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A Randomized Study of Patient Risk Perception for Incidental Renal Findings on Diagnostic Imaging Tests

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Abstract

Purpose—To assess differences in patient distress, risk perception and treatment preferences for incidental renal findings with descriptive versus combined descriptive and numeric, graphical risk information.

Methods and Materials—A randomized survey study was conducted for adult patients about to undergo outpatient imaging studies at a large urban academic institution. Two survey arms contained either descriptive or a combination of descriptive and numeric, graphical risk information about 3 hypothetical, incidental renal findings on CT: 2-cm (low risk) and 5-cm (high risk) renal tumors, and a 2-cm (low risk) renal artery aneurysm. The main outcomes were patient distress, perceived risk (qualitative and quantitative), treatment preference, and valuation of lesion discovery.

Results—299/374 patients participated (79.9% response rate). With inclusion of numeric and graphical, rather than only descriptive, risk information about disease progression for a 2-cm renal tumor, patients reported less worry (3.56 versus 4.12 on 5-point scale, $p<0.001$) and favored surgical consultation less often (29.3% versus 46.9%, $p=0.003$). The proportion choosing surgical consultation for the 2-cm renal tumor decreased to a similar level as for the renal artery aneurysm with numeric risk information (29.3%; 95% CI, 21.7%–36.8%, and 27.9%, 95% CI, 20.5%–35.3%,

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respectively). Patients overestimated the absolute risk of adverse events regardless of risk information type, but significantly more so when given descriptive information only, and valued discovery of lesions regardless of risk information type (range 4.41–4.81/5).

Conclusion—Numeric, graphical risk communication for patients about incidental renal lesions may facilitate accurate risk comprehension and support patients in informed decision-making.

Introduction

Increasing use of cross-sectional imaging over the past 30 years has aided efficient triage and treatment of disease (1). However, a major byproduct of imaging use includes incidental findings, and in the abdomen alone a wide range (27–98%) of CT studies of varying technique have been reported to return a result of at least one asymptomatic, clinically unsuspected lesion (2–5). Serendipitous discovery sometimes enables early treatment of an aggressive disease and avoidance of disease-specific morbidity or mortality. However, many incidental findings are of low risk, and yet their discovery commonly results in a cascade of additional testing and interventions for lesions that otherwise would not have harmed most patients (6).

Physicians have the duty of explaining to patients the concept as well as the significance of incidental findings and what these may represent, while maintaining patient autonomy in medical decision-making. Even for relatively common incidental findings, the element of the unexpected may impact patients' anxiety, risk perception and decision-making, or even belie their existing attitudes about medical intervention, contributing to overtreatment. The consequences of the frequent discovery of unsuspected, low risk lesions also include major economic impact (7, 8).

In order to understand and improve decision-making around incidental imaging findings, patient perceptions and preferences must be studied. While patients have reported wanting to engage in shared decision-making regarding common incidental findings such as lung nodules (9), the process can pose challenges. One particular obstacle to decision-making for patients is the method used for communicating the risks associated with medical tests. Routine communication of risk to patients regarding incidental findings on imaging is variable and non-standardized, with some reports of verbal descriptions (e.g. probably, most likely), or even possibly no discussion of risk (9–11). Previous studies in other clinical contexts have shown that to improve risk communication for patients, graphical representation of probabilities and simplified language should be employed (12, 13). Thus, these methods may also facilitate risk communication for incidental findings on imaging tests, as patient risk perception and decision-making for incidental findings are understudied. Understanding how patients process these unexpected findings may drive more patient-centered approaches to counseling about incidental lesions.

The purpose of our study was to assess differences in patient distress, risk perception and treatment preferences for incidental renal findings with descriptive versus a combination of descriptive and numeric, graphical risk information. We hypothesized a priori that patients would perceive risk inaccurately and with greater worry, and also favor surgical consultation more often without the availability of numeric and graphical risk information. Secondly,

we assessed the association of patients' stated treatment preferences with a validated scale for gauging patients' baseline preferences regarding health interventions instead of expectant management. We also hypothesized that patients' treatment preferences would be more in line with their baseline preferences for maximizing versus minimizing health interventions when patients received graphical risk information, due to improved comprehension of risk.

Methods and Materials

Study Setting and Population

All aspects of the study were HIPAA-compliant and approved by the Institutional Review Board. From June 21 to July 19, 2016, we administered a survey at two outpatient imaging facilities of a large urban academic institution.

