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Effectiveness of public deliberation methods for gathering input on issues in healthcare: Results from a randomized trial

Kristin L. Carman [a, *], Coretta Mallery [a], Maureen Maurer [a], Grace Wang [a], Steve Garfinkel [a], Manshu Yang [a], Dierdre Gilmore [a], Amy Windham [a], Marjorie Ginsburg [b], Shoshanna Sofaer [a], Marthe Gold [c], Ela Pathak-Sen [d], Todd Davies [e], Joanna Siegel [f], Rikki Mangrum [a], Jessica Fernandez [a], Jennifer Richmond [a], James Fishkin [g], Alice Siu Chao [g]

[a] American Institutes for Research, 1000 Thomas Jefferson Street, NW, Washington, DC 20007, USA
[b] Center for Healthcare Decisions, 955 University Avenue, Suite C, Sacramento, CA 95825, USA
[c] City College of New York, The Graduate Center, CUNY, 365 Fifth Avenue, New York, NY 10016, USA
[d] Commotion, Nishana Enterprises Ltd, Culvert Cottage, Kingsmill Lane, Painswick GL6 6RT, UK
[e] Center for the Study of Language and Information, Stanford University, CSLI, Cordura Hall, 210 Panama Street, Stanford, CA 94305, USA
[f] Center for Outcomes and Evidence, Agency for Healthcare Research and Quality, 540 Gaither Road, Suite 2000, Rockville, MD 20850, USA
[g] Center for Deliberative Democracy, Stanford University, Dept. of Communication, 450 Serra Mall, Bldg 120, Stanford, CA 94305, USA

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ABSTRACT

Public deliberation elicits informed perspectives on complex issues that are values-laden and lack technical solutions. This Deliberative Methods Demonstration examined the effectiveness of public deliberation for obtaining informed public input regarding the role of medical evidence in U.S. healthcare.

We conducted a 5-arm randomized controlled trial, assigning participants to one of four deliberative methods or to a reading materials only (RMO) control group. The four deliberative methods reflected important differences in implementation, including length of the deliberative process and mode of interaction. The project convened 76 groups between August and November 2012 in four U.S. locations: Chicago, IL; Sacramento, CA; Silver Spring, MD; and Durham, NC, capturing a sociodemographically diverse sample with specific attention to ensuring inclusion of Hispanic, African–American, and elderly participants. Of 1774 people recruited, 75% participated: 961 took part in a deliberative method and 377 participants comprised the RMO control group. To assess effectiveness of the deliberative methods overall and of individual methods, we evaluated whether mean pre-post changes on a knowledge and attitude survey were statistically different from the RMO control using ANCOVA. In addition, we calculated mean scores capturing participant views of the impact and value of deliberation.

Participating in deliberation increased participants' knowledge of evidence and comparative effectiveness research and shifted participants' attitudes regarding the role of evidence in decision-making. When comparing each deliberative method to the RMO control group, all four deliberative methods resulted in statistically significant change on at least one knowledge or attitude measure. These findings were underscored by self-reports that the experience affected participants' opinions.

Public deliberation offers unique potential for those seeking informed input on complex, values-laden topics affecting broad public constituencies.

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Interest in eliciting the public's views, values, and preferences to inform health policy decisions has grown steadily in recent years, as one approach to achieve better, more efficient, and patient-centered care (Abelson et al., 2012; Bolsewicz Alderman et al., 2013; Mitton et al., 2009, 2011). Deeply held values, beliefs, and

* Corresponding author. American Institutes for Research, Health and Social Development 1000 Thomas Jefferson Street, NW, Washington, DC 20007, USA.
E-mail address: KCarman@air.org (K.L. Carman).

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attitudes underlie public perceptions and are central to healthcare debates, including what should be covered by health insurance, who pays for care, who should participate in treatment decisions, and who is ultimately responsible for health outcomes. Involving the public in policy decisions can increase the transparency and legitimacy of the decision-making process, make the healthcare system more responsive to public values, and help inform health policy decisions (Bastian et al., 2011; Carman et al., 2013b; Nguyen et al., 2006; Siegel et al., 2013).

In the U.S., efforts to include the perspectives of lay individuals have focused primarily on increasing patients' involvement in their healthcare, rather than in broader health policy questions (Carman et al., 2013a; Gold et al., 2007; Workman et al., 2013). Increasingly, however, efforts to include patients and consumers have extended beyond the clinical setting. For example, many hospitals are partnering with patients and family advisors in organizational decisions (Johnson et al., 2008; Maurer et al., 2012) and the Patient-Centered Outcomes Research Institute (PCORI) includes patients in setting research priorities, evaluating research proposals, and conducting research (Fleurence et al., 2013). Efforts to support broadly improved healthcare quality depend upon the context of decisions as well as public views regarding diverse aspects of decisionmaking (Carman et al., 2010; Dobrow et al., 2004).

