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Medical students' knowledge and attitudes towards shared decision-making: results from a multinational cross-sectional survey

Running head: Shared decision making in medical school

Renata W Yen, MPH¹, Paul J Barr, PhD, MSc², Nan Cochran, MD³, Johanna W Aarts, MD, PhD⁴, France Légaré, MD, PhD, MSc⁵, Malcolm Reed, MD⁶, A James O'Malley, PhD⁷, Peter Scalia, MSc⁸, Geneviève Painchaud Guérard, MSc⁹, Grant Backer, MPH¹⁰ Clifford Reilly, MPH¹¹, Glyn Elwyn, MD, PhD¹², Marie-Anne Durand, PhD, MSc¹³

¹The Dartmouth Institute for Health Policy & Clinical Practice, Dartmouth College, Lebanon, NH, USA.

²The Dartmouth Institute for Health Policy & Clinical Practice, Dartmouth College, Lebanon, NH, USA.

³The Dartmouth Institute for Health Policy & Clinical Practice, Dartmouth College, Lebanon, NH, USA.

⁴Radboudumc University Medical Center, Department of Obstetrics & Gynecology, Nijmegen, The Netherlands.

⁵Université Laval, Department of Family Medicine and Emergency Medicine, Quebec City, Canada and Université Laval Centre de recherche sur les soins et les services de première ligne de l'Université Laval (CERSSPL-UL), Centre intégré universitaire de santé et services sociaux (CIUSSS) de la Capitale-Nationale, Quebec City, Canada.

⁶Brighton and Sussex Medical School, University of Sussex, Falmer, Brighton, BN1 9PX United Kingdom.

⁷The Dartmouth Institute for Health Policy & Clinical Practice, Dartmouth College, Lebanon, NH, USA.

⁸The Dartmouth Institute for Health Policy & Clinical Practice, Dartmouth College, Lebanon, NH, USA.

⁹CHU de Quebec Research Center Université Laval, Saint-François d'Assise Hospital, Quebec, Canada.

¹⁰The Dartmouth Institute for Health Policy & Clinical Practice, Dartmouth College, Lebanon, NH, USA.

¹¹The Dartmouth Institute for Health Policy & Clinical Practice, Dartmouth College, Lebanon, NH, USA.

¹²The Dartmouth Institute for Health Policy & Clinical Practice, Dartmouth College, Lebanon, NH, USA.

¹³The Dartmouth Institute for Health Policy & Clinical Practice, Dartmouth College, Lebanon, NH, USA.

Corresponding author: Marie-Anne Durand

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Abstract

Introduction: We aimed to conduct a multinational cross-sectional online survey of medical students' attitudes towards, knowledge of, and experience with shared decision-making (SDM).

Methods: We conducted the survey from September 2016 until May 2017 using: 1) a convenience sample of students from four medical schools each in Canada, the US, and the Netherlands (n=12), and 2) all medical schools in the UK through the British Medical School Council (n=32). We also distributed the survey through social media.

Results: 765 students read the information sheet and 619 completed the survey. Average age was 24, 69% were female. Mean SDM knowledge score was 83.6% (range:18.8%-100%; 95% CI 82.8%-84.5%). US students had the highest knowledge scores (86.2%, 95% CI 84.8%-87.6%). The mean risk communication score was 57.4% (range: 0%-100%; 95% CI 57.4%-60.1%). Knowledge did not vary with age, race, gender, school, or school year. Attitudes were positive, except 46% believed SDM could only be done with higher educated patients and 80.9% disagreed that physician payment should be linked to SDM performance (increased with years in training, $p<.05$). Attitudes did not vary due to any tested variable. Students indicated they were more likely than experienced clinicians to practice SDM (72.1% vs. 48.8%). 74.7% reported prior SDM training and 82.8% were interested in learning more about SDM.

Discussion: SDM knowledge is high among medical students in all four countries. Risk communication is less well-understood. Attitudes indicate that further research is needed to understand how medical schools deliver and integrate SDM training into existing curricula.

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Introduction

Shared decision making (SDM) has achieved high policy prominence but adoption into clinical practice remains slow.(1–3) Reported barriers to implementation include time constraints, health system barriers, clinicians’ attitudes towards SDM, and limited understanding of the relevance and applicability of SDM.(4–6) SDM training has largely focused on clinicians with limited research on medical students.(7,8) Studies on patient-centered care in medical education indicate medical students become less patient-centered as they advance in their training.(9–14) Globally, we know little about the knowledge of and attitudes towards SDM among medical students.

Previous literature on this topic is limited to a survey of Peruvian fourth-year medical students by Zeballos-Palacios and colleagues which demonstrated interest in SDM but little training and use of the skills: 8% of students reported receiving lecture-based training in SDM and 12% of students reported using an SDM approach in practice.(15) Students’ attitudes, however, were positive with 53% of students describing SDM as an ideal approach.

In the United States (US), the Patient Protection and Affordable Care Act (ACA) promotes SDM facilitation.(16) In the United Kingdom (UK), the National Health Service and the National Institute for Health and Care Excellence encourage SDM.(17,18) In Canada, provinces have SDM initiatives and national physician groups emphasize patient-centered care.(1,19,20) In the Netherlands, SDM is incorporated into the national healthcare agenda.(1,21,22) Medical students in these countries are therefore more likely to receive training in a landscape where SDM and patient-centered principles are nationally promoted. Our objectives were to investigate in these four countries: (1) medical students’ knowledge of, attitudes towards, and experience with SDM

as well as their preferred consultation style across the medical curriculum, and (2) the factors that may influence medical students' knowledge of and attitudes towards SDM.

Methods

Study design

We conducted a cross-sectional online survey of medical students in four countries where SDM has been advocated at the policy level (Canada, the Netherlands, the UK, and the US). Methods are presented in detail in the study protocol,(23) and described briefly here. We followed the Checklist for Reporting the Results of Internet E-Surveys (CHERRIES, supplemental file A).(24) We received ethical approval for this study in all four countries.

Study population

Medical students at least 18 years old who could understand written English in Canada, the Netherlands, the UK, and the US were eligible. In the Netherlands, there is no distinction between medical students in undergraduate and graduate training so students in both categories were eligible. We excluded students in residency or foundational training (UK).(23) In Canada, we collected but excluded French responses from this analysis and will report them separately as we did not test the French translation before distribution.

