



Original Research

Promoting early detection of melanoma during the mammography experience ☆☆☆☆



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ABSTRACT

Background: Invasive melanoma, a lethal form of skin cancer, is the seventh most common cancer in women. Factors such as a history of indoor tanning or sunburn and a personal or family history of skin cancer increase a woman's risk of developing a melanoma.

Objective: Because the majority of melanomas occur in patients age 40 years or older, which is the age that is recommended for women to begin screening mammograms, the mammogram experience could be used to promote early detection of melanoma by introducing skin self-examinations (SSE) to a population of women who are already invested in preventive health.

Methods: This was a pilot and feasibility study that was designed to promote the early detection of melanoma among women who undergo a mammogram at the Lynn Sage Breast Center at the Northwestern Medicine/Prentice Women's Hospital in Chicago, Illinois. The study was conducted in three phases: development of the materials, delivery of the program, and assessment of the program effectiveness.

Results: Eighty six percent of women with scheduled mammogram appointments participated in the study (n = 560). Among these women, 68% noticed the SSE information in the changing rooms, 78% thought the information applied to them, and 68% identified with at least one of the risk factors for melanoma. Twenty percent of the patients checked their skin in the changing room, 13% noticed a concerning mole, and 60% of those women who noted a concerning lesion stated their intent to see a dermatologist for further evaluation.

Conclusion: A large proportion of the women in our study had risk factors for developing a melanoma and noticed the SSE information in the screening center. Placing an intervention to encourage methods for the early detection of melanoma in an outpatient mammography environment is an effective strategy to increase awareness in a large proportion of at-risk women.

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Introduction

Invasive melanoma is the seventh most common cancer in women. The vast majority of melanomas are curable if they are detected at an early stage, yet more than 9,700 patients in the United States are estimated to die of melanoma in 2017 ([American Cancer Society, 2017](#)). There may be an opportunity to reduce melanoma

mortality by increasing the awareness for the need to perform skin self-examinations (SSE) among at-risk people and especially women who have engaged in deliberate tanning.

The incidence of melanoma has increased 3% per year for the last two decades, which is in part due to indoor tanning by young women. In 1994, 16% of female teenagers in Illinois between the ages of 11 and 19 years tanned indoors, which increased to 40% among women between the ages of 18 and 30 years old ([Robinson et al., 1997](#); [Schneider and Kramer, 2010](#)). Almost 30 million individuals tan indoors every year in the United States and the majority are women ([Levine et al., 2005](#)).

Exposure to tanning beds before age 30 years increases a person's risk of developing melanoma by 75% and 10 or more sessions in a lifetime is linked to a six-fold increased risk ([Melanoma Research](#)

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Foundation, 2017). Melanoma is the second most common type of cancer in young adults; however, the majority of melanomas occur in persons who are age 40 or older and the risk of developing melanoma persists throughout a woman's entire life. The U.S. Food and Drug Administration recently issued risk statements that recognize the need for regular skin examinations among women who have tanned indoors. Additional recognized risks for the development of new melanomas are a personal history of melanoma or nonmelanoma skin cancer and a family history of melanoma (based on a pooled relative risk of 6.9 or 6.4, respectively; Gandini et al., 2005; Robinson, 1997).

To raise awareness of the risk of developing melanoma for the vast numbers of women who are at-risk requires an easily disseminated, low cost intervention. Because women begin screening mammograms at 40 years of age, it may be possible to use the mammogram experience as a teachable moment to raise melanoma awareness and encourage SSE (Simmons et al., 2008). These women may be especially receptive to adopting a new early detection health promotion behavior such as a SSE because they were engaged in health promotion by undergoing a mammogram (Glanz et al., 2002). Women who undergo a mammogram may be particularly interested in learning how to recognize their own risk for melanoma, decide that SSE for melanoma detection is relevant, learn to perform SSE, and make decisions about seeking the care of a physician for a concerning mole. This research explored the feasibility to enhance awareness of the risk to develop a melanoma and motivate women to adopt SSE.

