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Breast density notification: evidence on whether benefit outweighs harm is required to inform future screening practice

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THE CURRENT LANDSCAPE OF BREAST DENSITY NOTIFICATION

Breast density is one of a number of independent risk factors for breast cancer.¹ Having dense breasts (heterogeneously dense or extremely dense) is prevalent in 40-50% of women in the breast screening population,² making it one of the most common risk factors for breast cancer. Separate from this, having dense breasts also increases a woman's risk of having a breast cancer missed on mammography, meaning that it increases the risk of having an interval cancer diagnosed before the next scheduled mammogram in screening participants.³ This is due to lower sensitivity of mammography in women with dense breast tissue.⁴

Over the past decade breast density has been a major topic of international discussion among women, physicians and policy-makers as a way to manage the risk of breast cancer.⁵ In the United States (US) unprecedented legislation has been enacted in 38 states and the District of Columbia to notify women about their breast density. Following on from this, in early 2019 the US Congress passed national breast density legislation which proposes that the US Food and Drug Administration ensures that all mammography facilities include breast density information in reports sent to patients and their physicians.⁶ This legislation has been driven by a complex social phenomena, largely stemming from industry interest, consumer advocacy groups demanding that women be informed, and concerns about the burden of missed cancers.^{5,7}

However, it could be argued that legislation to enforce notification of breast density before protocols for its management exist, neglects the fundamental premise of evidence-based medicine.

The current evidence to support widespread breast density notification at a population level is still lacking and the balance between the benefits and harms for an individual woman as well as society as a whole is far from clear. Furthermore, at present, there are no uniform recommendations provided to women who are informed they have dense breasts in regards to supplemental screening.

The legislation in the US has broad implications for other countries currently considering implementing breast density notification through population-based breast screening programs.⁸ For example, in Australia, breast density-specific legislation has not been implemented and the national screening program, BreastScreen Australia, does not routinely provide this information to women as national policy.⁹ However, BreastScreen's individual state services are reconsidering their stances given the recent developments in the US and growing pressure from key consumer advocacy groups, including public messaging targeting women's 'right to know' about this issue. Likewise, in the United Kingdom and Canada there are now major advocacy groups and petitions promoting national breast density notification, although their national screening committees recently concluded against measuring breast density. Other countries across the world with population-based screening programs are also having similar discussions and debates about how best to proceed in this complex space.

WHERE IS THE EVIDENCE WEAK OR LACKING?

In an era of shared decision making in healthcare, notifying women of their breast density has well-intentioned goals to improve individual decision making.¹⁰ At this time however, the lack of evidence underscores several concerns about implementing breast density notification, and these well-intentions might actually cause more harm than good. First and foremost is the uncertainty about what women who have dense breasts can do to manage their risk of dying from breast cancer. Although supplemental screening with imaging modalities such as ultrasound and MRI has been shown to enhance cancer detection in women with dense breasts,¹¹ the limitations of these additional tests and the overall health benefit remain unclear.^{11 12} The long-term outcomes including the effect on the rate of advanced breast cancers and mortality have not yet been adequately assessed or reported.¹³ Moreover, the potential benefit from detection of additional cancers through supplemental screening in women with dense breasts may not outweigh the associated downsides including false-positive readings and the possibility of further overdiagnosis and overtreatment of breast cancer.^{7 14} All of these can then lead to associated iatrogenic harms and costs.¹⁵

Secondly, breast density is measured on a continuum leading to difficulty in categorisation. It has been shown that there is variability in what constitutes dense or non-dense breasts among readings for an individual woman (reflecting reader and potential temporal variability), with 13-19% of women being re-classified into a different density category on their subsequent screen.¹² Variability in classifying breast density exists within and between radiologists which can lead to confusion for an individual woman. To reduce inconsistencies from readers, automated breast density measurement has been introduced for density reporting however the evidence on how this predicts cancer risk is still evolving.¹⁶ Because different automated density systems use different mechanisms and algorithms this may also contribute to additional variation. The degree to which women with dense breasts are at increased risk of breast cancer is also inconsistently measured in the evidence. For example, some studies have compared women with 'extremely dense' and 'heterogeneously dense' vs. women with 'scattered fibroglandular density' and 'fatty' breasts, whereas others only compare the extreme categories ('extremely dense' vs. 'fatty' breasts). This adds to the overall variation in the estimated magnitude of risk attributed to having dense breasts and poses the question about how we inform women of these uncertainties.

