of included studies

The Critical Appraisal Skills Programme (CASP) qualitative checklist [62] will be used to systematically examine the reliability, validity and usefulness of individual studies in the synthesis. The ten-item checklist comprises nine fixed-response questions that can be answered: yes/can't tell/no ("yes" indicates a positive score), and one text-response question. Two authors (TR and RH) will independently complete the CASP checklist for each study, and any disagreements in scoring will be resolved by a third author (DOC). A summary of CASP checklist results will be reported as a table and interpreted in text.

Synthesis and analysis

A thematic meta-synthesis of the Results sections of manuscripts will be undertaken. Analysis will comprise three main stages [63]: first, line by line coding; next, descriptive thematic development; and finally analytic theme development.

The thematic meta-synthesis method was chosen for several reasons. It fits the gaps this research responds to: the descriptive phase will address the need to systemise insights from disparate disciplines, contexts and topic areas, while the analytic phase is an interpretive tool with which synthesised studies can be re-examined to study why patients and the public find OverTD so difficult to understand. Furthermore, thematic analysis is suitable for handling data from disparate contexts [64], which fits this synthesis where included studies are likely to be heterogeneous. Finally, thematic meta-synthesis is particularly suited to informing policy and practice [65], which is an important consideration for this research. The synthesis assumes an objective idealist epistemic

position. The synthesised studies are considered to convey something about reality, but this reality is conveyed through a subjective lens [66]. This is also assumed for the findings of this synthesis.

The first stage of analysis will be line-by-line coding. Authors will familiarise themselves with the data. TR will inductively generate initial codes for ideas in the data, coding over several iterations until no new codes are needed to capture ideas. Single data fragments can be assigned multiple codes. Once TR is satisfied with the code frame, he will code the whole dataset, checking coding for data coverage and refining it as necessary. A second author (RH) will check a randomly selected sample of 10% of coded data for coding accuracy. A disagreement score will be calculated, and disagreements discussed and resolved, drawing on the wider team if required. An agreement score of 85% or higher will be targeted [67]. If the agreement score is low, reasons for this will be investigated, and line-by-line coding may need to be repeated.

The second stage of analysis will be the development of descriptive themes to organise existing ideas in the data. TR and RH will independently organise individual codes into broader themes. The two authors will then cooperate to develop one set of common descriptive themes, discussing them with the wider author group. Themes will be checked for data coverage and internal homogeneity [68]. External heterogeneity will not be assessed, as this is problematic where individual data can be multi-coded. Themes will be revised until their fit with data is optimised.

The third stage of analysis will be the development of analytical themes capturing the barriers and enablers to patient and public understanding of OverTD. This stage will be interpretative and will seek to generate new ideas [63, 69]. TR and RH will independently re-examine the data organised into descriptive themes to infer what the barriers and enablers to understanding OverTD are [70]. . This phase relies on the authors' subjectivities, and the authors will take a reflexive approach to minimise problems in interpretation and improve transparency in analysis [71]. TR and RH will meet to compare their analytic themes, discussing the factors that led to their interpretations, including their assumptions, logical inferences and ways in which the predetermined research aims influenced their interpretations. They will select common analytical themes, which will be discussed with the wider author group and finalised. Researcher reflexibility will be discussed in publication of the analytic themes.

Descriptive and analytic thematic results will be compared across a range of classifying variables, such as whether data is from studies about patients/the public/both, and whether data is from studies investigating understanding of overtesting/overdiagnosis/both. Notable comparative differences will be reported in the Results. Descriptive and analytical themes will be tabulated and paired with exemplary data fragments. A separate table will display how the data from each study is represented in the coding.

Assessment of confidence in findings

The GRADE-CERQual (Grading of Recommendations Assessment, Development and Evaluation-Confidence in Evidence from Reviews of Qualitative research) approach [72] will be used to assess confidence in the analytic synthesis results. GRADE-CERQual is used to consider four factors about studies contributing to review findings: i) methodological limitations; ii) relevance; iii) adequacy of supporting data, and; iv) coherence. The overall confidence in each review finding (i.e. for each theme generated) will be graded as: high, moderate, low or very low. GRADE-CERQual assessments will be undertaken independently by two authors (TR and RH). Any disagreements will be discussed until consensus is achieved. Review findings, the confidence judgement for each finding and an explanation of the judgement will be presented in a Summary of Qualitative Findings table.

Assessment of methodological limitations

Methodological limitations in the synthesis will be judged based on the aggregated CASP checklist results for all included studies (described earlier).

Assessment of relevance

Relevance is "the extent to which the body of data from the primary studies supporting a review finding is applicable to the context specified in the review question" (p. 53, [73]). Across synthesised studies contributing to each review finding, we will consider the years of publication, settings in which studies were conducted, target audiences and specificity of the findings. These will determine how relevant the body of synthesised studies is for developing knowledge about contemporary patient and public understanding of OverTD in general.

Assessment of adequacy

Adequacy is the quantity and richness of data contributing to a review finding [74]. Quantity is defined as the number of studies or data fragments supporting a theme. Richness is defined as the extent to which themes are supported by detailed, qualitative descriptions. Both parameters will be considered to judge the adequacy of data for supporting each theme in the synthesis results.

Assessment of coherence

Coherence is "how clear and cogent the fit is between the data from the primary studies and a review finding that synthesises that data" (p.35, [75]). To examine coherence, the synthesis themes will be compared against the results of individual synthesised studies, examining the extent to which the synthesis findings align with individual study findings.

Patient and Public Involvement

A health consumer advocate from the Consumer's Health Forum of Australia was consulted in the development of this protocol. They will advise on the interpretation of the synthesis results.

Results

The Results will comprise two subsections:

1. The sample profile, describing classifying information about the synthesised studies.
2. The thematic meta-synthesis results. Both descriptive and analytic themes will be reported. The descriptive themes will form a minor part of the Results, summarised in a table and briefly interpreted in text. The analytic themes will form a main part of the Results, with all major analytic themes tabulated, described in text and paired with exemplary data fragments and GRADE-CERQual assessment findings.

The meta-synthesis will be reported in accordance with the enhancing transparency in reporting the synthesis of qualitative research (ENTREQ) statement [76].

Ethics and dissemination

Ethics approval is not required for this secondary analysis of published data. The findings may be disseminated in peer-reviewed publications, conference papers and elsewhere.

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Author contributions

TR, DOC and RB conceived the study and wrote the first draft of the protocol. RH, RT, KMC and SC contributed to refining the protocol design and preparing subsequent protocol drafts. All authors approved the submitted protocol and are accountable for its content.

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Competing interests

None.