Materials and methods

This pilot and feasibility study was designed to promote the early detection of melanoma among women who undergo a mammogram at the Lynn Sage Comprehensive Breast Center at the Northwestern Medicine/Prentice Women's Hospital in Chicago, Illinois. Screening with mammography begins at 40 years of age at Northwestern Medicine. The hypothesis was that women who are already engaged in health promotion by undergoing a mammogram will be able to assess the personal relevance of SSE on the basis of informational material that is placed in the breast center changing rooms, be interested in learning about SSE for melanoma detection, and be able to implement SSE while partially disrobed in the privacy of the changing room. This study consisted of three phases: development of the materials (qualitative research component), delivery of the educational SSE program, and assessment of the program effectiveness (quantitative research component). The study was approved by the Institutional Review Board of Northwestern University.

Study design

Development phase

The development phase began during the first week of March 2017 with the creation of an informational poster and brochure. The brochure included a list of risk factors that would enable a woman to assess whether she was at increased risk to develop a

melanoma, the "ABCDE rules" with instructions on how to score features of a mole, instructions on how to make a decision about seeking medical care for a mole, and pictured examples of benign moles and melanomas. Both healthcare professionals and women who underwent mammograms evaluated the brochure. Women at the screening center were asked the following questions in a structured-interview: (1) *Would you be interested in taking the brochure home to learn more about checking your skin for melanoma?* (2) *Would you be interested in sharing the brochure with family or friends?* (3) *Would you be willing to check your skin while you are changing today?* (Table 1). The women were asked to explain why they answered either yes or no for each question and whether they had any additional suggestions on how to make the brochure more appealing. The research assistant recorded the comments, which were later summarized and analyzed for key patterns and themes using principles from the Interpretative Phenomenological Analysis (Clayman et al., 2009). Iterative changes were made on the basis of feedback that the research assistant received after each set of 25 interviews.

The research assistant also developed an informational poster to introduce the concept of a SSE for melanoma detection and direct women to pick up the brochure (Fig. 1). Both healthcare professionals and women who underwent mammograms evaluated the poster. The women at the mammography screening center were asked the following question in a structured interview: *If you saw this poster, would you want to learn more about how to check your skin for skin cancer of the melanoma type?* The women were then asked to explain why they answered either yes or no and whether they had any suggestions to make the poster more appealing. The responses were recorded and reviewed for common themes and iterative changes were made on the basis of the feedback received after each set of 25 interviews.

Delivery of educational skin self-examination program

During the last week of March 2017, each of the eight changing rooms at the Lynn Sage Comprehensive Breast Center was equipped with a poster, 10 brochures, a magnifying glass, and a ruler. The magnifying glass and ruler were installed with two separate chains, the poster was attached to a wall across from the doorway at eye-level, and the brochures were placed in holders on a shelf near a large mirror that was present in each room. Women could use this mirror to see their face and chest. The materials were installed at the start of the spring season because seeing the sun may help recall a prior sunburn, which is associated with the development of a melanoma. The materials remained in the changing rooms for 3 weeks (from March 27 to April 14, 2017).

Assessment of program effectiveness

A female research assistant performed in-person exit interviews to ascertain whether the women had noticed the poster and brochure (Table 2; Fig. 2). If they did, they were asked if they thought the information applied to them and why and whether they chose to check

Table 1
Subject responses from structured-interviews during the development phase

	<i>If you saw this poster, would you want to learn more about how to check your skin for skin cancer of the melanoma type?</i>	<i>Would you be interested in taking the brochure home to learn more about checking your skin for melanoma?</i>	<i>Would you be interested in sharing the brochure with family or friends?</i>	<i>Would you be willing to check your skin while you are changing today?</i>
Day 1	23/25	23/25	21/25	21/25
Day 2	19/25	21/25	18/25	18/25
Day 3	-	23/25	22/25	21/25

