ORIGINAL RESEARCH

Mastalgia is Not An Indication for Mammogram

Ian K. Komenaka, MD, Jesse Nodora, DrPH, Maria Elena Martinez, PhD, Chiu-Hsieh Hsu, PhD, Tina Wong, MD, PhD, Anushi Shah, MD, and Daniel M. Caruso, MD

Background: **Mastalgia is a common breast complaint that is worrisome to patients. This study was performed to determine if mastalgia is a sign of breast cancer and to evaluate the benefit of its work up.**

Methods: **Retrospective review of prospectively collected data on 8960 consecutive patients at a safety net institution from June 1, 2006 to December 31, 2020. Data on patient reported mastalgia and diagnosis of breast cancer were collected.**

Results: **8960 patients had a mean age of 45 years. The population was predominantly underinsured, 70% Hispanic, and 16% had adequate health literacy. Approximately 31% (2820 of 8960) of patients presented with a complaint of breast pain. Of 2820 patients with breast pain, 20 (0.7%) were found to have breast cancer. The average age of patients with breast cancer was 49 years. Physical examination identified a mass in 6 patients and only 3 patients had pain limited to the side of the cancer (10 bilateral, 7 contralateral). Of 1280 patients who were under age 40 years, 88% underwent breast imaging. The Cancer Detection Rate (CDR) was 0.9 per 1000 examinations. For 950 patients age 40 to 49 years and 590 patients age 50 years and older, 98% and 99% underwent breast imaging, respectively. The CDR was 10 per 1000 examinations for age 40 to 49 and 14 per 1000 examinations for age 50 years and older.**

Conclusions: **Mastalgia is rarely associated with breast cancer. In the absence of other findings, imaging of patients less than age 40 is not recommended. Any workup beyond routine screening mammography in age-appropriate patients, to identify the "cause" of breast pain, does not seem warranted. (J Am Board Fam Med 2022;35:000–000.)**

Keywords: **Breast Cancer, Evidence-Based Medicine, Health Literacy, Low-Value Care, Mastalgia, Radiology, Retrospective Studies**

Introduction

Breast pain or mastalgia is a very common complaint in outpatient offices. Approximately 70 to 80% of women will experience mastalgia.[1–3] Many providers have noticed an increase in referrals for mastalgia.[1] Despite the increase in referrals, this has not resulted in an increase in breast cancer diagnoses.[1,4] This finding should be expected as textbooks from multiple medical specialties state that mastalgia is not a sign of breast cancer.[5–9] While most clinicians are aware of this lack of association between mastalgia and breast cancer, patients however, fear that mastalgia is a sign of breast cancer. When patients present with mastalgia, clinicians often order breast imaging. The etiology of mastalgia, however, has long been attributed to a response in breast tissue to normal physiologic hormones and therefore any breast imaging is unlikely to identify a cause of pain.

This article was externally peer reviewed.

Submitted 29 November 2021; revised 23 February 2022; revised 26 February 2022; accepted 1 March 2022; *Ahead of Print Publication* 1 September 2022; *Final Publication* XX XXXX 2022.

From Valleywise Health/Maricopa Medical Center, Phoenix, AZ (IKK, JN, MEM, CH, TW, AS, DMC); Ironwood Cancer and Research Centers, Chandler, AZ(IK); Arizona Cancer Center, University of Arizona, Tucson (IKK, CH); Moores UCSD Cancer Center, San Diego, CA (JN, MEM); Mel and Enid Zuckerman Arizona College of Public Health, University of Arizona, Tucson (CH); Maricopa Medical Center, Phoenix, AZ (TW, AS, DMC)

Funding: None.

Conflict of interest: None.

Prior presentation: The abstract for this study was presented at the San Antonio Breast Cancer Symposium in December 2017.

Corresponding author: Ian K. Komenaka, MD, Ironwood Cancer and Research Centers, 700 W Warner Rd, Chandler, AZ 85224 (E-mail: Komenaka@hotmail.com).

J Am Board Fam Med: first published as 10.3122/jabfm.2022.AP.210476 on 12 September 2022. Downloaded from http://www.jabfm.org/ on 6 November 2026 by guest. Protected by copyright.