Appendix

1. PRISMA-P checklist

PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol*

Section and topic	Item No	Checklist item	Description of how item is addressed in Protocol
ADMINISTRATIVE INFORMATION			
Title:			
Identification	1a	Identify the report as a protocol of a systematic review	Identified on title page and Abstract.
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	Not applicable.
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	Registered sent to PROSPERO, as stated in Abstract and in the Methods sections.
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	Provided on title page.
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	Described in the Author contributions section. As stated, all authors are guarantors of the review.
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	Not applicable.
Support:			
Sources	5a	Indicate sources of financial or other support for the review	Disclosed on title page.
Sponsor	5b	Provide name for the review funder and/or sponsor	Disclosed on title page.
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	Disclosed on title page.
INTRODUCTION			
Rationale	6	Describe the rationale for the review in the context of what is already known	Described in Introduction section.
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	The study objectives are stated in the Objectives section. As there are no participants or interventions, a PICO framework was not appropriate. However, similar parameters (such as the types of studies, the focus on patients and the public, the methods, and

			so on) are described in the Study selection criteria section, while the expected outcomes are described in the Discussion section.
METHODS			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	Eligibility criteria and report characteristics are described in the Study selection criteria section.
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	The electronic databases are described in the Search methods section. The planned dates of coverage are described in the Study selection criteria section.
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	The draft search strategy is described in the Search methods section, and a draft of a search strategy for the electronic database MEDLINE is included in Appendix 2.
Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	The mechanisms and software that will be used to manage records are described in the Selection of studies section.
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	The process for selecting studies through each phase of the review is described in the Selection of studies section.
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	The process for extracting data from reports is described in the Selection of studies section, and in the first paragraph of the Synthesis and analysis section.
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	The data that will be sought are described in the first paragraph of the Data extraction section. There are no pre-planned data assumptions or simplifications.
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	The outcomes for which data will be sought are described for each phase of the thematic meta-synthesis in the Synthesis and analysis section.
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	Risk of bias will be assessed at the individual level using the CASP qualitative checklist, as described in the Assessment of quality of studies section. It will also be assessed at the review level, as described in the Assessment of confidence in findings section.
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	Not applicable. Data will be qualitatively synthesised.

	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I^2, Kendall's τ)	Not applicable.
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	See response to item 15d.
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	Qualitative thematic meta-synthesis will be undertaken. The summary planned is described in the Synthesis and analysis section.
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	No assessment of meta-biases is planned.
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	The strength of the body of evidence will be examined using the GRADE-CERQual approach, as described in the Assessment of confidence in findings section.

*** It is strongly recommended that this checklist be read in conjunction with the PRISMA-P Explanation and Elaboration (cite when available) for important clarification on the items. Amendments to a review protocol should be tracked and dated. The copyright for PRISMA-P (including checklist) is held by the PRISMA-P Group and is distributed under a Creative Commons Attribution Licence 4.0.**

From: Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart L, PRISMA-P Group. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. BMJ. 2015 Jan 2;349(jan02 1):g7647.

2. Draft search strategies

Concepts:

- **Primary, published, peer-reviewed research:** to be identified during manual screening, as the OVID MEDLINE "additional limits" function for study type may miss some eligible studies.
- **Examining understanding:** filtered by first set of concepts (MEDLINE: Ref 1-15, PsycINFO: Ref 1, CINAHL: Ref S1, Scopus: Ref 1).
- **Among patients and/or the public:** filtered by second set of concepts (MEDLINE: Ref 16-28, PsycINFO: Ref 2, CINAHL: Ref S2, Scopus: Ref 2).
- **Of overtesting and/or overdiagnosis:** filtered by third set of concepts (MEDLINE: Ref 29-41, PsycINFO: Ref 3, CINAHL: Ref S3, Scopus: Ref 3).
- **Either qualitative or mixed methods study design:** filtered by fourth set of concepts, taken or adapted from existing studies (MEDLINE: Ref 42, PsycINFO: Ref 4, CINAHL: Ref S4, Scopus: Ref 4).
- **Published in the English language:** filtered at end of each search strategy.
- **Published in any year:** no filter needed.
- **Conducted in any setting:** no filter needed.
- **Focusing on the general concepts of OverTD and/or in relation to specific condition/s or interventions:** no filter needed.

Medline search strategy

Ref	Search term/s	Description
1	exp attitude to health/ or health knowledge, attitudes, practice/	Filters to identify concepts related to understanding
2	belie*.mp.	
3	exp Attitude/ or attitud*.mp.	
4	exp Comprehension/ or exp Communication/	
5	experience*.mp.	
6	exp perception/ or concept formation/ or decision making/ or judgment/	
7	understand*.mp.	
8	exp Patient Acceptance of Health Care/ or patient acceptance.mp.	
9	decision making.mp. or Decision Making/	
10	expectation*.mp.	
11	exp Risk Assessment/	
12	Thinking/	
13	"health literacy".mp. or exp Health Education/ or Health Literacy/ or consumer health information/	
14	exp Patient Education Handout/ or Patient Education as Topic/	
15	exp Patient Preference/	
16	patient*.mp. or exp Patients/	Filters to identify concepts related to patients and the public
17	public.mp.	
18	exp Male/	
19	exp Female/	
20	clients.mp.	
21	community.mp.	
22	exp Spouses/	
23	consumer*.mp.	
24	exp men/ or patients/ or population groups/ or survivors/ or terminally ill/ or transplant recipients/ or women/	

25 26 27 28	women*.mp. men.mp. men's.mp. exp Adult/ or adult*.mp.	
29 30 31 32 33 34 35 36 37 38 39 40 41	exp Medical Overuse/ or Health Services Misuse/ over?test*.mp. over?diagnos*.mp. over?detect*.mp. "too much medic*".mp. "unnecessary screen*".mp. "unnecessary test*".mp. "low value care".mp. exp Medicalization/ or medicali*.mp. "medical over?use".mp. over?medical*.mp. over?screen*.mp. pseudo?disease.mp.	Filters to identify concepts related to overtesting and overdiagnosis
42	interview:.mp. OR experience:.mp. OR qualitative.tw.	Filters to identify qualitative research †, ‡
43	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15	Synthesis of filters: understanding
44	16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28	Synthesis of filters: patients and public
45	29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41	Synthesis of filters: overdiagnosis and overtesting
46	42 and 43 and 44 and 45, limited to English language	Final output

† Validated filter developed by: Health Information Research Unit. *Search Filters for MEDLINE in Ovid Syntax and the PubMed translation*. McMaster University, 2016 [cited 2020 25 March]; available from: https://hiru.mcmaster.ca/hiru/HIRU_Hedges_MEDLINE_Strategies.aspx#Qualitative

‡ Filter used: *Qualitative – MEDLINE: Best balance of sensitivity and specificity*

