The paradox of popularity in mammography screening and quaternary prevention

O paradoxo da popularidade no rastreamento mamográfico e a prevenção quaternária

La paradoja de la popularidad en las mammografías y prevención cuaternaria

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Abstract

Introduction: Although overdiagnoses (diagnoses of diseases that would not manifest clinically) in mammographic screening have made the balance between benefits and harms doubtful, its positive recommendations to women (>50 years) and professionals persists, which demands quaternary prevention — avoidance of iatrogenic injury and overmedication. Fictitious expectations, preventive moralistic culture, surveillance medicine, and biocapitalism (economic interests) are involved in this persistence. We argue that the “paradox of popularity” — paradoxical expansion of the popularity of screening fueled by the production of its iatrogenic injury — has more importance in this context than it has been taken into account. Objective: To describe and discuss some possible modes of operation of this paradox in healthcare professionals. Methods: Essay based on intentionally selected literature. Results: In addition to the synthesis of this paradox in populations, its operational feasibility in healthcare professionals involves cognitive factors (invisibility of overdiagnosed cases, dilution of severe cases among overdiagnosed ones, and only positive cognitive feedback in clinical experience), political factors (powerful corporate and commercial interests) and psychological factors (significant subjective reward of treating more people with excellent results and less emotional exhaustion derived from caring for overdiagnosed cases, in addition to other common psychocognitive biases). Conclusions: The discussed processes may be relevant for quaternary prevention and better clinical and institutional management of this screening, which should involve Primary Health Care professionals and several other social actors.

Keywords: Quaternary prevention; Primary health care; Disease prevention; Breast neoplasms; Mass screening.


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Resumo

Introdução: Apesar dos sobrediagnósticos (diagnósticos de doenças que não se manifestariam clinicamente) no rastreamento mamográfico terem tornado duvidoso o balanço benefícios-danos, persistem suas recomendações positivas às mulheres (>50 anos) e aos profissionais, o que demanda prevenção quaternária — evitação de danos iatrogênicos e sobremedicalização. Nessa persistência, estão envolvidos expectativas fictícias, cultura moralista preventivista, medicina de vigilância e biocapitalismo (interesses econômicos). Argumentamos que o “paradoxo da popularidade” — expansão paradoxal da popularidade dos rastreamentos alimentada pela produção de seus danos iatrogênicos — tem mais importância nesse contexto do que se tem considerado. Objetivo: Descrever e discutir alguns modos de operação possíveis desse paradoxo nos profissionais de saúde. Métodos: Ensaio baseado em literatura selecionada intencionalmente. Resultados: Para além da síntese desse paradoxo nas populações, sua operacionalidade em profissionais de saúde envolve fatores cognitivos (invisibilidade dos casos sobrediagnosticados, diluição dos casos graves entre os sobrediagnosticados e feedbacks cognitivos apenas positivos na experiência clínica), políticos (interesses corporativos e comerciais poderosos) e psicológicos (significativa recompensa subjetiva de tratar mais pessoas com ótimo resultado e menor desgaste emocional derivado do cuidado aos casos sobrediagnosticados, além de outros comuns vieses psicocognitivos). Conclusões: Os processos discutidos podem ser relevantes para a prevenção quaternária e um melhor manejo clínico e institucional desse rastreamento, que deve envolver os profissionais da Atenção Primária à Saúde e vários outros atores sociais.

Palavras-chave: Prevenção quaternária; Atenção Primária à Saúde; Prevenção de doenças; Câncer de mama; Programas de rastreamento.

INTRODUCTION

Quaternary prevention (P4) means protecting users from iatrogenic injury (common and relevant) and overmedicalization. One of these injuries is overdiagnosis: correct diagnosis of diseases that would not manifest themselves in the person’s life. It occurs by screening (performing tests on asymptomatic people), expanded definitions of diseases, and excessive testing in clinical investigation. The greater sensitivity of technologies for small abnormalities, inclusive changes in diagnostic criteria (merging increased risk with pathology), and shifts in cut-off points for high risk have generated overdiagnoses. Overdiagnosis is a public health issue that operates at the level of healthcare systems, has implications for social justice and is especially relevant for Primary Health Care (PHC). Its (accepted) reality shows that diseases may not progress to clinical manifestation, including cancer, which is counterintuitive. Some cancer screenings produce a lot of overdiagnoses and overtreatment (treatment of overdiagnosed cases), both of which are serious iatrogenic injuries.