This information about mastalgia has been present for so long that textbooks from many medical specialties acknowledge and give nearly identical information about breast pain. Some examples:

Harrison's Principles of Internal Medicine: Lesions with certain features are more likely to be cancerous. These include enigmatically, painless masses.[5]

Comprehensive Gynecology: Over 2 thirds of women will experience breast pain at some time during their reproductive years. Approximately 90% of conditions that cause breast pain are benign. Breast cancer is usually asymptomatic before the development of locally advanced disease. Focal mastalgia is usually associated with a benign condition.[6]

Sabiston Textbook of Surgery: An exaggerated response of breast stroma and epithelium to hormones is frequently characterized by breast pain and tenderness. This mastalgia can be worrisome to many women; however, breast pain is not usually a symptom of breast cancer.[7]

Tintinalli's Emergency Medicine: Breast pain is an uncommon symptom of breast cancer.[8]

Nelson Textbook of Pediatrics: The most common causes of breast pain in adolescents are exercise and benign breast changes. Hormonal imbalance can cause exaggerated responses in the breast tissue, especially in the upper and outer quadrants.[9]

Despite the consensus from multiple specialties that mastalgia is caused by hormonal changes and is not, or rarely is, a sign of breast cancer, patients with mastalgia remain fearful. This study was performed to determine if mastalgia is a sign of breast cancer and to evaluate the benefit of work up of mastalgia in patients of different ages.

Methods

This study was conducted at Valleywise Medical Center (VMC) Breast Clinic in Phoenix, Arizona, and reviewed and approved by the institutional review board before data collection. From June 1, 2006 to December 31, 2020, all patients seen in the Breast Clinic were included. The majority of patients seen were by referral. The referrals came from: Family Practice 44%, Emergency Department 20%, Internal Medicine 20%, and Obstetrics/Gynecology 14%. The remainder came from Psychiatry, Pediatrics, General Surgery, and patient self-referral/walk-in. Retrospective review was performed on prospectively collected data on every patient. As part of the history and physical examination, a standard form was used to be sure that all patients were systematically asked the same questions over the time period studied. Attention to detail with respect to data collection was emphasized throughout the time period and therefore very thorough. Patients who were non-English speaking were seen with a certified translator/interpreter. All records were reviewed to identify diagnoses of breast cancer at the time of initial workup or in subsequent years of available follow up. Starting on May 1, 2011 all patients estimated their lifetime risk of breast cancer.[10]

Patients who presented with mastalgia were considered any patient who complained of breast pain. The diagnosis, treatment, and follow up were reviewed. Patients who presented with mastalgia did not have any laboratory tests ordered by the Breast Clinic providers. With respect to breast imaging (mammography, breast ultrasound, breast magnetic resonance imaging), the Breast Clinic providers did not routinely order imaging except in the following circumstances. For patients under age 40 years, if a mass was identified on physical examination, then a diagnostic ultrasound was ordered, if not already done. For patients over age 40 years, if the patient had not had a screening mammogram in the past 12 months, then 1 was ordered. Or if a mass was found on physical examination, then a diagnostic mammogram was ordered.

During this same time period, there were 1551 patients diagnosed with breast cancer who presented with any complaint other than mastalgia. Of the patients diagnosed with breast cancer whose data did not indicate a presentation of mastalgia, the records were reviewed a second time to ensure there was no indication of breast pain as the primary complaint.

Statistical Analysis

Health literacy was assessed using the Newest Vital Sign (NVS).[11,12] The health literacy assessment was started on January 14, 2010 and continued on every possible patient until the end of the study. Patients who could not have the health literacy assessment included those who were not English or Spanish speaking and those who were visually impaired. For patients seen initially before January 14, 2010, the assessment was then performed on their first visit after January 14, 2010. Patients with NVS 4 to 6 were categorized as having "adequate health literacy." Patients with NVS 0 to 3 were considered "low health literacy."[12]

Radiology outcomes were determined according to the American College of Radiology Breast Imaging

J Am Board Fam Med: first published as 10.3122/jabfm.2022.AP.210476 on 12 September 2022. Downloaded from http://www.jabfm.org/ on 6 November 2026 by guest. Protected by copyright.

and Reporting Data System (BI-RADS) fifth edition Follow up and Outcome Monitoring.[13] The Recall Rate was defined as the number of recommendations for additional imaging after screening evaluation. The Positive Predictive Value 2 (PPV2) was defined as the percentage of positive cases based on recommendation for tissue diagnosis (BIRADS 4,5). The positive Predictive Value 3 (PPV3) was defined as the percentage of positive cased based on the results of biopsies performed. The National Benchmarks reported by the Breast Cancer Surveillance Consortium (BCSC) were derived from very large numbers of screening and diagnostic mammography examinations.