PsycINFO search terms

Ref	Search term/s	Description
1	exp comprehension/ or exp health knowledge/ or "knowledge (general)"/ or client education/ or health attitudes/ or health education/ or health literacy/ or mental health literacy/ or "mental illness (attitudes toward)"/ or "physical illness (attitudes toward)"/ or "health liter*".mp. or exp Attitudes/ or Adult Attitudes/ or Client Attitudes/ or attitud*.mp. or exp decision making/ or declarative knowledge/ or judgement or exp risk assessment/ or risk management/ or risk perception/ or exp Perception/ or percept*.mp. or concept formation/ or perceiv*.mp. or exp Education/ or understand*.mp. or experienc*.mp. or exp Expectations/ or Social Cognition/ or expect*.mp. or exp Thinking/ or exp Consumer Attitudes/ or Consumer Education/ or Client Education/ or exp Awareness/ or belie*.mp. or exp Preferences/ or exp communication/	Filters to identify concepts related to understanding
2	exp Clients/ or exp Human Males/ or exp Human Females/ or exp Terminally Ill Patients/ or Hospitalized Patients/ or Psychiatric Patients/ or Geriatric Patients/ or Patients/ or Medical Patients/ or Surgical Patients/ or patient*.mp. or public.mp. or "men".mp. or men's.mp. or Working Women/ or women*.mp. or woman*.mp. or consumer*.mp. or communit*.mp. or exp Spouses/	Filters to identify concepts related to patients and the public
3	overdiagnos*.mp. or "over diagnos*".mp. or overtest*.mp. or "over test*".mp. or overdetect*.mp. or "over detect*".mp. or overscreen*.mp. or "over screen*".mp. or "too much medic*".mp. or "low value care".mp. or medicali*.mp. or pseudodisease.mp. or "pseudo disease".mp. or "unnecessary screen*".mp. or "unnecessary test*".mp. or "medical overuse".mp.	Filters to identify concepts related to overtesting and overdiagnosis
4	experiences.tw. OR interview:.tw. OR qualitative.tw.	Filters to identify qualitative research †, ‡
5	1 and 2 and 3 and 4, limited to English language	Final output

† Validated filter developed by: Health Information Research Unit. *Search Strategies for PsycINFO in Ovid Syntax*. McMaster University, 2016 [cited 2020 25 March]; available from: https://hiru.mcmaster.ca/hiru/HIRU_Hedges_PsycINFO_Strategies.aspx

‡ Filter used: *Qualitative - PsycINFO: Best balance of sensitivity and specificity*

CINAHL search terms

Ref	Search term/s	Description
S1	(MH "Attitude+") or (MH "Health Beliefs+") or (MH "Public Opinion+") or (MH "Knowledge+") or (MH "Patient Education+") or (MH "Cognition+") or (MH "Life Experiences+") or (MH "Decision Making+") or (MM "Health Literacy") or (MM "Concept Formation") or (MM "Risk Assessment") or (MH "Thinking+") or (MM "Patient Preference") or (MH "Communication+") or experienc* or percept* or perceiv* or attitud* or opinion* or belie?* or understand* or accept* or expectation* or "health know*" or practic* or comprehension or communicat* or accept* or "health literacy* or "risk percept*" or aware* or prefer*	Filters to identify concepts related to understanding
S2	(MH "Patients+") or (MM "Female") OR (MH "Immigrants+") OR (MH "Male") OR (MH "Men") OR (MM "Minority Groups") OR (MH "Parents+") OR (MH "Research Subjects+") OR (MM "Spouses") OR (MH "Survivors+") OR (MH "Women+") or patient* or public or client* or wom?n* or men's or communit* or consumer* or adult* or spouse*	Filters to identify concepts related to patients and the public
S3	"over#diagn*" or "medical overuse" or "over#test*" or "over#detect*" or "too much medic*" or "unnecessary screen*" or "unnecessary test*" or "low value care" or medicali?* "medical#overuse" or "over#medical" or "over#screen*" or "pseudo#disease*"	Filters to identify concepts related to overtesting and overdiagnosis
S4	((MH "study design+" not MM "study design+") or MH "attitude" or (MH "interviews+" not MM "interviews+"))	Filters to identify qualitative research †, ‡
S5	S1 AND S2 AND S3 AND S4, limited to English language	Final output

† Validated filter developed by: EBSCO Connect. *What are the search strategies used by CINAHL Clinical Queries?* EBSCO Connect, 2020 [cited 2020 25 March]; available from: https://connect.ebsco.com/s/article/What-are-the-search-strategies-used-by-CINAHL-Clinical-Queries?language=en_US

‡ Filter used: *Qualitative - High Sensitivity* filter. A 'best balance' filter not used as this high sensitive filter only yielded 245 studies when used as part of the CINAHL search terms on the 18th March 2020.

Scopus search terms

Ref	Search term/s	Description
1	TITLE-ABS-KEY (Attitud* OR perception* OR perceive* OR opinion* OR think* or belie* OR experienc* OR "decisionmaking" OR "decision making" OR understand* or accept* OR aware* OR know* OR "health litera*" OR educat* OR comprehen* OR communicat* or "risk assess*" or prefer* or expect*)	Filters to identify concepts related to understanding
2	TITLE-ABS-KEY (*patient* OR client* OR wom?n* OR men OR men's OR caregiver* OR "care giver*" OR relatives OR carer* OR public* OR consumer* OR community OR survivor* OR "terminally ill" OR recipient* OR persons OR sufferer* OR spouse* OR partner OR participant*)	Filters to identify concepts related to patients and the public
3	TITLE-ABS-KEY ("medical overuse" OR overdiagn* OR "over diagn*" OR overtest* OR "over test*" OR overdetect* OR "over detect*" OR "too much medic*" OR "low value care" OR medicali?ation* OR medicali?ed OR overutiliz* OR "over utiliz*" OR "choosing wisely" OR "medical overus*" OR overscreen* OR "over screen*" OR "over medicali*" OR overmedical* OR "unnecessary screen*" OR "unnecessary test*" OR pseudodisease OR "pseudo disease")	Filters to identify concepts related to overtesting and overdiagnosis
4	TITLE-ABS-KEY(qualitativ* OR ethnol* OR ethnog* OR ethnonurs* OR emic OR etic OR leininger OR noblit OR (field PRE/1 note*) OR (field PRE/1 record*) OR fieldnote* OR (field PRE/1 stud*) or (participant PRE/1 observ*) OR hermaneutic* OR phenomenolog* OR (lived PRE/1 experience*) OR heidegger* OR husserl* OR "merleau-pont*" OR colaizzi OR giorgi OR ricoeur OR spiegelberg OR (van PRE/1 kaam) OR (van PRE/1 manen) OR (grounded PRE/1 theory) OR (constant PRE/1 compar*) OR (glaser PRE/1 strauss) OR (content PRE/1 analy*) OR (thematic PRE/1 analy*) OR (unstructured PRE/1 interview*) OR (semi?structured PRE/1 interview*) OR (action PRE/1 research) OR (focus PRE/1 group*) or (mixed PRE/1 method*))	Filters to identify qualitative research †, ‡
5	#1 AND #2 AND #3 AND #4 AND (LIMIT-TO (LANGUAGE,"English"))	Final output

† *Unvalidated filter developed by*: University Libraries. *Systematic Reviews: Search Filters / Hedges.* The American University of Beirut, 2020 [Cited 2020 23 January]; available from: https://aub.edu.lb.libguides.com/c.php?g=329862&p=3023731

‡ *Filter used: Qualitative filter,* which was modified to increase yield of results.