Paradoxically, the more overdiagnoses/overtreatments are generated, the more harmed people believe they have been saved, what Welch and Raffle and Gray called the “paradox of popularity.” P4 in
screening requires better understanding and handling of the paradox of popularity. The objective of this essay is to hypothetically describe processes involved in the paradox of popularity and to point out some consequences and challenges, respectively, in the case of mammographic screening of breast cancer (well-studied and exemplifying of the issue, common to other cancers).

METHODS

Methodologically, this article is based on Welch and on articles on mammographic screening, considering the scarce literature on the subject. It begins by contextualizing the complexity of P4 in this screening. Subsequently, the dynamics of the paradox are investigated, without covering all the controversy about this screening (unnecessary for the purpose of this study). Finally, some consequences and challenges are pointed out.

RESULTS AND DISCUSSION

The strength of preventivism and mammographic screening

The maxim “prevention is better than cure” is disseminated, intensified with longevity and chronic diseases. The call for prevention and healthy lifestyles has become a social rule and moral imperative, criticized as sanitary imperialism, for the medicalization and individualization of risks and responsibilities.

Early detection of cancer is a medical and institutional concern. There is consensus that the later the treatment of cancers, the worse the prognosis; the earlier, the better. Secondary prevention expanded from techniques that detected early stages of cancers. The notion of its stages of development has been developed, whose nomenclature was made official in 1952 and absorbed by the scientific community. In the case of mammography, there was enthusiasm and it was claimed that it saves lives, which does not occur or occurs in a very small proportion.

The popular literature and much of the scientific literature emphasize the benefits of periodic mammography. High-income individuals perform more screening and reinforce the belief in its value. The media reports cancer in young women and celebrities, inflating fear and belief in the benefits of screening. In medical handbooks, this is generally reinforced by the poor prognosis of advanced forms. For example: in ovarian cancer, the “5-year survival is approximately 17% with distant metastases, 36% with local spread, and 89% with early disease” (p. 794). It is also possible that the great stress and emotional distress of oncological care lead to the overvaluation of screening.

Conversely, part of the scientific literature shows that overdiagnoses are frequent in preventive mammography: diagnosing via screenings select diseases with a slower evolution, which would not manifest themselves. Overdiagnosis was recognized as the greatest harm of this screening, whose benefit was initially estimated at a 30% reduction in breast cancer mortality, reduced to 20–25%, and later to 10–15% in clinical trials. In a review of observational studies, it was estimated at 10–12.5%, with several reaching zero. There are arguments for suspending screening and for campaigns to change public opinion.

Although there is polarized controversy about the magnitude of overdiagnosis (0 to 50%) and the benefit-harm balance, a conclusion or consensus is not necessary to decide on preventive mammography.
A positive recommendation demands a largely favorable benefit-harm balance with little harm, due to preventive ethics that demand a high valuation of non-maleficence. The existence of controversy (in the literature) about benefits and harms raises doubts about this balance, and this is sufficient for its non-recommendation. Furthermore, the ethical analysis by Rogers et al. and the precautionary principle, applicable in situations with a high potential for extensive and significant damage when there are scientific doubts, converge in this direction. Despite this doubt or failure, medical and health institutions maintain a positive recommendation, including the Brazilian Ministry of Health; requiring clarification of benefits and harms for an informed decision.

For Carter, this screening persists due to other complex factors: “fictitious expectations,” a moralistic culture adhering to sanitary imperialism, surveillance medicine, and biocapitalism (economic interests). We argue that the paradox of popularity encourages this situation more than it has been taken into account, makes P4 difficult, and justifies its analysis for a better understanding.

The perception of harms as benefits: the vicious circle of the paradox

The most common harms of mammography are false-positives, whose cumulative probability in ten years is 61% (annual mammography) and 42% (biannual). Qualitative studies have shown uncertainty and stress experienced in false-positives, particularly anxiety, worries, and long-term psychosocial damage. Other harms are unquantifiable: informing about risks can mean “putting a drop of ink into the clear water of the patient’s identity; it can never be completely clear again” (p. 222) Diagnosis through screening undermines self-confidence, with lasting consequences for identity. It has been estimated that half of those thus diagnosed will suffer from chronic pain.

