

**A Randomized Study of
Public Deliberation about Diagnostic Error:
An Analysis of Multiple Healthcare Consumer Events in 2015-2016***

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Executive Summary

This report presents results from the analysis of data collected from four healthcare consumer groups as part of the research study, *Using Public Deliberation to Define Patient Roles in Reducing Diagnostic Error*. Specifically, the report uses survey data collected from three treatment groups – education, deliberation, and participatory feedback – and the control group. In addition to examining demographic data, the report focuses on the individual-level impacts of the interventions on the participants, including patient activation, trust in doctors, perceptions and knowledge about diagnostic error, perceptions about patient engagement, and health literacy. To explore these impacts, we use a series of t-tests to examine changes within the groups before and after the treatments, and then use regression analyses to determine whether the magnitude of each group’s change significantly differs from the change in the control group.

Overall, the results show that:

- Participants in all four consumer groups were diverse across a number of *socio-demographic indicators*, and the research team was generally successful in oversampling from female and minority populations.
- Participants in all of the treatment groups (but not the control group) experienced statistically significant increases in *patient activation* and *trust in doctors*. Moreover, the magnitude of these changes (in comparison to the control group) was greatest for the deliberation group.
- The results were mixed in terms of *participants’ awareness about the seriousness of diagnostic errors* and the *perceptions about patient participation*. We posit that these results are function of the design and purposes of the various participatory interventions.
- Participants in the education, deliberation, and feedback groups seem to have experienced gains in *knowledge about diagnostic error*, as evinced by the increased percentage of correct answers to a question. There was no change in the control group.
- Participants in the deliberation and feedback groups had significant gains on all three measures of *health literacy*, with the largest magnitudes of changes occurring in the deliberation group. Neither the education group nor the control group experienced significant changes on any of three measures.

Together, these results suggest that various kinds of participatory arrangements, from simple education, to intensive deliberation, to short and less intensive feedback sessions, can have meaningful individual level impacts on participants. They also demonstrate that the magnitude of impacts seems to be greatest for deliberative arrangements, with intensive forms of deliberation being more impactful than short and less intensive sessions.

Project Overview

This report presents the results from the analysis of data collected from four healthcare consumer groups as part of the research study, *Using Public Deliberation to Define Patient Roles in Reducing Diagnostic Error*, which was funded by the Agency for Healthcare Research and Quality (AHRQ) and implemented collaboratively by researchers and practitioners from the Program for the Advancement of Research on Conflict and Collaboration (PARCC) at the Syracuse University Maxwell School of Citizenship and Public Affairs, the Jefferson Center, and the Society to Improve Diagnosis in Medicine (SIDM).

The overarching goal of the project was to use deliberative approaches to develop informed and practical patient-focused recommendations for reducing diagnostic errors, which SIDM will transform into whitepapers, toolkits, and other materials that patients and providers can use to improve diagnostic quality in various healthcare settings. Subsidiary goals were to examine the use of deliberation for healthcare issues, test the efficacy of deliberation compared to two other participatory interventions (education and feedback groups), and assess the perceived quality of recommendations developed through a deliberative process.

To achieve these goals, the project utilized a randomized and controlled experimental design that engaged healthcare consumers in one of four groups: (1) an education group, (2) a deliberation group, (3) a participatory feedback group, and (4) a control group that received no intervention and did not participate in any activities.¹ All members of all groups were asked to complete pre- and post-surveys, which captured demographic information and individual-level measures, including patient activation, trust in doctors, perceptions and knowledge about diagnostic error, perceptions about patient engagement, and health literacy. The surveys also contained, when relevant, a series of questions about their satisfaction with the activities in which they engaged.

Healthcare Consumer Groups

The events and activities with each of the healthcare consumer groups are briefly described below. Table 1 shows the overall project structure for the consumer groups, the dates of survey administration, and the number of responses.

¹ Several steps were taken to recruit healthcare consumers as participants in the education, deliberation, and control groups. First, a marketing firm sent a letter to 15,000 residents of Onondaga County, NY and ads were posted on Facebook and Craigslist. The letter and the ads included information about the project and invited those interested in participating to complete an application either online or by phone. The application collected basic socio-demographic data, as well as information about people's recent experiences in healthcare settings. These data were used to stratify the pool of 276 applicants into matched pairs. The research team then contacted all applicants to confirm their availability for events. Individuals who were no longer able to participate were replaced with someone who matched their demographic characteristics. Finally, individuals from the matched pairs were randomly assigned to participate in either the education group or deliberation group. The remaining applicants were placed into the control group.

