Shared Decision-Making and Cancer Screenings: Does Choice Matter?

Christine Gunn, MA

Marina Soley-Bori, MA

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Background: Screening Guidelines

- Breast cancer screening results in population mortality benefits
- Many new screening guidelines include shared decision making in recommendations
- Currently a lot of debate and discussion about the relative benefits and harms of breast cancer screening

Background: Shared Decision-Making

- Cancer screening is ideal venue for shared decision-making
- New mandate under the Affordable Care Act to use shared decision-making in clinical practice
- Elwyn and colleagues (2012) provide a model to guide shared decision making, including 3 steps:
  - Introducing a choice
  - Describing options
  - Helping explore patient preferences to reach decision

Objective

Assess the current use of shared decision-making in screening decisions from the patient perspective and its impact on utilization of breast cancer screening tests.

1) Measure the influence of individual characteristics and communication on patient-reported choice.
   H_1: Higher levels of patient-provider communication will increase the likelihood that patients report having a choice for screening.

2) Determine the effect of having a choice to undergo cancer screening on utilization of mammograms.
   H_2: Having a choice will decrease use of mammography.

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Methods: Health Interview National Trends Survey

- HINTS 4 (Cycle 1 and Cycle 2; 2012) were used to measure utilization and choice among female respondents
- Included all people who responded to the breast cancer screening questions of interest (N=2,338)
- Weighted sample data were used in all multivariate analysis (N=127,743,755)

Methods: Statistical analyses

- **Choice model:** Logistic regression
  - Dependent Variable: Choice

    Has a doctor ever told you that you could choose whether or not to have the mammogram?

- **Utilization model:** Multinomial Logistic Regression
  - Dependent Variable: Utilization

    When did you have your most recent mammogram to check for breast cancer, if ever? (never; > 2 years; ≤ 2 years)

Methods: Communication Variable

- Created a single composite measure of communication:
- Cronbach α = 0.93
- Scale range: 7 – 28

C6. The following questions are about your communication with all doctors, nurses, or other health professionals you saw during the past 12 months...

How often did they do each of the following:	Always	Usually	Sometimes	Never
a. Give you the chance to ask all the health-related questions you had?	☐	☐	☐	☐
b. Give the attention you needed to your feelings and emotions?	☐	☐	☐	☐
c. Involve you in decisions about your health care as much as you wanted?	☐	☐	☐	☐
d. Make sure you understood the things you needed to do to take care of your health?	☐	☐	☐	☐
e. Explain things in a way you could understand?	☐	☐	☐	☐
f. Spend enough time with you?	☐	☐	☐	☐
g. Help you deal with feelings of uncertainty about your health or health care?	☐	☐	☐	☐

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Results: Population Characteristics

Variable	Percent (SD)
Age	Mean: 45 (0.77)
Health insurance: Yes	89% (1.21)
Most recent Mammogram Less than 2 years ago More than 2 years ago Never	 51% (1.17) 11% (1.45) 38% (2.04)
Choice for Mammogram: Yes	35% (1.64)
Communication	**Mean:** 23.1 (0.19)

Choice Model

- **Dependent Variable: Choice**

  Has a doctor ever told you that you could choose whether or not to have the mammogram?

  (reference category = no)

- **Key Independent Variable: Communication**

  Other controls: age, gender, race, education, income, general health status, personal history of cancer, family history of cancer regular provider, and data cycle.

Results: Choice Model

Communication did not impact whether women reported having a choice to get a mammogram

Odds Ratio= 1.017

95% CI: 0.986, 1.049

Results: Choice Model

Significant Predictors:

- Age
- Regular Provider
- Health Status

Model c-statistic: 0.6

Utilization model

- **Dependent Variable: Utilization**

  When did you have your most recent mammogram to check for breast cancer, if ever?
  (reference category = never)

- **Key Independent Variable: Choice**

  Has a doctor ever told you that you could choose whether or not to have the mammogram?

  Other controls: age, gender, race, education, income, general health status, personal history of cancer, family history of cancer, regular provider, communication, and data cycle.

Results: Utilization Model

Reported choice increased the odds of having a mammogram

$OR_{< 2\ YEARS}$= **2.42**

95% CI:1.35-4.37

$OR_{> 2\ YEARS}$=**3.76**

95% CI: 2.07-6.81

Results: Utilization Model

Other Significant Predictors:

- Age
- Race
- Regular Provider
- Education
- Marital Status

Model c-statistic: 0.92

Limitations

- Survey questions did not pertain to individual encounters
- Missing values could not be imputed
- Patient-reported outcomes only

Conclusions

- Choice increased use of mammograms
- Low overall rates of shared decision-making, represented by ‘choice’
- Communication did not influence patient-reported choice

Implications

- Shared decision making in this setting may be challenging and innovative approaches are needed

- The ACA advocates for the use of decision aids to promote information and preference sharing
  - Need for decision aids that incorporate ***both*** informational aspects and elicit patient preferences to guide patient-provider discussions

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Questions?