Overdiagnosis is the most serious damage, but invisible and imperceptible: overdiagnosed individuals are not individually identifiable. It is an epidemiological phenomenon: the finding observed after screenings of an increase in the incidence of cancers without a proportional reduction in the incidence of advanced and metastatic forms and specific mortality over the years, which should occur if early-detected cancers were to progress to clinical manifestation.

Post-screening observational studies have recorded: no return to pre-screening trend incidence levels; absence or modest decreases in the rates of advanced cancer, whose incidence has remained stable instead of decreasing; absence of further proportional reduction in incidence above the screened age group; absence of correlation between the onset of screening and the reduction in mortality and incidence of advanced cancer in different countries, between states of the same country, and between countries with different magnitudes of women’s adherence. Mastectomies have increased post-screening.

In a clinical trial, 50% of invasive cancers identified via screening were overdiagnosed, rising to 72% when including ductal carcinomas in situ (DCIS). After screening, 25% of all breast cancers are DCIS, more than 90% of which are detected by screening. The increase in the number of DCIS follows the introduction of screening, but specific mortality has not decreased with its early treatment. The vast majority of DCIS will never progress to invasive cancer and will not manifest clinically, but nearly all are treated. The reduction in specific mortality occurred equally in screened and unscreened populations and is more associated with improvements in treatment.

There is debate about how to estimate the number of overdiagnoses. Several methods underestimate it, making adjustments according to the lead time (time for the tumor to appear if it had not...
been detected by screening), assuming that all diagnosed cancers would appear later; which does not occur in most cases.\textsuperscript{42}

Clinical trials, which have better control for confounding variables, tend to underestimate overdiagnosis.\textsuperscript{40,88} There is an accumulation of data indicating that overdiagnosis is significant: 20% or more of all breast cancers among women invited to screening; and 30 to 50% of cancers detected by screening, which are approximately 70% of all diagnoses of screened women.\textsuperscript{40}

To facilitate the understanding, it is recommended to use natural frequencies:\textsuperscript{85} for each reduced death from breast cancer (assuming that screening reduces specific mortality by 20%), “X” women are overdiagnosed. In the leaflets of the English National Health Service (NHS),\textsuperscript{89} of the Brazilian Ministry of Health\textsuperscript{63}, and of the Canadian Ministry of Health\textsuperscript{90}, X=3. In other words, diagnosing via mammographic screening has a 25% benefit and a 75% chance of harm.\textsuperscript{31} This is without considering the non-reduction in total deaths from cancer\textsuperscript{38} and the increase in cardiovascular mortality resulting from screening,\textsuperscript{38} which nullify the supposedly positive effect of saving lives.\textsuperscript{91} A recent systematic review estimated X=4,\textsuperscript{92} worsening the chance of harm by 80%.

However, these numbers were not popularized. They seem not to have affected the professional representations\textsuperscript{93} of those involved in the care of these patients. Clinical practice produces knowledge, called “experience,” which influences decisions. What does this experience teach about mammographic screening? No studies were found with this focus, but deductions are tested. The increase in post-screening incidence may have generated the perception that this cancer has become more common, but without considering that much of this is produced by screening and its overdiagnosis.\textsuperscript{48,75,76,94,95} Perceived benefits probably involve an increase in diagnoses of early cancers and a decrease in advanced cancers, with cures for most diagnosed women.

There would be a simple explanation: the increase in cases with better/excellent prognosis was mainly due to screening, diluting advanced cases into a larger group that absorbs a significant part of the time and attention of professionals. Advanced cases continue to exist and have slightly decreased, but they have been diluted in more early cancers (mostly overdiagnosed) and perceived, therefore, as rarer. A better overall prognosis was obtained by including in clinical care a large volume of cases that would not become clinically ill.

In clinical experience, noticeable harms are: false-positives (repairable with good news from repeat tests or negative biopsies\textsuperscript{67}), unnecessary biopsies (whose good results hide that they were not necessary), and false-negatives (an inter-screening cancer is perceived like a disaster that was sought to be avoided). The possible balances are misleading: instead of comparing minor harm (false-positives and correlated biopsies) with perceived benefits (profusion of cures inflated by overdiagnosis), minor harm should be added to overdiagnosis and overtreatment, which is not possible in clinical experience.\textsuperscript{96} This will always show a favorable benefit-harm balance. That is, the cognitive feedbacks derived from practice that reach professionals are all positive as well as the social and institutional ones.\textsuperscript{97}

Another deduction: if screening was ended, there would be no dilution of advanced cases, and their relative increase would likely be perceived as absolute. Staging would show more severe cases, with more aggressive and less curative treatments, more adverse effects and complications: worse results in the perception of professionals.