Survey

The survey began with an information and consent page, indicating that completion was voluntary, then included the following sections (see supplemental file B):

Preferred consultation style

We assessed preferred consultation style through a single-item measure adapted from the control preferences scale, (25–28) that asked: “How do you think healthcare decisions should be made?” with five response options. The first three options were considered “active” (patient plays an active role in the decision-making process) and the last two were considered “passive” (patient does not participate in the decision-making process).(27) This measure appeared at the beginning and end of the survey to see if responses changed after being exposed to SDM questions.

Demographics

We asked students to provide their gender, race/ethnicity, country, year in medical school, and medical school name. We used skip logic to present race categories based on country. Students completed this section after the first preferred consultation style question.

Attitudes towards SDM

We included six SDM attitudes questions, each on a four-point scale from “strongly agree” to “strongly disagree”. We adapted these questions from existing literature and the validated OPTION instrument.(29,30) We included two clinical scenarios where students indicated for each scenario how they would react and how they think a senior clinician would react. Students could select from one of four approaches: shared decision making, informed decision making (IDM), paternalistic, and semi-paternalistic. We wrote one scenario where SDM was the appropriate approach (option 2, Q20 in supplemental file B), where the patient and provider should work together to come to a decision, and one where IDM was the appropriate approach (option 3, Q14 in supplemental file B), where the patient should be made aware of her options in order to make a well-informed decision. A medical student wrote these questions supported by a

senior clinician and the research team. We randomized the order of the attitude questions and clinical scenarios.

Knowledge of SDM and risk communication

We asked 16 knowledge questions, including 15 true/false statements and one multiple-choice scenario. Three of the knowledge questions assessed risk communication. We developed these questions from existing literature and expert consensus as there were no validated scales available.(3)

SDM awareness and training

We asked students if they had heard of SDM before, the extent of their SDM training, and their interest in learning more. We also asked if students felt SDM would affect the length of a clinical encounter. Using adaptive skip logic, students saw three to six questions in this section.

On the final page, students had the option to provide their email address. We did not define SDM in the information sheet or survey since providing a definition of SDM could have influenced students' answers. We piloted and tested the survey questions in spring 2016 with students at two medical schools and revised accordingly, as detailed in the published protocol.(23)

Data collection

We reached out to medical school faculty contacts in each country to assess interest in the survey. All agreed to participate, including four schools each in Canada, the Netherlands, and the US and all 32 medical schools in the UK through the Medical School Council. Administrators or faculty at each school invited students through email lists or social media and sent one reminder

two to four weeks after the initial invitation, except for two schools that did not permit reminders. We also distributed the survey using social media.(23) We incentivized participation by offering a \$20 USD equivalent gift card to one in every 50 participants, which was given after students completed the survey.

We distributed the survey via Qualtrics, an online survey platform, (31) from 01 September 2016 through 31 May 2017. The survey was open for at least six months in each country. Using cookies, we allowed students to resume their response up to one week after starting it. We forced responses to all questions but gave the option of “I prefer not to say” for questions about race, ethnicity, and gender. Participants viewed 19 to 23 questions, depending on their answer selections. (23) We did not have a back button. We stored email addresses in password-protected excel sheets on private servers. We did not specify a minimum completion time a priori and accepted partially completed surveys but did a manual review of all surveys to check for abnormal response patterns.

Analysis

We included responses from students who attended medical school in one of the four participating countries, completed demographics and at least one content-based question. We determined the completion rate by comparing the number of individuals who read past the information sheet to the number who completed the survey. Respondents who completed all 16 knowledge questions received a knowledge score based on the number of items answered correctly (range 0 to 16). Respondents who completed all three questions on risk communication (items 5, 13, and 16 in Table 2) also received a risk communication score (range 0 to 3).

We categorized each attitude question as positive or negative and dichotomized responses, grouping “strongly agree” with “agree” and “strongly disagree” with “disagree”. Respondents who completed all attitude questions received an attitude score (range: 0 to 5), excluding the question about SDM compensation which would not be indicative of a positive or negative attitude.

Using Stata 13 (Stata Corp, College Station, Texas), chi-squared tests evaluated the unadjusted influence of country, demographics, school year, and previous training on SDM knowledge and attitudes. We used the kappa statistic to determine inter-participant agreement for preferred consultation style, calculating a weighted mean using the square of the inverse of the standard errors for each country’s kappa.

Two hierarchical linear regressions evaluated the impact of eight categorical variables (gender, country, race for each country, ethnicity, medical school, and school year) and one continuous variable (age) on knowledge and attitude scores. The regression knowledge score was based on the number of 15 true/false knowledge questions answered correctly. We treated medical school as a random effect to account for the likelihood that observations within schools were likely more highly correlated than those between schools. We treated the regression coefficients of all other predictors as fixed-effects.

Results

Study flow

Across all four countries, 765 students read the information sheet, 685 provided demographic information and responded to at least one content-based question. The majority (619/685, 90.4%)

completed all questions. We do not know the number of students who received the survey or clicked on the survey link due to our open-ended distribution methods. The order randomization of questions had no effect on the results.

Participants

A disproportionate number of females responded in the US, the UK, and Canada (Table 1).(32–34) Average age and ethnicity were similar to national statistics for medical school students. The majority (85.4%) were between years one and four, which was expected since Canada and the US only have four years of medical education. Students from 46 unique schools participated.

Knowledge of SDM and risk communication

Across all four countries, the mean knowledge score was 83.6% (range: 18.8%-100%; 95% CI 82.8%-84.5%). Only 10.4% answered all 16 correctly. The mean risk communication score was 57.4% (range: 0%-100%; 95% CI 54.6%-60.1%). About one-third (30.8%) answered all three correctly. Less than half (44.4%) correctly indicated that SDM results in fewer patients choosing major surgery.(35) Table 2 presents the responses to all 16 knowledge questions by country. In the hierarchical linear regression, knowledge scores did not vary with age, race, gender, school, or school year; however, US-trained students had statistically significant higher knowledge scores compared to students from other countries (86.2%, range: 18.8%-100%; 95% CI 84.8%-87.6% vs 82.1%, range 50.0% - 100%; 95% CI 81.1%-83.1%). Full regression results are available in supplementary file C.

Attitudes towards SDM

Respondents demonstrated positive attitudes towards SDM. Across all four countries, the mean positive attitude score was 4.25 out of 5 (range: 1-5; 95% CI: 4.19-4.32). However, over half (60.5%) of UK respondents agreed that SDM can only be done with patients who are sufficiently educated ($X^2 = 19.60$, $p < .001$). Most respondents (80.9%) disagreed that physician payment should be based on SDM performance. This increased by year, with only 18.8% in year 1 strongly disagreeing compared to 44.9% in year 6 ($X^2 = 28.5$, $p < .05$). More US respondents agreed (28.8%) that payment should be associated with SDM performance ($X^2 = 26.85$, $p < .001$). In the hierarchical linear regression, attitudes did not vary with age, race, gender, school, school year, or country of education. Table 3 presents participants' percent disagreement to each attitude item by country.

