Good Morning!!

1

The Basics of Mammography That You Were Never Taught

Louise C. Miller, R.T.(R)(M)(ARRT), CRT, FSBI, FNCBC
Director of Education
Mammography Educators
San Diego, CA

© 2017 Mammography Educators. Not for commercial use. No unauthorized distribution. Presentation for educational purposes only.

2

U.S. Department of Health and Human Services

U.S. FOOD & DRUG ADMINISTRATION

A to Z Index | Follow FDA | En Español

Search FDA

Home | Food | Drugs | Medical Devices | Radiation-Emitting Products | Vaccines, Blood & Biologics | Animal & Veterinary | Cosmetics | Tobacco Products

Radiation-Emitting Products

Home > Radiation-Emitting Products > Mammography Quality Standards Act and Program > MQSA Insights

MQSA Insights
MQSA Insights Articles
MQSA National Statistics

Poor Positioning Responsible For Most Clinical Image Deficiencies, Failures

SHARE | TWEET | LINKEDIN | PIN IT | EMAIL | PRINT

Mammography combines "the science of imaging and the art of positioning" [1]. Although there have been many significant and exciting changes to the technology of mammography since the passage of MQSA in 1999, including the introduction of full-field digital mammography (FFDM) and digital breast tomosynthesis (DBT), one aspect of mammography that remains unchanged and critically important is proper patient positioning.

Positioning is so important because only those portions of the breast which are included on the mammographic image can be evaluated for signs of cancer. Any portion of the breast which is not imaged cannot be evaluated, and cancers in those portions of the breast can be missed. In a 2002 study, the "[s]ensitivity [of mammography] dropped from 84.4% among cases with passing positioning to 66.3% among cases with failed positioning" [2].

Poor positioning has been found to be the cause of most clinical image deficiencies and most failures of accreditation. In 2015, the American College of Radiology (ACR), the largest FDA-approved accreditation body (AB), found that of all clinical images which were deficient on the first attempt at accreditation, 92% were deficient in positioning. Also, in ACR-accredited facilities, 79% of all unit accreditation failures in 2015 were due to

Source: https://www.fda.gov/Radiation-EmittingProducts/MammographyQualityStandardsActandProgram/FacilityScorecard/ucm495378.htm

3

The Member Newsletter of the Society of Breast Imaging
Click on this bar to return to Table of Contents

A Technologist's Perspective of the FDA Report "Poor Positioning Responsible for Most Clinical Image Deficiencies, Failures"

By Louise Miller, RT(R)(M)

Louise Miller, RT(R)(M)

Recently I received a call from a radiologist asking me to provide 8 hours of positioning training for his technologists. They had failed American College of Radiology (ACR) accreditation for positioning and needed to document the training in order to resubmit new images, which were due in a week. A side note here: if you fail, get help EARLY. When I met the radiologist in his office on the morning of the training, he began to tell me that his techs obviously didn't know how to position correctly. This is a common assumption that is not entirely untrue. I met with the techs, who were all experienced mammographers with varying years of experience. I presented a lecture on standardized positioning and correlational anatomy and then gave a hands-on demonstration with a model. Almost all were surprised by the way I positioned, which was based on the tenets of consistency, reproducibility, and sound ergonomics. I learned these principles way back in the 1990s and have modified them to accommodate the changes in technology over the years. They all laughed nervously because none of them positioned this way. In fact, their positioning techniques were all different from each other's. This is a scenario I see in hundreds of facilities throughout the country. I started asking myself, "What has changed? What did they miss that I did not?" These were all women who were proud of their work and were often embarrassed by their failure. They were doing the best they knew how. Fortunately, most technologists want to learn techniques, and they want to improve and do their best possible work for the patients. These technologists were lacking essential training updates for positioning or had insufficient initial training

4

You have been
assigned this
mountain
to show others
it can be moved.

5

Now is the time to make a collaborative effort to establish, improve and maintain quality in mammography positioning.

6

QUALITY

ALL industries have established standardized methods for performance of tasks to:

- Establish and maintain quality
- Reduce errors
- Increase consumer satisfaction
- Increase profit
- Reduce possibility of litigation

MAMMOGRAPHY EDUCATORS

7

400,000 deaths per year due to medical errors….and how many mistakes were made??