To recruit participants for the participatory feedback group, we contacted individuals who were interested in participating in the process but were unavailable for the first and second events. We also placed ads on Facebook and Craigslist. We randomly selected 100 participants for this portion of the research.

Our goals in these recruitment processes were to create diverse groups of participants that reflected the demographic composition of Onondaga County, but oversampled from minority populations.

Table 1: Consumer Group Project Structure, Survey Dates, and Participant Numbers

	Intervention Groups			Control Group	
	Education Group	Deliberation Group			Participatory Feedback Group
		Session 1	Session 2		
Pre-Survey	21 (8/27/15)	20 (8/27/15)	-- (10/8/15)	93 (2/6/16)	108 (10/16)
Post-Survey	21 (8/27/15)	18 (8/29/15)	17 (10/10/15)	91 (2/6/16)	73 (5/16)
Completed Both Surveys	21	16		89	71

Education Group. On August 27, 2015, 21 people participated in a 3-hour informational session about diagnostic error that was provided by health professionals and experts. The participants completed a survey at the start and end of the session.

Deliberation Group. On August 27, 2015, a group of 20 people participated in the informational session noted above. Following that session, this group remained and engaged in approximately 18 hours of deliberation over the remainder of the day on August 27 and throughout the days of August 28 and 29. The deliberative discussion centered on: (1) the roles patients are willing and able to play in preventing, identifying, and reporting diagnostic error; (2) the strategies that should be used to enable patients to play those roles; and (3) the changes needed in systems and structures for patients to assume those roles. Based on their discussions, the deliberation group produced a set of draft recommendations for improving diagnostic quality and reducing diagnostic error. At the start and end of the weekend, the participants completed surveys.

The deliberation group reconvened October 8 through 10, 2015. First, the group received feedback that had been gathered at the September 2015 Diagnostic Error in Medicine Conference. Participants then spent approximately 20 hours over the weekend deliberating and engaging in participatory activities to refine and finalize their recommendations.² At the conclusion of the event, participants completed post-surveys. We use data from the August pre-survey and the October post-survey for the analyses in this report.³

Participatory Feedback Group. On February 6, 2016, a participatory feedback group that included 95 individuals was convened at the OnCenter in Syracuse, New York. Upon arrival, each participant was randomly assigned to sit at a table with approximately 6-8 other participants and a table facilitator, and asked to complete a pre-survey. The event opened with an introductory lecture by an expert in diagnostic error, which was followed by a question and answer session. The facilitation team then described the process in which the 2015 deliberation group engaged, and representatives from the deliberation group discussed their experience and responded to questions. Next, the participants were presented with the recommendations produced by the deliberation group and asked to complete a short survey assessing various facets of their quality. Participants in the consumer feedback group engaged in a series of discussions about diagnostic error through the remainder of the day and

² The participant recommendations are available at: <http://jefferson-center.org/patient-prescriptions/>.

³ For detailed analyses on data from post-survey in August, please refer to our first project report.

completed a post-intervention survey at the close of the event.

Control Group. The control group, consisting of 108 individuals, did not participate in any project events. They were mailed a pre-survey in October 2015 and a post-survey in May 2016.

This report examines data collected in the surveys administered to all four of the healthcare consumer groups.⁴ In addition to examining demographic data, the report focuses on the individual-level impacts of the interventions on the participants, including patient activation, trust in doctors, perceptions and knowledge about diagnostic error, perceptions about patient engagement, and health literacy. Specifically, we use a series of t-tests to examine changes within the groups before and after the treatments, and then use regression analyses to determine whether the magnitude of each group's changes significantly differ from those that occurred in the control group.

Demographics of Participants

Table 2 provides demographic information for the participants in the four groups. The table shows that the participants in all groups were fairly diverse on a number of indicators, including gender, race, age, education, employment status, and income. Most participants in all groups had Internet access.

Table 3 examines the percentage of participants in each group as compared the percentage of the overall population of Onondaga County for several demographic characteristics. As part of our overall recruitment strategy, we planned to over-enroll female and minority participants. The data show that we were moderately successful at this effort.