As for the population, all the overdiagnosed (harmed) women, how they feel benefited (by the cure, although very few have been), faced with a supposed fatal evolution if they do not screen and treat it (nonexistent in the overdiagnosed ones), are induced to believe that screening has saved
The more screenings, the more overdiagnoses and the more screening seems to save people who have been harmed by it (overdiagnosed). All overtreatments are perceived as saving cures, instead of unnecessary diagnoses, surgical mutilations, serious chemotherapy and radiotherapy aggressions (Figure 1).

Such a vicious circle increases the demand for specialized cancer care and the clientele for gynecologists, oncologists, radiologists, and mastologists, generating greater economic gains in the private sector. The increased demand dilutes the severe cases into a more psychologically comfortable and rewarding set to attend to: lots of periodic negative screenings; many false positives with a happy ending; several confirmed diagnoses with happy staging and curative treatment, with a happy follow-up (many overdiagnoses). Screening makes the work lighter and emotionally satisfying, with greater healing power and less distress.

Financial gain does not exist for public service professionals. On the contrary, such increased demand is an additional cost for the Brazilian Unified Health System (SUS) and its users, and diverts resources and clinical care from those who need it most to many who do not (overdiagnosed), producing inequity in access to cancer care and emphasizing the law of inverse care. However, in public services, there is the same psychological/emotional “gain” for professionals.

There is a close interface between the aforementioned processes, the cognitive and affective biases about screening and the heuristics of Kahneman et al. and Morgenstern, summarized in Table 1, and which affect women and professionals.

There seems to be a positive feedback between the popularity paradox and these biases/heuristics. A detailed analysis of this interface is beyond our scope, but some points are worth mentioning. Biases of availability (recall of striking cases rather than population statistics), anchoring (for example, the prevalence of cancer in populations of hospitals and specialized services is erroneously applied to the entire population), and confirmation (cases reported in the media or somewhat striking) are probably feeders of the paradox. The cognitive effects of the aforementioned dilution of severe cases on professional perception seem to be anchoring biases. The aforementioned subjective rewards unconsciously pressure pro-screening practitioners.

These psychosociognoseological dynamics are worth of empirical investigations. In Brazil, the website of the Brazilian Society of Mastology (Sociedade Brasileira de Mastologia – SBM) attributes to its...
Table 1. Biases and heuristics involved in the decision about screening.104

<table>
<thead>
<tr>
<th>Bias</th>
<th>Description</th>
<th>Relevance for Consent in Screening</th>
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</thead>
<tbody>
<tr>
<td>Affect heuristic</td>
<td>The tendency to rely on emotions, rather than concrete information, when making decisions</td>
<td>Emotions not founded in evidence may lead to unjustified decisions</td>
</tr>
<tr>
<td>Ambiguity aversion (uncertainty aversion)</td>
<td>A preference for known risks over unknown risks</td>
<td>There are many unknown risks in screening</td>
</tr>
<tr>
<td>Anchoring bias</td>
<td>The tendency to insufficiently adjust subjective risk to the objective risk value communicated to people</td>
<td>Conceptions about the risks and benefits of participating in screening is not modified by factual information</td>
</tr>
<tr>
<td>Availability bias</td>
<td>The tendency to rely on immediate examples that come to a given person’s mind when making decisions</td>
<td>Information applied in decisions may be anecdotal, unbalanced, or incomprehensive</td>
</tr>
<tr>
<td>Bandwagon effect</td>
<td>The tendency for people to adopt certain behaviors because others are doing so</td>
<td>Decisions are not based on comprehension or on own deliberation</td>
</tr>
<tr>
<td>Commission bias</td>
<td>The tendency toward action rather than inaction</td>
<td>Biases decisions toward accepting invitations</td>
</tr>
<tr>
<td>Confirmation bias</td>
<td>The tendency to interpret new information as confirmation of existing beliefs, conceptions, or theories</td>
<td>Interpreting new information as confirmation of existing beliefs may reduce critical assessment of the evidence and result in biased decisions</td>
</tr>
<tr>
<td>Decoy effect</td>
<td>Increasing the interest in a target action inclusion by introducing an inferior alternative choice (decoy)</td>
<td>Using decoys would be to lure people toward specific choices and would undermine deliberation</td>
</tr>
<tr>
<td>Default bias</td>
<td>The tendency to stay in or make the default choice</td>
<td>Providing a default choice undermines real informed choice</td>
</tr>
<tr>
<td>Framing effect</td>
<td>The tendency for people to decide based on how the information is presented (framed)</td>
<td>Framed information reduces the ability to comprehend and deliberate on information</td>
</tr>
<tr>
<td>Impact bias (Affective forecasting)</td>
<td>The tendency for people to overestimate the impact that future events will have on their lives</td>
<td>Overestimating the risk of cancer can bias decision making</td>
</tr>
<tr>
<td>Optimism bias</td>
<td>The tendency for people to underestimate their probability of experiencing adverse effects</td>
<td>Underestimating the risk of overdiagnosis and overtreatment can bias decision making</td>
</tr>
<tr>
<td>Order effects: primacy/recency</td>
<td>The tendency to pay more attention to information presented first (and last)</td>
<td>Unbalanced attention to information may bias decision making</td>
</tr>
<tr>
<td>Representativeness heuristic</td>
<td>The tendency to base present decisions on past events or experiences that appear similar to the current situation</td>
<td>Decisions can be based on knowledge of persons having screening experiences rather than own relevant risk assessments</td>
</tr>
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</table>

