Evaluating the Role of Artificial Intelligence in Breast Self-screening

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Abstract

Background: With the increasing accessibility of artificial intelligence (AI), the general population is frequently engaging with conversational AI platforms to understand topics related to health and well-being. Breast cancer remains a significant global health issue, ranking as the second most common cancer in women and the leading cause of cancer-related mortality worldwide. While breast self-examination (BSE) is not a replacement for professional screening, it promotes body awareness and may support earlier recognition of changes. Evaluating AI's role in patient education regarding such practices is therefore timely and important.

Objective: This viewpoint aimed to explore the potential and limitations of AI-based conversational models in providing health advice on breast self-screening, using DeepSeek AI as an exemplar.

Methods: A qualitative review was conducted of a dialogue session with DeepSeek AI, where six commonly asked questions regarding breast self-examination were posed. Responses were assessed in comparison with guidance from established health organisations such as the World Health Organization (WHO) and Breastcancer.org. The evaluation focused on accuracy, comprehensibility, and alignment with evidence-based practices.

Results: DeepSeek AI generated comprehensive and accessible responses, employing language suitable for the general population and maintaining consistency with professional recommendations. The model explained BSE techniques clearly, acknowledged alternative approaches, and consistently emphasised that self-examination is complementary rather than a substitute for medical screening. However, notable limitations included insufficient emphasis on the limited mortality benefits of BSE, lack of references to individual variability (e.g., dense breast tissue), and absence of links to credible video resources, which may enhance understanding for visual learners.

Conclusions: AI-driven dialogues demonstrate promise in reinforcing public health practices such as breast self-examination, offering accurate and comprehensible information. Nevertheless, oversimplification, inadequate contextualisation, and lack of integration with multimedia resources remain challenges. For responsible use in health education, AI responses should be supplemented by physician oversight, structured public health campaigns, and clear signposting to diagnostic services. Strengthening AI outputs with evidence-based statistics and visual learning resources can optimise their role as supportive tools in preventive health. Clinical Trial: N/A

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KEYWORDS: Breast, Cancer, Self assessment, AI, SeepSeek

With the growing accessibility of artificial intelligence, the general population is increasingly engaging in conversation with AI chat bots, especially to understand topics related to their body and well being, hence making it important for the medical community to evaluate and guide dissemination of content relating to this. This sparked my curiosity to explore one such interaction with DeepSeek AI to generate a general health advice session revolving around breast self-screening.

Breast cancer is a prevalent global health issue, ranking as the second most common cancer in women and the leading cause of cancer related mortality in women. (1) A breast self assessment or self exam, while not being a substitute for medical screening, helps one become familiar with how one’s breast looks and feels, making it easier to detect unusual changes, which probe prompt medical aid, early detection, and a better prognosis.

DeepSeek AI is an artificial research company whose aim is to cost efficient but high-performance language models. It offers models at a lower cost than OpenAI’s GPT-4 and is being increasingly used for medical research and development.

In my recent conversation with DeepSeek AI, I posed the bot with 6 commonly asked questions about breast self screening.

QUESTION	RESPONSE
Is self screening for breast cancer important?	Yes, self-screening (self-breast examination) for breast cancer is important as part of early detection, though it should not replace clinical screenings like mammograms or exams by a healthcare provider. Breast self-exams (BSE) are important for early detection but don't replace clinical screenings like mammograms. Benefits: Early detection of changes (lumps, dimpling, discharge) Increases awareness of your breast health Helps catch changes between clinical exams Limitations: Can't detect all cancers (imaging finds some earlier) May cause false alarms due to normal hormonal changes
How often should I screen myself for breast cancer?	You should perform a self-breast exam (SBE) once a month to check for any changes. Here's a more detailed breakdown: How often: - Once/month - 3-5 days after period (or fixed date if postmenopausal) Why monthly? - Tracks normal vs. abnormal changes - Improves early detection of lumps, dimpling, or discharge If you find: • New hard lump • Skin/nipple changes • Persistent swelling/pain → See a doctor (many lumps are benign) Important Notes: - Self-exams complement, but don't replace, clinical screenings. Follow guidelines for: - Mammograms (typically starting at age 40–50, earlier if high-risk). - Clinical breast exams (by a doctor every 1–3 years in your 20s–30s, annually after 40). - High-risk individuals (family history, BRCA gene) may need earlier/more frequent imaging (MRI, ultrasound).
How do I screen myself for breast cancer?	Performing a breast self-exam (BSE) properly is key to detecting early changes. Here's a step-by-step guide to do it correctly: 1. Visual Check (Mirror): - Check breasts with arms down/up - Look for: size changes, dimpling, nipple changes 2. Manual Check (Lying Down): - Use 3 finger pads - Apply light/medium/firm pressure - Move in circles, vertical lines, or wedges - Cover entire breast + armpit 3. Shower Check: - Soap helps fingers glide - Repeat circular motions Normal vs Warning Signs: Normal: Soft, slightly lumpy tissue Warning: Hard lump, skin changes, bloody discharge If You Find a Lump: - Don't panic (most are benign) - See a doctor if: • New/hard lump • Changes last >1 menstrual cycle Remember: - Do monthly (best after period) - Combines with mammograms (start at 40-50)