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Results: Population Characteristics

Variable	Percentage or mean (SD)
Age	45.47 (0.77)
Race: Non-Hispanic White	73.14 (2.52)
Marital status: Married	54.04 (2.05)
Education: Some college	36.84 (1.36)
Income: >$75,000	33.63 (3.18)
Health insurance: Yes	89.02 (1.21)
General health: Good or better	87.16 (2.14)
Personal history of cancer: yes	10.35 (0.60)
Family history of cancer: yes	77.36 (2.11)

Variable	Percentage or mean (SD)
Most recent Mammogram -Less than 2 years ago -More than 2 years ago -Never	 50.90 (1.17) 10.93 (1.45) 38.16 (2.04)
Choice for Mammogram: yes	35.41 (1.64)
Communication	23.13 (0.19)

Results: Choice Model

Significant Predictors:

Variable	Odds Ratio	95% CI
Age	1.017	(1.005, 1.028)**
Health Status Fair/Poor vs. Good or better	1.807	(1.082, 3.018)*
Regular Provider Yes vs. No	1.348	(1.129, 1.511)**

Model c-statistic: 0.6

**p<0.05 **p<0.01*

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Results: Utilization Model

	Less than 2 years		More than 2 years	
Variable	**OR**	**95% CI**	**OR**	**95% CI**
Age	1.19	1.16-1.23***	1.18	1.14-1.22***
Race: -Hispanic -Black or African American	2.90 2.52	1.41-5.98** 1.01-6.35*	2.86 NS	1.17-6.99* NS
Marital status: Widowed	0.13	0.04-0.49**	0.17	0.05-0.62**
Education: College graduate	0.56	0.33-0.96*	0.44	0.25-0.77*
Communication	NS	NS	0.94	0.88-0.99*
Regular provider: yes vs. no	1.42	1.03-1.66*	NS	NS

*Model c-statistic=0.924, *p<0.05, **p<0.01, ***p<0.0001, N=2,303; weighted N=127,743,755*

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Results

Table 1: Descriptive Statistics of HINTS 4 Evaluable Sample

	HINTS 4 (N=2,338)		
Race/Ethnicity	N	Weighted N	Percent (SD)
Hispanic	281	14,491,452	11.11 (1.55)
Non-Hispanic White	1542	95,360,388	73.14 (2.52)
Black or African American	359	12,490,199	9.58 (1.17)
Other	156	8,034,549	6.16 (0.80)
Marital status			
Married	1159	70,463,699	54.04 (2.05)
Living as married	91	4,029,614	3.09 (0.34)
Divorced	387	11,778,380	9.03 (0.73)
Widowed	252	8,790,045	6.74 (0.57)
Separated	65	1,697,590	1.30 (0.28)
Single, never been married	384	33,617,260	25.78 (1.74)
Age (in years)			
Mean (SD)	2,338	45.47 (0.77)	
Education: Highest level			
Less than high school	146	11,705,013	8.97 (1.79)
High school graduate	431	23,439,813	17.98 (1.11)
Some college	701	48,028,319	36.84 (1.36)
College graduate	1060	47,203,443	36.20 (2.19)
Income			
≤ $20,000	462	25,776,032	19.77 (2.98)
$20,000-35,000	391	19,805,694	15.19 (1.32)
$35,000-50,000	346	18,317,363	14.05 (1.08)
$50,000-75,000	409	22,632,346	17.36 (1.36)
>$75,000	730	43,845,153	33.63 (3.18)
Health Insurance			
Yes	2,137	116,060,318	89.02 (1.21)
General Health			
Good or better	2,001	113,637,586	87.16 (2.14)
Personal History of Cancer			
Yes	329	13,493,392	10.35 (0.60)
Family History of Cancer			
Yes	1812	100,858,868	77.36 (2.11)
Most Recent Mammogram			
≤ 2 years ago	1437	66,367,119	50.90 (1.17)
>2 years ago	289	14,254,185	10.93 (1.45)
Never	612	49,755,284	38.16 (2.04)
Choice for Mammogram			
Yes	825	46,164,634	35.41 (1.64)
Communication			
Mean (SD)	2303	23.13 (0.19)	

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Results

Table 2: Logistic Model Predicting Patient-Reported Choice to Undergo Mammogram Screening