First, 52% of the population in Onondaga County is female. We achieved this percentage or greater in the education group (52%), the feedback group (64%), and the control group (69%); however, our deliberation group was only 44% female.

Second, 11% of the population in Onondaga County is Black or African American. We exceeded this percentage in all of the groups, including the education group (14%), the deliberation group (13%), the feedback group (19%), and the control group (15%).

Third, 4% of the population in Onondaga County is Hispanic/Latino(a). We exceeded this percentage in the education group (5%), the deliberation group (6%), and the feedback group (5%), but not in the control group (2%).

Finally, 3% of the population in Onondaga County is Asian/Asian-Indian. We exceeded this percentage in the education group (5%) and met it in the control group (3%), but fell short in both the deliberation group (0%) and the feedback group (1%).

⁴ Two additional reports provide detailed examinations of the data from the healthcare consumer events. The first report, *Results from a Randomized Study of Public Deliberation about Diagnostic Error: An Analysis of Healthcare Consumer Events in 2015*, examines the data from the education and deliberation groups. The second report, *Initial Phases of a Randomized Study of Public Deliberation about Diagnostic Error: An Analysis of the 2016 Healthcare Consumer Event*, examines data from the participatory feedback group. For copies of those reports, contact Tina Nabatchi (tnabatch@syr.edu).

Table 2: Demographic Information for All Consumer Groups

		Education Group (N=21)	Deliberation Group⁵ (N=16)	Feedback Group⁶ (N=95)	Control Group (N=108)
Gender	Male	10	9	31	34
	Female	11	7	61	74
Race	Black/African American	3	2	18	16
	White/Caucasian	14	12	58	85
	Hispanic/Latino(a)	1	1	5	2
	Asian/Asian-Indian	1	0	1	3
	Multi-Ethnic	0	1	8	1
	Other	1	0	2	1
	Unknown	1	0	0	0
Age	18-21	2	0	4	3
	22-35	2	3	32	30
	36-45	3	2	17	19
	46-55	6	5	20	26
	56-65	4	2	12	21
	66-75	4	3	5	5
	Over 76	0	1	1	2
Education	Some high school	0	1	5	1
	High school graduate	1	4	15	14
	Some college, no degree	7	5	29	24
	Associate's degree	4	1	10	15
	Bachelor's degree	4	3	11	25
	Graduate /prof. degree	5	2	22	28
Employment	Unemployed	3	2	20	7
	Part-time	5	0	22	25
	Full-time	4	4	26	48
	Retired	4	5	9	12
	In school	0	0	5	2
	Other	5	5	10	14
Income	Under \$10,000	3	3	18	18
	\$10,000-\$19,999	6	0	16	17
	\$20,000-\$29,999	0	3	15	11
	\$30,000-\$39,999	4	3	14	15
	\$40,000-\$49,999	1	1	6	10
	\$50,000-\$59,999	0	1	6	4
	\$60,000-\$69,999	1	1	2	8
	\$70,000-\$79,999	1	2	3	5
	\$80,000-\$89,999	1	0	1	4
	\$90,000-\$99,999	0	0	0	3
\$100,000 or more	4	2	10	12	
Internet	Yes	19	16	84	99
	No	2	0	6	7

⁵ Data are from the 16 participants who attended and completed surveys in both August and October.

⁶ Of the 95 total participants, 93 completed the pre-survey, 91 completed the post-survey, and 89 completed both. Demographic questions were asked only in the pre-survey. Of the 92 that answered these questions, one did not report age, one did not report income, and two did not answer the internet access question.

Table 3: Consumer Group Characteristics vs. Population of Onondaga County, NY

		Education Group (N=21)	Deliberation Group (N=16)	Feedback Group (N=95)	Control Group (N=108)	Onondaga County
Gender	Male	48%	56%	33%	31%	48%
	Female	52%	44%	64%	69%	52%
Race	Black/African American	14%	13%	19%	15%	11%
	White/Caucasian	67%	75%	61%	79%	81%
	Hispanic/Latino(a)	5%	6%	5%	2%	4%
	Asian/Asian-Indian	5%	0%	1%	3%	3%
Age	18-35	19%	19%	38%	31%	31%
	36-65	62%	56%	52%	61%	50%
	66 & over	19%	25%	6%	6%	19%
Education	Some high school	0%	6%	5%	1%	10%
	High school graduate	5%	25%	16%	13%	45%
	Associate's or Bachelor's	38%	25%	22%	37%	30%
	Grad. or Prof. degree	24%	13%	23%	26%	15%

Individual-Level Impacts

This section reports on the impacts of the various interventions (education, deliberation, participatory feedback) on individual-level outcomes, including: patient activation, trust in doctors, perceptions and knowledge about diagnostic error, perceptions about patient engagement, and health literacy.