Historically, the public's views have been collected through opinion surveys and focus groups that are designed to gather initial and intuitive responses (Fishkin et al., 2004). Such methods are generally designed to measure the prevalence and range of opinions, not their stability or depth. In contrast, public deliberation is an approach designed to capture in-depth and informed public perspectives on complex topics. In public deliberation, members of the public consider an ethical or values-based dilemma and are asked to engage in the careful weighing of alternative—often competing—views. Deliberation emphasizes participant education and engagement in new information, usually provided through written materials or conversations with experts; demands balance, ensuring that all sides of an issue are considered; and encourages participants to become social decision-makers along with considering and speaking from individual points of view (Fig. 1) (Burkhalter et al., 2002; delli Carpini et al., 2004; Jacobs et al., 2009).

Public deliberation has been used on a limited scale in the U.S. in both privately and publicly sponsored projects. Applications of deliberation to health topics have sought to provide guidance on policy decisions such as what to include in health insurance benefits, issues surrounding patient consent, or healthcare priority setting; and insights into the values driving public views on these types of issues (Carman et al., 2013b; Danis et al., 2007; Gold et al., 2007; Goold et al., 2005; Mitton et al., 2009). Although considerable theoretical and case-study literature endorses the value of public deliberation, little empirical research has been conducted about its effectiveness for health policy and few well-designed studies have compared different deliberative methods (Abelson et al., 2003b; Carman et al., 2013b).

The Deliberative Methods Demonstration, funded by the Agency for Healthcare Research and Quality (AHRQ), sought to expand the evidence base for public deliberation by evaluating its effectiveness in obtaining informed public input and by comparing deliberative methods. The focus of the demonstration was public views about the degree to which medical evidence (or its absence) should be used to determine healthcare choices, a concern central to the agency's mission and research programs. We designed a randomized controlled trial (RCT) to assess the overall effectiveness of deliberation compared to a control group and to compare different deliberative approaches. We selected four distinct previously used methods of deliberation and included core components of successful deliberation identified through literature review (Carman et al., 2013b). These methods varied on important aspects that have implications for cost and feasibility for policymakers. This paper reports on one of two aims of this research: to evaluate whether public deliberation is an effective way to obtain informed public input regarding complex health questions and identify the most feasible deliberative methods. Findings summarizing the input about appropriate and acceptable ways to use evidence are reported separately (Carman et al., 2014).

1. Methods

1.1. Measuring effectiveness

Based on an extensive literature review and input from a Technical Expert Panel, we chose to measure the effectiveness of deliberation using four outcomes (Carman et al., 2013b, 2014). The first is increase in participants' *knowledge* of the deliberative topic – specifically, of medical evidence and comparative effectiveness research. The intent of deliberation is to obtain *informed* public opinion; improvement in knowledge is thus a necessary— although insufficient— indicator of whether effective deliberation occurred. The second measure, *shift* in participants' *attitudes* about the use of evidence in decision-making, reflects the core assumption of public deliberation that information, discussion, and understanding of others' perspectives will alter participants' views as they reach a more informed judgment on a topic. The third measure of effectiveness is participants' *self-report of the impact* of deliberation, i.e., whether the participants believed that deliberation affected their views and that participating in the processes had value. Studies of deliberative processes frequently assess these outcomes as measures of deliberation effectiveness (Abelson et al., 2003a, 2007; Deng and Wu, 2010; Timotijevic and Raats, 2007). The final measure of effectiveness in our study is whether the deliberative process can elicit from the public main themes and values regarding

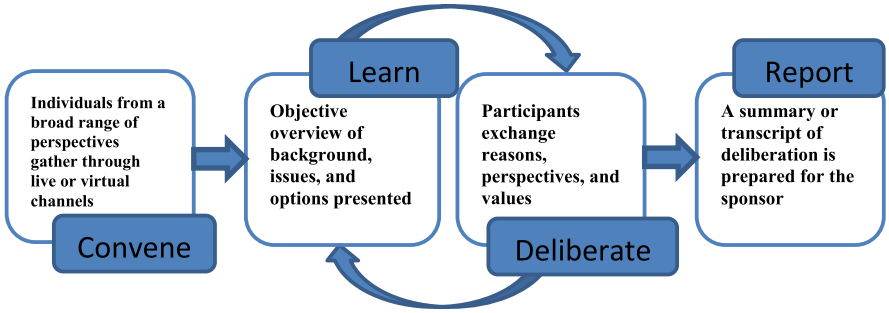

Fig. 1. Public deliberation: process and core elements.

Table 1
Deliberative methods and RMO control group.

Method	Number of participants per group	Structure and intensity	Mode of communication	Use of content experts
Brief Citizens' Deliberation (BCD)	12 participants	2 h total; one session	Face to face	None
Community Deliberation (CD)	12 participants	6 h total; two 2.5-hour sessions 1 week apart with 1 h average online time between sessions	Face to face; asynchronous online between sessions	Online communication with two experts via discussion board
Online Deliberative Polling® (ODP)	12 participants	5 h total; four 1.25-hour sessions 1 week apart	Teleconference (synchronous online)	Recorded Q&A via a moderator with three experts
Citizens' Panel (CP)	24–30 participants	20 h total; one 3-day session: two 8-hour days and one 4-hour day	Face to face	Presentations and Q&A with seven experts
Reading materials only (RMO) control group	N/A	1 h reading time at home	Written materials received via Web site	None

use of medical evidence. These qualitative findings, as well as the content of the input obtained through deliberation, are reported elsewhere (see Carman et al., 2014).