A 2-sample *t* test was used to determine if there were significant differences in continuous variables. A Fisher's exact test was used to assess differences in the categorical variables. Pearson chi-square test was performed to compare the observed rates with the national benchmark rates. All statistical tests were 2 sided and significance levels were set at 0.05. The statistical methods of this study were performed and reviewed by a biomedical statistician (CHH).

Results

A total of 8960 patients were seen during the 13.5 years studied. Of these patients, 2820 (31%) were seen for mastalgia or breast pain. The mean age of the patient population was 40.6 years (range 9 to 89). Only 23% of patients age 40 years or older underwent screening mammography (see Table 1).

Table 1. Patient Sociodemographic Information From 2006–2020

	Breast Pain Patients (n = 2820)	All Other Patients (n = 6140)	*P* Value
Mean age, years (SD)	40.7 (11.8)	44.9 (13.2)	<0.0001
Postmenopausal	523 (19%)	2149 (35%)	<0.0001
Race/ethnicity			
Non-Hispanic White	307 (11%)	1182 (19%)	
African American	186 (7%)	599 (10%)	
Hispanic	2231 (79%)	4077 (66%)	<0.0001
Other	96 (3%)	282 (5%)	
Language, English	1042 (37%)	2897 (47%)	<0.0001
Education, years (SD)	10.1 (3.7)	10.6 (3.8)	<0.0001
6 or less	617 (22%)	1176 (19%)	
7 – 11	867 (31%)	1572 (26%)	
High school/equivalent	716 (25%)	1551 (26%)	
Some college	383 (14%)	1151 (19%)	
College degree	224 (8%)	611 (10%)	
Missing	13	79	
Adequate Health Literacy	14% (283/2024)	18% (877/4866)	0.0006
Height (m)	1.58 (0.079)	1.60 (0.077)	
Weight (kg)	74.3 (18.1)	76.1 (19.3)	
Body mass index in kg/m2 (SD)	29.5 (6.62)	29.9 (8.08)	0.03
Marital status – married	1196 (42%)	2432 (40%)	0.0006
Domestic partner	246 (9%)	466 (7%)	
Employment, employed	1008 (36%)	2133 (35%)	0.39
Insurance status			
Commercial	141 (5%)	386 (6%)	
Medicare	70 (2%)	252 (4%)	
AHCCCS (Medicaid)	699 (25%)	1773 (29%)	
None	1910 (68%)	3729 (61%)	<0.0001
Monthly income $ (SD)	1208.03 (1116.00)	1211.92 (1245.34)	0.66
Family history of breast cancer in first degree relative	244 (9%)	748 (12%)	<0.0001
Undergoing breast screening (40 years+)	23% (343/1500)	22% (967/4331)	0.97
Age 40 to 49 years	25% (232/927)		
Age 50 years+	19% (111/573)		

Abbreviations: SD, standard deviation; AHCCCS, Arizona Health Care Cost Containment System.

J Am Board Fam Med: first published as 10.3122/jabfm.2022.AP.210476 on 12 September 2022. Downloaded from http://www.jabfm.org/ on 6 November 2026 by guest. Protected by copyright.

Approximately 65% of patients estimated their lifetime risk of breast cancer. Of these patients, 29% presented with a complaint of breast pain while 71% presented with other complaints related to their breasts. Patients who presented with mastalgia estimated their lifetime risk of breast cancer significantly higher than those who presented with other complaints (41% vs 25%, $P < .0001$).

Almost 1 in 5 (20%) patients went to the Emergency Department before their initial visit to the Breast Clinic. One patient presented 7 different times to the Emergency Department for mastalgia. Patients underwent workup by the referring clinician including 94% undergoing breast imaging (mammogram, ultrasound, MRI, or CT scans) and 40% had a biopsy. Many patients (42%) also had laboratory tests ordered by the referring clincians.

1280 patients were under age 40 years and 88% underwent breast imaging. Average risk patients under age 40 years are not recommended to undergo screening breast imaging by any National Guideline, therefore the Recall Rate was 88% (see Table 2). Only 2 (0.2%) patients were diagnosed with breast cancer. One patient presented with bilateral breast pain, but a palpable right breast mass was found which resulted in the patient getting a biopsy before imaging (see Table 3). Therefore only 1 patient (0.08% of the 1280) under age 40 benefited from breast imaging as a result of their complaint of breast pain. The Positive Predictive Value 2 (PPV2) was 0.2%. The Positive Predictive Value 3 (PPV3) was 0.2%. The Cancer Detection Rate (CDR) was 0.9 per 1000 examinations.