president the statement: “it is essential that women, especially those aged 40 years and older, undergo an annual mammogram” [free translation],105 without mentioning harms or informed decision.

**Consequences and challenges of the paradox**

It seems unreasonable to expect gynecologists, mastologists, oncologists, radiologists, and surgeons to change their conduct and guidelines if they have not yet done so. Such guidelines are associated with conflicts of interest, which also exist outside Brazil,106,107 generate pro-screening pressure108,109 and
represent a political challenge. No national institution, preventive task force, or group of experts took a stand for stopping or reviewing screening — except for the Swiss Medical Board\textsuperscript{110} (which recommended to stop it), the French committee (which recommended either stopping or reforming the program\textsuperscript{111}), and an editorial in the Spanish journal \textit{Revista de Senología y Patología Mamaria}.\textsuperscript{112}

Most literature on screening\textsuperscript{113,114} and most professionals continue to report more on benefits and less on harms.\textsuperscript{115} Many public health booklets also provide insufficient information.\textsuperscript{116-118} Usually, PHC professionals do not have “the capacity [...] to support informed choices about cancer screening for their patients” [free translation]\textsuperscript{119} Not surprisingly, physicians and patients have expectations that overestimate benefits and underestimate harm.\textsuperscript{120}

When women receive information about harm in studies, there is an improvement in their knowledge,\textsuperscript{121,122} but maintenance or minimal change in their decision.\textsuperscript{123-127} Objective information seems to be surpassed in importance by factors such as trust (in the professional or authority), symbolic value (of the breasts), fear, because it is offered by the health system or is free of charge, and by routinization (screening becomes a routine beneficial component of care),\textsuperscript{104} converging with the aforementioned cognitive and affective biases. Six categories of systematic pro-screening influence widely used by health authorities and professionals were also identified: misleading presentation of statistics, misrepresentation of harms and benefits, exclusion systems (examination is scheduled, requiring active cancellation action if non-adherence), recommendation for participation, appeals to fear and influence of healthcare professionals.\textsuperscript{128}

Regardless of women’s knowledge, it is possible that there is some resistance expressed as non-adherence, a way of circumventing the pressures to be screened. Some democratization of information via the Internet and, rarely, traditional media,\textsuperscript{129} could be a mitigating factor of this pressure. Adherence is greater than 70% in several countries with organized programs (Denmark, Netherlands, Finland, Spain, Sweden, Slovenia), but lower in others (50–69%: France, Germany, Portugal, Poland, Italy, Ireland, Hungary).\textsuperscript{130} In Brazil, without an organized program, the estimated coverage ranged from 74.4% (2011) to 78.0% (2020).\textsuperscript{131}

The structure of the healthcare system can also influence the maintenance of screening, associated with the lack of coordination of care and the lack of monopoly of first contact by primary health care. We found no research on this, but there are suggestive indications: in addition to financial conflicts of interest,\textsuperscript{132} corporate interests and professional experiences are important, which influence the conclusion of systematic reviews.\textsuperscript{133,134} The presence of family doctors restricts recommendations, and the presence of radiologists expands these recommendations in committees that produce them.\textsuperscript{135} This probably occurs in care practice as well.