The specific research questions we address here are: 1) Do participants in the deliberative methods – all four methods combined – demonstrate greater changes in knowledge and attitudes about the deliberative topics than the RMO control group? 2) Do participants in each of the four deliberative methods demonstrate greater changes in knowledge and attitudes about the deliberative topics than the RMO control group? 3) What was the perceived impact of deliberation on participants in each of the four deliberative methods? Our analysis reported here addresses these questions providing evidence for the overall effectiveness of deliberation, the effectiveness of the four methods included in this study, and the impact of deliberation on the participants. Direct comparisons between selected deliberative methods, the resources required for each, and other aspects of the individual methods are reported in Carman et al., 2014.

1.2. Overall study design

We constructed a five-arm RCT assigning participants to one of four deliberative methods or a RMO control group. We designed the four deliberative methods based on existing methods used in prior public deliberations and incorporated differences in implementation that previous empirical research suggests most affect outcomes, i.e., the number of participants, session length, mode of interaction, and use of content experts (Abelson et al., 2003b; Fishkin and Luskin, 2005; Fishkin et al., 2004; Gold et al., 2007; National Institute for Health and Clinical Excellence, 2006; Paul et al., 2008). The project was approved by the American Institutes for Research Institutional Review Board (IRB00000436) and received approval from the Office of Management and Budget (OMB No. 0935-0199).

The methods we tested were:

Brief Citizens' Deliberation (BCD): A single in-person, 2-hour deliberative session with twelve participants. After participants reviewed educational materials, they discussed one case study.

Online Deliberative Polling® (ODP): Four weekly online, 1.25-hour deliberative sessions with twelve participants. During the first two sessions, participants reviewed educational materials and explored key issues in one case study. Following discussions, participants generated questions for experts who recorded answers for participants to listen during the third session. Participants discussed the answers and returned to previous discussion points in the fourth session.

Community Deliberation (CD): Two in-person, 2.5-hour deliberative sessions, separated by one week of online interaction with twelve participants. During the first week, participants reviewed educational materials and explored issues in one case study. Over the next week, they had the opportunity for online discussion with group members and experts. In week two, they returned to discussion of the first case study and discussed a second case study.

Citizens' Panel (CP): One in-person, 20-hour deliberative session held over 2.5 days with twenty-four to thirty participants. Participants reviewed educational materials and all five case studies. Discussion occurred in small groups moderated by facilitators as well as in full-group sessions. Participants also could interact live with experts (Table 1).

1.2.1. Deliberation topic

Topics appropriate for deliberation should affect the common good (Carman et al., 2013b; delli Carpini et al., 2004) and should be genuinely of interest to the sponsor so that participants know that their input is valued (Fishkin et al., 2004; Mallery et al., 2012). In consultation with AHRQ, we developed the following deliberative question:

Should individual patients and/or their doctors be able to make any health decisions no matter what the evidence of medical effectiveness shows, or should society ever specify some boundaries for these decisions?

This question required participants to understand how medical evidence is generated and used and to discuss the trade-offs for individuals and society when evidence is or is not applied in medical decisions. The question was designed to prompt participants to reveal which values were important to them in considering the role of evidence for patients and physicians making healthcare decisions.

1.2.2. Structure of deliberative sessions

Prior to participation, all participants, including the RMO control group, received reading materials describing the project's purpose. These plain-language materials described medical research and evidence and healthcare quality. Information on rising healthcare costs and who pays for healthcare was included to provide context for the discussions.

We developed five case studies to provide concrete illustrations of the overall question and to help focus discussion. Topics for the case studies were: the trade-offs in obtaining care at a regional, high-volume hospital versus a local, low-volume hospital; the link

between the inappropriate use of antibiotics and MRSA; the relevance of evidence in choosing treatment for coronary artery disease; comparing approaches to managing obesity; and comparing approaches to treating or preventing a hypothetical illness (Appendix). Each deliberative method used a different selection of these case studies, depending upon the time available for discussion. Participants in all methods discussed the case study on hospital quality.

1.2.3. Eligibility and recruitment

We recruited participants who were aged 18 or older; resided in one of the four geographic locations selected for the study; were comfortable reading and conversing in English; were never employed as healthcare professionals or researchers; had not participated in a study using interviews or focus groups in the past six months; and were willing to participate in at least two of the four types of deliberative methods based on descriptions of the methods. Participants in all five arms were required to have Internet access to avoid having Internet access confound comparisons between methods that required it and other methods. This also made it possible to distribute reading materials and administer surveys online.

The study was powered to find small differences (with Cohen's $d = 0.2$; Cohen, 1988) between the pooled deliberation groups and the RMO control group and medium differences (with Cohen's $d = 0.5$) between the individual methods and the RMO control group. A medium effect size is consistent with that found in social science studies generally (Lipsey and Wilson, 1993); we determined that medium differences would be sufficient for the latter comparisons, because minor differences likely would not be important to sponsors deciding between methods given the meaningful differences in costs to conduct the deliberations and burden to participate.