Learn the **ABCDE's** of **melanoma** detection

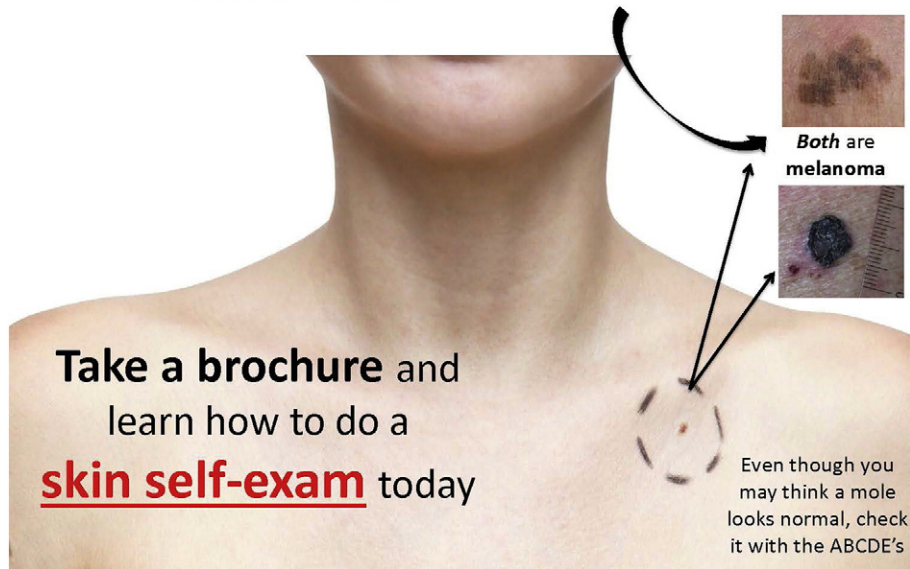


Figure 1. Final poster

their skin while in the changing room. She was also asked about a history of sunburn and ten or more sessions of indoor tanning, a family or personal history of skin cancer, and whether she consulted with a dermatologist regularly. Lastly, if woman had checked their skin in the changing room, they were asked if they had noticed any concerning moles and whether they planned to make an appointment with a dermatologist as a result.

The research assistant spent 7 days in the breast center conducting exit interviews and observing the ambience and conversations between women about the study materials in the waiting area. In addition, the total number of brochures that were taken during those 7 days was recorded. There were 8 additional days during which the materials were stocked in the changing rooms but no exit interviews were conducted. The number of brochures taken on these days was recorded as well. The research assistant also conducted exit interviews with the technicians who worked in the screening center to determine whether the patients made any references to the SSE materials to the staff.

Participants

The patients were included in the study if they were 18 years of age or older, female, and waiting to undergo a screening mammogram at the Lynn Sage Comprehensive Breast Center at Northwestern Medicine/Prentice Women's Hospital in Chicago, Illinois. The

exclusion criteria included an inability to read a newspaper or in the English language, evidence of cognitive impairment causing problems with functioning at a sixth grade reading level, and an inability to speak. The research assistant received verbal assent from each participant prior to each structured and exit interview.

Results

Population

During the time that the research assistant conducted exit interviews, 650 patients had a scheduled mammogram appointment and 560 of these patients (86.2%) agreed to participate in an exit interview. All participants were women over the age of 40 years. Women of all ethnicities and races were asked to participate and represented the following groups: White (84%), Black (11%), and Hispanic/Latino (5%). All women who participated in an interview were able to speak and read English.

Development of materials (qualitative component)

A total of nine revisions of the brochure were created before arriving at the tenth draft, which was the final version that was used in the SSE program. The first four drafts of the brochure were created on the basis of feedback the research assistant received from healthcare professionals who were involved in the project. The subsequent drafts were revised from the feedback the research assistant obtained from structured interviews with women who were waiting to undergo a mammogram ($n = 75$) and again with the healthcare professionals who were involved with the project. The recurring themes of the women's feedback were to include pictures of what a benign mole and melanoma may look like and reduce the amount of factual information in the brochure to make it more succinct and therefore quicker to read.

The poster was revised a total of five times, with the sixth draft serving as the final version that was used in the SSE program. The feedback about the poster was provided by healthcare professionals who were involved in the project as well as women who were waiting to undergo a mammogram ($n = 50$). The recurring themes

Table 2
Subject responses from the exit-interviews

Questions:	Yes	No
Did you notice any information about checking your skin for melanoma?	382	178
Did you think the information applied to you?	299	83
Do you have a history of sunburn?	245	137
Do you have a history of 10 or more sessions of indoor tanning?	73	309
Do you have a family or personal history of skin cancer?	99	283
Did you check your skin today?	77	305
If yes, did you notice any concerning moles?	10	67
Do you intend to make an appointment with a dermatologist?	6	4
Do you see a dermatologist regularly?	172	210