For the adapted preferred consultation style questions, the weighted kappa was 0.62, indicating moderate agreement between the opening and closing question. At the beginning of the survey, nearly all respondents (98.5%) selected an active SDM style. About half (47.6%) indicated the patient should make the final decision after seriously considering the clinicians' opinion and about one-third (31.53%) felt that the clinician should share responsibility with the patient. About three-quarters of respondents (72.8%) believed that engaging in SDM would increase the length of a clinical encounter. Over half (58.7%) believed it would increase the length by at least five minutes.

Clinical scenarios

Students' answers to the two scenarios differed substantially when asked what a senior clinician

would do versus what they would do (Table 3). Students favored an SDM approach in both scenarios. In the SDM-appropriate scenario, 48.8% indicated senior clinicians would utilize an SDM approach, while 72.1% indicated they would personally utilize SDM. In the IDM-appropriate scenario, 42.5% indicated senior clinicians would utilize an SDM approach while 65.6% indicated they would utilize an SDM approach. In this scenario, only 11.5% of respondents indicated that senior clinicians would utilize IDM and only 14.0% indicated they would utilize IDM.

Reported training

The majority (92.6%) had heard of SDM before the survey. Three-quarters (74.7%) reported previous SDM training, 66.6% reported theoretical training (e.g., lecture-based) and 47.5% reported practical training (e.g., role-play). Theoretical and practical training both increased by class year. Among respondents, 8.8% reported receiving 0-1 hours of combined training, 27.4% reported 1-2 hours, 33.2% reported 2-5 hours, and 30.6% reported over 5 hours. Overall, 82.8% of respondents were interested in learning more about SDM. This interest decreased as class year increased ($X^2 = 69.62, p < .001$).

Discussion

Summary of main findings

In general, this sample of medical students: 1) knew the basic principles of SDM; 2) didn't know some nuances of SDM practice such as how to communicate risk and the impact of SDM on surgery choice; 3) considered themselves more likely to engage in SDM than the senior clinicians they interact with and observe; 4) had overall positive attitudes towards SDM but

almost half did not believe they could engage in SDM unless the patient was sufficiently educated; and 5) were less likely to believe payment should be linked to SDM performance if they were further along in their medical education. Attitudes did not vary with age, race, gender, school, school year, or country of education. Knowledge did not vary with age, race, gender, school, or school year. The US-trained sample had the highest knowledge scores and were most likely to agree that reimbursement could be linked to SDM performance.

Comparison with other studies

Our findings support previous research indicating that medical students' attitudes towards patient centered care and SDM are positive.(12–15) Our results differed from Zeballos-Palacios and colleague's 2012-2013 findings regarding the amount of SDM training received.(15) Only 2% of students in their study had received SDM training, compared to 74.7% in our study.

Additionally, a larger proportion of students in our survey (72% vs 12%) considered their consultation style as SDM. This could be attributed to increased global awareness of SDM, additional policy support for SDM in the countries sampled in our survey, or local support for SDM at the schools where our survey was conducted. Our results indicating that SDM interest declines by class year also align with a recent study by Perron and colleagues showing that Swiss medical schools focus less on communication in later years of training.(36)

Our results on risk communication support previous studies that clinicians struggle to appropriately present risk to patients,(37,38) even though risk communication is essential to engaging in SDM.(39) Over half of the students in our sample believed it is better to present information as relative risk, which is consistent with research on clinicians' preferences,(38,40)

even though there is good evidence that relative risk is not the best format to present risk information to patients.(38,40,41)

Our study is the first to find that students believe SDM can only be done with sufficiently educated patients, suggesting they feel that educational attainment affects patients' abilities to participate in SDM. This reflects previously reported findings among clinicians that patients' characteristics can be a barrier to SDM.(4–6) It is important to understand more about this finding given that patients of higher education are already more likely to take an active decision making approach,(42) while patients of lower education and socioeconomic status have the most to gain from SDM.(43) Additionally, this study was the first to show that medical students believe they are more likely to utilize SDM than the senior clinicians they work with and observe.

This study was also the first to show that students become less willing to have reimbursement tied to SDM utilization as they progress through medical education. Interpretation of this finding is difficult without additional research, but it is surprising in the context of the high overall knowledge and positive attitudes towards SDM. It is possible that students do not believe SDM is important enough to be associated with payment. Students may also believe that SDM should be a part of general practice and therefore does not require unique compensation. This finding could also be impacted by the different payment models in each of the four participating countries.

US students sampled were most in favor of SDM-linked reimbursements and had the highest knowledge scores, perhaps indicative of a larger role SDM has in US medical school curricula.

With more exposure to SDM, these students may be more interested in a reimbursement model that integrates utilization of SDM.

Strengths and limitations of study

This study was the first international survey of medical students regarding SDM attitudes and knowledge. A major strength is the inclusion of participants from all years of medical education in four countries where SDM has been promoted at the national level.

Most study limitations are related to the nature of online survey research. Since we distributed our survey on open forums and social media, we could not calculate a response rate. We targeted medical school students; however, others might have taken the survey. We did not indicate that the survey's topic was SDM but did say it was "health communication" therefore students with an interest in health communication might have been more likely to respond. We administered the survey in areas where English was not the primary language (Quebec province in Canada and the Netherlands) which could have caused interpretation errors. Our sample of students was homogenous enough across the four countries that measurement invariance calculations were not warranted, however national group level influences cannot be ruled out.

Social desirability bias could have led students to respond based on social expectations rather than their true attitudes towards SDM.(44) Notably, in the scenario where SDM was not the most appropriate consultation style, SDM was still overwhelmingly selected. We did not account for common method bias in our analyses but we believe this is only a slight limitation since we had a small sample size and our focus was not on building a predictive model for the industry. We did not define SDM, therefore some students may have reported SDM training without recognition

that it covered the requisite skills. Further, while we wrote the clinical scenarios with expert consensus and with the intent that SDM would be appropriate in only one scenario, some could argue that in both scenarios use of SDM may or may not be warranted.

We did not validate our SDM knowledge and attitudes questions and therefore do not know how accurately they assess knowledge and attitudes. The absolute framing of our question on physician payment could have biased respondents against agreement with this statement.