We recruited 1774 persons from Chicago, IL; Sacramento, CA; Durham, NC; and Silver Spring, MD. We selected these locations to achieve diversity and used stratified sampling to ensure inclusion of members of three AHRQ priority populations: Hispanic participants, African–American women, and the elderly. Participants were contacted by a local commercial recruitment firm at each location and screened by telephone or Internet. We then convened 76 groups between August and November 2012.

1.2.4. Randomization procedure

Multi-treatment randomized studies are designed to minimize confounding bias by recruiting participants who are willing and able to participate in any of the treatment options and then randomizing among those options and the control arm. In this study, however, using a standard randomization approach would have excluded all but a small, atypical group of participants who were willing and able to participate in all four deliberative methods, because the burden for participation varied substantially among methods.

To address this concern but maintain the advantages of randomization, we developed a conditional randomization approach. We required participants to be willing to participate in at least two deliberation study arms but not necessarily all of them. Recruits were first randomly assigned to either deliberation or RMO control; then, deliberation participants were randomly assigned to one of the methods that they were willing and available to participate in. This procedure resulted in deliberative groups and control groups that were comparable on willingness and availability to participate. (Our analytic models addressed participants' differences in willingness to participate between different deliberative methods when required for direct deliberative methods comparisons (Carman et al., 2014; see Appendix H)).

Finally, to enable us to monitor representation of priority populations assigned to each deliberative method, we recruited and randomized hard-to-reach participants early in the recruitment process for each location. Because recruits indicated willingness and availability to participate in more methods than we anticipated, we filled deliberative methods without difficulty and before filling the control groups. We assigned a small number of participants recruited later in the process— many of them non-minority— to the control groups, compromising randomization to a limited extent.

1.2.5. Data collection and measurement

We administered a pre- and post-deliberation survey of knowledge and attitudes and a post-deliberation survey about perceived deliberation quality and experience. We developed knowledge and attitude questions specific to the topics discussed in the deliberations and questions addressing deliberation quality and experience using both new and existing items from other instruments (Kim et al., 2009; Rowe and Frewer, 2005; Timotijevic and Raats, 2007). The survey development process involved extensive expert review and two rounds of cognitive testing to evaluate respondents' understanding of the questions and to improve item validity.

The knowledge items focused on information in the educational materials provided to participants and reflected knowledge we and expert panel members considered necessary to meaningfully deliberate the topics of interest, including concepts related to healthcare in the U.S., the use of medical evidence, and comparative effectiveness research. There were seven items coded dichotomously (1 = correct; 0 = incorrect); scores were reported as the percent correct, equivalent to the average score across the seven items.

The attitude items address the use of medical evidence in decision-making (Appendix). We used exploratory factor analysis to define the underlying structure of survey items and to determine where it was appropriate to calculate summary scores for the domains of interest. All domains showed acceptable internal consistency reliability as measured by Cronbach's alpha, based on the commonly used threshold of alpha >0.7. Although we had no hypothesis about the directionality of shifts in attitudes, we were interested in whether participants moved toward or away from the statements presented and so used relative rather than absolute values for change in all analyses.

The deliberation quality and experience items capture a participant's self-report of their experience and include two domains assessing how participants were affected by and how much they valued the experience (Appendix). In addition, we collected data on personal and demographic characteristics.

1.2.6. Data analysis

The randomization process resulted in an approximately equal distribution of participants by sociodemographic characteristics in each deliberative method. However, it produced a different profile in the RMO control group on health insurance coverage, income, and racial/ethnic groups. We addressed this issue by using sampling weights for all comparisons of deliberative methods with the RMO control group, a standard approach to compensate for unequal distributions. Participants were weighted to the U.S. Census population distribution of the relevant variables in the geographic location where they were selected.

Because the analyses were performed using the participant as the unit of analysis, each deliberative session represented a cluster of participants who shared the deliberation experience, which could have caused outcome variables to be more similar within these clusters. Independence is an underlying assumption of our

Table 2
Participant demographics and participation rate.

Demographic	Number recruited, n = 1774	Number of shows, n = 1338 (columnar %)	Number of no shows, n = 436 (columnar %)	Show rate (%)
Method				
Brief Citizen's Deliberation (BCD)	412	309 (23%)	103 (24%)	75
Online Deliberative Polling (ODP)	384	262 (20%)	122 (28%)	68
Community Deliberation (CD)	429	292 (22%)	137 (31%)	68
Citizen's Panel (CP)	133	98 (7%)	35 (8%)	74
RMO control	416	377 (28%)	39 (9%)	91
Location				
Chicago, IL	420	326 (24%)	94 (22%)	78
Durham, NC	420	339 (25%)	81 (19%)	81
Silver Spring, MD	459	327 (24%)	132 (30%)	71
Sacramento, CA	475	346 (26%)	129 (30%)	73
Age				
Under 65	1580	1175 (88%)	405 (93%)	74
Over 65	194	163 (12%)	31 (7%)	84
Gender				
Male	797	599 (45%)	198 (45%)	75
Female	977	739 (55%)	238 (55%)	76
Race				
Non–African American	1274	944 (71%)	330 (76%)	74
African American	498	394 (29%)	104 (24%)	79
Ethnicity				
Non-hispanic	1588	1208 (90%)	380 (87%)	76
Hispanic	186	130 (10%)	56 (13%)	70
Education				
College or post grad	842	662 (49%)	180 (41%)	79
Some college, 2yr associate, or vocational	609	454 (34%)	155 (36%)	75
High school/GED or less	325	222 (17%)	103 (24%)	68