And lastly, an often overlooked concern relates to the unique challenges with communicating information about breast density and its risk to women. Along with the uncertainties discussed above, breast density is a risk factor that is not readily modifiable, unlike other lifestyle risk factors (e.g. post-menopausal obesity) that carry a similar risk for breast cancer.¹⁷ With the current inconsistencies in notification information in the US, women's knowledge, awareness and understanding of density has been shown to be low and quite variable.^{18 19} Studies in the US highlight areas of uncertainty, gaps in knowledge and unmet support needs from both women being notified of their breast density as well as among physicians notifying the women.⁸ Furthermore, it has been shown²⁰ that health information materials designed to communicate about breast density score poorly on readability and understandability formulae, and are written beyond average reading and health literacy levels of the population. Therefore current materials are not meeting even basic quality standards for the provision of health information.²⁰

All of these concerns suggest that women and physicians may not be equipped with enough evidence, information or resources to assess, interpret and discuss the benefits and harms of breast density results on screening mammograms and make informed, shared and actionable decisions.^{20 21} Moreover, the challenges we have described around breast density notification cannot necessarily be solved simply by providing more information to individual women and doctors.²² At the forefront of all of this is the short- and long-term psychological effect this may have on women undergoing routine screening. The immediate psychological consequences of breast density notification are relatively unknown⁸ and to our knowledge there are no rigorous or long-term evaluation studies

providing evidence on the impact of breast density information. Furthermore, from a population health perspective, it remains unknown whether routine density notification would confer sufficient benefit to balance or outweigh all additional harms and costs. This would be essential if such policy was to be enacted through legislation.

MOVING FORWARD

We believe that it is imperative to have robust evidence about whether to communicate breast density information to women and, if so, how best to do it. Before this happens there first needs to be an assessment of the balance between the benefits and harms at the societal level. There is also a need for better understanding of both the short- and long-term effect that breast density notification has had on women in the US. Developing an appropriate strategy for whether to and for who to inform, including how to effectively notify women and communicate the potential benefits and harms of density information in other countries may still be feasible. This will take time, so for now screening services and programs could contribute through carefully planned research which assesses the impact of providing breast density information to women on both the societal and individual level.

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REFERENCES

1. Boyd NF, Guo H, Martin LJ, et al. Mammographic density and the risk and detection of breast cancer. *The New England journal of medicine* 2007;356(3):227-36. doi: 10.1056/NEJMoa062790 [published Online First: 2007/01/19]
2. Sprague BL, Gangnon RE, Burt V, et al. Prevalence of mammographically dense breasts in the United States. *Journal of the National Cancer Institute* 2014;106(10) doi: 10.1093/jnci/dju255 [published Online First: 2014/09/14]
3. Houssami N, Hunter K. The epidemiology, radiology and biological characteristics of interval breast cancers in population mammography screening. *NPJ Breast Cancer* 2017;3:12. doi: 10.1038/s41523-017-0014-x [published Online First: 2017/06/27]
4. Carney PA, Miglioretti DL, Yankaskas BC, et al. Individual and combined effects of age, breast density, and hormone replacement therapy use on the accuracy of screening mammography. *Annals of internal medicine* 2003;138(3):168-75. doi: 10.7326/0003-4819-138-3-200302040-00008 [published Online First: 2003/02/01]