The survey was not disseminated to all medical schools in all countries leading to potential selection bias. In Canada, the Netherlands, and the US, our sample was limited by existing contacts and networks. Because of this, it is important to expand this survey, and broader topic of understanding SDM among medical school students, to other countries and continents.

Conclusions and implications

Our sample of medical school students in Canada, the Netherlands, the UK, and the US understand the principles of SDM. The nuances of SDM strategies (e.g., risk communication) are not thoroughly understood in our sample. Research has shown that students become significantly more competent at communicating risk when they are exposed to a targeted risk communication curriculum,(45) and that better risk communication strategies can improve patient understanding.(3) Considering this, future research should explore how these techniques might be best integrated into an SDM curriculum.

Attitudes towards SDM were overwhelmingly positive and a willingness to use this approach seems to be higher than in previous generations of physicians. However, the results of specific

knowledge and attitude questions show that additional research is needed to understand how SDM training should be integrated into medical school curricula. The high willingness to learn more about SDM indicates that curricula changes could lead to increased uptake of SDM by students. Wild and colleagues found that among recent medical school students in residency, patient-centered communication training improved patient-centered care.(46) Previous research has also shown that an integrated SDM curriculum improves SDM attitudes and confidence.(7,47) From our results, it is unclear which factors may influence medical students' knowledge of and attitudes towards SDM.

Designing an approach where students both learn SDM skills and feel prepared and willing to utilize them is paramount for long-term viability of SDM integration into clinical practice. Previous research has shown the positive impact of SDM on patients' decision-making processes and other outcomes.(48) Effectively educating medical students about SDM principles is key to ensuring this beneficial approach to care can be promoted and sustained in routine practice. Future research should determine the appropriate pathways for SDM curricula to become systematically integrated into medical school education, including long-term follow up of SDM retention. In order to further examine the results of the survey and assess what SDM integration into medical school curricula should look like, a stakeholder analysis is being completed through interviews with medical school students and curriculum specialists. From this, we aim to understand when and how SDM training should be introduced in medical school as well as what tools are required to make SDM integration successful. SDM attitudes and knowledge after medical school also remain unknown and future research is warranted to determine if the positive attitudes towards SDM we found continue once students reach residency programs.

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Ethics Approval

Institutional Review Boards at Dartmouth College (US, approval number: STUDY00029369), University of California San Francisco (US, 16-20756), McGill University (Canada, approval number: A12-M80-16B), Universit  Laval (Canada, approval number: 2016-219 / 16-11-2016), and University of Ottawa (Canada, approval number: #H11-16-10).

Brighton and Sussex Medical School Research Governance and Ethics Committee (UK).

Survey participants were advised that entering the survey after reading the information sheet was an indication of willingness to participate.

Competing interests

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare:

Financial

GE has edited and published books that provide royalties on sales by the publishers: the books include *Shared Decision Making* (Oxford University Press) and *Groups* (Radcliffe Press). He has provided consultancy on patient support tools for organizations, the most recent being Emmi Solutions, National Quality Forum, and Washington State Health Department. He is the director of &think LLC, which owns the registered trademark for Option Grids patient decision aids. He currently provides consultancy to Access Community Health Network, and EBSCO Health Option GridsTM patient decision aids. He owns copyright in measures of shared decision making and care integration: collaboRATE, integRATE, and Observer OPTION-5 and Observer OPTION-12. These measures are freely available for use.

M-A D receives consulting income from EBSCO Health and may receive royalties in the future. She is also a consultant for ACCESS Community Health Network.

Non-Financial

Many authors are authors of SDM and communication training programs in medical schools. However, they get no financial benefits from it.

PB owns copyright in collaboRATE.

Details of Contributors

M-A D planned the study and designed the initial iteration of the survey. RY and M-A D developed the second iteration of the survey, in collaboration with PB, NC, and GE. RY obtained ethical approval in the USA and piloted the survey. JA facilitated the recruitment of medical schools in the Netherlands. MR obtained ethical approval in the UK and facilitated the recruitment of medical schools in partnership with the UK Medical School Council. FL and GPG facilitated the recruitment of medical schools in Canada, and related ethical approval process, and translated materials into French. PS supported the ethical approval process in Canada, translation of materials into French, and contributed to the statistical analysis of the results. GB and CR contributed to the statistical analysis of the survey results. AJO provided guidance on the statistical analysis. RY and M-A D drafted the manuscript. All authors contributed to writing the manuscript and approved the final draft.

Data Sharing

Full dataset and supplementary materials available from the corresponding author at marianne.durand@dartmouth.edu.

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Table 1. Participant characteristics

Characteristic	Total (n=685)	Canada (n=150)	The Netherlands (n=102)	United Kingdom (n=172)	United States (n=261)
Age, mean (SD)	23.9 (3.28)	24.1 (2.51)	22.4 (2.73)	22.6 (3.92)	25.3 (2.76)
Gender, n (%)					
Female	471 (68.8)	107 (71.3)	86 (84.3)	110 (64.0)	168 (64.4)
Male	210 (30.7)	42 (28.0)	16 (15.7)	61 (35.5)	91 (34.9)
Other/Undisclosed	4 (0.6)	1 (0.7)	0 (0.0)	1 (0.6)	2 (0.8)
Year, n (%)					
One	219 (32.0)	55 (36.7)	9 (8.8)	33 (19.2)	122 (46.7)
Two	139 (20.3)	48 (32.0)	6 (5.9)	25 (14.5)	60 (23.0)
Three	96 (14.0)	29 (19.3)	21 (20.6)	22 (12.8)	24 (9.2)
Four	131 (19.1)	18 (12.0)	19 (18.6)	39 (22.7)	55 (21.1)
Five	49 (7.2)	0 (0.0)	17 (16.7)	32 (18.6)	0 (0.0)
Six	51 (7.5)	0 (0.0)	30 (29.4)	21 (12.2)	0 (0.0)
Race, n (%)*					
Asian	169 (24.7)	52 (34.7)	0 (0.0)	39 (22.7)	78 (29.9)
Black	17 (2.5)	3 (2.0)	0 (0.0)	6 (3.5)	8 (3.1)
White	417 (60.9)	70 (46.7)	96 (94.1)	111 (64.5)	140 (53.6)
Mixed	37 (5.4)	8 (5.3)	4 (3.9)	8 (4.7)	17 (6.5)
Other	40 (5.8)	16 (10.7)	2 (2)	7 (4.1)	15 (5.8)
Undisclosed	5 (0.7)	1 (0.7)	0 (0.0)	1 (0.6)	3 (1.2)
Hispanic, n (%)					
Yes	26 (6.3)	0 (0.0)	--	--	26 (10.0)
No	377 (91.7)	149 (99.3)	--	--	228 (87.4)
Undisclosed	8 (2.0)	1 (0.7)	--	--	7 (2.7)