ANCOVA models; thus, we computed the intra-class correlation (ICC) of outcomes within each deliberative group. We found a negligible clustering effect (ICCs mostly below 0.02), and, as a result, did not adjust the variances for ICC in these analyses.

Analysis assessing change in knowledge and attitudes was limited to participants who completed both pre- and post-deliberation surveys; the analysis assessing deliberation quality and experience was limited to participants who completed all surveys. To answer the question of whether deliberation is effective, we first pooled participants from all deliberative methods to compare deliberation to the RMO control condition. We evaluated whether mean pre-post changes of the outcome variables were equal across the different deliberative methods and the RMO control group, while statistically controlling for the effects of the covariates using the analysis of covariance (ANCOVA) modeling approach (SAS version 9.2), a type of multiple regression analysis. We specified the following model:

$$KA_i = \beta_0 + \beta_{1pre\text{-}score} + \beta_2 DELI_i + \delta X + \varepsilon_i$$

where the unit of analysis is the individual participant; and

KA_i is the change in knowledge or attitude for participant i;
pre-score is the knowledge or attitude in the pre-survey for participant i;
$DELI_i$ is a dummy variable indicating the intervention condition to which participant i was assigned (e.g., $DELI_i = 1$ if participant i was assigned to a deliberative method (any method) and $DELI_i = 0$ if assigned to the control group);
X is a vector of the control variables including geographic location to control for regional variation in knowledge and attitudes; and the participant's health status, experience with the healthcare system, gender, age, marital status, education, employment status, and bi-lingual status to control for personal characteristics that might affect knowledge and attitudes;
and ε represents the unexplained variance;
β_2, is the key coefficient used to determine if the change in outcomes for all the deliberative methods combined is significantly different from the change in outcomes for the RMO group.

To examine the effectiveness of each method as measured by changes in knowledge and attitudes, we compared each deliberative method alone to the RMO control group using a similar ANCOVA modeling approach. Four ANCOVA models were fitted to the data, one for each deliberative method. The same set of nine control variables was included in each model. We reported the means for the deliberation quality and experience outcomes in each deliberative method to capture participants' self-report of their experience.

2. Results

2.1. Sample characteristics

Of the 1774 recruited, 961 participated in a deliberative method and 377 were part of the RMO control group, an overall participation rate of 75 percent. The study sample reflected each location's population in terms of sex, age, race, and ethnicity, based on U.S. Census Bureau estimates (Table 2).

2.2. The overall effect of deliberation on knowledge and attitudes

Table 3 presents the difference in differences between the pooled deliberation groups and the RMO control group on all knowledge and attitude outcomes, reported as β values.

2.2.1. Knowledge

Knowledge scores increased for all groups—the RMO control group and the combined deliberative groups—reflecting improved

Table 3
Effect of deliberation on knowledge and attitudes: pooled deliberative groups versus reading materials only control.

Outcomes	Method	Sample N size	Pre-mean	Post-mean	β	*SE*
Knowledge (% correct)	RMO control	347	39.8%	47.9%		
	All deliberation	882	38.3%	50.6%	0.14*	0.06
Attitudes toward using medical evidence in healthcare decisionmaking (possible values range from 1–5)						
Importance of knowing about medical evidence when making healthcare treatment decisions	RMO control	347	4.4	4.4		
	All deliberation	883	4.4	4.5	0.55*	0.18
Medical research versus doctor's knowledge about patient as most important in medical treatment decisionmaking (individual item)	RMO control	347	2.7	2.6		
	All deliberation	880	2.6	2.8	0.64*	0.25
Providers and patients should consider evidence over preferences when making treatment decisions	RMO control	347	2.9	2.9		
	All deliberation	882	2.9	2.9	0.33	0.19
Attitude toward mechanisms to support use of high volume hospitals (possible values range from 1–5)						
Insurance companies should require children who need heart surgery to be treated at high-volume hospitals (individual item)	RMO control	347	3.1	3.2		
	All deliberation	882	3.2	3.4	0.50	0.32
Hospitals should be required to achieve a high success rate in order to continue performing heart surgery on children (individual item)	RMO control	347	3.9	3.9		
	All deliberation	882	3.9	3.9	0.10	0.26
Doctors who treat patients at low-volume hospitals should tell their patients if other high-volume hospitals have better results (individual item)	RMO control	347	4.1	4.2		
	All deliberation	882	4.0	4.1	−0.11	0.20

Pre-mean indicates the mean score prior to deliberation; post-mean indicates mean score post deliberation; the β estimate is the difference between the pre-post change for the deliberative groups and the pre-post change for the control group obtained from the analysis of covariance (ANCOVA).
*Indicates a statistically significant difference between all methods and RMO control at $p < 0.05$.

knowledge of the healthcare concepts covered in the survey (Table 3). This change was measured from pre-treatment to post-treatment, with the RMO control group increases in knowledge demonstrating knowledge gains that improved the baseline knowledge (prior to deliberation) for the deliberative groups. Further, the improvement for the combined deliberative groups had a statistically significant effect when compared to the RMO control group and controlling for the covariates.