The paradox of popularity worsens the “pathogenic vulnerability” created by overdiagnoses: a vulnerability that arises when an action aimed at improving a situation (reducing breast cancer mortality) exacerbates existing vulnerabilities or creates new ones, in which individuals’ agency is limited by multiple factors. Women’s agency is undermined by pressures to screen (including via official recommendations), controversies over efficacy and harm (when accessed), and practical barriers to an informed decision, making it an ethically unacceptable option.\textsuperscript{53}

Carter\textsuperscript{52} discusses pro-permanence factors of this screening, partly constituting and partly synergistic with the paradox of popularity: the “epistemic” issue, the “agency” issue, and the “fictional expectations” issue. We have already addressed the first: controversy over the balance between benefits and harm and the impossibility of personally identifying those who are overdiagnosed.
As for “expectations,” there is a broad cultural resonance in contemporary times, in which imaginary futures are of great importance and decisions are made in profound uncertainty; which demands something to guide action: fictitious expectations provide that guidance. Such expectations fall somewhere between fact and imagination, are shareable, are serious, as opposed to made-up stories, and emphasize common exaggerations in fictional expectations. In the case of mammography, they emphasize the potential benefits while obscuring the harms.52

The problem with “agency” is that there is a plurality of human motivations, perspectives and interests (PHC physicians, various specialists, managers, media, patients, etc.) that disperses their agency in multiple directions, some of them pro-screening. This allows the agency of technology (of biocapital) to remain preponderant, in synergy with surveillance medicine,136 which emphasizes the future (prevention). Biocapital reinforces this agency, also due to its performativity. A discourse is performative if it helps to accomplish what it refers to. In the economy, the power of performativity is well-known, which mobilizes large financial resources, social, and scientific forces. In health, great performativity was observed in promises of technological and medical revolution, boosting research, beliefs, and opinions (even if fallacious, exaggerated, and/or failed). In addition to the influence of interests and the power of money, biocapital operates via performativity intensifying fictitious pro-screening expectations.52

A management strategy for this situation is the aforementioned application of the precautionary principle to preventive mammography.50,61 This would mitigate the epistemic problem, by screening contraindication; it would reinforce human agency, converging it toward the practical valuation of non-maleficence (consensual in theory, but little practiced); it would empower professionals, managers, social movements, and States in the opposite direction to biocapital.

Other powerful pro-screening forces are preventivism moralism and emotional manipulation through the use of salvationist words, which biasedly manipulate people’s well-documented and widespread propensity to morally decide (do the right thing) and accept “trading” few valuable benefits (“saved lives” for many minor losses [overdiagnoses]).137

Therefore, patients will hardly lead changes or be able to make truly informed decisions, also due to lack of statistical literacy, which is also scarce among physicians;138,139 although some social movements began to discuss the issue, such as the Coletivo Feminista Sexualidade e Saúde [Sexuality and Health Feminist Group], in Brazil.140

In any case, the paradox of popularity must be faced by managers, educators, and professionals. In the scientific literature, this discussion is rare. The closest topic is the attempt to minimize overdiagnoses.141 There is a call to: optimize benefits and minimize harm; improve information; empower PHC physicians and users;142 develop techniques to separate higher risk groups and intervene only in them.143 This is relevant because new technologies added to mammography, such as magnetic resonance imaging144 etc., have been proposed based on improvements in detection rates, without reduction in specific mortality,145 potentially producing even more overdiagnoses.