5. Cappello NM. Decade of 'normal' mammography reports--the happygram. *Journal of the American College of Radiology : JACR* 2013;10(12):903-8. doi: 10.1016/j.jacr.2013.09.006 [published Online First: 2013/12/04]
6. Hoeven J. Agriculture, Rural Development, Food and Drug Administration and Related Agencies Appropriations Bill of 2019, S 115-259, 115th Cong, 2nd Sess (2018). [Available from: <https://www.congress.gov/congressional-report/115th-congress/senate-report/259/1?q=%7B%22search%22%3A%5B%22farm%22%5D%7D>. accessed 14 January 2020.
7. Slanetz PJ, Freer PE, Birdwell RL. Breast-density legislation--practical considerations. *The New England journal of medicine* 2015;372(7):593-5. doi: 10.1056/NEJMp1413728 [published Online First: 2015/02/12]
8. Houssami N, Lee CI. The impact of legislation mandating breast density notification - Review of the evidence. *Breast* 2018;42:102-12. doi: 10.1016/j.breast.2018.09.001 [published Online First: 2018/09/22]
9. Allen & Clark Review of Evidence: Breast density and screening. A literature review to inform BreastScreen Australia's position statement on breast density and screening, 2018.
10. Lee CI, Bassett LW, Lehman CD. Breast density legislation and opportunities for patient-centered outcomes research. *Radiology* 2012;264(3):632-6. doi: 10.1148/radiol.12120184 [published Online First: 2012/08/25]
11. Bakker MF, de Lange SV, Pijnappel RM, et al. Supplemental MRI Screening for Women with Extremely Dense Breast Tissue. *The New England journal of medicine* 2019;381(22):2091-102. doi: 10.1056/NEJMoa1903986 [published Online First: 2019/11/28]
12. Melnikow J, Fenton JJ, Whitlock EP, et al. Supplemental Screening for Breast Cancer in Women With Dense Breasts: A Systematic Review for the U.S. Preventive Services Task Force. *Annals of internal medicine* 2016;164(4):268-78. doi: 10.7326/M15-1789 [published Online First: 2016/01/13]
13. Longo DL. Detecting Breast Cancer in Women with Dense Breasts. *The New England journal of medicine* 2019;381(22):2169-70. doi: 10.1056/NEJMe1912943 [published Online First: 2019/11/28]
14. Haas JS, Kaplan CP. The Divide Between Breast Density Notification Laws and Evidence-Based Guidelines for Breast Cancer Screening: Legislating Practice. *JAMA internal medicine* 2015;175(9):1439-40. doi: 10.1001/jamainternmed.2015.3040 [published Online First: 2015/07/07]
15. Brodersen J, Schwartz LM, Heneghan C, et al. Overdiagnosis: what it is and what it isn't. *BMJ Evid Based Med* 2018;23(1):1-3. doi: 10.1136/ebmed-2017-110886 [published Online First: 2018/01/26]
16. Wanders JOP, Holland K, Karssemeijer N, et al. The effect of volumetric breast density on the risk of screen-detected and interval breast cancers: a cohort study. *Breast cancer research : BCR* 2017;19(1):67. doi: 10.1186/s13058-017-0859-9 [published Online First: 2017/06/07]
17. Colditz GA, Bohlke K. Priorities for the primary prevention of breast cancer. *CA: a cancer journal for clinicians* 2014;64(3):186-94. doi: 10.3322/caac.21225 [published Online First: 2014/03/22]
18. Santiago-Rivas M, Benjamin S, Jandorf L. Breast Density Knowledge and Awareness: A Review of Literature. *J Prim Care Community Health* 2016;7(3):207-14. doi: 10.1177/2150131916633138 [published Online First: 2016/02/26]
19. Schifferdecker KE, Tosteson ANA, Kaplan C, et al. Knowledge and Perception of Breast Density, Screening Mammography, and Supplemental Screening: in Search of "Informed". *Journal of general internal medicine* 2019 doi: 10.1007/s11606-019-05560-z [published Online First: 2019/12/04]

20. Kressin NR, Gunn CM, Battaglia TA. Content, Readability, and Understandability of Dense Breast Notifications by State. *Jama* 2016;315(16):1786-8. doi: 10.1001/jama.2016.1712 [published Online First: 2016/04/27]
21. Hersch JK, Nickel BL, Ghanouni A, et al. Improving communication about cancer screening: moving towards informed decision making. *Public Health Res Pract* 2017;27(2) doi: 10.17061/phrp2731728 [published Online First: 2017/08/03]
22. Johansson M, Brodersen J. Informed choice in screening needs more than information. *Lancet* 2015;385(9978):1597-9. doi: 10.1016/S0140-6736(15)60258-6 [published Online First: 2015/02/24]