2.2.2. Attitudes toward using medical evidence in healthcare decision-making

Deliberation had a statistically significant effect when compared to the change that occurred in the RMO control, in shifting participants' attitudes regarding:

- *Importance of knowing about medical evidence when making healthcare treatment decisions (factor)* and
- *Medical research versus doctor knowledge about the patient as the most important consideration in making medical treatment decisions (item).*

There was no statistically significant effect on the remaining outcome related to the use of evidence.

2.3. The effect of individual methods on knowledge and attitudes

To determine the impact on participant knowledge and attitudes of each deliberative method separately, we calculated an estimate of the difference in differences between each deliberative method and the RMO control group (Table 4).

2.3.1. Knowledge

Each group showed improvements in knowledge scores capturing concepts presented in the background educational materials. The mean increases were, from lowest to highest increase: RMO control 8.1%; Online Deliberative Polling® 10.7%; Community Deliberation 11.6%; Brief Citizens' Deliberation 12.5%; and Citizens' Panel 17.2%. Participants in Citizens' Panel and Brief Citizens' Deliberation showed statistically significant gains above what was observed in the RMO control group.

2.3.2. Attitudes toward using medical evidence in healthcare decision-making

Compared to the RMO control group, deliberation had a statistically significant impact on the shift in participants' attitudes toward:

- *Importance of knowing about medical evidence when making healthcare treatment decisions (factor)* for participants in three methods: Citizens' Panel, Community Deliberation, and Online Deliberative Polling®. This shift was statistically significant even though all participants —even RMO control – agreed with this view at the outset;
- *Medical research versus doctor's knowledge about patient as most important in medical treatment decisionmaking (item)* for two methods: Community Deliberation and Brief Citizens' Deliberation; and
- *Providers and people should consider evidence over preferences when making treatment decisions (factor)* for Citizens' Panel.

2.4. Deliberation quality and experience

Only participants in the deliberative sessions completed the survey on deliberation quality and experience, so there was no measure of change or of comparison to the RMO control group. We calculated means for each group with a possible range of 1–4. Mean

Table 4
Effect of deliberative methods on knowledge and attitudes: each deliberative method versus RMO control.

Measure	Method	N	Pre-mean	Post-mean	β	SE
Knowledge (% correct)	RMO control	347	39.8%	47.9%		
	BCD	272	39.6%	52.2%	0.04*	0.02
	ODP	251	36.6%	47.4%	0.00	0.02
	CD	263	39.3%	50.9%	0.03	0.02
	CP	96	36.1%	53.3%	0.07*	0.02
Attitudes toward using medical evidence in healthcare decisionmaking (possible values range from 1–5)						
Importance of knowing about medical evidence when making healthcare treatment decisions	RMO control	347	4.4	4.4		
	BCD	273	4.4	4.4	0.04	0.06
	ODP	251	4.4	4.5	0.14*	0.05
	CD	263	4.4	4.5	0.11*	0.05
	CP	96	4.4	4.6	0.27*	0.07
Medical research versus doctor's knowledge about patient as most important in medical treatment decisionmaking (individual item)	RMO control	347	2.7	2.6		
	BCD	271	2.6	2.8	0.19*	0.08
	ODP	251	2.6	2.6	0.05	0.08
	CD	262	2.6	2.8	0.22*	0.07
	CP	96	2.6	2.8	0.17	0.11
Providers and patients should consider evidence over preferences when making treatment decisions	RMO control	347	2.9	2.9		
	BCD	272	2.9	2.9	0.00	0.06
	ODP	251	2.9	2.9	0.00	0.05
	CD	263	2.8	3.0	0.10	0.06
	CP	96	3.0	3.2	0.23*	0.09
Attitude toward mechanisms to support use of high volume hospitals (possible values range from 1–5)						
Insurance companies should require children who need heart surgery to be treated at high-volume hospitals (individual item)	RMO control	347	3.1	3.2		
	BCD	272	3.2	3.4	0.11	0.10
	ODP	251	3.3	3.5	0.14	0.10
	CD	263	3.2	3.3	0.10	0.10
	CP	96	3.3	3.5	0.15	0.14
Hospitals should be required to achieve a high success rate in order to continue performing heart surgery on children (individual item)	RMO control	347	3.9	3.9		
	BCD	272	3.8	3.7	−0.14	0.09
	ODP	251	4.0	4.0	0.09	0.08
	CD	263	3.8	3.8	0.00	0.08
	CP	96	3.8	3.9	0.14	0.12
Doctors who treat patients at low-volume hospitals should tell their patients if other high-volume hospitals have better results (individual item)	RMO control	347	4.1	4.2		
	BCD	272	4.1	4.2	−0.08	0.07
	ODP	251	4.0	4.1	0.03	0.06
	CD	263	4.0	4.1	−0.05	0.06
	CP	96	4.0	4.2	0.00	0.09

Pre-mean indicates the mean score prior to deliberation; post-mean indicates mean score post deliberation; the β estimate is the difference between the pre-post change for the deliberative groups and the pre-post change for the control group obtained from the analysis of covariance (ANCOVA).
*Indicates a statistically significant difference between method and RMO control at $p < 0.05$.

scores in both areas were high, 3 or above in all cases (Table 5).