P4 in this screening challenges PHC professionals in their daily lives,146 demanding a protagonism for which some strategies were indicated147 (Figure 2)

Professional protagonism is not enough. There is a need for institutional, political, and social mobilization.141 It has been slowly starting on similar topics, such as the Choosing Wisely148 and the Too Much medicine movements.149 Regarding overdiagnosis, there are institutional and governmental initiatives in Australia.150
### Strategy Description Examples of action

**Reduce screening**
- **Do not bring up the topic**
  For topics with negative recommendations, especially strong recommendations against screening, do not bring up the subject
  For women younger than 50 y of age, choose to discuss other preventive issues, not mammography, unless the woman asks
- **Reduce unnecessary testing**
  Screen only the population at sufficient risk so that the potential benefits are greater than the potential harms of screening
  Do not screen people before the recommended interval, as they are at very low risk. There is minimal benefit, while the risk of harms is similar to when done at the appropriate interval (eg, false positives)

**Improve patient communication**
- **Share decision making**
  Patient and physician need to discuss the harms and benefits of screening. Consider patient preferences and values
  Share screening decisions with patients to reduce decisional conflict
- **Effectively communicate both harms and benefits to patients**
  Use measures of outcome and effect size that are most easily understood by patients
  Use natural frequencies and absolute risk reduction with baseline estimate (eg, mammography screening helps 1 woman in 1000)
- **Use knowledge translation tools and patient decision aids**
  Tools improve patient understanding of harms and benefits of screening
  Use 1000-person diagrams or “fact boxes” (from the Harding Centre for Risk Literacy) that outline the harms and benefits of the action
- **Manage emotional outcomes of harms**
  Prepare strategies to manage patients who have experienced harms associated with screening
  Help patients who decided not to screen realize that their decision was sensible when they made it, and to understand that their outcome might be no different than if they had been screened

**Fully understand screening**
- **Understand the limitations of the screening test and its variability**
  All laboratory tests, imaging, and clinical assessments have measurement variation
  Understand that frequent repeat testing is not helpful (eg, DEXA bone density test results have greater variation than annual changes in bone density do)
- **Understand screening test quality**
  Be aware of quality markers for screening (eg, positive results for mammography vary from 4% to 9% among radiologists)
  Refer to the highest-quality laboratory or service. Focus on correct disease detection and excess positive rates
- **Understand natural history of disease**
  Know the course a disease takes (without medical interference) in individual persons from its inception until its eventual resolution through complete recovery or death
  Acknowledge the pool of undiagnosed disease that would never affect people's lives (overdiagnosis). The proportion depends on the disease and person's life stage
- **Use knowledge of epidemiology of disease**
  Disease probability changes with age and risk factors, so chance of benefit changes accordingly
  Decide whether to start screening for cervical cancer, about 10 years after first sexual activity, not based just on age 21 or 25

**Adopt organizational strategies**
- **Develop a follow-up approach to positive test results**
  Use less-invasive strategies to manage positive test results
  Repeat marginally elevated tests (eg, cholesterol, blood pressure) to decide if it is a chance variation
- **Develop recall processes**
  Processes can be developed in a practice, region, or province to proactively recall patients for screening
  Advocate for such processes to recommend shared decision making between patient and physician not to simply tell patients to do the test

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**Figure 2.** Strategies to reduce the harm caused by screening in the daily lives of professionals.\(^{347}\)
CONCLUSION

Mammographic screening produces overdiagnosis/overtreatment in women that are indistinguishable from those with cancer that threatens them. Therefore, overdiagnoses are perceived as saviors and generate the misleading perception of their great benefit, inducing more screenings, closing the vicious circle of the paradox of popularity. It affects the population and probably professionals. In the latter, it involves commercial, intellectual and corporate interests; cognitive biases, among others, those derived from the apparently large reduction in advanced cancers; and subjective rewards in clinical practice, which is lighter and more curative during screening. In this screening, P4 demands that PHC professionals and their confederations, social movements, researchers (including Public Health), and managers join together in addressing the paradox of popularity and overdiagnoses.

CONFLICT OF INTERESTS

Nothing to declare.

REFERENCES

1. Makary MA, Daniel M. Medical error-the third leading cause of death in the US. BMJ 2016;353:i2139. https://doi.org/10.1136/bmj.i2139
Popularity paradox and P4


25. Prasad V, Lenzer J, Newman DH. Why cancer screening has never been shown to “save lives”- and what we can do about it. BMJ 2016;352:h6080. https://doi.org/10.1136/bmj.h6080


140. Coletivo Feminista Sexualidade e Saúde. Outubro rosa - o que existe além de câncer de mama e mamografia? [Internet]. [cited on June 12, 2022]. Available at: https://www.mulheres.org.br/outubro-rosa-o-que-existe-alem-de-cancer-de-mama-e-mamografia/
149. The BMJ. Too much medicine [Internet]. [cited on June 9, 2022]. Available at: https://www.bmj.com/too-much-medicine