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How do patients and the public understand overtesting and overdiagnosis? A protocol for a thematic meta-synthesis of qualitative research

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How do patients and the public understand overtesting and overdiagnosis? A protocol for a thematic meta-synthesis of qualitative research

Tomas Rozbroj (tomas.rozbroj@monash.edu) [1,2] *, Romi Haas (romi.haas@monash.edu) [1,2], Denise O'Connor (denise.oconnor@monash.edu) [1,2], Rae Thomas (rthomas@bond.edu.au) [3], Kirsten McCaffery (kirsten.mccaffery@sydney.edu.au) [4] , Stacy Carter (stacyc@uow.edu.au) [5], Rachelle Buchbinder (rachelle.buchbinder@monash.edu) [1,2].

1. Monash Department of Clinical Epidemiology, Cabrini Institute, Malvern, Victoria, Australia.
2. Department of Epidemiology and Preventive Medicine, School of Public Health and Preventive Medicine, Monash University, Melbourne, Victoria, Australia.
3. Institute for Evidence-Based Healthcare, Bond University, Gold Coast, Queensland, Australia.
4. School of Public Health, University of Sydney, Sydney, New South Wales, Australia
5. Australian Centre for Health Engagement, Evidence and Values, University of Wollongong, Australia
* Corresponding author

Correspondence

Tomas Rozbroj
Monash Department of Clinical Epidemiology, Cabrini Institute
4 Drysdale Street, Malvern
Victoria 3144
Australia

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Competing interests

None.

Abstract

Introduction

Examining patient and public understanding of overtesting and overdiagnosis (OverTD) is vital for reducing the burden of OverTD. Studies from disparate contexts, disciplines and focusing on disparate healthcare issues have examined patient and public understanding of OverTD. A synthesis is needed to bring this literature together, examine common themes, strengthen conclusions and identify gaps. This will help steer further research, policy and practice to improve patient and public understanding of OverTD. The objective of this study is to synthesise qualitative research data about patient and public understanding of OverTD.

Methods and analysis

A thematic meta-synthesis will be used to synthesise primary qualitative research and qualitative components of primary mixed-methods research about patient and public understanding of OverTD. Studies published in English will be included. These will be identified using systematic searches from inception to March 2020 in the Scopus, CINAHL, PsycINFO and MEDLINE databases. Studies that satisfy eligibility criteria will be assessed for methodological quality using the Critical Appraisal Skills Programme (CASP) checklist. Thematic meta-synthesis will comprise three stages: i) line-by-line coding; ii) generation of descriptive themes, and; iii) generation of analytic themes. Confidence in the synthesis findings will be assessed using the Grading of Recommendations Assessment, Development and Evaluation Confidence in Evidence (GRADE CERQual) approach. A summary of GRADE CERQual results will be presented alongside the key themes. Study eligibility screening, data extraction, analysis and the CASP and GRADE CERQual assessments will be undertaken independently by two review authors.

Ethics and dissemination

Ethics approval is not required for this secondary analysis of published data. The results will be disseminated in peer-reviewed journals and may be presented in conference papers and elsewhere.

Trial registration number

CRD42020156838 (PROSPERO)

Strengths and limitations of this study

- The first meta-synthesis of qualitative research about patient and public understanding of overtesting and overdiagnosis (OverTD).
- Systematic search strategy informed by up-to-date evidence about database and keyword optimisation.
- Confidence in the qualitative meta-synthesis findings strengthened by use of the GRADE-CERQual approach.
- Scope of the research limited by the exclusion of studies not written in the English language and of grey literature.

Introduction

The high prevalence of overtesting, overdiagnosis and overtreatment across a range of health conditions is a global challenge [1]. Overtesting is when diagnostic tests that are not indicated are utilised [2]. It can lead to overdiagnosis [3], which is when a diagnosis is made according to professional standards, but when it is unlikely to benefit the patient [4]. Overtesting and overdiagnosis can lead to overtreatment [2, 5], which is treatment that does more harm than good [6].

It is important to reduce overtesting, overdiagnosis and overtreatment [7, 8]. Overtesting can lead to harms including unnecessary invasive procedures, false positives and misdiagnoses [2]. Overdiagnosis can lead to unwanted behavioural and psychological responses in patients, such as reduced participation in usual activities [9], stress and anxiety [10, 11]. A diagnosis primes patients and physicians to commence treatment, even for benign conditions [6]. Overtreatment can lead to patient suffering, treatment-related complications, loss of quality of life, lost productivity and other burdens [6, 12]. Medical overuse is massively costly to healthcare systems and to patients and their families [2, 13, 14], and must be reduced to maintain healthcare system sustainability [15].

Improving patient and public understanding of overtesting and overdiagnosis (OverTD) is key to reducing their incidence as well as the incidence of overtreatment [15, 16]. Both patients and the public need to be aware of OverTD, as people regularly transition between being in and out of medical care [17], and their medical decision-making is informed by beliefs that are formed and reformed across contexts [18]. Presently, patients and the public often drive medical overuse. Some patients and members of the public tend to over-rely on tests and diagnoses [19], overestimating their benefits [20, 21], underestimating their risks [22] as they cope with uncertainty poorly [3, 23]. Few are aware that overtesting or overdiagnosis occurs [24, 25], and those who are often find the phenomena difficult to understand [25, 26]. Research suggests that patient outcomes would be improved if they understood OverTD better [27, 28]. Patients with better knowledge about OverTD make more appropriate screening and treatment decisions [25]. Patient knowledge also influences the tests and treatments prescribed by medical practitioners [29], who in some cases overuse medical interventions [30, 31]. Patients and the public want to be informed about OverTD [21], and need to understand both risks and benefits of medical interventions in order to participate in shared decision-making [32].

Research is increasingly examining patient and public understanding of OverTD [33]. Patient and public understandings of OverTD have been surveyed [24, 34], and qualitatively examined, in relation to a range of conditions and in multiple contexts [21, 26-28, 35]. Researchers have studied the challenges of communicating about OverTD to the general public [27, 36, 37] as well as to particular patient groups, such as patients with low health literacy [38]. Strategies are being developed to overcome these communication challenges. They include the development of decision aids, which inform patients about the risks as well as benefits of particular medical interventions [25], such as breast cancer screening [39], and assist them in making evidence-backed healthcare decisions [40]. Other research has focused on refining patient educational tools. This includes studying how different concepts of OverTD resonate with patients and the public [41], the effects of information about overdiagnosis on patient screening decisions [21], and studying patients' understandings of their own diagnoses [10]. The use of mass media to reduce OverTD has also been studied, such as how media narratives can influence cancer screening decisions [42, 43] or promote better management of back pain [44].

Despite progress in research, important gaps in knowledge remain [16, 45, 46]. Firstly, existing studies are scattered across disciplines, contexts and focus on disparate medical conditions [47]. It is difficult to appraise the overall state of research or glean its collective insights. Secondly, while it is known that patients and the public find OverTD unintuitive, little is known about why [15, 48]. A meta-synthesis of qualitative data from research examining patient and public understanding of OverTD will help address these gaps. It will systemise insights from disparate disciplines, contexts and topic areas by identifying descriptive themes in the body of literature. The synthesis will also identify analytic themes about the reasons for poor public and patient understanding of OverTD. These findings will inform future research by highlighting priority areas for further enquiry. An increased understanding about why patients and the public struggle to understand OverTD may inform the development of educational interventions and other practice to improve their understanding.