T-tests and OLS regressions were used for the statistical analyses; the results are reported in a series of tables. For each measure, we first present t-test results to see whether there were any significant changes in participants' perceptions and attitudes after our interventions. We then provide regression results to examine whether the change in each group is significantly different from the change in the control group; for all regression models, we use changes in scores on each indicator as dependent variables, and included a set of demographic variables as controls (gender, race, age, level of education, internet access, employment status, and annual income).

Patient Activation

The Patient Activation Measure (PAM), licensed by Insignia Health, aims to assess individuals' "knowledge, skills and confidence for managing their own health" using a Guttman scale.⁷ Specifically, the 13-item measure ($\alpha = 0.82$; see Appendix 1) places individuals on a 0-100 scale, where higher scores indicate greater patient activation and empowerment. The scores can be further segmented into four activation levels: (1) the individual is disengaged and overwhelmed; (2) the individual is becoming aware, but is still

⁷ J.H. Hibbard, et al. (2004). Development of the Patient Activation Measure (PAM): Conceptualizing and Measuring Activation in Patients and Consumers, *Health Service Research*, 39(4): 1005–1026.

struggling; (3) the individual is taking action; and (4) the individual is maintaining behaviors and pushing further to adopt a healthy lifestyle. Thus, this measure conceptualizes patient activation as a hierarchically structured development process, where individuals can progress through the levels to become more fully activated in their health management. The four levels of patient activation are described further in Figure 1.



Figure 1: Four Levels of the Patient Activation Measure

A simple way to assess changes in patient activation is to look at how many participants fell into each level before and after the events. We cover these changes in detail in previous reports. Here, we only report the percentage of participants in each group whose PAM levels increased after the event.⁸ Specifically, 42% (5 of 12 people) of the education group moved up at least one PAM Level; 50% (8 of 16 people) of the deliberation group moved up at least one PAM Level; 24% (21 of 88 people) of the feedback group moved up at least one PAM Level; and 19% (13 of 67 people) of the control group moved up at least one PAM Level.

In addition to this simple analysis, we also conducted more robust t-tests and regressions. Table 4, which displays the t-test results, shows that participants in each of the three treatment groups experienced significant and positive changes in their level of empowerment and activation, while the control group did not experience significant changes. With a mean increase of 7.66 ($p < .01$), the deliberation group saw the largest change, followed by the education group (4.04, $p < .05$) and the feedback group (2.45, $p < .05$).

Table 4: Changes in Patient Activation Measure Scores by Group

	Education Group	Deliberation Group	Feedback Group	Control Group
N	21	17	88	65
Before	59.61	57.11	63.01	64.34
After	63.65	64.77	65.46	63.54
Difference	4.04**	7.66***	2.45**	-0.80

Note: * $p < .10$, ** $p < .05$, *** $p < .01$; one-tailed test of significance

⁸ Note that we only include participants who complete both pre- and post-surveys and whose surveys could be matched.

The regression results shown in Table 5 further support the t-test findings. Specifically, the results show that participants in all of the treatment groups experienced statistically significant increases in their participants' PAM scores. Once again, the deliberation group experienced the greatest increase; the change in that group's score is 8.18 ($p < .01$) larger than the change in the control group. The change in education group's PAM score is 5.7 ($p < .05$) greater than the change in the control group, which indicates simply receiving information about diagnostic error can improve patient activation. Finally, the change in the feedback group was 3.75 ($p < .05$) larger than the change in the control group. Together, the t-test and regression results suggest that educational and deliberative opportunities can have powerful impacts on patient activation.