MAMMOGRAPHY EDUCATORS

8

How do we reduce medical errors?

- Standardization
- Consistency
- Reproducibility

MAMMOGRAPHY EDUCATORS

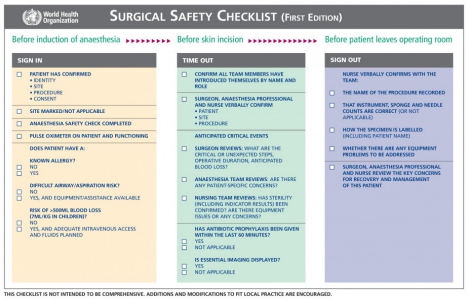
9

MAMMOGRAPHY EDUCATORS

10

MAMMOGRAPHY EDUCATORS

11



World Health Organization

SURGICAL SAFETY CHECKLIST (FIRST EDITION)

Before induction of anaesthesia ▸▸▸▸▸▸▸▸ Before skin incision ▸▸▸▸▸▸▸▸▸▸▸▸▸▸ Before patient leaves operating room

SIGN IN

- ☐ PATIENT HAS CONFIRMED
  - IDENTITY
  - SITE
  - PROCEDURE
  - CONSENT
- ☐ SITE MARKED/NOT APPLICABLE
- ☐ ANAESTHESIA SAFETY CHECK COMPLETED
- ☐ PULSE OXIMETER ON PATIENT AND FUNCTIONING

DOES PATIENT HAVE A:

KNOWN ALLERGY?
- ☐ NO
- ☐ YES

DIFFICULT AIRWAY/ASPIRATION RISK?
- ☐ NO
- ☐ YES, AND EQUIPMENT/ASSISTANCE AVAILABLE

RISK OF >500ML BLOOD LOSS (7ML/KG IN CHILDREN)?
- ☐ NO
- ☐ YES, AND ADEQUATE INTRAVENOUS ACCESS AND FLUIDS PLANNED

TIME OUT

- ☐ CONFIRM ALL TEAM MEMBERS HAVE INTRODUCED THEMSELVES BY NAME AND ROLE
- ☐ SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE VERBALLY CONFIRM THE PATIENT
  - SITE
  - PROCEDURE

ANTICIPATED CRITICAL EVENTS

- ☐ SURGEON REVIEWS: WHAT ARE THE CRITICAL OR UNEXPECTED STEPS, OPERATIVE DURATION, ANTICIPATED BLOOD LOSS?
- ☐ ANAESTHESIA TEAM REVIEWS: ARE THERE ANY PATIENT SPECIFIC CONCERNS?
- ☐ NURSING TEAM REVIEWS: HAS STERILITY (INCLUDING INDICATOR RESULTS) BEEN CONFIRMED? ARE THERE EQUIPMENT ISSUES OR ANY CONCERNS?

HAS ANTIBIOTIC PROPHYLAXIS BEEN GIVEN WITHIN THE LAST 60 MINUTES?
- ☐ YES
- ☐ NOT APPLICABLE

IS ESSENTIAL IMAGING DISPLAYED?
- ☐ YES
- ☐ NOT APPLICABLE

SIGN OUT

- ☐ NURSE VERBALLY CONFIRMS WITH THE TEAM:
- ☐ THE NAME OF THE PROCEDURE RECORDED
- ☐ THAT INSTRUMENT, SPONGE AND NEEDLE COUNTS ARE CORRECT (OR NOT APPLICABLE)
- ☐ HOW THE SPECIMEN IS LABELLED (INCLUDING PATIENT NAME)
- ☐ WHETHER THERE ARE ANY EQUIPMENT PROBLEMS TO BE ADDRESSED
- ☐ SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE REVIEW THE KEY CONCERNS FOR RECOVERY AND MANAGEMENT OF THIS PATIENT

THIS CHECKLIST IS NOT INTENDED TO BE COMPREHENSIVE. ADDITIONS AND MODIFICATIONS TO FIT LOCAL PRACTICE ARE ENCOURAGED.