Objective

The objective of this study is to synthesise data from qualitative research on patient and public understanding of overtesting and overdiagnosis.

Methods

Thematic meta-synthesis will be used to examine primary qualitative research and qualitative components of mixed-methods research about patient and public understanding of OverTD.

The protocol is presented in accordance with the Preferred Reporting Items for Systematic review and Meta-Analysis Protocols (PRISMA-P) checklist [49] (available in Appendix 1). The protocol is registered on PROSPERO: CRD42020156838.

Study selection criteria

Study selection criteria and their rationale are described in Table 1.

Table 1: study selection criteria

Inclusion criterion	Rationale
Primary, published, peer-reviewed studies	Restricting the synthesis to primary, published, peer-reviewed studies matches the aims of examining primary evidence.
Studies examining understanding	Understanding is defined as objectual understanding: understanding of something, such as collection of ideas or a subject matter [50]. Studies examining participants' knowledge, perceptions, sentiments, values or experiential understanding will be included. This reflects that understanding can be developed through experiential learning [51], emotional learning [52] as well as abstract learning.
Among patients and/or the public	The synthesis will examine understanding among both patients and the public. People regularly transition between being one or the other [17], and make diagnostic and screening decisions drawing on understanding they developed overtime and in either role. So, it is appropriate to examine understanding of OverTD among both groups.

	It will be distinguished whether studies are about patients, the public or both. People have a differing engagement with health decision-making when they are patients or the public [53]. To account for this, synthesis results for each group will be compared, and important inter-group considered in study outcomes.
Of overtesting and/or overdiagnosis	Studies about both overtesting (OT) and overdiagnosis (OD) will be included, as both are deeply interlinked and underpinned by common broader patient ideas about healthcare. However, understandings of OT and OD may differ. To account for this, studies will be classified based on whether they examine OT, OD, or both. The synthesis results will be compared by these classifications, and important differences will be accounted for. Synonymous concepts to overtesting and overdiagnosis will be included, such as "over-detection" and "overuse of diagnostic testing". The term "overdiagnosis" was popularised relatively recently [54], but it was predated by earlier terms [55], and it is important to capture these earlier studies. Studies which did not explicitly aim to understand how to inform patients or the public about OverTD are outside the scope of this synthesis and will be excluded. Studies that only address overtreatment and not overtesting or overdiagnosis will also be excluded.
Either qualitative or mixed methods study design	Mixed-methods studies will be included where their qualitative components can still be examined in the thematic meta-synthesis. Quantitative components of mixed-methods studies will be excluded, as will studies where it is not possible to differentiate between quantitative and qualitative components of analysis.
Published in the English language	Only English language studies will be included, as the authors are English speakers, and relying on translations of non-English studies could introduce inaccuracies into the analysis.
Published in any year	There will be no date restrictions: older insights may still be relevant.
Conducted in any setting	There will be no setting restrictions: studies from all settings may potentially contain transferrable insights about patient and public understandings of OverTD.
Focusing on the general concepts of OverTD and/or in relation to any condition/s or interventions	While patient and public understanding of OverTD may differ depending on medical conditions, there may be underlying themes across conditions, so it is relevant to include studies relating to any conditions. The condition/s which a study focuses on will be noted. Study themes will be compared by conditions in analysis if the sample characteristics make this viable.

Search methods

The search process will comprise first an informal scoping stage to develop search strategies, and then a formal main stage to identify and collate eligible studies. The main stage will identify English language studies indexed in four databases from inception until March 2020.

The scoping stage will be exploratory. Its aims are to become familiar with the literature, refine search parameters, identify MeSH terms and keywords and test the preliminary search strategy.

The main stage will comprise the formal literature search. It will be informed by the scoping stage, by search strategy guidelines from the Cochrane Collaboration [56, 57], guidelines for optimising database searches for medical qualitative research [58], and guidelines for searching the individual databases used, such as for MEDLINE [59] and PsycINFO [60]. Search filters will be identified for each of the inclusion criteria. A subject librarian will contribute to the development of the search strategy.

The following databases will be used: Scopus, CINAHL, MEDLINE and PsycINFO. These were chosen because they are most likely to index studies about patient and public understanding of OverTD: social research (Scopus); medicine/public health/health communication research (MEDLINE, CINAHL); psychological research (PsychINO) and generalist fields (Scopus). Database selection was also informed by research showing that Scopus, MEDLINE and CINAHL searches retrieve some of the largest numbers of qualitative health studies, and the largest number of qualitative health studies not listed by other databases [58]. Additionally, PsycINFO was included despite indexing relatively few unique studies [58], because it may index studies about psychosocial factors related to understanding OverTD. Examples of all search strategies, including filters for each criterion and Boolean operators, are included in Appendix 2.

Even where database selection is optimised, one study shows that 7% of qualitative health studies that fit the search parameters will not be retrieved, with the majority not indexed by major databases [58]. To increase the chances of relevant studies being retrieved, the reference lists of all studies included in the final sample will be scanned for eligibility, and experts in the field will be contacted to identify studies that may have been missed. Potentially eligible studies will be added to the data screening process (described below).

The search may be re-run and results updated at a future date if required (i.e. after 12 months if study is not yet published).

Selection of studies

Study selection will comprise the following steps:

1. All study records identified using the search strategy will be extracted with a PDF of the study manuscript into EndNote reference management software.
2. Duplicate studies will be removed from the data.
3. Study titles and abstracts will be screened for eligibility by two authors (TR and RH) working independently. Eligible studies and studies where eligibility cannot be clearly determined from the abstract and title will be included for full text review.
4. Full texts will be independently read and examined for eligibility by TR and RH using a standardised form. Ineligible studies will be screened out, and the reason for exclusion recorded. Eligible studies will be included in the analysis. Where the two authors cannot

agree on eligibility after discussion, a third author (DOC) will judge whether the study should be included.

5. The final sample of full text studies will be extracted to NVIVO research software.

The screening process will be reported in a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram [61].

Data extraction

The complete study manuscript will be extracted into NVIVO. Analysis will be undertaken on the Results sections of manuscripts, including themes, sub-themes and primary data as reported in the manuscripts, such as participant quotes. Primary data included in tables and appendix sections of manuscripts may also be analysed.

For each study, a standardised data collection form will be completed to capture:

- Study details: authors, year of publication, journal in which study was published.
- Research question/s.
- Participants: sample size, demographic characteristics, whether they are patients and/or the public, methods of participant recruitment and selection.
- Setting: type/s of healthcare and/or conditions the study focused on, whether the study examined overtesting and/or overdiagnosis, country where study was completed, whether study was in urban or rural settings.
- Method of data collection (such as interview or survey).
- Method of data analysis (such as narrative analysis or discourse analysis).

These details will be added as classifying information to the extracted full text studies in NVIVO.