Table 5: Impacts of Interventions on Patient Activation

DV: change in PAM score	Education Group	Deliberation Group	Feedback Group
	5.72** (2.61)	8.18*** (2.30)	3.75** (1.79)
R-Squared	0.1111		
N	175		

Note: * $p < .10$, ** $p < .05$, *** $p < .01$; two-tailed test of significance; Standard errors in parentheses; controls included but not reported

Trust in Doctors

To measure trust in doctors, we use an additive index ($\alpha = 0.76$) consisting of three 5-point Likert scale items, where 1 = strongly disagree to 5 = strongly agree:

1. "Doctors are extremely thorough and careful."
2. "I trust my doctors' decisions about which medical treatments are best for me."
3. "All in all, I trust doctors completely."

Table 6, which presents the t-test results for trust in doctors, shows that all three treatment groups experienced statistically significant increases in their trust in doctors. On average, the before-after differences are 0.22 ($p < .10$) for the education group, 0.59 ($p < .05$) for the deliberation group, and 0.15 ($p < .10$) for the feedback group. Once again, the deliberation group had the largest gains. Moreover, although the control group's mean score increased by 0.10, the change is not significant.

Table 6: Changes in Trust in Doctors by Group

	Education Group	Deliberation Group	Feedback Group	Control Group
N	21	18	89	69
Before	2.84	2.85	3.06	3.20
After	3.06	3.44	3.21	3.10
Difference	0.22*	0.59**	0.15*	0.10

Note: * $p < .10$, ** $p < .05$, *** $p < .01$; one-tailed test of significance

The regression results, shown in Table 7, buttress the t-test findings. Specifically, the deliberation group experienced the greatest change in comparison to the change in the control group (0.73, $p < .01$), followed by the education group (0.32, $p < .05$), and the feedback group (0.24, $p < .10$). Together, these results suggest that different kinds of participatory

interventions can improve trust in doctors, with deliberation generating the greatest gains..

Table 7: Impacts of Interventions on Trust in Doctors

DV: change in trust in doctors	Education Group	Deliberation Group	Feedback Group
	0.32** (0.15)	0.73*** (0.17)	0.24** (0.10)
R-Squared	0.1711		
N	174		

Note: *p < .10, **p < .05, ***p < .01; two-tailed test of significance; Standard errors in parentheses; controls included but not reported

Perceptions and Knowledge about Diagnostic Error

To measure for participants’ perceptions about the seriousness of diagnostic error, we constructed an additive index ($\alpha = 0.58$) using two 5-point Likert scale questions, where 1 = strongly disagree and 5 = strongly agree:

1. “Diagnostic errors are a serious issue in the medical profession.”
2. “Diagnostic error is an under-recognized and under-studied problem.”

The results are surprising and interesting. Table 8, which presents the t-test results, shows that all groups experienced increases in their awareness about diagnostic error. However, the only statistically significant change was for the feedback group, who saw an increase of 0.23 ($p < .05$). The regression results, provided in Table 9, suggest that none of the interventions had a significant impact on awareness of the seriousness of diagnostic errors; the changes in the scores for all of the groups were not significant as compared to change in the control group.

Although unexpected, these results make some sense given that the participants in education and deliberation groups were presented with abundant information about the frequency, causes, and consequences of diagnostic error, as well as ways to address the problem. Through these sessions, the participants may have come to believe that they have the power to improve diagnostic quality and reduce the occurrence of diagnostic error. Hence, they may have left thinking that diagnostic error is neither a very serious problem nor an under-studied issue. In contrast, individuals in feedback group were presented with far less information about diagnostic error and given far less time to discuss options for addressing it. This may have contributed to the increase in awareness that we see in Table 8.

Table 8: Changes in Perceptions about Diagnostic Errors by Group

	Education Group	Deliberation Group	Feedback Group	Control Group
N	21	16	88	71
Before	4.31	4.22	3.96	3.94
After	4.51	4.47	4.19	4.07
Difference	0.20	0.25	0.23**	0.13

Note: *p < .10, **p < .05, ***p < .01; one-tailed test of significance

Table 9: Impacts of Interventions on Perceptions about Diagnostic Error

DV: change in perception about diagnostic error	Education Group	Deliberation Group	Feedback Group
	0.11 (0.17)	0.24 (0.19)	0.12 (0.11)
R-Squared	0.0499		
N	175		