MAMMOGRAPHY EDUCATORS

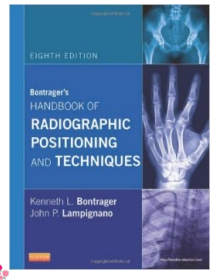
12

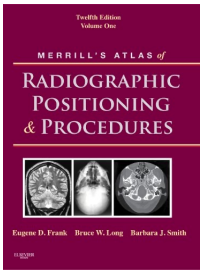
Standardized Technologist Training For General Radiology

MAMMOGRAPHY EDUCATORS

13

Bontrager's and Merrill's





MAMMOGRAPHY EDUCATORS

14

Standardization

- We all position the same way for every body part.
- We all do it in the same sequence.
- We all set up the machine before we bring the patient in.
- We all position the whole patient, not just the body part.

MAMMOGRAPHY EDUCATORS

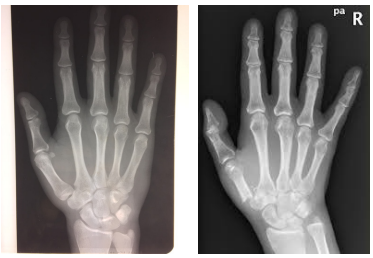
15

In General Radiology

All training is competency based and a technologist's skills will be evaluated for *positioning techniques*, as well as *clinical image evaluation*.

MAMMOGRAPHY EDUCATORS

16



MAMMOGRAPHY EDUCATORS

17

Consistency and Ergonomics

- **M**achine
- **P**atient
- **B**ody Part (Breast)

MAMMOGRAPHY EDUCATORS

18

Consistency and Ergonomics

- **M**aking
- **P**ositioning
- **B**etter

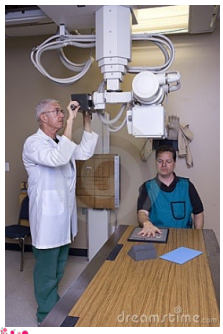
MAMMOGRAPHY EDUCATORS

19

We Position the Whole Patient, Not Just the Body Part!

MAMMOGRAPHY EDUCATORS

20



MAMMOGRAPHY EDUCATORS

21

In General Radiology

we use anatomical landmarks that are visible and palpable:

- Radial head
- Humeral head
- Sternal-clavicular notch
- CL
- OML
- ASIS
- Umbilicus

MAMMOGRAPHY EDUCATORS

22

In Mammography

we *should also use* Anatomical Landmarks that are Visible and Palpable:

- Perimeter of the breast
- Humeral head
- Sternal-clavicular notch
- IMF
- PNL

MAMMOGRAPHY EDUCATORS

23

All exams are done using the *same* positioning technique, in the *same* sequence.

MAMMOGRAPHY EDUCATORS

24

WHY???

- Consistency
- Reproducibility
- Efficiency
- Proficiency
- Use of proper body mechanics

MAMMOGRAPHY EDUCATORS

25

But in mammography… we are "all over the map."

- LCC, LMLO, RMLO, RCC
- RCC, LCC, RMLO, LMLO
- RMLO, RCC, LMLO, LCC
- LCC, RCC, LMLO, RMLO
- RCC, RMLO, LMLO, LCC
- LCC, LMLO, RCC, RMLO
- LMLO, LCC, RCC, RMLO

MAMMOGRAPHY EDUCATORS

26

My suggestion:

- Do CC's first.
- Then do the MLO on the side you just finished the CC on.
- Finally, do the other MLO.

Example: RCC, LCC, LMLO, RMLO

MAMMOGRAPHY EDUCATORS

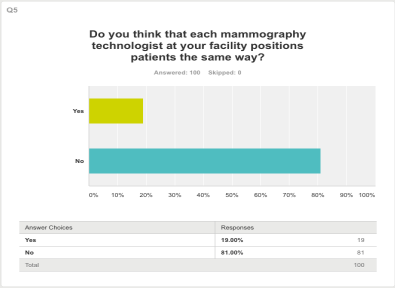
27

SO WHY IS THIS TRUE FOR ALL BODY PARTS IN RADIOLOGY **EXCEPT** IN MAMMOGRAPHY???

MAMMOGRAPHY EDUCATORS

28

Most technologists *do not* practice a standardized method of positioning



MAMMOGRAPHY EDUCATORS

29

IN MAMMOGRAPHY

- Most technologists have not been taught correlative anatomy, so they do not understand how positioning techniques effect image quality.
- Most technologists know *what* they need to see on the images, but have not been taught *how* to correct positioning problems.