3. Discussion

3.1. Deliberation increased knowledge and shifted attitudes

Pooling the deliberative methods to compare to RMO controls gave us the strongest measure of whether deliberative methods, taken as a group and despite variation in their content, have a greater impact on knowledge and attitudes than educational materials alone. The increase in knowledge among deliberative group participants was about 50% greater than that for the RMO controls (12.3% vs. 8.1%). Because the knowledge questions drew directly from the educational materials provided to all participants, this difference represents a clear effect of deliberation on information gained and retained—contrary to findings in previous studies (Muhlberger and Weber, 2006). Given the breadth of discussion and opportunities to learn from experts in some of the methods, our measurement of the impact of deliberation on knowledge is a conservative one.

Deliberation also shifted participants' attitudes related to the importance of medical evidence at a statistically significant level. Specifically, when considering the use of evidence in making healthcare treatment decisions, deliberation had an impact on the *importance of knowing about medical evidence* (factor) and the importance of *medical research versus doctor knowledge about the patient* (item). However, a shift did not occur in the measure providers and patients should consider evidence over preferences when making treatment decisions (factor). These measures can be seen as hierarchical in that one may be more willing to accept the importance of knowing about medical evidence—or even to be convinced that evidence is more important than a physician's knowledge of a patient— before one would accept that evidence is more important than preferences. Deliberation had an impact on the “lower bar” of perceived importance but stopped short of the strongest changes in attitude in this domain.

Table 5
Participants' self-reported evaluation of the impact and value of their deliberative experience: mean scores for each method (possible values range from 1 to 4 with 4 being the highest value).

Measure	Method	Sample size	Mean
Effect of deliberation on participants (the discussion led me to change some of my opinions, how much did the educational materials affect your opinions on the issues, etc.)	BCD	278	3.2
	ODP	239	3.0
	CD	261	3.3
	CP	95	3.4
Perceived value of the event (I would participate in activities like this in the future, more events like this should be held as a way of getting the views of people throughout the country, etc.)	BCD	276	3.6
	ODP	239	3.5
	CD	260	3.7
	CP	94	3.7

See Appendix A for full list of the components of these measures.

3.2. Individual deliberative methods

All four deliberative methods showed effectiveness in changing either knowledge or at least one attitude, as compared to the RMO control group. (Of note, these results do not compare different deliberative methods; see Carman et al., 2014 for selected methods comparisons.)

On the knowledge measure, increases were statistically significant for Citizens' Panel and Brief Citizens' Deliberation. There were changes in attitudes toward the use of medical evidence, an outcome central to our deliberative question, for all methods. On outcomes that assessed the importance of *knowing about medical evidence* when making healthcare treatment decisions (factor) there were shifts for three methods; on the importance of evidence *versus doctor's knowledge* about the patient (item) there were shifts for two methods; and on the importance of providers and people considering medical evidence *over preferences* (factor) there was a shift for one method. Again, the latter measure may be the most difficult to shift. The most intensive method, Citizens' Panel, was the only method where participant shifts were observed in this measure.

Participants across all methods believed that deliberation impacted their opinions on the deliberative topic. In addition, they placed high value on taking part in deliberation, as shown in high ratings of the perceived value of the event, including willingness to participate in similar activities in the future.

3.3. Other findings

There were no statistically significant shifts on attitudes related to the material in the hospital quality case study that all the groups deliberated, likely due to the case study's complexity. We deliberately created this case study to present moral and ethical trade-offs, and discussions of the case often focused on evidence of clinical effectiveness as the primary basis for deciding on a hospital, versus importance of other aspects of healthcare, such as proximity to home and family. Although many participants argued that clinical outcome is the most important factor in quality healthcare, others prioritized receiving personal, respectful care and felt this could be best delivered in a low-volume hospital. When participants assumed the role of town councilors in this case study, they weighed having access to the “better” hospital against the potential impact the local hospital losing business. In this case, strict adherence to evidence of clinical effectiveness meant accepting negative impacts on the community—in contrast to the other case studies, where implementing decisions based on evidence clearly would improve community health outcomes as a whole (see Appendix for full case studies).