For patients aged 40 to 49 years and age 50 years and older, 98% and 99% underwent breast imaging, respectively. The Recall Rate was 87% and 94% (Table 2). One 41 year old patient presented with bilateral breast pain but a palpable right breast mass was found which again resulted in the patient getting a biopsy before imaging. The PPV2, PPV3, and CDR are shown in Table 2.

Of the 2820 patients with mastalgia, only 20 (0.7%) were found to have breast cancer (Table 3). Of these patients, 10 presented with bilateral breast pain and 7 patients had breast pain contralateral to the breast cancer with no pain on the side of diagnosis. In the remaining patients, 1 patient had diffuse pain throughout the breast and had an 8 mm cancer. The second patient had intermittent focal left breast pain for 5 years with 3 BIRADS 1 or 2 mammograms before abnormal finding on imaging. The area of pain appeared normal on imaging but DCIS was found in a separate location. The last patient had focal right breast pain but mammography found extensive microcalcifications. The patient underwent a mastectomy which revealed extensive DCIS with microinvasion.

Of the patients diagnosed with breast cancer, the average age was 49 years. Only 1 patient (5%) was undergoing screening mammography and the cancer was not an interval cancer. Physical examination identified a palpable mass in 6 patients (30%) and the remaining were nonpalpable cancers found by mammogram. With a mean follow up of 4.5 years after presentation, no additional patients who presented with mastalgia were diagnosed with breast cancer.

By contrast, over the same study period (2006–2020), 6140 patients presented with other breast complaints (i.e., breast mass 40% (2457/6140), abnormal mammogram 39% (2402/6140), nipple discharge, skin changes, breast asymmetry, or desire for breast cancer risk assessment). 1551 patients (25%) were diagnosed with breast cancer. Therefore compared with the patients who presented with

Table 2. Recall Rate, Positive Predictive Value, and Cancer Detection Rate of Breast Imaging for Complaint of Breast Pain

Age	Recall Rate	Positive Predictive Value2 (PPV2)	Positive Predictive Value3 (PPV3)	Cancer Detection Rate (per 1000 examinations)
BCSC National Benchmark[13]	10.6%	25.4%	31%	4.7
Current Study				
Under 40 years	88%	0.2% (1/590)	0.2% (1/580)	0.9
40 to 49 years	87%	2.3% (9/391)	2.5% (9/362)	10
Over 50 years	94%	4% (8/202)	4.5% (8/178)	14
P Value (vs BCSC)*	<0.0001	<0.0001	<0.0001	0.13

*Derived from Pearson Chi-Squared test.
Abbreviation: BCSC, Breast Cancer Surveillance Consortium.

J Am Board Fam Med: first published as 10.3122/jabfm.2022.AP.210476 on 12 September 2022. Downloaded from http://www.jabfm.org/ on 6 November 2026 by guest. Protected by copyright.

Table 3. Patients' Location of Breast Pain and Location of Breast Cancer

Patient	Age	Pain	Cancer Location	Cancer	ER/PR	ErbB2 (Her2neu)	LN	Stage
1	45	Left	Right mammogram	DCIS	81/58	NA	NA	0
2	47	Bilateral	Right mammogram	IDC	90/80	0	1	IIA
3	41	Bilateral	Right mass	IDC	95/80	0	0	I
4	46	Bilateral	Left mammogram	IDC	91/53	2+, 1.3	0	I
5	40	Bilateral	Right mass	ILC	100/90	0	0	I
6	44	Bilateral	Left mammogram	IDC	95/90	0	0	I
7	48	Bilateral	Left mass	IDC	95/70	2+, 6.4	0	IIA
8	60	Bilateral	Right mammogram	DCIS	97/80	NA	NA	0
9	50	Bilateral	Left mammogram	IDC	95/95	2+, 1.1	0	I
10	37	Bilateral	Left mammogram	IDC	100/100	2+, 1.2	3	IIA
11	37	Bilateral	Right mass	IDC	90/80	2+, 3.8	2	IIA
12	65	Left	Left mammogram	IDC	90/60	1+	0	I
13	52	Left	Right mammogram	ILC	100/99	1+	0	I
14	45	Left	Right mass	IDC	0/0	0	0	IIIA
15	59	Left	Right mass	IDC	95/90	0	0	2
16	42	Left	Right mammogram	DCIS	95/0	NA	0	0
17	64	Left	Left mammogram	DCIS	90/80	NA	NA	0
18	63	Left	Right mammogram	ILC	95/0	0	0	I
19	52	Right	Left mammogram	DCIS	95/100	NA	NA	0
20	49	Right	Right mammogram	IDC	60/60	3+	7	IIIA
Mean	49.3							

mastalgia, patients who presented with any other complaint were 36 times more likely (0.7% vs 25%) to be diagnosed with breast cancer. This finding is expected as abnormal mammogram and breast mass are common presentations for breast cancer.