N=2,303, weighted N= 127,631,428

Variable	Odds Ratio	95% Wald CI
Age	**1.017**	**(1.005, 1.028)****
Race (ref= Non-Hispanic White)		
Hispanic	0.917	(0.584, 1.442)
Black or African American	0.980	(0.665, 1.443)
Other	1.733	(0.932 , 3.220)
Marital status (ref= Married)		
Divorced	0.798	(0.576, 1.104)
Living as married	1.407	(0.816, 2.429)
Separated	0.855	(0.401, 1.825)
Single, never been married	0.719	(0.430, 1.200)
Widowed	0.582	(0.330, 1.025)
Education (ref= some college)		
College graduate	1.129	(0.789, 1.615)
High school graduate	1.260	(0.850, 1.866)
Less than high school	1.225	(0.635, 2.365)
Household Income (ref < $20,000)		
$20,000 to < $35,000	0.770	(0.454, 1.305)
$35,000 to < $50,000	0.983	(0.601, 1.606)
$50,000 to < $75,000	0.897	(0.486, 1.654)
$75,000 or More	1.230	(0.667, 2.269)
General Health		
Fair or worse vs. Good or better	**1.807**	**(1.082, 3.018)***
Health care coverage		
Yes vs. No	0.943	(0.556, 1.598)
Ever Had Cancer		
No vs. Yes	1.067	(0.698, 1.630)
Family ever Had Cancer		
No vs. Yes	1.133	(0.799, 1.607)
Communication	1.017	(0.986, 1.049)
Regular Provider		
Yes vs. No	**1.348**	**(1.129, 1.511)****
Cycle	0.870	(0.690, 1.099)

Testing global null hypothesis: χ^2 = 8204713.7 DF= 23 p < 0.0001
Model C-statistic: 0.592
*p<0.05
**p< 0.01

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Results

Table 3: Generalized Logit Predicting Mammogram Utilization
N=2,303, weighted N= 127,743,755

	Most Recent Mammogram (ref=never)			
	Less than 2 years		More than 2 years	
Variable	Odds ratio	95% Wald CI	Odds ratio	95% Wald CI
Choice				
Yes vs. no	**2.424**	**(1.345, 4.367)****	**3.757**	**(2.073, 6.811)*****
Age	**1.193**	**(1.157, 1.229)*****	**1.183**	**(1.143, 1.225)*****
Race (ref = Non-Hispanic White)				
Hispanic	**2.904**	**(1.410, 5.979)****	**2.865**	**(1.174, 6.995)***
Black or African American	**2.524**	**(1.003, 6.354)***	1.001	(0.479, 2.089)
Other	2.056	(0.872, 4.848)	0.719	(0.288, 1.797)
Marital status (ref=married)				
Divorced	0.779	(0.427, 1.423)	1.307	(0.591, 2.888)
Living as married	**0.233**	**(0.093, 0.587)****	0.573	(0.119, 2.761)
Separated	1.575	(0.349, 7.115)	2.780	(0.595, 12.988)
Single, never been married	0.872	(0.408, 1.862)	0.955	(0.428, 2.132)
Widowed	**0.132**	**(0.036, 0.487)****	**0.169**	**(0.046, 0.622)****
Education (ref: some college)				
College graduate	**0.564**	**(0.330, 0.963)***	**0.440**	**(0.250, 0.775)***
High school graduate	0.748	(0.366, 1.527)	0.875	(0.381, 2.010)
Less than high school	1.165	(0.363, 3.742)	0.510	(0.158, 1.648)
Household Income (ref < $20,000)				
$20,000 to < $35,000	0.587	(0.185, 1.862)	0.541	(0.157, 1.860)
$35,000 to < $50,000	1.453	(0.527, 4.007)	1.052	(0.307, 3.604)
$50,000 to < $75,000	1.229	(0.485, 3.111)	0.957	(0.327, 2.800)
$75,000 or More	1.663	(0.585, 4.728)	0.863	(0.246, 3.003)
General Health				
Fair or worse vs. Good or better	0.862	(0.449, 1.655)	1.333	(0.638, 2.784)
Health care coverage				
Yes vs. No	1.564	(0.638, 3.834)	0.891	(0.328, 2.419)
Ever Had Cancer				
No vs. Yes	0.545	(0.171, 1.736)	0.684	(0.219, 2.135)
Family ever Had Cancer				
No vs. Yes	0.788	(0.527, 1.176)	0.890	(0.514, 1.541)
Communication	0.997	(0.956, 1.040)	**0.938**	**(0.884, 0.994)***
Regular Provider				
Yes vs. No	**1.423**	**(1.033, 1.656)***	1.173	(0.352, 1.585)
Cycle 1 vs. 2	1.350	(0.902, 2.022)	1.765	(0.964, 3.233)

Testing global null hypothesis: χ^2 = 97874525.8 DF= 48 p < 0.0001
Model C-statistic: 0.924
*p<0.05
**p< 0.01
***p< 0.0001

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Prostate Cancer Screening

Results

- Choice model:
  - Statistically significant variables: age, marital status, education, and general health.