3.4. Limitations

Using RCTs in social science research is inherently difficult, with challenges in implementing the intervention consistently, controlling for external influences, and defining and measuring outcomes. Nevertheless, because RCTs mitigate a number of threats to internal validity more effectively than other research designs, we chose this approach and adapted it as necessary (Shadish et al., 2002). Our requirement that participants agree to be randomly assigned to one of at least two of the deliberative methods allowed us to assure greater generalizability of our results. In fact, a surprising third of participants indicated willingness to participate in any of the methods. Our requirement that participants have access to the Internet also had a potential effect on generalizability. To mitigate the impact of this requisite, we accepted people with limited Internet access and so included people with limited computer and Internet skills in the study.

Another concern was differences in facilitation style among our deliberative session facilitators, which had the potential to introduce variation. To address this concern, we developed guides for each method, specifying step-by-step activities for each part of the session, important verbal probes, and staff roles and responsibilities. All guides were pilot tested and revised. Facilitators completed debriefing forms following each session describing and providing rationale for deviations from protocol.

This study is the first large-scale randomized comparison of alternative methods of public deliberation. As such, it addresses the first stage in the logic model of the value of public deliberation for policymaking: how public deliberation affects participants' knowledge and attitudes. The second stage—the impact of changing knowledge and attitudes on the information available to policymakers—and the third stage—the impact of new kinds of information on the decisions made by policymakers—and ultimately the meaningfulness and value of public deliberation for policymaking, remain for future research.

4. Implications

4.1. Use of deliberation to obtain public input

Many organizations—researchers, healthcare providers, and public and private-sector purchasers—now recognize that transparency and multi-stakeholder collaboration are essential to achieving better care, better health, and lower costs. Both civic and patient engagement are becoming important components of a variety of decision processes. This study demonstrates the impact of public deliberation methods and highlights the potential of these methods to obtain informed public views on complex topics affecting broader constituencies. Diverse groups of individuals can convene and successfully debate challenging healthcare issues, share ideas for their resolution, and learn from experts and from each other. The result is different input based on increased knowledge and reconsidered attitudes.

Public deliberation may be particularly useful for healthcare issues where members of the public have limited knowledge (or even incorrect information) about a technically complex topic yet hold strong beliefs and attitudes. Our data suggest that participants had a deeper understanding of the issues under discussion. Further, changes in attitude suggest that deliberation encouraged participants to learn more about the topic and listen and respond to other points of view. Some have suggested that deliberation is a tool for “seeing around corners,” providing valuable insight into what a more informed public might say, and assisting policymakers in anticipating and planning for changes in public attitudes. When making decisions about research, priorities, or policy, these multidimensional and informed views arguably provide an essential ingredient in terms of public perceptions, values, and perspectives.

4.2. Areas for future research

4.2.1. Impact on participants

Although input from public deliberation can inform public policy and programmatic decisions, many proponents also highlight its impact on participants as an important outcome (Gastil et al., 2008). Future studies could explore the ways in which participants are affected (e.g., whether participants are more active in their own healthcare, whether civic engagement is increased), and how long that impact continues.

4.2.2. Impact of deliberation on the sponsor

Only a few case studies have reported how the input from

deliberative sessions affected specific decisions, laws, policies, or practices (Carman et al., 2013b; Street et al., 2014). Assessing the impact on the sponsor's decisions was beyond the scope of this project, but it will be important to evaluate whether deliberative sessions provide useful input to decision-makers.

4.2.3. Other measures of deliberation effectiveness

Further development of process measures, such as the representativeness of deliberative groups or the ability of all participants to contribute to discussions, are important areas for future work. Similarly, the development of measures that assess the quality of deliberative output—or establish quality criteria—would advance evaluation efforts.

4.2.4. Multi-stakeholder deliberation

By design, we excluded healthcare professionals as participants because of the potential that they could overly influence or inhibit discussion. The experiment, however, demonstrated the ability of the lay public to interact successfully with expert presenters. Including participants with professional expertise may be beneficial, such as when patients or the public are involved in deliberations on medical research, hospital governance, or community health assessment. An important question is how we can support members of the public most effectively in these situations.

5. Conclusion

As more public and private organizations work toward including the public in healthcare program and policy decisions, questions arise about how best to involve the public in shaping policies and programs that affect everyone's health and healthcare. More frequently used methods may include traditional survey and focus-group approaches to public consultation, public or patient participation on advisory committees (Cambridge University Hospitals, 2014; National Institutes for Health, 2013), or public comment mechanisms such as those used by AHRQ to gather input on draft reports and research initiatives. Each of these methods offers distinct advantages; most are used to gather stakeholder input from those with an identified interest in a product or a policy question. The methods are also consultive in nature because they ask for responses to existing approaches, rather than partnership or co-production of approaches to program and policy decisions (Mallery et al., 2012).

Public deliberation offers unique potential for organizations seeking informed public input that balances individual needs and desires with broader societal needs and interests. It can also offer the public the opportunity for stronger participation. In our study, deliberation enabled diverse groups to learn about, explore, and provide input on a complex healthcare issue. At the same time, participants found great value in the process, and decision-makers received new input reflecting the considered views of the public. In a rapidly transforming healthcare system with changing consumer roles and responsibilities, deliberation can be a critical tool in developing and improving policies and programs to meet the needs of the public.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.socscimed.2015.03.024.

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