Table 4 shows that the incidence of breast cancer diagnoses in patients who presented with mastalgia was lower than expected in each age-group compared with SEER data of asymptomatic women (age 30 to 39: 0.16% vs 0.49%, age 40 to 49: 1.11% vs 1.55%, age 50+: 1.45% vs 2.40% (see Table 4).[14]

Retrospective review of the 1551 patients who presented with complaints other than mastalgia at the time they were diagnosed with breast cancer found 3 patients who had mastalgia in the past but not at the time they were diagnosed with breast cancer. One patient had left breast pain that resolved and then was diagnosed with contralateral right breast cancer 2 years later. The second patient had breast pain in different locations at.5 years and 2 years before diagnosis, and had normal imaging both times. When she was diagnosed with breast cancer she did not have mastalgia. The last patient had 1 episode of left breast pain that resolved and then 3 years later presented with a painless contralateral right breast cancer. Therefore all 3 patients had no sign of breast cancer when they presented with mastalgia and then developed breast cancer more than 2 years after the mastalgia had resolved. In addition, 2 of the 3 patients had mastalgia contralateral to the side of the eventual cancer diagnosis. Including these 3 patients with the 20 patients who presented with mastalgia would not significantly impact the results of the current study (0.7% (20/2820) vs 0.8% (23/2823)).

Table 4. Risk of Breast Cancer by Age (SEER Data Normal Risk Women[14])

	Risk of Breast Cancer		
Age	SEER (Normal Risk Women)	Current Study	P Value*
30–39 years	0.49%	0.16% (n = 1280)	0.10
40–49 years	1.55%	1.11% (n = 950)	0.29
50 + years	2.40%	1.45% (n = 590)	0.15

*Derived from Pearson chi-squared test (vs SEER).
Abbreviation: SEER, The Surveillance, Epidemiology, and End Results.

Discussion

Breast pain or mastalgia is a common complaint in women and a frequent indication for referral (31%

J Am Board Fam Med: first published as 10.3122/jabfm.2022.AP.210476 on 12 September 2022. Downloaded from http://www.jabfm.org/ on 6 November 2026 by guest. Protected by copyright.

of all referrals). Of 2820 patients, only 20 (0.7%) were diagnosed with breast cancer and the majority of patients had breast pain in a different breast or location than where the breast cancer was found.

Twelve studies in different populations from several countries have shown similar findings. Of 13,183 patients only 106 (0.8%) were found to have breast cancer (Table 5). A study by Joyceet al reported similar findings to the current study. Of 3331 patients, only 1.2% diagnosed with breast cancer and only 2 patients were under age 40 years.[1] Similarly Altintaset al identified 10 malignancies (0.7%) in 1294 patients who presented with mastalgia. The authors concluded that "patients who complain of mastalgia should not be afraid of cancer.[15]"

The lack of association with a diagnosis of breast cancer is not surprising as mastalgia is attributed to a physiologic response of the breast tissue to hormones.[5–9] Some recommend workup for focal breast pain but all studies reviewed do not find an increased risk for breast cancer with focal breast pain (see Table 5). A meta-analysis which included older studies from the 1980s found that the malignancy rate was not higher than that found in women without pain or in areas that were not painful.[16]

Similar to the lack of association with breast cancer, Radiology literature demonstrates that imaging rarely identifies a cause for focal breast pain.[17–22] Chetlenet al found an imaging correlate for the pain in only 3% of women. Authors concluded that there is no radiologic imaging finding to explain the etiology of mastalgia in most women.[19] Among 5 studies that looked at the addition of ultrasound to mammography in patients with mastalgia, none found a benefit to additional imaging.[17–19,21,22] A study by Choet al examined the benefit of diagnostic ultrasound in addition to digital mammography in the evaluation of focal breast pain based on breast density. Of 413 patients, 82% had no finding on breast imaging. No cancer (0%) was found in any of the patients.[17] The authors concluded that ultrasound "may contribute to unnecessary intervention as a result of incidental findings." Other studies similarly concluded that targeted ultrasound may be deferred with no other clinical findings.[18,21]