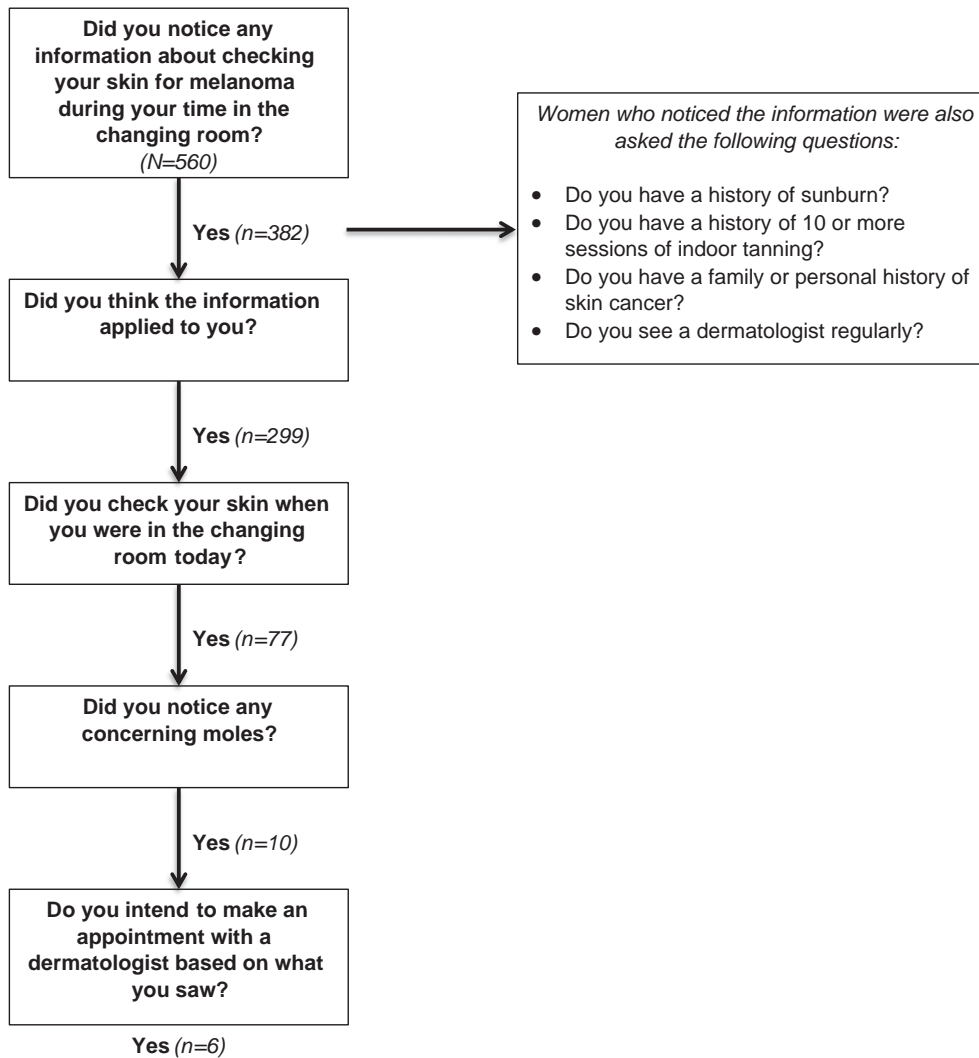


Figure 2. Flow chart for exit-interviews.

about the poster were to place more emphasis on the phrase “skin self-examination” by changing the graphics and organization of the poster and include a call-to-action so that women would know to direct their attention to the brochure in the room. In addition, several women reiterated that fewer words on the poster was preferred because of the assumption that a woman would have only a few seconds to glance at the poster while changing and during this crucial time, she would decide whether or not she wants to learn more. If the poster looked too busy with excess information, a woman may lose interest.

Assessment of program effectiveness (quantitative component)

A total of 382 women (68%) who participated in the exit interview noticed the information about SSE in the changing rooms. Of the women who noted the information, 299 women (78%) thought that the information about SSE applied to them and 262 women (68%) responded yes to at least one of the three questions about melanoma risk factors (history of sunburn and indoor tanning, and personal or family history of skin cancer). A total of 77 women (20%) of those who noticed the information decided to check their skin in the changing room. Of these 77 women, 10 (13%) noticed a concerning mole and ultimately 6 women (60% of those with a concerning mole)

reported that they were going to make an appointment with a dermatologist because of the mole they saw.