MAMMOGRAPHY EDUCATORS

30

IN MAMMOGRAPHY

- Most technologists have not been taught a standardized method of positioning.
- Most technologists have not been trained by a qualified trainer.

MAMMOGRAPHY EDUCATORS

31

In General Radiology, Sequence of Views is Standardized!!

MAMMOGRAPHY EDUCATORS

32

How did this happen?

- No current standardization for positioning for FFDM and DBT
- CEUs for hands-on positioning not required
- Initial 25 mammograms required but under whose supervision?

MAMMOGRAPHY EDUCATORS

33

How did this happen?

- Technologists are getting most CEUs online (no actual education for positioning).
- Radiologists are passing inadequate images and/or can only give feedback regarding positioning criteria.

MAMMOGRAPHY EDUCATORS

34

How did this happen?

- Updated positioning trainings are not provided by employers.
- There is no current published data available to establish parameters for positioning criteria.

MAMMOGRAPHY EDUCATORS

35

How did this happen?

- No updates for positioning with FFDM or DBT (and the new equipment design requires a modification of positioning techniques used for FS).

MAMMOGRAPHY EDUCATORS

36

FS/FFDM/DBT

- Increased length of the IR by up to 40%
- Increased thickness of the IR by up to 80%
- Increased width of face shield up to 50%

MAMMOGRAPHY EDUCATORS

37

How can we make things better?

CONSISTENCY AND REPRODUCIBILITY

MAMMOGRAPHY EDUCATORS

38

No Standards for Mammography Positioning

There are standards for WHAT images should look like, but not HOW you get to that point!

MAMMOGRAPHY EDUCATORS

39

So the problem is:

- No standardization or follow-through
- Which means less consistency and reproducibility
- More repeats and rejects
- More accreditation failures
- Increased exposure
- MISSED BREAST CANCERS???

MAMMOGRAPHY EDUCATORS

40

MAMMOGRAPHY POSITIONING TECHNIQUES SHOULD BE. . .

- BASED ON ERGONOMIC PRINICPLES
- EFFICIENT
- PROFICIENT
- CONSISTENT
- REPRODUCIBLE

MAMMOGRAPHY EDUCATORS

41

Common Work Related Injuries for Mammographers

- Wrist problems
- Shoulder problems
- Back
- Knees
- Hips

MAMMOGRAPHY EDUCATORS

42

Do standardized positioning techniques work?

- Used consistently for 50+ years in Sweden
- Was taught by ACR in the 1990s
- Results published by Bassett et al in 1993 showed an improvement of 68% in image quality after ACR standardized positioning training
- Current preliminary data regarding standardized positioning techniques is impressive

MAMMOGRAPHY EDUCATORS

43

Standardized Training

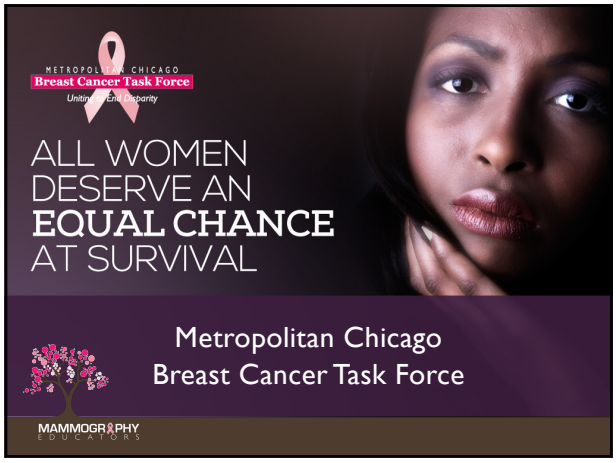
Northwestern University 2012*

- After standardized training, they showed a **50%** reduction in technical call backs (for positioning, blur, etc.).