*participants were allowed to select multiple race categories

Table 2. SDM knowledge items: Percent correct by country, n (%)

Question (ANSWER)	United States	United Kingdom	Canada	The Netherlands
1. Shared decision making is a process in which clinicians and patients work together, sharing information about options and preferred outcomes, in order to reach a mutual agreement on the best course of action. (TRUE)	232/236 (98.3)	170/172 (98.8)	135/138 (97.8)	82/83 (98.8)
2. Shared decision making causes patients to feel uncertain about their decisions. (FALSE)	204/236 (86.4)	133/172 (77.3)	120/138 (87.0)	71/83 (85.5)
3. Shared decision making increases patient decision regret. (FALSE)	216/236 (91.5)	147/172 (85.5)	129/138 (93.5)	71/83 (85.5)
4. Shared decision making results in fewer patients choosing major surgery. (TRUE)	126/236 (53.4)	62/172 (36.1)	47/138 (34.1)	44/83 (53.0)
5. When communicating information about risks, it is best to use relative risk (e.g., there is double the risk of developing thrombosis when using oral contraceptives). (FALSE)	120/236 (50.6)	65/172 (37.8)	48/138 (34.8)	39/83 (47.0)
6. Evidence shows that involving patients in making important healthcare decisions increases knowledge. (TRUE)	234/236 (99.2)	163/172 (84.8)	136/138 (98.6)	78/83 (94.0)
7. To promote shared decision making, the clinician will indicate that alternative treatment or management options exist. (TRUE)	233/236 (98.7)	164/172 (95.4)	137/138 (99.3)	79/83 (95.2)
8. To promote shared decision making, the clinician will give information about the pros and cons of options that are considered reasonable (including taking 'no action') (TRUE)	234/235 (99.6)	171/171 (100.0)	136/138 (99.0)	82/82 (100.0)

9. To promote shared decision making, the clinician will support the patient in becoming informed and comparing options. (TRUE)	234/235 (99.6)	169/171 (98.8)	137/138 (99.3)	80/82 (97.6)
10. There is no need for the clinician to check the patient's understanding. (FALSE)	230/235 (97.9)	171/171 (100.0)	136/138 (98.6)	81/82 (98.8)
11. In the shared decision making process, it is necessary to elicit the patient's preferences. (TRUE)	234/235 (99.6)	166/171 (97.1)	133/138 (96.4)	77/82 (93.9)
12. Whenever possible, the clinician should integrate the patient's preferences in deciding what to do next. (TRUE)	227/233 (97.4)	170/171 (99.4)	137/138 (99.3)	80/82 (97.6)
13. Most people will understand natural frequency (e.g., 1 in every 100 people) better than a percentage. (TRUE)	189/233 (81.1)	139/171 (81.3)	98/138 (71.0)	56/82 (68.3)
14. A majority of patients do not want to engage in shared decision making with their clinician. (FALSE)	214/233 (91.9)	146/171 (85.4)	123/138 (89.1)	71/82 (86.6)
15. Even if the patient does not wish to be involved in the decision making process, it is the clinician's role to encourage the patient to make a decision. (TRUE)	172/233 (73.8)	136/171 (79.5)	99/138 (71.7)	51/82 (62.2)
16. A 40-year-old male with a family history of Cancer A visits his physician to discuss undergoing a scheduled screening for Cancer A. What is considered the most effective way of communicating how screening changes his risk of mortality from Cancer A? (B - Multiple choice)	147/250 (58.8)	86/172 (50.0)	62/143 (43.4)	44/92 (47.8)

Table 3. Attitudes toward SDM: Percent disagree by country, n=660, n (%)*

Attitude statement	Canada (n=146)	The Netherlands (n=92)	United Kingdom (n=172)	United States (n=250)
Shared decision making can only be done with patients who are sufficiently educated and confident to discuss treatment or screening options with their clinician.^	85 (58.2)	56 (60.9)	68 (39.5)	147 (58.8)
Doing shared decision making is unrealistic because it takes too much time.^	135 (92.5)	92 (100.0)	161 (93.6)	223 (89.2)
Doing shared decision making is low on my priority list.^	140 (95.9)	90 (92.8)	167 (97.1)	240 (96.0)
Physician payment should be based on how well they do shared decision making.	121 (82.9)	82 (89.1)	153 (89.0)	178 (71.2)
Having resources which summarize the risks and benefits of clinical decisions would be helpful (e.g. patient decision aid).^	2 (1.4)	0 (0.0)	3 (1.7)	7 (2.8)
Patients should trust clinicians to make all decisions on their behalf.^	137 (93.8)	69 (75.0)	130 (75.6)	219 (87.6)

*Each question was asked on a 4-point scale from strongly agree to strongly disagree, strongly agree was combined with agree and strongly disagree was combined with disagree for analysis.

^Indicates question was included in multivariate analysis.

Table 4. Participant responses to clinical scenario questions by country, n (%)