Exit interviews with subjects

A thematic analysis was conducted of the participants' responses to the exit interview questions as well as of the discussions that the research assistant overheard between women in the waiting area (Table 3). The most common themes that arose were women who thought that the information was a great reminder and it was

Table 3
Thematic analysis of the comments made by women in the waiting area

Comment themes	No. of subjects
Information is good reminder, important to be aware	70
Information about SSE applies to everyone	52
Concern about her own moles	36
Shared personal story about sunburn or amount of time spent in sun	23
Shared personal story about skin cancer affecting her	22
Brochure will be useful for family member or friend	11
Misinterpreted the material thinking it was for breast self-exams	6

important to raise awareness ($n = 70$); women who thought that the information about SSE applies to everyone ($n = 52$); women who were aware of their own moles and felt that having moles was a reason to perform SSE ($n = 36$); and the brochure would be useful for a specific family member or friend ($n = 11$). Many women also shared personal experiences about how skin cancer has affected them or personal stories about being sunburned and about the amount of time they have spent in the sun ($n = 22$). There were several occasions where a woman shared a story like this and women nearby would make a related comment or join the conversation.

Exit interviews with technicians

A total of six technicians who worked in the mammogram screening center during the time of the SSE program implantation were individually interviewed upon study completion. Each technician was asked whether they had received any questions or feedback from the patients about the SSE materials in the changing room. Five technicians reported that they had received no comments in reference to the material in the changing room over the course of 3 weeks and one technician reported that a few patients endorsed the materials in the changing rooms. In addition, one technician stated that they had asked a patient if the patient had seen the SSE material in the changing room because the technician was worried about one of the patient's moles.

Brochures

A total of 200 brochures were taken during the 7 days during which the research assistant conducted exit interviews. During this 7-day period, 650 patients had a scheduled mammogram appointment and came in contact with the research assistant. A total of 142 brochures were taken during the 8 days that the research assistant was not present and 985 patients had scheduled appointments during this time. A comparison of sample proportions was conducted to determine the effect of the presence of the research assistant on brochure dispersal. The proportion of women who picked up the brochure was 0.307 when the research assistant was present and 0.144 when the research assistant was not present, for a difference of 0.164 (95% confidence interval [0.1234–0.204]; $p < .0001$; z score = 8).

Discussion

This pilot and feasibility study showed that a significant proportion of women who underwent a screening mammogram noticed the SSE information in the breast center changing rooms. A relatively larger proportion of these women (78%) felt that the information was applicable to them and it had successfully caught their interest. Women used the information presented in the brochure as a guide to ascertain their risk of developing a melanoma and actions they could take to avert this fatal type of skin cancer. By targeting a specific population of women who are already involved in health-promoting behavior by participating in an early detection program for breast cancer, the informational brochure and poster helped women decide that SSE for melanoma detection is both relevant and something they should consider doing.

Although other studies have been performed on the early detection of more than one cancer simultaneously, the concept of specifically combining melanoma and breast cancer screening is novel. In a 2013 study by Sella et al. (2013), an integrated cancer prevention center was created in a multidisciplinary outpatient clinic that allowed a one-stop screening experience for 11 common cancers including breast, colon, endometrial, cervical, prostate, skin, oral cavity, testicular, thyroid, and lung cancer. The results of this study showed that a centralized screening for multiple cancers is feasible with

increased rates of compliance and an ability to detect a wide range of neoplastic lesions at an early stage. An earlier study by Boursi et al. (2010) also reported on the screening of an asymptomatic population for 11 cancers and demonstrated similar results. A study conducted by Doyle et al. (1996) specifically combined breast and cervical cancer screenings in an inner city medical walk-in clinic that encouraged women to accept same-day screening for both cancers and comply with recommended follow-up. The results of this study supported the establishment of cancer screening programs in nontraditional settings such as walk-in clinics and emergency departments to target patients who are at a high risk to remain unscreened. These studies as well as several others have shown the feasibility and benefits of screening for more than one cancer in the same encounter and the potential to reduce morbidity and mortality through early detection. Thus, combining early detection of melanoma and breast cancer screening and targeting an at-risk population of women may provide similar benefits.