	- High-risk? Ask about MRI/ultrasound
Is there more than one way to screen myself for breast cancer?	Yes! There are multiple ways to perform a breast self-exam (BSE), and different techniques work better for different people. Here are the three most common methods, along with tips for effectiveness: 1. Circular (Spiral) Method - Technique: Begin at the outer breast edge near your armpit - Movement: Make dime-sized circles moving toward the nipple - Coverage: Include upper chest and underarm area - Advantage: Thorough, systematic coverage of all tissue 2. Vertical Strip Method - Technique: Imagine vertical lines dividing breast into 1-inch sections - Movement: Move fingers up and down each strip - Coverage: Extend from collarbone to bra line, side to underarm - Advantage: Recommended by ACS as most thorough method 3. Wedge (Pie Slice) Method - Technique: Visualize breast as a clock face - Movement: Examine each "hour" section from nipple outward - Coverage: Check each wedge individually - Advantage: Helps focus on specific areas Enhanced Examination Tips: For Better Detection: - Alternate between standing and lying positions - In shower: Use soap for smoother gliding motion - Apply three pressure levels: * Light (surface tissue) * Medium (middle layer) * Firm (deep tissue near ribs) Important Reminders: - Best timing: 3-5 days after period ends - Compare both breasts for symmetry - Document any changes month-to-month - Mammograms advised starting at 40 (earlier if high risk) Remember: - Self-exams are supplemental—they don’t replace mammograms or clinical exams. - If high-risk, ask your doctor about MRI or ultrasound screenings.
At what age do I start to screen myself for breast cancer?	You can start breast self-awareness (noticing how your breasts normally look and feel) in your teens or 20s, but formal monthly self-exams (BSEs) are typically recommended starting at age 20. Here’s a breakdown by age group: Teens-20s: - Develop breast awareness - Monthly exams optional unless high-risk 20s-30s: - Consider monthly exams - Clinical exams every 1-3 years - Report changes immediately 40+: - Continue self-exams - Add annual mammograms (start 40-50) - High-risk may need MRI/ultrasound Special Cases: - Start 10 years earlier than family diagnosis if high-risk - Pregnancy/breastfeeding: consult doctor about changes - Genetic risks (BRCA) or radiation history need earlier screening Key Point: Self-exams aid detection but don't replace clinical exams. Adjust schedule based on personal risk factors.
What findings during self screening should make me see a doctor?	During breast self-exams, certain findings should prompt you to see a doctor promptly. Here’s a clear list of warning signs that need medical evaluation: Urgent Warning Signs: - New hard, immovable lump (marble-like)

	- Skin changes: dimpling, orange-peel texture, unhealed sores - Nipple changes: sudden inversion, bloody discharge, crusting - Unexplained persistent pain in one spot - Sudden asymmetric swelling/distortion Normal Variations: - Cyclical tenderness/lumpiness (before period) - Symmetrical texture changes - Small movable lumps that vary with cycle Action Steps: 1. Monitor changes through 1-2 menstrual cycles 2. Document: size, location, persistence 3. Seek prompt evaluation for: - Rapid changes - Combination symptoms (lump + discharge) - Non-cyclical symptoms Important Notes: - Most findings are benign (cysts/fibroadenomas) - Always follow up with clinical exams/mammograms - High-risk patients may need additional imaging

This dialogue highlighted both the potential and the limitations of AI in patient education.

Overall, I felt that the responses to the question asked were quite comprehensive and detailed, preserving language that the general population can understand and implement. The responses used words and techniques as utilised by various credible agencies promoting breast self examination such as Breastcancer.org and WHO. The responses also gave an easy-to-understand explanation about the technique of the examination, outlining various alternatives, in line with what is advised by medical professionals and institutions. (2) Additionally, every response stated on the fact that breast self examination was not a substitute to medical examination or screening investigations, but a complementary practice. (3)

Points for further improvement that were clear to me included provision of links to videos published by credible sites and organisation showing this practice, as 65% of the general population are considered to be visual learners. (4) There is also a risk of over simplification of the process, especially in cases where anatomy of breast tissue differs in individuals (like those with dense breast tissue). There is also not enough stress on the fact that breast self examination is not a substitute for medical examination and screening, which could be stressed mentioning certain facts that self screening in some studies is shown to not reduce the mortality but only is linked to early detection. (5)

In conclusion, while AI-based conversations can aid in spreading awareness and reinforcing health behaviours like breast self-screening, they must be complemented by physician oversight, public education campaigns, and accessibility to diagnostic services. AI based responses must be supported by certain facts and percentages to stress on some important aspects rather than just mentioning them.

Thank you for considering this perspective. I hope it contributes to the ongoing discourse on digital health tools and their responsible integration into medicine.

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Acknowledgments
The generative AI tool DeepSeek AI was used to generate a conversation between a user and the AI regarding breast self-examination, as detailed in the study. The conversation outputs were subsequently reviewed and refined by the study group. The original DeepSeek AI transcripts are provided as a Multimedia Appendix, and the key details are summarized in the corresponding table within the text.
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