A 45-year-old female presents to the Emergency Department. She requires an urgent emergency surgical intervention but is capable of giving consent. (n=643)				
What do you notice experienced clinicians do?	Canada (n=142)	The Netherlands (n=86)	United Kingdom (n=172)	United States (n=243)
Paternalistic	43 (30.3)	39 (45.4)	38 (22.1)	73 (30.0)
Shared decision making	58 (40.9)	21 (24.4)	80 (46.5)	114 (46.9)
Informed decision making [^]	24 (16.9)	5 (5.8)	19 (16.9)	26 (10.7)
Semi-paternalistic	17 (12.0)	21 (24.4)	35 (20.4)	30 (12.4)
Imagine that you are the clinician in this situation, how would you react?	Canada (n=142)	The Netherlands (n=86)	United Kingdom (n=172)	United States (n=243)
Paternalistic	17 (12.0)	13 (15.1)	16 (9.3)	27 (11.1)
Shared decision making	94 (66.2)	49 (57.0)	106 (61.6)	173 (71.2)
Informed decision making [^]	26 (18.3)	8 (9.3)	28 (16.3)	28 (11.5)
Semi-paternalistic	5 (3.5)	16 (18.6)	22 (12.8)	15 (6.2)
A 53-year-old male presents to his primary care physician for an annual physical exam. The patient asks his provider about the need to screen for colorectal cancer. (n=645)				
What do you notice experienced clinicians do?	Canada (n=143)	The Netherlands (n=86)	United Kingdom (n=172)	United States (n=244)
Paternalistic	27 (18.9)	27 (31.4)	25 (14.5)	41 (16.8)
Shared decision making [^]	69 (48.3)	26 (30.2)	96 (55.8)	124 (50.8)
Informed decision making	36 (25.2)	19 (22.1)	32 (18.6)	57 (23.4)
Semi-paternalistic	11 (7.7)	14 (16.3)	19 (11.1)	22 (9.0)
Imagine that you are the clinician in this situation, how would you react?	Canada (n=143)	The Netherlands (n=86)	United Kingdom (n=172)	United States (n=244)
Paternalistic	7 (4.9)	10 (11.6)	6 (3.5)	11 (4.5)
Shared decision making [^]	103 (72.0)	53 (61.6)	127 (73.8)	182 (74.6)
Informed decision making	26 (18.2)	15 (17.4)	30 (17.4)	45 (18.4)
Semi-paternalistic	7 (4.9)	8 (9.3)	9 (5.2)	6 (2.5)

[^]Appropriate answer

Supplemental File A - Checklist for Reporting Results of Internet E-Surveys (CHERRIES)

Item Category	Checklist Item	Explanation	Page number
Design	Describe survey design	Describe target population, sample frame. Is the sample a convenience sample? (In “open” surveys this is most likely.)	4
IRB (Institutional Review Board) approval and informed consent process	IRB approval	Mention whether the study has been approved by an IRB.	4,17
	Informed consent	Describe the informed consent process. Where were the participants told the length of time of the survey, which data were stored and where and for how long, who the investigator was, and the purpose of the study?	17
	Data protection	If any personal information was collected or stored, describe what mechanisms were used to protect unauthorized access.	7
Development and pre-testing	Development and testing	State how the survey was developed, including whether the usability and technical functionality of the electronic questionnaire had been tested before fielding the questionnaire.	4-6
Recruitment process and description of the sample having access to the questionnaire	Open survey versus closed survey	An “open survey” is a survey open for each visitor of a site, while a closed survey is only open to a sample which the investigator knows (password-protected survey).	7

Survey administration

Contact mode	Indicate whether or not the initial contact with the potential participants was made on the Internet. (Investigators may also send out questionnaires by mail and allow for Web- based data entry.)	6-7
Advertising the survey	How/where was the survey announced or advertised? Some examples are offline media (newspapers), or online (mailing lists – If yes, which ones?) or banner ads (Where were these banner ads posted and what did they look like?). It is important to know the wording of the announcement as it will heavily influence who chooses to participate. Ideally the survey announcement should be published as an appendix.	6-7
Web/E-mail	State the type of e-survey (eg, one posted on a Web site, or one sent out through e-mail). If it is an e-mail survey, were the responses entered manually into a database, or was there an automatic method for capturing responses?	7
Context	Describe the Web site (for mailing list/newsgroup) in which the survey was posted. What is the Web site about, who is visiting it, what are visitors normally looking for? Discuss to what degree the content of the Web site could pre-select the sample or influence the results. For example, a survey about vaccination on a anti-immunization Web site will have different results from a Web survey conducted on a government Web site	7
Mandatory/voluntary	Was it a mandatory survey to be filled in by every visitor who wanted to enter the Web site, or was it a voluntary survey?	4
Incentives	Were any incentives offered (eg, monetary, prizes, or non-monetary incentives such as an offer to provide the survey results)?	7
Time/Date	In what timeframe were the data collected?	7

	Randomization of items or questionnaires	To prevent biases items can be randomized or alternated.	6
	Adaptive questioning	Use adaptive questioning (certain items, or only conditionally displayed based on responses to other items) to reduce number and complexity of the questions.	5,6
	Number of items	What was the number of questionnaire items per page? The number of items is an important factor for the completion rate.	Protocol manuscript
	Number of screens (pages)	Over how many pages was the questionnaire distributed? The number of items is an important factor for the completion rate.	Protocol manuscript
	Completeness check	It is technically possible to do consistency or completeness checks before the questionnaire is submitted. Was this done, and if “yes”, how (usually JavaScript)? An alternative is to check for completeness after the questionnaire has been submitted (and highlight mandatory items). If this has been done, it should be reported. All items should provide a non-response option such as “not applicable” or “rather not say”, and selection of one response option should be enforced.	7
	Review step	State whether respondents were able to review and change their answers (eg, through a Back button or a Review step which displays a summary of the responses and asks the respondents if they are correct).	7
Response rates	Unique site visitor	If you provide view rates or participation rates, you need to define how you determined a unique visitor. There are different techniques available, based on IP addresses or cookies or both.	7
	View rate (Ratio unique site visitors/unique survey visitors)	Requires counting unique site visitors (not page views!) divided by the number of unique visitors of the first page of the survey. It is not unusual to have view	Unable to be determined based on

Preventing multiple entries from the same individual

	rates of less than 0.1 % if the survey is voluntary.	available data, addressed on page 9
Participation rate (Ratio unique survey page visitors/agreed to participate)	Count the unique number of visitors who visit the first page of the survey (or the informed consents page, if present) divided by the number of people who filled in the first survey page (or agreed to participate). This can also be called “recruitment” rate.	9
Completion rate (Ratio agreed to participate/finished survey)	The number of people agreeing to participate (or submitting the first survey page) divided by the number of people submitting the last questionnaire page. This is only relevant if there is a separate “informed consent” page or if the survey goes over several pages. This is a measure for attrition. Note that “completion” can involve leaving questionnaire items blank. This is not a measure for how completely questionnaires were filled in. (If you need a measure for this, use the word “completeness rate”.)	9
Cookies used	Indicate whether cookies were used to assign a unique user identifier to each client computer. If so, mention the page on which the cookie was set and read, and how long the cookie was valid. Were duplicate entries avoided by preventing users access to the survey twice; or were duplicate database entries having the same user ID eliminated before analysis? In the latter case, which entries were kept for analysis (eg, the first entry or the most recent)?	7
IP check	Indicate whether the IP address of the client computer was used to identify potential duplicate entries from the same user. If so, mention the period of time for which no two entries from the same IP address were allowed (eg, 24 hours). Were duplicate entries avoided by preventing users with the same IP address access to the survey twice; or were duplicate database entries having the same IP address within a given period of	Protocol manuscript