* Not published study

MAMMOGRAPHY EDUCATORS

44



45

What They Did to Affect Change:

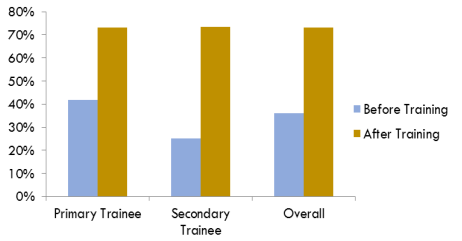
- Developed a Train-the-Trainer* (TTT) program.
- Area technologists applied to participate in the program and were chosen by specific criteria.
- They received specialized training so that they can provide effective and proven positioning techniques to other technologists in underserved areas.
- Train-the-Trainer program successfully in place for 4 years.
- Plans for expansion to other major urban areas in US.

**Program designed and presented by Louise C. Miller, RTRM*

MAMMOGRAPHY EDUCATORS

46

Does TTT program help improve the quality of images taken by participating mammography technologists?



MAMMOGRAPHY EDUCATORS

47

USE DATA!!

MAMMOGRAPHY EDUCATORS

48

Mammography Positioning Standards in the Digital Era: Is the Status Quo Acceptable?

Positioning criteria *following training for updated standardized positioning techniques* for FFDM and DBT far exceeds data on Bassett study.*

*Approved for publication by AJR, December 2017

MAMMOGRAPHY EDUCATORS

49

Mammography Positioning Standards in the Digital Era: Is the Status Quo Acceptable?

Ashley I. Hoppe[1]
Kelly L. Overman[2]
Jason B. Eatenwood[3]
Jacqueline D. Hill[2]
Louisa C. Miller[4]
Marc F. Inciardi[2]

OBJECTIVE. The objective of our study was to evaluate positioning of full-field digital mammography (FFDM) and digital breast tomosynthesis (DBT) compared with film-screen (FS) mammography positioning standards.

MATERIALS AND METHODS. A retrospective study was conducted of consecutive patients who underwent screening FFDM in 2010–2012 and DBT in 2012–2013 at an academic institution. Examinations were performed by five experienced technologists who underwent updated standardized positioning training. Positioning criteria were assessed by consensus reads among three breast radiologists and compared with FS mammography data from a 1995 study by Bassett and colleagues.

RESULTS. One hundred seventy patients (n = 340 examinations) were analyzed, showing significant differences between FFDM and DBT examinations ($p < 0.05$) for medial or inferior skin folds (FFDM vs DBT: craniocaudal [CC] view, 86% [n = 56] vs 23% [n = 77]; mediolateral oblique [MLO] view, 35% [n = 118] vs 45% [n = 154]), inclusion of lateral glandular tissue on CC view (FFDM vs DBT, 75% [n = 247] vs 85% [n = 274]), and concave pectoralis muscle shape (FFDM vs DBT, 36% [n = 121] vs 28% [n = 95]). In comparison with Bassett et al. data, all positioning criteria for both FFDM and DBT examinations were significantly different ($p < 0.05$). The largest differences were found in visualization of the pectoralis muscle on CC views and the inframammary fold on MLO views, inclusion of posterior or lateral glandular tissue, and inclusion of skin folds, with DBT and FFDM more frequently exhibiting all criteria than originally reported Bassett et al. findings.

CONCLUSION. DBT and FFDM mammograms more frequently include posterior or lateral tissue, the inframammary fold on MLO views, the pectoralis muscle on CC views, and skin folds than FS mammograms. Inclusion of more breast tissue with newer technologies suggests traditional positioning standards, in conjunction with updated standardized positioning training, are still applicable at the expense of including more skin folds.

Keywords: digital breast tomosynthesis, mammography, positioning

DOI:10.2214/AJR.16.17620

Received October 21, 2016; accepted after revision May 4, 2017.

[1]Department of Radiology, The University of Kansas Medical Center, 3901 Rainbow Blvd, Mail Stop 4033, Kansas City, KS 66160. Address correspondence to A. I. Hoppe (ahoppe@kumc.edu).

[2]Department of Radiology, Piedmont Atlanta Regional Medical Center, Atlanta, GA.

[3]Mammography Educators, San Diego, CA.

[4]Mammography Educators, San Diego, CA.