Assessment of quality of included studies

The Critical Appraisal Skills Programme (CASP) qualitative checklist [62] will be used to systematically examine the reliability, validity and usefulness of individual studies in the synthesis. The ten-item checklist comprises nine fixed-response questions that can be answered: yes/can't tell/no ("yes" indicates a positive score), and one text-response question. Two authors (TR and RH) will independently complete the CASP checklist for each study, and any disagreements in scoring will be resolved by a third author (DOC). A summary of CASP checklist results will be reported as a table and interpreted in text.

Synthesis and analysis

A thematic meta-synthesis of the Results sections of manuscripts will be undertaken. Analysis will comprise three main stages [63]: first, line by line coding; next, descriptive thematic development, and finally; analytic theme development.

The thematic meta-synthesis method was chosen for several reasons. It fits the gaps this research responds to: the descriptive phase will address the need to systemise insights from disparate disciplines, contexts and topic areas, while the analytic phase is an interpretive tool with which synthesised studies can be re-examined to study why patients and the public find OverTD so difficult to understand. Furthermore, thematic analysis is suitable for handling data from disparate contexts [64], which fits this synthesis where included studies are likely to be heterogeneous. Finally, thematic meta-synthesis is particularly suited to informing policy and practice [65], which is an important consideration for this research. The synthesis assumes an objective idealist epistemic

position. The synthesised studies are considered to convey something about reality, but this reality is conveyed through a subjective lens [66]. This is also assumed for the findings of this synthesis.

The first stage of analysis will be line-by-line coding. Authors will familiarise themselves with the data. TR will inductively generate initial codes for ideas in the data, coding over several iterations until no new codes are needed to capture ideas. Single data fragments can be assigned multiple codes. Once TR is satisfied with the code frame, he will code the whole dataset, checking coding for data coverage and refining it as necessary. A second author (RH) will check a randomly selected sample of 10% of coded data for coding accuracy. A disagreement score will be calculated, and disagreements discussed and resolved, drawing on the wider team if required. An agreement score of 85% or higher will be targeted [67]. If the agreement score is low, reasons for this will be investigated, and line-by-line coding may need to be repeated.

The second stage of analysis will be the development of descriptive themes to organise existing ideas in the data. TR and RH will independently organise individual codes into broader themes. The two authors will then cooperate to develop one set of common descriptive themes, discussing them with the wider author group. Themes will be checked for data coverage and internal homogeneity [68]. External heterogeneity will not be assessed, as this is problematic where individual data can be multi-coded. Themes will be revised until their fit with data is optimised.

The third stage of analysis will be the development of analytical themes capturing the barriers and enablers to patient and public understanding of OverTD. This stage will be interpretative and will seek to generate new ideas [63, 69]. TR and RH will independently re-examine the data organised into descriptive themes to infer what the barriers and enablers to understanding OverTD are [70]. This phase relies on the authors' subjectivities, and the authors will take a reflexive approach to minimise problems in interpretation and improve transparency in analysis [71]. TR and RH will meet to compare their analytic themes. As part of researcher reflexivity, they will discuss the factors that led to their interpretations, including their assumptions, logical inferences and how their interpretations may have been shaped by the pre-determined research aims. Researcher reflexivity will also be addressed in peer-reviewed publications resulting from this research, including consideration about the ways in which the authors' own positions could have influenced the study design, analysis and the interpretation of findings. TR and RH will determine the analytical themes, which will be discussed and finalised with the wider author group.

Descriptive and analytic thematic results will be compared across a range of classifying variables, such as whether data is from studies about patients/the public/both, and whether data is from studies investigating understanding of overtesting/overdiagnosis/both. Notable comparative differences will be reported in the Results. Descriptive and analytical themes will be tabulated and paired with exemplary data fragments. A separate table will display how the data from each study is represented in the coding.

Assessment of confidence in findings

The GRADE-CERQual (Grading of Recommendations Assessment, Development and Evaluation-Confidence in Evidence from Reviews of Qualitative research) approach [72] will be used to assess confidence in the analytic synthesis results. GRADE-CERQual is used to consider four factors about studies contributing to review findings: i) methodological limitations; ii) relevance; iii) adequacy of supporting data, and; iv) coherence. The overall confidence in each review finding (i.e. for each theme generated) will be graded as: high, moderate, low or very low. GRADE-CERQual assessments will be undertaken independently by two authors (TR and RH). Any disagreements will be discussed

until consensus is achieved. Review findings, the confidence judgement for each finding and an explanation of the judgement will be presented in a Summary of Qualitative Findings table.

Assessment of methodological limitations

Methodological limitations in the synthesis will be judged based on the aggregated CASP checklist results for all included studies (described earlier).

Assessment of relevance

Relevance is "the extent to which the body of data from the primary studies supporting a review finding is applicable to the context specified in the review question" (p. 53, [73]). Across synthesised studies contributing to each review finding, we will consider the years of publication, settings in which studies were conducted, target audiences and specificity of the findings. These will determine how relevant the body of synthesised studies is for developing knowledge about contemporary patient and public understanding of OverTD in general.

Assessment of adequacy

Adequacy is the quantity and richness of data contributing to a review finding [74]. Quantity is defined as the number of studies or data fragments supporting a theme. Richness is defined as the extent to which themes are supported by detailed, qualitative descriptions. Both parameters will be considered to judge the adequacy of data for supporting each theme in the synthesis results.

Assessment of coherence

Coherence is "how clear and cogent the fit is between the data from the primary studies and a review finding that synthesises that data" (p.35, [75]). To examine coherence, the synthesis themes will be compared against the results of individual synthesised studies, examining the extent to which the synthesis findings align with individual study findings.

Patient and Public Involvement

A health consumer advocate from the Consumer's Health Forum of Australia was consulted in the development of this protocol. They will advise on the interpretation of the synthesis results.

Results

The Results will comprise two subsections:

1. The sample profile, describing classifying information about the synthesised studies.
2. The thematic meta-synthesis results. Both descriptive and analytic themes will be reported. The descriptive themes will form a minor part of the Results, summarised in a table and briefly interpreted in text. The analytic themes will form a main part of the Results, with all major analytic themes tabulated, described in text and paired with exemplary data fragments and GRADE-CERQual assessment findings.

The meta-synthesis will be reported in accordance with the enhancing transparency in reporting the synthesis of qualitative research (ENTREQ) statement [76].

Ethics and dissemination

Ethics approval is not required for this secondary analysis of published data. The findings may be disseminated in peer-reviewed publications, conference papers and elsewhere.

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Author contributions

TR, DOC and RB conceived the study and wrote the first draft of the protocol. RH, RT, KMC and SC contributed to refining the protocol design and preparing subsequent protocol drafts. All authors approved the submitted protocol and are accountable for its content.

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Competing interests

None.