Although our SSE program had a significant effect in raising awareness about the risk factors for melanoma and the importance of a regular SSE, it did not demonstrate that the women conducted a SSE during their time in the changing room. There are various reasons for this observation, most prominently the amount of time that women felt they could spend in the changing room. Because the screening center is such a fast-paced environment, many women were worried that they would miss their name being called if they took too long to undress; therefore, their time in the changing room was very brief. However, several women stated that they would take the brochure with them and do a SSE later in the comfort of their home when they no longer felt pressed for time. Many women also said that the reason they chose not to do a SSE in the changing room was that they either already consulted with a dermatologist on a regular basis or did regular SSEs at home; thus they felt that their skin was well taken care of. Although this group of women noticed the information in the changing room and thought it was important, they did not check their skin in the changing room, which may have made the SSE program seem less effective.

Another limitation of this study was that there was no follow-up with the women who intended to make an appointment with a dermatologist because of a concerning mole that they had noticed while in the changing room. Because consulting with a dermatologist is the final step that these women need to take for early detection, it will be important to determine how many women actually saw a dermatologist and how many were diagnosed with a melanoma. In addition, this pilot study did not determine whether women performed a SSE outside of the mammography environment. Knowing the proportion of women who performed a SSE and chose to make SSEs a personal habit would be relevant outcome measures of the effectiveness of the program. Lastly, this study failed to ask women if they planned to make an appointment with a dermatologist solely as a result of seeing the informational poster and brochure in the changing room and not because they had noticed a concerning mole. Because many women stated that the SSE program was a convenient reminder that they were due for their yearly skin check appointment, knowing the proportion of women who made an appointment with a dermatologist would be an important outcome measure of the ability of the program to encourage at-risk women who already have an established relationship with a dermatologist to return for their formal skin examination.

The presence of the research assistant in the screening center had a stimulatory effect on the number of brochures that were taken. Although the research assistant did not specifically instruct women to take a brochure home, she brought to their attention the fact that there were brochures in each of the changing rooms by asking each participant if they had seen the SSE material in the changing room. Women who otherwise may not have noticed the poster or brochure

were directly made aware of the SSE program through the research assistant and this interaction may have been the key factor in determining whether they were interested in learning more about melanoma. Several women admitted their surprise at overlooking the materials in the changing room and when they returned from their mammogram made it a point to tell the research assistant that they were taking a brochure home. If the research assistant had not been present, it is uncertain whether these women would have noticed the information in the changing rooms on their way out after already having overlooked it the first time.

In addition, the presence of the research assistant was effective in stimulating the conversation between women in the waiting room, which likely amplified the effect of the SSE program. Because women could overhear the research assistant speaking with other women during the exit interviews, they were exposed to hearing about the various risk factors to develop a melanoma on more than one occasion and this may have led to a longer-lasting effect on promoting awareness.

Interestingly, the waiting room often became an interactive environment as women shared stories with the research assistant and inadvertently with other women in the room. These stories often triggered conversations between women as they were able to create a connection about past behaviors that they were now regretting such as indoor tanning.

Overall, a significant proportion of the women who participated in our study had risk factors to develop a melanoma and noticed the SSE information in the screening center. Placing this intervention in a mammography screening center is an efficient way to reach a significant population of women, not only because all women over the age of 40 years are recommended to undergo breast cancer screening but also because the screening center at Northwestern Medicine has more than 100 to 150 appointments scheduled every weekday. This setting is an ideal opportunity to target a large proportion of women in a relatively short time-span.

In addition, this intervention raised awareness about the early detection of melanoma among women who undergo mammograms and potentially to these women's family members and friends. Several women made comments about taking a brochure home for a friend or how they wanted to do a skin examination on a family member, amplifying the effect of the SSE program. Of note, the presence of the SSE material in the changing rooms did not create a disturbance in the workflow of the screening center or create an increased

concern during a woman's mammogram experience. Encouraging methods on the early detection of melanoma in an outpatient mammography environment is an effective strategy to increase awareness in a population of women who are dedicated to their personal health.

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