AJR 2017; 209:1–7

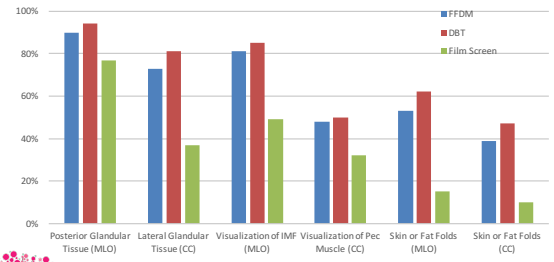
0361–803X/17/2006–1

© American Roentgen Ray Society

Downloaded from www.ajronline.org by Mayo Clinic on 07/06/17 from IP address 70.114.114.114. Copyright ARRS. For personal use only; all rights reserved

MAMMOGRAPHY EDUCATORS

50



*AJR:209, December 2017

MAMMOGRAPHY EDUCATORS

51

Reasonable Expectations

	Positioning Criteria	FFDM	DBT	Bassett
MLO View	Visualization of Pec Muscle to PNL	86%	87%	81%
	Concave Pec	36%	28%	-
	Straight Pec	41%	46%	-
	Convex Pec	23%	26%	-
	Wide Margin at Top of Pec	95%	93%	-
	No Motion	98%	97%	99%
	Posterior Glandular Tissue Included	90%	94%	77%
	Nipple in Profile	89%	92%	88%
	Skin or fat folds	53%	62%	15%
	Upper Location	25%	27%	-
	Lower Location	35%	45%	-
	Visualization of Inframammary Fold	81%	85%	49%
	Requires More Than One View	13%	17%	-
CC View	Pec Muscle Visualized	48%	50%	32%
	No Motion	100%	98%	-
	Lateral Glandular Tissue Included	73%	81%	37%
	Nipple in Profile	83%	85%	89%
	Skin or fat folds	39%	47%	10%
	Medial Location	16%	23%	-
	Lateral Location	29%	32%	-
	Visualization of Cleavage	41%	34%	-
	Requires More Than One View	5%	7%	-

MAMMOGRAPHY EDUCATORS

52

Reasonable Expectations

- Our patients have different and often challenging body habitus.
- Their breast size, shape, mobility and tenderness are hugely variable.

MAMMOGRAPHY EDUCATORS

53

Reasonable Expectations

- Even the "perfect" patient, in terms of body habitus, breast mobility, etc., may provide a challenge that inhibits the technologist's ability to position and compress properly.

MAMMOGRAPHY EDUCATORS

54

MAMMOGRAPHY EDUCATORS

55

MAMMOGRAPHY EDUCATORS

56

MAMMOGRAPHY EDUCATORS

57

Not every mammogram can be ACR perfect!

"What Every Technologist Would Like Their Radiologist to Know" – Part 1-3*

About Our Patients
About Our Images
The Role of the Technologist

*Published in the SBI Newsletters 2015
www.SBI-online.org

MAMMOGRAPHY EDUCATORS

58

But we CAN improve image quality by using standardized positioning techniques that are applicable for FFDM and DBT *and* developing a strong knowledge based foundation that depends on the technologist's understanding of correlative anatomy.