		time eliminated before analysis? If the latter, which entries were kept for analysis (eg, the first entry or the most recent)?	
	Log file analysis	Indicate whether other techniques to analyze the log file for identification of multiple entries were used. If so, please describe.	n/a
	Registration	In “closed” (non-open) surveys, users need to login first and it is easier to prevent duplicate entries from the same user. Describe how this was done. For example, was the survey never displayed a second time once the user had filled it in, or was the username stored together with the survey results and later eliminated? If the latter, which entries were kept for analysis (eg, the first entry or the most recent)?	n/a, this was an open survey
Analysis	Handling of incomplete questionnaires	Were only completed questionnaires analyzed? Were questionnaires which terminated early (where, for example, users did not go through all questionnaire pages) also analyzed?	7
	Questionnaires submitted with an atypical timestamp	Some investigators may measure the time people needed to fill in a questionnaire and exclude questionnaires that were submitted too soon. Specify the timeframe that was used as a cut-off point, and describe how this point was determined.	7
	Statistical correction	Indicate whether any methods such as weighting of items or propensity scores have been used to adjust for the non-representative sample; if so, please describe the methods.	n/a

Bron:

Eysenbach, G. (2004). Improving the quality of web surveys: the checklist for reporting results of internet e-surveys (cherries). *Journal of medical Internet research*, 6(3)e34 doi:10.2196/jmir.6.3.e34 <http://www.jmir.org/2004/3/e34/>

Supplemental File B - Copy of survey in English

Medical School Student Survey on Shared-Decision Making [English]

NOTES:

- An * indicates skip logic, which will cause some participants to see a different version of the question for country-based clarification.
 - Page break in document does not equate to page break in online survey.
-

(Q1 Language Selection – English or French)

Q2 How do you think healthcare decisions should be made?

- The patient should make the final decision about which treatment she/he would receive.
- The patient should make the final decision about which treatment she/he would receive after seriously considering my opinion.
- As the physician, I should share responsibility with the patient for making the final decision about the treatment she should receive.
- As the physician, I should make the final decision about which treatment the patient should receive after seriously considering the patient's opinion.
- As the physician, I should make the final decision about which treatment the patient should receive.

Q3 Please indicate your age using the dropdown menu.

Response choices in drop-down range from 18 years to over 65 years.

Q4 How do you self-identify? Please choose from the options below.

- Female
- Male
- Transgender
- Other identity, please specify: _____
- I prefer not to say

Q5 Please indicate where you currently are in your medical education (medical school) using the dropdown menu below.

- Year 1
- Year 2
- Year 3
- Year 4
- Year 5
- Year 6

Q6 In what country are you currently receiving your medical school training?

- United States of America
- United Kingdom
- Canada
- The Netherlands
- Other, please specify: _____

Q7* Which group or groups do you most closely identify with? Please choose all that apply.

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White or Caucasian
- Other: _____
- I prefer not to say

Q8* Are you Spanish, Hispanic, or Latino?

- Yes
- No
- I prefer not to say

Q11 What medical school do you attend? Please provide the full institution name, no abbreviations.

Fill in the blank.

Q12 Please indicate how much you agree or disagree with the following statements.

Shared decision making can only be done with patients who are sufficiently educated and confident to discuss treatment or screening options with their clinician.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Doing shared decision making is unrealistic because it takes too much time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Doing shared decision making is low on my priority list.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physician payment should be based on how well they do shared decision making.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having resources which summarize the risks and benefits of clinical decisions would be helpful (e.g. patient decision aid).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patients should trust clinicians to make all decisions on their behalf.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q13 Read the following scenario. Please indicate: (A) what you notice experienced clinicians do (e.g., attending physicians, residents, interns), and (B) which decision style you would adopt if you were in this situation. There are no right or wrong answers. Assume consent is obtained for each patient.

Q14 A 45-year-old female presents to the Emergency Department. She requires an urgent emergency surgical intervention but is capable of giving consent.

Q15* A. What do you notice experienced clinicians do (e.g., attending physicians, residents, interns)?

- Experienced clinicians use evidence-based information to decide on the best course of action for the patient and inform the patient of their decision.
- Experienced clinicians share evidence-based information with the patient, and elicit the patient's preferences, so the clinician and patient can make an informed decision together.
- Experienced clinicians share evidence-based information with the patient and allow the patient to make the decision on their own.
- Experienced clinicians share evidence-based information with the patient and choose the best course of action for the patient.

Q18 B. Imagine that you are the clinician in this situation, how would you react?

- I would use evidence-based information to decide on the best course of action for the patient and inform the patient of my decision.
- I would share evidence-based information with the patient, and elicit the patient's preferences, so the patient and I can make an informed decision together.
- I would share evidence-based information with the patient and allow the patient to make the decision on their own.
- I would share evidence-based information with the patient and choose the best course of action for the patient.

Q19 Read the following scenario. Please indicate: (A) what you notice experienced clinicians do (e.g., attending physicians, residents, interns), and (B) which decision style you would adopt if you were in this situation. There are no right or wrong answers. Assume consent is obtained for each patient.

Q20 A 53-year-old male presents to his primary care physician for an annual physical exam. The patient asks his provider about the need to screen for colorectal cancer.

Q21* A. What do you notice experienced clinicians do (e.g., attending physicians, residents, interns)?

- Experienced clinicians use evidence-based information to decide on the best course of action for the patient and inform the patient of their decision.
- Experienced clinicians share evidence-based information with the patient, and elicit the patient's preferences, so the clinician and patient can make an informed decision together.
- Experienced clinicians share evidence-based information with the patient and allow the patient to make the decision on their own.
- Experienced clinicians share evidence-based information with the patient and choose the best course of action for the patient.

Q24 B. Imagine that you are the clinician in this situation, how would you react?

- Experienced clinicians use evidence-based information to decide on the best course of action for the patient and inform the patient of their decision.
- Experienced clinicians share evidence-based information with the patient, and elicit the patient's preferences, so the clinician and patient can make an informed decision together.
- Experienced clinicians share evidence-based information with the patient and allow the patient to make the decision on their own.
- Experienced clinicians share evidence-based information with the patient and choose the best course of action for the patient.

Q25 A 40-year-old male with a family history of Cancer A visits his physician to discuss undergoing a scheduled screening for Cancer A. What is considered the most effective way of communicating how screening changes his risk of mortality from Cancer A?