With the lack of association with breast cancer, the goal of care should be to determine if screening for breast cancer is indicated based on normal patient risk assessment. Then subsequently reassurance can be given that mastalgia is rarely a sign of breast cancer. Breast screening is performed to identify breast cancer in a population at sufficient risk to warrant the cost and risks of screening. No National Guideline including the USPSTF, American Academy of Family Physicians, American Cancer Society, American College of Obstetricians and Gynecologists, and American College of Physicians, recommends breast screening in normal

Table 5. Studies of Breast Pain/Mastalgia

Author	Year	Specialty	Location	Patients (n)	Mean Age (Years)	Mean Follow up (months)	Breast Cancer Cases (%)
Current study	2020	Surgery	AZ, USA	2820	40	61	20 (0.7%)
Owen et al[18]	2019	Radiology	MO, USA	944	46	44	7 (0.7%)
Mema et al[22]	2019	Radiology	NY, USA	374	46	NR	0 (0%)
Fonseca et al[24]	2019	Radiology	Canada	953	50	NR	8 (0.8%)
Altintas et al[15]	2018	Radiology	Turkey	1294	43	NR	10 (0.8%)
Cho et al[17]	2017	Radiology	NC, USA	413	53	24	0 (0%)
Chetlen et al[19]	2017	Radiology	PA, USA	236	NR	NR	1 (0.4%)
Noroozian et al[25]	2015	Radiology	MI, USA	617	49	51	11 (1.8%)
Joyce et al[1]	2014	Surgery	Ireland	3331	NR	NR	40 (1.2%)
Leddy et al[21]	2013	Radiology	SC, USA	257	48	12	3 (1%)
Howard et al[27]	2012	Internal Medicine	MA, USA	916	39	NR	2 (0.2%)*
Masroor et al[26]	2009	Radiology	Pakistan	207	44	18	0 (0%)
Duijm et al[20]	1998	Radiology	Netherlands	987	49	48	4 (0.4%)
Total				13,349			106 (0.8%)

*Study reported 6 patients (0.6%) with breast cancer, however, 4 patients presented with a palpable mass and pain.
Abbreviation: NR, not reported.

J Am Board Fam Med: first published as 10.3122/jabfm.2022.AP.210476 on 12 September 2022. Downloaded from http://www.jabfm.org/ on 6 November 2026 by guest. Protected by copyright.

risk women under age 40 years.[23] The incidence of breast cancer diagnoses in patients who presented with mastalgia was lower than expected in each age-group compared with asymptomatic women based on SEER statistics (Age 30 to 39: 0.16% vs 0.49%, Age 40 to 49: 1.11% vs 1.55%, Age 50+: 1.45% vs 2.40%; Table 4. Duijmet al reported similar findings where the rate of breast cancer in patients who presented with mastalgia was 0.4%, compared with an asymptomatic population 0.7%.[20] Work-up for mastalgia has been found to result in overutilization of health care resources.[24]

In patients under age 40, the evidence to date would indicate that breast imaging should not be performed on this population (Tables 4 and 5). Breast imaging in this population leads to additional procedures and costs.[1,15,17–22,24–27] Table 2 shows that imaging patients under age 40 years yields outcomes worse than the BCSC thresholds for asymptomatic women for Recall Rate, PPV2, PPV3, and CDR.[13] With the lack of evidence of an association of mastalgia with breast cancer (Tables 4 and 5), the only plausible reason for breast imaging is to alleviate fear of patients.[15]

Patients fear that mastalgia is a sign of breast cancer. This may have resulted in patients with mastalgia overestimating their risk of breast cancer significantly more than those who present with other complaints (40% vs 25%, $P < .0001$). Patient fear or expectations are a known primary contributor to low-value care.[28,29] Low-value care is defined as care that provides minimal or no benefit, considering the harms, the costs, and alternatives.[30,31] There are several initiatives to reduce low-value care throughout many countries.[30–32] Using any imaging on a population with minimal or no evidence of benefit goes against the recommended practice of medicine. A similar example would be the practice of routine imaging for distant metastases in asymptomatic patients with operable breast cancer. This is often performed due to patient fear of distant metastases present at diagnosis. The American Society of Clinical Oncology and National Comprehensive Cancer Network recommend against this practice, however, due to lack of benefit and unnecessary costs.[33,34]

In patients age 40 and older who present with mastalgia, available data demonstrates that these patients are not at increased risk for breast cancer (Tables 4 and 5). Therefore additional imaging beyond routine screening is not supported. Howard et al found a 98% recall rate in patients with mastalgia, despite 75% having had normal findings. This high recall rate significantly increased clinical services utilization (OR 25.4, 95% CI: 16.7, 38.6). Imaging in the absence of clinical breast examination abnormalities did not increase the likelihood of breast cancer diagnoses.[27] It is difficult to determine if the additional breast imaging (mammogram, breast ultrasound, breast magnetic resonance imaging) was driven by patient fear, clinician uncertainty, or a combination of both factors. The current study did not find any interval cancers, cancers diagnosed between recommended standard mammographic intervals. Therefore the authors recommend against repeat imaging in patients over age 40 years who have had screening in the past 12 months.