Note: *p < .10, **p < .05, ***p < .01; two-tailed test of significance; Standard errors in parentheses; controls included but not reported

In addition to perceptions about diagnostic error, we also attempted to measure knowledge about diagnostic error. To do so, we used a single multiple choice question: “On average, what fraction of patients seen in clinics every year will be subject to a diagnosis that is wrong, missed, or delayed?” with the “1 in 10” being the correct answer. Table 10 shows the percentage of people in each group who selected the right answer before and after the interventions. Although we cannot calculate statistical significance, the results are noteworthy. The percentage of correct answers increased by about 27% for the education group, and by about 12% for both the deliberation and feedback groups. There was a less than 1% change in correct answers for the control group. These results suggest that the participants in the treatment groups experienced at least some minor gains in knowledge about diagnostic error.

Table 10: Knowledge about Diagnostic Error

	Education Group	Deliberation Group	Feedback Group	Control Group
Before	6 out of 18 (33.33%)	8 out of 17 (47.06%)	20 out of 76 (26.32%)	29 out of 101 (28.71%)
After	12 out of 20 (60.00%)	10 out of 17 (58.82%)	28 out of 74 (37.84%)	19 out of 66 (28.79%)

Perceptions about Patient Participation

We have two measures for perceptions about patient participation. The first assesses perceptions about who has responsibility for diagnostic errors, and the second assesses perceptions about the role of patients in the diagnostic process.

To measure responsibility for diagnostic error, we created an additive index ($\alpha = 0.66$) using two 5-point Likert scale items, where 1 = strongly disagree and 5 = strongly agree:

1. “Diagnostic error is the sole responsibility of physicians.”
2. “Patients do not contribute to diagnostic error.”

Given the nature of these two items, higher numbers attribute the responsibility for diagnostic errors to health service providers, while lower numbers indicate that patients can (and perhaps should) also take responsibility in the diagnostic process.

Table 11: Changes in Perceptions about Responsibility for Diagnostic Error by Group

	Education Group	Deliberation Group	Feedback Group	Control Group
N	21	16	89	71
Before	2.31	2.56	2.49	2.46
After	2.04	2.06	2.39	2.25
Difference	-0.26	-0.50*	-0.10	-0.20

Note: *p < .10, **p < .05, ***p < .01; one-tailed test of significance

The t-test results, presented in Table 11, show that although participants attributed less responsibility to physicians (and more to patients) after the events, only the change for the deliberation group (-0.50, p < .10) was statistically significant. The regression results presented in Table 12 yielded similar findings. As compared to the change in the control group, only the deliberation group experienced a significant change (-0.46, p < .10). These results make sense, given that the deliberation group developed patient-centered recommendations for reducing diagnostic error, and therefore may have concluded that patients need to take some responsibility for diagnostic error.

Table 12: Impacts on Perceptions about Responsibility for Diagnostic Error

DV: change in perception about responsibility for diagnostic error	Education Group	Deliberation Group	Feedback Group
	-0.14 (0.23)	-0.46* (0.26)	0.03 (0.16)
R-Squared	0.0405		
N	175		

Note: *p < .10, **p < .05, ***p < .01; two-tailed test of significance;
Standard errors in parentheses; controls included but not reported

To measure perceptions about the role of patients in the diagnostic process, we created another additive index ($\alpha = 0.63$) using three 5-point Likert scale items, where 1 = strongly disagree and 5 = strongly agree:

1. “If doctors and patients interacted more during visits, then the frequency of diagnostic error could be reduced.”
2. “Patients can play a critical role in improving diagnostic quality.”
3. “I find patient engagement to be an interesting medical issue.”

Given the nature of these items, higher numbers indicate more positive perceptions about the role a patient can play in the diagnostic process.

Table 13: Changes in the Perceptions about the Role of Patients by Group

	Education Group	Deliberation Group	Feedback Group	Control Group
N	21	18	90	70
Before	4.29	4.09	4.15	3.93
After	4.51	4.42	4.37	3.93
Difference	0.22*	0.33**	0.23***	0.00

Note: *p < .10, **p < .05, ***p < .01; one-tailed test of significance

As shown in Table 13, all of the treatment groups experienced statistically significant changes in their perceptions about the role of patients in the diagnostic processes, but the control group did not. Specifically, the education group increased by 0.22 ($p < .10$), the deliberation group increased by 0.33 ($p < .05$), and the feedback group increased by 0.23 ($p < .01$). The results suggest that participants more strongly recognized the importance of their roles in healthcare, and that participation can improve perceptions about patient engagement in the diagnostic process.