Appendix

1. PRISMA-P checklist

PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol*

Section and topic	Item No	Checklist item	Description of how item is addressed in Protocol
ADMINISTRATIVE INFORMATION			
Title:			
Identification	1a	Identify the report as a protocol of a systematic review	Identified on title page and Abstract.
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	Not applicable.
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	PROSPERO registration is CRD42020156838, as stated in Abstract and in the Methods sections.
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	Provided on title page.
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	Described in the Author contributions section. As stated, all authors are guarantors of the review.
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	Not applicable.
Support:			
Sources	5a	Indicate sources of financial or other support for the review	Disclosed on title page.
Sponsor	5b	Provide name for the review funder and/or sponsor	Disclosed on title page.
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	Disclosed on title page.
INTRODUCTION			
Rationale	6	Describe the rationale for the review in the context of what is already known	Described in Introduction section.
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	The study objectives are stated in the Objectives section. As there are no participants or interventions, a PICO framework was not appropriate. However, similar parameters (such as the types of studies, the focus on patients and the public, the methods, and

			so on) are described in the Study selection criteria section, while the expected outcomes are described in the Discussion section.
METHODS			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	Eligibility criteria and report characteristics are described in the Study selection criteria section.
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	The electronic databases are described in the Search methods section. The planned dates of coverage are described in the Study selection criteria section.
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	The draft search strategy is described in the Search methods section, and a draft of a search strategy for the electronic database MEDLINE is included in Appendix 2.
Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	The mechanisms and software that will be used to manage records are described in the Selection of studies section.
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	The process for selecting studies through each phase of the review is described in the Selection of studies section.
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	The process for extracting data from reports is described in the Selection of studies section, and in the first paragraph of the Synthesis and analysis section.
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	The data that will be sought are described in the first paragraph of the Data extraction section. There are no pre-planned data assumptions or simplifications.
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	The outcomes for which data will be sought are described for each phase of the thematic meta-synthesis in the Synthesis and analysis section.
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	Risk of bias will be assessed at the individual level using the CASP qualitative checklist, as described in the Assessment of quality of studies section. It will also be assessed at the review level, as described in the Assessment of confidence in findings section.
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	Not applicable. Data will be qualitatively synthesised.

	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I^2, Kendall's τ)	Not applicable.
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	See response to item 15d.
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	Qualitative thematic meta-synthesis will be undertaken. The summary planned is described in the Synthesis and analysis section.
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	No assessment of meta-biases is planned.
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	The strength of the body of evidence will be examined using the GRADE-CERQual approach, as described in the Assessment of confidence in findings section.

*** It is strongly recommended that this checklist be read in conjunction with the PRISMA-P Explanation and Elaboration (cite when available) for important clarification on the items. Amendments to a review protocol should be tracked and dated. The copyright for PRISMA-P (including checklist) is held by the PRISMA-P Group and is distributed under a Creative Commons Attribution Licence 4.0.**

From: Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart L, PRISMA-P Group. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. BMJ. 2015 Jan 2;349(jan02 1):g7647.

2. Draft search strategies

Concepts:

- **Primary, published, peer-reviewed research:** to be identified during manual screening, as the OVID MEDLINE "additional limits" function for study type may miss some eligible studies.
- **Examining understanding:** filtered by first set of concepts (MEDLINE: Ref 1-15, PsycINFO: Ref 1, CINAHL: Ref S1, Scopus: Ref 1).
- **Among patients and/or the public:** filtered by second set of concepts (MEDLINE: Ref 16-28, PsycINFO: Ref 2, CINAHL: Ref S2, Scopus: Ref 2).
- **Of overtesting and/or overdiagnosis:** filtered by third set of concepts (MEDLINE: Ref 29-41, PsycINFO: Ref 3, CINAHL: Ref S3, Scopus: Ref 3).
- **Either qualitative or mixed methods study design:** filtered by fourth set of concepts, taken or adapted from existing studies (MEDLINE: Ref 42, PsycINFO: Ref 4, CINAHL: Ref S4, Scopus: Ref 4).
- **Published in the English language:** filtered at end of each search strategy.
- **Published in any year:** no filter needed.
- **Conducted in any setting:** no filter needed.
- **Focusing on the general concepts of OverTD and/or in relation to specific condition/s or interventions:** no filter needed.

Medline search strategy

Ref	Search term/s	Description
1	exp attitude to health/ or health knowledge, attitudes, practice/	Filters to identify concepts related to understanding
2	belie*.mp.	
3	exp Attitude/ or attitud*.mp.	
4	exp Comprehension/ or exp Communication/	
5	experience*.mp.	
6	exp perception/ or concept formation/ or decision making/ or judgment/	
7	understand*.mp.	
8	exp Patient Acceptance of Health Care/ or patient acceptance.mp.	
9	decision making.mp. or Decision Making/	
10	expectation*.mp.	
11	exp Risk Assessment/	
12	Thinking/	
13	"health literacy".mp. or exp Health Education/ or Health Literacy/ or consumer health information/	
14	exp Patient Education Handout/ or Patient Education as Topic/	
15	exp Patient Preference/	
16	patient*.mp. or exp Patients/	Filters to identify concepts related to patients and the public
17	public.mp.	
18	exp Male/	
19	exp Female/	
20	clients.mp.	
21	community.mp.	
22	exp Spouses/	
23	consumer*.mp.	
24	exp men/ or patients/ or population groups/ or survivors/ or terminally ill/ or transplant recipients/ or women/	

25 26 27 28	women*.mp. men.mp. men's.mp. exp Adult/ or adult*.mp.	
29 30 31 32 33 34 35 36 37 38 39 40 41	exp Medical Overuse/ or Health Services Misuse/ over?test*.mp. over?diagnos*.mp. over?detect*.mp. "too much medic*".mp. "unnecessary screen*".mp. "unnecessary test*".mp. "low value care".mp. exp Medicalization/ or medicali*.mp. "medical over?use".mp. over?medical*.mp. over?screen*.mp. pseudo?disease.mp.	Filters to identify concepts related to overtesting and overdiagnosis
42	interview:.mp. OR experience:.mp. OR qualitative.tw.	Filters to identify qualitative research †, ‡
43	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15	Synthesis of filters: understanding
44	16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28	Synthesis of filters: patients and public
45	29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41	Synthesis of filters: overdiagnosis and overtesting
46	42 and 43 and 44 and 45, limited to English language	Final output

† Validated filter developed by: Health Information Research Unit. *Search Filters for MEDLINE in Ovid Syntax and the PubMed translation*. McMaster University, 2016 [cited 2020 25 March]; available from: https://hiru.mcmaster.ca/hiru/HIRU_Hedges_MEDLINE_Strategies.aspx#Qualitative

‡ Filter used: *Qualitative – MEDLINE: Best balance of sensitivity and specificity*