- Utilization model:
  - Dependent variable: “Have you ever had a PSA test?” (yes, no, not sure)
  - Statistically significant variables: choice, age, race, and marital status
  - Reported choice increased the odds of undergoing screening by 95.5%. **OR=0.045**, 95% CI (0.020,0.100)

PSA Test -Binary Logit- N=874, Weighted N=60,672,353
Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Age	1.077	1.057	1.098 *
Race: Hispanic vs Other	1.864	0.392	8.865
Race: Non-Hispanic Black or African American vs Other	1.356	0.41	4.479
Race: Non-Hispanic White vs Other	1.39	0.424	4.554
MaritalStatus: Divorced vs Married	0.576	0.295	1.127
MaritalStatus: Living as married vs Married	0.791	0.236	2.646
MaritalStatus: Separated vs Married	1.552	0.096	25.186
MaritalStatus: Single, never been married vs Married	0.272	0.123	0.603 *
MaritalStatus: Widowed vs Married	0.267	0.055	1.304
Education: College graduate vs Some college	1.214	0.707	2.083
Education: High school graduate vs Some college	0.482	0.233	0.996 *
Education: Less than high school vs Some college	0.804	0.26	2.489
Household Income: $20,000 to < $35,000 vs Less than $20,000	1.739	0.528	5.728
Household Income: $35,000 to < $50,000 vs Less than $20,000	0.841	0.246	2.875
Household Income: $50,000 to < $75,000 vs Less than $20,000	1.327	0.404	4.358
Household Income: $75,000 or More vs Less than $20,000	1.402	0.454	4.33
Health Care Coverage: Yes vs No	0.715	0.243	2.099
General Health: Excellent, vs Very good	1.24	0.627	2.45
General Health: Fair vs Very good	0.631	0.259	1.537
General Health: Good vs Very good	0.732	0.435	1.232
GeneralHealth: Poor vs Very good	0.138	0.042	0.453 *
Ever Had Cancer: No vs Yes	0.633	0.284	1.412
Family Ever Had Cancer: No vs Yes	0.773	0.403	1.48
Family Ever Had Cancer: Not sure vs Yes	0.431	0.177	1.046
Chance Get Cancer: Likely vs Very unlikely	0.323	0.11	0.948 *
Chance Get Cancer: Neither unlikely nor likely vs Very unlikely	0.308	0.111	0.855 *
ChanceGetCancer: Unlikely vs Very unlikely	0.254	0.084	0.767 *
ChanceGetCancer: Very likely vs Very unlikely	0.519	0.125	2.163
Communication	1.026	0.966	1.09

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	25404537.5	29	<.0001
Score	21245606.6	29	<.0001
Wald	469.8721	29	<.0001

Association of Predicted Probabilities and Observed Responses

Percent Concordant	77.3	Somers' D	0.548
Percent Discordant	22.5	Gamma	0.549
Percent Tied	0.2	Tau-a	0.274
Pairs	190968	c	0.774

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Table 6: Utilization against choice, PSA

PSA Screening as the Dependent Variable- Generalized Logit- N=880, Weighted N=61,046,574 Odds Ratio Estimates (95% CI)							
	Ever Had PSA	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Choice talk							
Choice: yes vs. no	*No*	0.031 (0.018, 0.052)*	0.062 (0.027, 0.142)*	0.062 (0.027, 0.140)*	0.060 (0.028,0.133)*	0.045 (0.020, 0.100)*	0.045 (0.020, 0.100)*
Choice: yes vs. no	*Not sure*	0.031 (0.013, 0.071)*	0.057 (0.024, 0.135)*	0.056 (0.025, 0.128) *	0.054 (0.023, 0.123) *	0.043 (0.020, 0.096) *	0.042 (0.019, 0.095) *
Demographics							
Age, Race, Marital Status, Education and Income			(Age, Race, Marital Status)*	(Age, Race)*	(Age, Race)*	(Age, Race, Marital Status)*	(Age, Race, Marital Status) *
Health Status				x	x	x	x
Insurance					x	x	x
Risk Perception							
Family History						x	x
Personal History						x	x
Self Perception						0.080 (0.018, 0.347) * (Likely vs. Very unlikely/no vs. yes)	0.088 (0.020, 0.391)* (Likely vs. very unlikely)
Option talk							
Communication							1.031 (0.968, 1.097) (no vs. yes)
(-)2Log Likelihood		90,962,939	75,232,838	73,657,102	73,218,695	69,405,533	69,035,326
AIC		90,962,931	75,232,898	73,657,178	73,218,775	69,405,641	69,035,438

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