However, the regression results presented in Table 14 are somewhat different. Specifically, as compared to the change in the control group, only the feedback group experienced a statistically significant change (0.27, $p < .05$) in perceptions about the role of patients.

Table 14: Impacts of Interventions on the Perceptions about the Role of Patients

DV: change in perception about the role of patients	Education Group	Deliberation Group	Feedback Group
	0.27 (0.17)	0.18 (0.19)	0.27** (0.11)
R-Squared	0.1075		
N	173		

Note: * $p < .10$, ** $p < .05$, *** $p < .01$; two-tailed test of significance; Standard errors in parentheses; controls included but not reported

Again, these results might be due to differences in the nature of the events. Participants in the education and deliberation groups were exposed to information about the causes and challenges of addressing diagnostic error, including many at the policy and systems levels that are beyond the reach of patients. Therefore, they may have come to believe that while important, patient roles are not enough to successfully address the problem. In contrast, the participants in the feedback group received only surface-level information about the causes and challenges of diagnostic error, and instead spent time focusing on the patient-centered recommendations for reducing diagnostic error. This may have led the to believe more strongly than the other groups in the abilities and roles of patients in the diagnostic process.

Together, these two sets of results suggest mixed effects on perceptions on patient engagement. On one hand, participants in the deliberation group, who worked to create recommendations for reducing diagnostic error, developed a greater sense of patient-responsibility for diagnostic error. Perceptions about responsibility did not change for either education or feedback group. On the other, it seems that the greatest impact on perceptions about the role of patients occurred for the feedback group, who received less information about the causes and challenges of diagnostic error than the other two treatment groups. Regardless of how one interprets these results, we suggest that they reflect the need to work toward more patient engagement and more understanding of diagnostic error.

Health Literacy

Health literacy, defined as “the capacity to obtain, process and understand basic health information and services needed to make appropriate health decisions,”⁹ is an important

⁹ U.S. Department of Health and Human Services. (2000). *Healthy People 2010: General Data Issues*. Washington, DC: U.S. Government Printing Office. (http://www.cdc.gov/nchs/data/hpdata2010/hpdata2010_general_data_issues.pdf)

indicator in developing patient-focused strategies in healthcare service delivery. We measure health literacy using three individual survey items, all of which are on a 5-point Likert scale, where 1 = strongly disagree to 5= strongly agree.¹⁰

1. I am confident that I can review and understand results from diagnostic tests.
2. I can communicate with my doctor electronically (via a computer or smart phone) with my healthcare questions, concerns, or comments.
3. I am willing to ask my healthcare provider to wash his or her hands (if I didn't see them do this) before examining me.

The t-test results, presented in Tables 15 through 17, show that both the deliberation group and the feedback group experienced statistically significant increases on all three measures of health literacy. Moreover, it appears that the gains were larger for the deliberation group than for the feedback group. Specifically, in terms of their perceived ability to review and understand test results, the deliberation and feedback groups respectively experienced increases of 0.44 and 0.22 ($p < .10$). In terms of their ability to electronically communicate with doctors, the deliberation and feedback groups respectively experienced increases of 1.07 and 0.77 ($p < .05$). Finally, in terms of their willingness to ask providers to wash their hands, the deliberation and feedback groups respectively experienced increases of 0.41 and 0.28 ($p < .10$). Together, these results suggest that deliberation is more effective for improving health literacy than education only.

Table 15: Health Literacy Question 1 - Review and Understand Test Results

	Education Group	Deliberation Group	Feedback Group	Control Group
N	21	17	92	70
Before	3.37	3.19	3.58	3.67
After	3.53	3.63	3.80	3.61
Difference	0.16	0.44*	0.22*	0.06

Note: * $p < .10$, ** $p < .05$, *** $p < .01$; one-tailed test of significance

Table 16: Health Literacy Question 2 – Electronic Communication with Doctors

	Education Group	Deliberation Group	Feedback Group	Control Group
N	21	17	88	67
Before	2.72	2.94	2.70	3.25
After	2.78	4.00	3.47	3.44
Difference	0.06	1.07**	0.77**	0.19

Note: * $p < .10$, ** $p < .05$, *** $p < .01$; one-tailed test of significance

¹⁰ A factor analysis revealed that the three items measure different aspects of health literacy. Because the items did not cluster into a single factor, we could not construct a health literacy index.