- Screening results in a 50% reduction in mortality.
- Screening reduces mortality from 6 out of 10,000 people to 3 out of 10,000 people.
- Screening reduces mortality by 0.02%.
- Screening dramatically decreases his mortality from Cancer A.

Q26 Please indicate whether you feel each of the following statements is TRUE or FALSE.

Shared decision making is a process in which clinicians and patients work together, sharing information about options and preferred outcomes, in order to reach a mutual agreement on the best course of action.	<input type="radio"/>	<input type="radio"/>
Shared decision making causes patients to feel uncertain about their decisions.	<input type="radio"/>	<input type="radio"/>
Shared decision making increases patient decision regret.	<input type="radio"/>	<input type="radio"/>
Shared decision making results in fewer patients choosing major surgery.	<input type="radio"/>	<input type="radio"/>

Q27 Please indicate whether you feel each of the following statements is TRUE or FALSE.

When communicating information about risks, it is best to use relative risk (e.g., there is double the risk of developing thrombosis when using oral contraceptives).	<input type="radio"/>	<input type="radio"/>
Evidence shows that involving patients in making important healthcare decisions increases knowledge.	<input type="radio"/>	<input type="radio"/>
To promote shared decision making, the clinician will indicate that alternative treatment or management options exist.	<input type="radio"/>	<input type="radio"/>

Q28 Please indicate whether you feel each of the following statements is TRUE or FALSE.

To promote shared decision making, the clinician will give information about the pros and cons of options that are considered reasonable (including taking 'no action')	<input type="radio"/>	<input type="radio"/>
To promote shared decision making, the clinician will support the patient in becoming informed and comparing options.	<input type="radio"/>	<input type="radio"/>
There is no need for the clinician to check the patient's understanding.	<input type="radio"/>	<input type="radio"/>
In the shared decision making process, it is necessary to elicit the patient's preferences.	<input type="radio"/>	<input type="radio"/>

Q29 Please indicate whether you feel each of the following statements is TRUE or FALSE.

Whenever possible, the clinician should integrate the patient's preferences in deciding what to do next.	<input type="radio"/>	<input type="radio"/>
Most people will understand natural frequency (e.g., 1 in every 100 people) better than a percentage.	<input type="radio"/>	<input type="radio"/>
A majority of patients do not want to engage in shared decision making with their clinician.	<input type="radio"/>	<input type="radio"/>
Even if the patient does not wish to be involved in the decision making process, it is the clinician's role to encourage the patient to make a decision.	<input type="radio"/>	<input type="radio"/>

Q30 Had you heard of shared decision making before completing this survey?

- Yes
- No

Q31 Have you received training in shared decision making?

I have received formal theoretical shared decision making training (e.g., didactic learning).	<input type="radio"/>	<input type="radio"/>
I have received formal practical shared decision making training (e.g., using role plays and simulated patients).	<input type="radio"/>	<input type="radio"/>

Q32 Roughly how many hours of training (combined theoretical and practical) have you received in shared decision making?

- 0 to 1 hours
- Between 1 to 2 hours
- Between 2 to 5 hours
- Greater than 5 hours

OR

Automatically directed to Q33 if the answer to both statements in Q31 were 'No'.

OR

Automatically directed to Q33 if answer to statement in Q30 was 'No'.

Q33 Please indicate how much you agree or disagree with the following statement.

I would like to know more about how to do shared decision with patients.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Q34 In a clinical encounter, how do you think engaging in shared decision making would affect the length of the visit?

- Decrease the overall length of the visit.
- The length of the visit would remain the same.
- Increase the overall length of the visit.

Q35 You selected "Decrease the overall length of the visit." How much shorter would the clinical visit be when engaging in shared decision making?

- About 5 minutes shorter, or more
- About 2 minutes shorter
- About 1 minute shorter

OR

Q36 You selected "Increase the overall length of the visit." How much longer would the clinical visit be when engaging in shared decision making?

- About 1 minute longer
- About 2 minutes longer
- About 5 minutes longer, or more

OR

Automatically directed to Q37 if answer to statement in Q34 was 'The length of the visit would remain the same.'

Q37 How do you think healthcare decisions should be made?

- The patient should make the final decision about which treatment she would receive.
- The patient should make the final decision about which treatment she would receive after seriously considering my opinion.
- As the physician, I should share responsibility with the patient for making the final decision about the treatment she should receive.
- As the physician, I should make the final decision about which treatment the patient should receive after seriously considering the patient's opinion.
- As the physician, I should make the final decision about which treatment the patient should receive.

Q38* Please indicate your interest in the following (select ALL that apply):

- YES, I am interested in taking part in a 10-minute telephone interview on shared decision making.
- YES, I would like to be entered into the prize drawing for a gift card where 1 in 50 respondents will receive a \$20 USD Amazon gift card.

Q39 You indicated interest in either the prize drawing or the telephone interview. Please enter a valid email address below to be eligible:

Fill in the blank.

Supplemental file C. Hierarchical linear regression results for SDM knowledge

Variable	β	Standard Error	<i>t</i>	p-value
<i>Step 1</i>				
Age	.07	.02	3.79	.00
Gender	-.23	.12	-1.96	.05
Race_US	.07	.05	1.26	.21
Race_UK	-.06	.08	-.71	.48
Race_Ne	-.37	.24	-1.51	.13
Hispanic	-.13	.13	-1.02	.31
<i>Step 2</i>				
Age	.06	.02	3.12	.00
Gender	-.22	.12	-1.88	.06
Race_US	.07	.05	1.31	.19
Race_UK	-.06	.08	-.75	.45
Race_Ne	-.41	.25	-1.65	.10
Hispanic	-.11	.14	-.78	.44
School Year	.04	.05	.91	.37
<i>Step 3</i>				
Age	.06	.020	3.12	.10
Gender	-.22	.116	-1.86	.01
Race_US	.07	.053	1.32	.17
Race_UK	-.06	.080	-.73	.10
Race_Ne	-.43	.249	-1.73	.06
Hispanic	-.11	.136	-.83	.15
School Year	.04	.046	.93	.13
Medical School	.00	.005	.63	.01
<i>Step 4</i>				
Age	.054	.020	2.67	.01
Gender	-.230	.116	-1.99	.05
Race_US	.063	.052	1.20	.23
Race_UK	-.073	.080	-.92	.36
Race_Ne	-.138	.273	-.51	.61
Hispanic	-.129	.136	-.95	.34
School Year	.055	.046	1.19	.23
Medical School	.002	.005	.37	.71
Country	-.192	.075	-2.57	.01