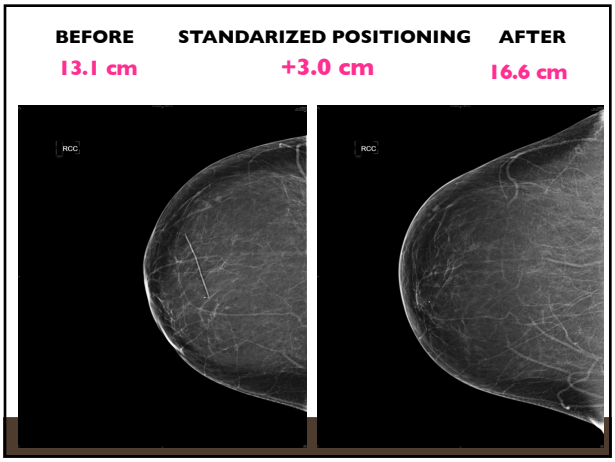
MAMMOGRAPHY EDUCATORS

59

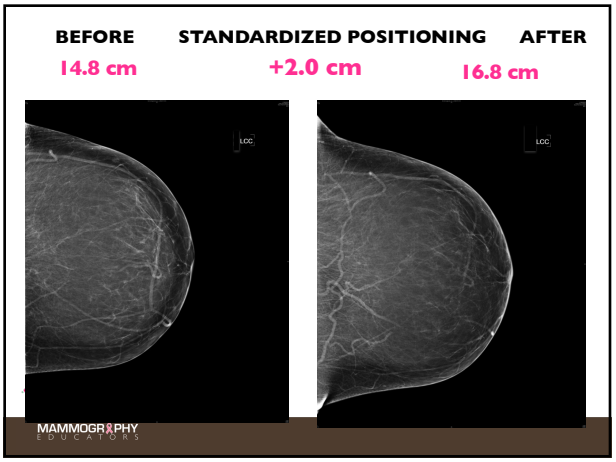
Does It Work?

MAMMOGRAPHY EDUCATORS

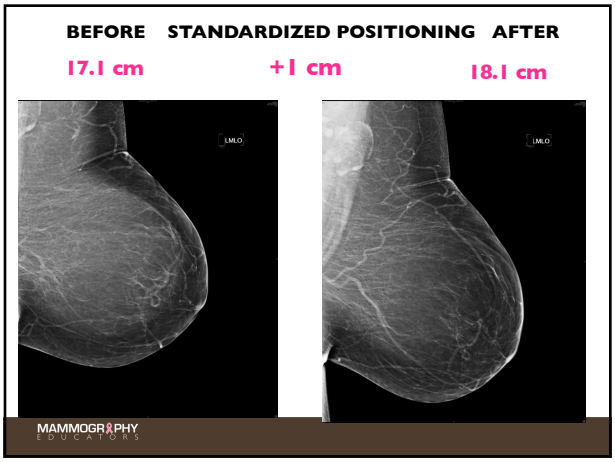
60



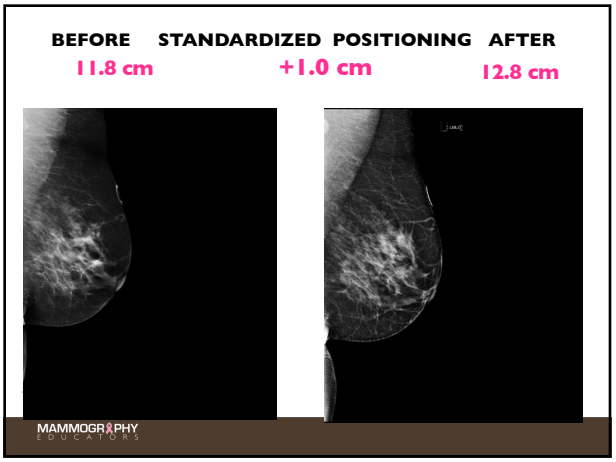
61



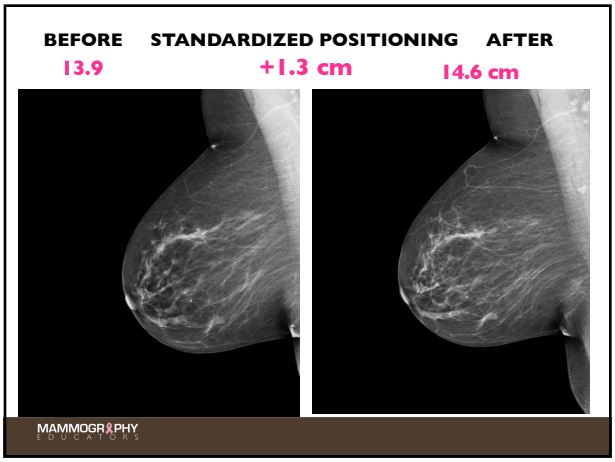
62



63



64



65

We need

- Accurate methods for determining the actual number of images taken
- Accurate methods for analyzing positioning standards
- The ability to provide corrective action plans for *improving* positioning errors (EQUIP)
- The establishment of standardized positioning techniques that are efficient, consistent and ergonomically sound

MAMMOGRAPHY
EDUCATORS

66

MAMMOGRAPHY EDUCATORS

67

It is ALL our responsibility to make sure that ALL women receive the highest quality of mammogram achievable.

MAMMOGRAPHY EDUCATORS

68

MAMMOGRAPHY EDUCATORS

69