Table 17: Health Literacy Question 3 – Ask Provider to Wash Hands

	Education Group	Deliberation Group	Feedback Group	Control Group
N	21	17	91	69
Before	3.35	4.00	3.78	3.75
After	3.55	4.41	4.06	3.72
Difference	0.20	0.41*	0.28*	-0.03

Note: *p < .10, **p < .05, ***p < .01; one-tailed test of significance

The regression results, provided in Tables 18 to 20, show that the magnitude of changes on the health literacy questions were greatest for the deliberation group. However, the results also show that as compared to the changes in the control group, the deliberation group experienced statistically significant changes on only one health literacy measure – the ability to electronically communicate with doctors – where the increase for the deliberation group was 0.85 (p < .05) greater than for the control group. Once again, these findings suggest that small-group, intensive deliberation is more effective than other participatory forms for increasing health literacy.

Table 18: Impacts of Interventions on Health Literacy Question 1 – Review and Understand Test Results

DV: change in health literacy question 1 (review and understand test results)	Education Group	Deliberation Group	Feedback Group
	0.15 (0.29)	0.38 (0.33)	0.18 (0.19)
R-Squared	0.0327		
N	175		

Note: *p < .10, **p < .05, ***p < .01; two-tailed test of significance; Standard errors in parentheses; controls included but not reported

Table 19: Impacts of Interventions on Health Literacy Question 2 – Electronic Communication with Doctors

DV: change in health literacy question 2 (electronic communication)	Education Group	Deliberation Group	Feedback Group
	-0.13 (0.30)	0.85** (0.34)	0.31 (0.20)
R-Squared	0.1428		
N	156		

Note: *p < .10, **p < .05, ***p < .01; two-tailed test of significance; Standard errors in parentheses; controls included but not reported

**Table 20: Impacts of Interventions on Health Literacy Question 3
– Ask Providers to Wash Hands**

DV: change in health literacy question 3 (ask providers to wash hands)	Education Group	Deliberation Group	Feedback Group
	0.12 (0.23)	0.27 (0.27)	0.12 (0.16)
R-Squared	0.0490		
N	173		

Note: *p < .10, **p < .05, ***p < .01; two-tailed test of significance;
Standard errors in parentheses; controls included but not reported

Conclusion

This report summarizes the statistical analyses from the pre- and post- surveys collected from healthcare consumers in the 2015 and 2016 education, deliberation, participatory feedback, and control groups. Using both cross-group comparisons, and specific comparisons of changes in relation to the control group, we are able to show that the participatory interventions had several interesting individual-level effects on consumers. In general, participation in our interventions contributed to positive changes in patient activation, trust in doctors, knowledge about diagnostic error, perceptions of patient engagement, and health literacy. Taken together, our analyses suggest that several types of participatory activities, including education, intensive deliberation, and less-intensive feedback sessions, can have meaningful individual-level impacts. Moreover, our analysis generally suggest that deliberation, and particularly more intensive forms of deliberation, generates the strongest effects of the various participatory activities explore here.

Appendix 1: Patient Activation Measure (PAM)

a.	When all is said and done, I am the person who is responsible for taking care of my health.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
b.	Taking an active role in my own health care is the most important thing that affects my health.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
c.	I am confident I can help prevent or reduce problems associated with my health.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
d.	I know what each of my prescribed medications do.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
e.	I am confident that I can tell whether I need to go to the doctor or whether I can take care of a health problem myself.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
f.	I am confident that I can tell a doctor concerns I have even when he or she does not ask.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
g.	I am confident that I can follow through on medical treatments I may need to do at home.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
h.	I understand my health problems and what causes them.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
i.	I know what treatments are available for my health problems.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
j.	I have been able to maintain (keep up with) lifestyle changes, like eating right or exercising.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
k.	I know how to prevent problems with my health.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
l.	I am confident I can figure out solutions when new problems arise with my health.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
m.	I am confident that I can maintain lifestyle changes, like eating right and exercising, even during times of stress.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A