One limitation of this study is that it is a retrospective review from 1 institution. As discussed, however, there are similar studies from different populations and different countries showing the same findings. These studies demonstrate that the finding that mastalgia is not a sign or risk factor for breast cancer is not unique to any population. A prospective randomized trial will likely never be done to investigate this question. Nor should the resources be used to perform a trial in that fashion. The retrospective design of the current study did allow review of patients diagnosed with breast cancer who presented with all other complaints to ensure that no patients with isolated mastalgia were missed.

This study demonstrates that mastalgia is not a sign or risk factor for breast cancer. This finding is consistent with human physiology documented in textbooks from medical specialties. Mastalgia is most commonly attributed to hormonal interaction with breast tissue. Therefore the goal should not be to identify the "cause" of mastalgia, as breast imaging cannot identify hormonal interactions. More importantly, there is no evidence of increased risk for cancer and no evidence that mastalgia is a sign of cancer, therefore the goal should be to avoid low-value care and preserve health care resources. The COVID-19 pandemic has shown the world the value of health care resources. Unnecessary breast imaging may also reinforce fearful behavior and exacerbate the belief in patients that "something should always be done.[28,29]" In the absence of other findings, no imaging is recommended for mastalgia in patients under age 40 years. In patients 40 years and older, screening mammography is

J Am Board Fam Med: first published as 10.3122/jabfm.2022.AP.210476 on 12 September 2022. Downloaded from http://www.jabfm.org/ on 6 November 2026 by guest. Protected by copyright.

recommended. Additional imaging goes against the available data and against the practice of evidence based medicine. Reassurance that mastalgia is not a sign of breast cancer is critical to the management of breast pain, not the unnecessary use of health care resources.

To see this article online, please go to: http://jabfm.org/content/XX/X/000.full.