PsycINFO search terms

Ref	Search term/s	Description
1	exp comprehension/ or exp health knowledge/ or "knowledge (general)"/ or client education/ or health attitudes/ or health education/ or health literacy/ or mental health literacy/ or "mental illness (attitudes toward)"/ or "physical illness (attitudes toward)"/ or "health liter*".mp. or exp Attitudes/ or Adult Attitudes/ or Client Attitudes/ or attitud*.mp. or exp decision making/ or declarative knowledge/ or judgement or exp risk assessment/ or risk management/ or risk perception/ or exp Perception/ or percept*.mp. or concept formation/ or perceiv*.mp. or exp Education/ or understand*.mp. or experienc*.mp. or exp Expectations/ or Social Cognition/ or expect*.mp. or exp Thinking/ or exp Consumer Attitudes/ or Consumer Education/ or Client Education/ or exp Awareness/ or belie*.mp. or exp Preferences/ or exp communication/	Filters to identify concepts related to understanding
2	exp Clients/ or exp Human Males/ or exp Human Females/ or exp Terminally Ill Patients/ or Hospitalized Patients/ or Psychiatric Patients/ or Geriatric Patients/ or Patients/ or Medical Patients/ or Surgical Patients/ or patient*.mp. or public.mp. or "men".mp. or men's.mp. or Working Women/ or women*.mp. or woman*.mp. or consumer*.mp. or communit*.mp. or exp Spouses/	Filters to identify concepts related to patients and the public
3	overdiagnos*.mp. or "over diagnos*".mp. or overtest*.mp. or "over test*".mp. or overdetect*.mp. or "over detect*".mp. or overscreen*.mp. or "over screen*".mp. or "too much medic*".mp. or "low value care".mp. or medicali*.mp. or pseudodisease.mp. or "pseudo disease".mp. or "unnecessary screen*".mp. or "unnecessary test*".mp. or "medical overuse".mp.	Filters to identify concepts related to overtesting and overdiagnosis
4	experiences.tw. OR interview:.tw. OR qualitative.tw.	Filters to identify qualitative research †, ‡
5	1 and 2 and 3 and 4, limited to English language	Final output

† Validated filter developed by: Health Information Research Unit. *Search Strategies for PsycINFO in Ovid Syntax*. McMaster University, 2016 [cited 2020 25 March]; available from: https://hiru.mcmaster.ca/hiru/HIRU_Hedges_PsycINFO_Strategies.aspx

‡ Filter used: *Qualitative - PsycINFO: Best balance of sensitivity and specificity*

CINAHL search terms

Ref	Search term/s	Description
S1	(MH "Attitude+") or (MH "Health Beliefs+") or (MH "Public Opinion+") or (MH "Knowledge+") or (MH "Patient Education+") or (MH "Cognition+") or (MH "Life Experiences+") or (MH "Decision Making+") or (MM "Health Literacy") or (MM "Concept Formation") or (MM "Risk Assessment") or (MH "Thinking+") or (MM "Patient Preference") or (MH "Communication+") or experienc* or percept* or perceiv* or attitud* or opinion* or belie?* or understand* or accept* or expectation* or "health know*" or practic* or comprehension or communicat* or accept* or "health literacy* or "risk percept*" or aware* or prefer*	Filters to identify concepts related to understanding
S2	(MH "Patients+") or (MM "Female") OR (MH "Immigrants+") OR (MH "Male") OR (MH "Men") OR (MM "Minority Groups") OR (MH "Parents+") OR (MH "Research Subjects+") OR (MM "Spouses") OR (MH "Survivors+") OR (MH "Women+") or patient* or public or client* or wom?n* or men's or communit* or consumer* or adult* or spouse*	Filters to identify concepts related to patients and the public
S3	"over#diagn*" or "medical overuse" or "over#test*" or "over#detect*" or "too much medic*" or "unnecessary screen*" or "unnecessary test*" or "low value care" or medicali?* "medical#overuse" or "over#medical" or "over#screen*" or "pseudo#disease*"	Filters to identify concepts related to overtesting and overdiagnosis
S4	((MH "study design+" not MM "study design+") or MH "attitude" or (MH "interviews+" not MM "interviews+"))	Filters to identify qualitative research †, ‡
S5	S1 AND S2 AND S3 AND S4, limited to English language	Final output

† Validated filter developed by: EBSCO Connect. *What are the search strategies used by CINAHL Clinical Queries?* EBSCO Connect, 2020 [cited 2020 25 March]; available from: https://connect.ebsco.com/s/article/What-are-the-search-strategies-used-by-CINAHL-Clinical-Queries?language=en_US

‡ Filter used: *Qualitative - High Sensitivity* filter. A 'best balance' filter not used as this high sensitive filter only yielded 245 studies when used as part of the CINAHL search terms on the 18th March 2020.

Scopus search terms

Ref	Search term/s	Description
1	TITLE-ABS-KEY (Attitud* OR perception* OR perceive* OR opinion* OR think* or belie* OR experienc* OR "decisionmaking" OR "decision making" OR understand* or accept* OR aware* OR know* OR "health litera*" OR educat* OR comprehen* OR communicat* or "risk assess*" or prefer* or expect*)	Filters to identify concepts related to understanding
2	TITLE-ABS-KEY (*patient* OR client* OR wom?n* OR men OR men's OR caregiver* OR "care giver*" OR relatives OR carer* OR public* OR consumer* OR community OR survivor* OR "terminally ill" OR recipient* OR persons OR sufferer* OR spouse* OR partner OR participant*)	Filters to identify concepts related to patients and the public
3	TITLE-ABS-KEY ("medical overuse" OR overdiagn* OR "over diagn*" OR overtest* OR "over test*" OR overdetect* OR "over detect*" OR "too much medic*" OR "low value care" OR medicali?ation* OR medicali?ed OR overutiliz* OR "over utiliz*" OR "choosing wisely" OR "medical overus*" OR overscreen* OR "over screen*" OR "over medicali*" OR overmedical* OR "unnecessary screen*" OR "unnecessary test*" OR pseudodisease OR "pseudo disease")	Filters to identify concepts related to overtesting and overdiagnosis
4	TITLE-ABS-KEY(qualitativ* OR ethnol* OR ethnog* OR ethnonurs* OR emic OR etic OR leininger OR noblit OR (field PRE/1 note*) OR (field PRE/1 record*) OR fieldnote* OR (field PRE/1 stud*) or (participant PRE/1 observ*) OR hermaneutic* OR phenomenolog* OR (lived PRE/1 experience*) OR heidegger* OR husserl* OR "merleau-pont*" OR colaizzi OR giorgi OR ricoeur OR spiegelberg OR (van PRE/1 kaam) OR (van PRE/1 manen) OR (grounded PRE/1 theory) OR (constant PRE/1 compar*) OR (glaser PRE/1 strauss) OR (content PRE/1 analy*) OR (thematic PRE/1 analy*) OR (unstructured PRE/1 interview*) OR (semi?structured PRE/1 interview*) OR (action PRE/1 research) OR (focus PRE/1 group*) or (mixed PRE/1 method*))	Filters to identify qualitative research †, ‡
5	#1 AND #2 AND #3 AND #4 AND (LIMIT-TO (LANGUAGE,"English"))	Final output

† *Unvalidated filter developed by*: University Libraries. *Systematic Reviews: Search Filters / Hedges.* The American University of Beirut, 2020 [Cited 2020 23 January]; available from: *https://aub.edu.lb.libguides.com/c.php?g=329862&p=3023731*

‡ *Filter used: Qualitative filter,* which was modified to increase yield of results.