References

1. Joyce DP, Alamiri J, Lowery AJ, et al. Breast clinic referrals: can mastalgia be managed in primary care? Ir J Med Sci 2014;183:639–42.
2. Ader DN, Shriver CD. Cyclical mastalgia: prevalence and impact in an outpatient breast clinic sample. J Am Coll Surg 1997;185:466–70.
3. Ader DN, Browne MW. Prevalence and impact of cyclic mastalgia in a United States clinic-based sample. Am J Obstet Gynecol 1997;177:126–32.
4. O'Rourke N. Review of referral patterns and triage processes in symptomatic breast units. A hospital perspective (Report No.:9781906218492). National Cancer Control Programme; 2012.
5. Jameson JL, Fauci AS, Hauser SL, et al., eds. Harrison's principles of internal medicine (20th ed.). New York, NY: McGraw-Hill Education; 2018.
6. Lobo RA, Gershenson DM, Lentz GM, Valea FA. eds. Comprehensive gynecology (7th ed.). Elsevier; 2017.
7. Townsend CM, Beauchamp RD, Evers BM, eds. Sabiston textbook of surgery (20th ed.). Amsterdam, Netherlands: Elsevier; 2017.
8. Tintinalli JE, ed. Tintinalli's emergency medicine (9th ed.). New York, NY: McGraw-Hill Education; 2020.
9. Kliegman RM, Stanton BF, St Gerne JW, Shchor NF, eds. Nelson textbook of pediatrics. Elsevier; 2015.
10. Diefenbach MA, Weinstein ND, O'Reilly J. Scales for assessing perceptions of health hazard susceptibility. Health Educ Res 1993;8:181–92.
11. Weiss BD, Mays MZ, Martz W, et al. Quick assessment of literacy in primary care: the newest vital sign. Ann Fam Med 2005;3:514–22.
12. Komenaka IK, Nodora JN, Machado L, et al. Health literacy assessment and patient satisfaction in surgical practice. Surgery 2014;155:374–83.
13. Follow up and outcome monitoring [Internet]. ACR BI-RADS;2014 (accessed 2 July 2021). Available from: https://www.acr.org/Clinical-Resources/Reporting-and-Data-Systems/Bi-Rads#FollowUpandMonitoring.
14. Cancer of the female breast (invasive) Table 4.17. [Internet]. Seer Cancer Statistics Review; 2020 (accessed 1 June 2021). Available from: https://seer.cancer.gov/csr/1975_2017/browse_csr.php?sectionSEL=4&pageSEL=sect_04_table.17.
15. Altıntas Y, Bayrak M. Evaluation of 1294 female patients with breast pain: a retrospective study. Adv Ther 2018;35:1411–9.
16. Holbrook AI. Breast pain, a common grievance: guidance to radiologists. AJR Am J Roentgenol 2020;214:259–64.
17. Cho MW, Grimm LJ, Johnson KS. Focal breast pain: does breast density affect the need for ultrasound? Acad Radiol 2017;24:53–9.
18. Owen WA, Brazeal HA, Shaw HL, et al. Focal breast pain: imaging evaluation and outcomes. Clin Imaging 2019;55:148–55.
19. Chetlen AL, Kapoor MM, Watts MR. Mastalgia: imaging work-up appropriateness. Acad Radiol 2017;24:345–9.
20. Duijm LE, Guit GL, Hendriks JH, et al. Value of breast imaging in women with painful breasts: observational follow up study. BMJ 1998;317:1492–5.
21. Leddy R, Irshad A, Zerwas E, et al. Role of breast ultrasound and mammography in evaluating patients presenting with focal breast pain in the absence of a palpable lump. Breast J 2013;19:582–9.
22. Mema E, Cho E, Ryu YK, et al. In the setting of negative mammogram, is additional breast ultrasound necessary for evaluation of breast pain? Curr Probl Diagn Radiol 2019;48:117–20.
23. Breast cancer screening guidelines [Internet]. Centers for Disease Control and Prevention (accessed 1 August 2020). Available from: https://www.cdc.gov/cancer/breast/pdf/breast-cancer-screening-guidelines-508.pdf.
24. Fonseca M, Lamb LR, Verma R, et al. Breast pain and cancer: should we continue to work-up isolated breast pain? Breast Cancer Res Treat 2019;177:619–27.
25. Noroozian M, Stein LF, Gaetke-Udager K, Helvie MA. Long-term clinical outcomes in women with breast pain in the absence of additional clinical findings: mammography remains indicated. Breast Cancer Res Treat 2015;149:417–24.
26. Masroor I, Afzal S, Sakhawat S, et al. Negative predictive value of mammography and sonography in mastalgia with negative physical findings. J Pak Med Assoc 2009;59:598–601.
27. Howard MB, Battaglia T, Prout M, Freund K. The effect of imaging on the clinical management of breast pain. J Gen Intern Med 2012;27:817–24.
28. Kool RB, Verkerk EW, Winnemuller LJ, et al. Identifying and de-implementing low-value care in primary care: the GP's perspective-a cross-sectional survey. BMJ Open 2020;10:e037019.
29. Wammes JJG, Jeurissen PPT, Verhoef LM, et al. Is the role as gatekeeper still feasible? A survey among Dutch general practitioners. Fam Pract 2014;31:538–44.
30. Brownlee S, Chalkidou K, Doust J, et al. Evidence for overuse of medical services around the world. Lancet 2017;390:156–68.

J Am Board Fam Med: first published as 10.3122/jabfm.2022.AP.210476 on 12 September 2022. Downloaded from http://www.jabfm.org/ on 6 November 2026 by guest. Protected by copyright.

31. Colla CH. Swimming against the current–what might work to reduce low-value care? N Engl J Med 2014;371:1280–3.
32. Levinson W, Kallewaard M, Bhatia RS, Wolfson D, Shortt S, Kerr EA, Choosing Wisely International Working Group. 'Choosing Wisely': a growing international campaign. BMJ Qual Saf 2015;24:167–74.
33. Schnipper LE, Smith TJ, Raghavan D, et al. American Society of Clinical Oncology identifies five key opportunities to improve care and reduce costs: the top five list for oncology. J Clin Oncol 2012;30:1715–24.
34. National Comprehensive Cancer Network (NCCN): Breast Cancer. Available at: https://www.nccn.org/guidelines/guidelines-detail?category=17&id=1419 (accessed 1 July 2021).

J Am Board Fam Med: first published as 10.3122/jabfm.2022.AP.210476 on 12 September 2022. Downloaded from http://www.jabfm.org/ on 6 November 2026 by guest. Protected by copyright.