Patients approached for recruitment were awaiting scheduled outpatient imaging examinations, and were eligible to participate if meeting inclusion criteria of 1) age of at least 18 years, 2) outpatients undergoing any MRI, ultrasound, or CT of the chest, pelvis, head, spine, or extremities, and 3) ability to read and answer questions in English. Patients who were scheduled for an abdominal CT or abdominopelvic CT were not considered eligible to avoid provoking anxiety or confusion regarding their actual test results. Other exclusion criteria included more than 1 prior CT of the abdomen, as these patients would have higher likelihood of either having experienced an abdominal incidental finding influencing their responses, or personal knowledge of a lack of incidental findings over several studies, as potential sources of bias; other criteria for exclusion were a known diagnosis of malignancy or history of a treated malignancy.

Survey Instrument

Each survey version asked whether patients were familiar with incidental lesions, and contained three hypothetical scenarios regarding incidental lesions in the kidney: a 2-cm renal mass, a 2-cm renal artery aneurysm, and a 5-cm renal mass. For the surveys containing only descriptive risk information, patients were told that the 2-cm mass could be benign or malignant, and it was most likely the lesion would not spread if malignant (14–16); that the 5-cm lesion was probably malignant and had a high chance of spreading (16); and for the renal artery aneurysm, that it was most likely it would not rupture and cause severe bleeding (17) [survey shown in Supplementary Figure E1]. For the combination of descriptive and numeric risk description, participants were shown a pictograph in addition to text describing 1% risk of tumor spreading for the 2-cm lesion (14, 18), 25% risk of spreading for the 5-cm lesion (19–21), and 1% risk of rupture with severe bleeding for the aneurysm (17) (Supplementary Figure E2) (14, 17, 22, 23). Benefits and harms of surgery were also summarized using descriptive or graphical representation in each respective survey version (24, 25). The order of scenarios was not randomized to prevent potential influence by the highest risk lesion (5-cm renal tumor) scenario upon patient risk perception and responses for the lower risk lesions. The 5-cm renal mass scenario was also used to internally gauge data quality, by checking for a rational response of a higher risk estimate and preference for surgical consultation than the 2-cm renal mass.

Each scenario was followed by four questions regarding the patients' level of worry, whether they were glad to find out about the lesion, an estimation of risk of serious adverse outcome associated with the lesion, and the treatment option the patient would probably choose. Questions regarding level of worry and how glad they were to know about the lesion were answered using a 5-point scale (e.g. 1 indicating not at all worried, 5 indicating very worried). Additional items included standard demographic data and relevant individual difference measures, such as a 10-item validated scale for baseline preferences of patients regarding minimization versus maximization of interventions instead of expectant management of health problems, which uses a 7-point scale with the highest score reflecting a preference to maximize medical interventions (26).

A multidisciplinary team developed the scenarios and survey questions. Draft versions of the survey were tested through several pilot studies. First, three experts in medical decision-making survey research reviewed the survey and provided substantive feedback on content. Second, we interviewed ten patient participants who provided feedback regarding the clarity and comprehensibility of the survey. After revisions were made, twenty additional patients completed revised questionnaires to further improve the clarity and comprehensibility. Feedback was used in an iterative process after each round to revise the survey instrument.

Survey Administration

A random number generator was used to pre-assign the order of survey type administered to patients. Patients scheduled for an outpatient imaging study during a four-week period were approached by two study team members who were trained to discuss the survey for potential participation, administer an eligibility checklist, and provide instruction on questionnaire completion. Willing patients confirmed eligibility and provided verbal consent to study team members and completed the surveys while waiting to undergo their imaging test. An incentive of a \$5 gift card was offered to all participants.

Outcome Measures

The survey outcomes included the treatment preference that the patients felt they would likely choose for each lesion type: do nothing, undergo a CT in 6 months to assess for growth, or see a specialist (surgeon) and have surgery. We used Likert scales to measure how worried patients felt about the lesion, how glad they were to know it had been found, the overall perceived level of comprehension of risk associated with the lesions, and the value of having the hypothetical CT scan yield only the discussed incidental findings (scales of 1–5 with higher numbers reflecting stronger endorsement).

We also quantified the risk perceived regarding serious adverse outcomes for each lesion, prompting participants for their estimate of risk using a number between 1–100%. The absolute difference between the actual risk estimate based on the literature and the subjects' responses was then compared when numerical risk information was provided versus not provided.

Explanatory Variables

Patient characteristics included age group, sex, education level, and whether or not they were aware of the concept of incidental lesions on diagnostic imaging tests. We also measured general baseline preferences to maximize or minimize health interventions using a previously validated instrument; the 10-item Medical Maximizer-Minimizer Scale (MMMS) gauges preferences for medical interventions in the form of physician visits and prescriptions, as well as attitudes toward expectant management of health problems compared with intervention (26).

Statistical Analysis

All analyses were performed using SAS 9.3 software (SAS Institute, Cary, NC). All tests were conducted at the two-sided 1% significance level rather than the traditional 5% level in order to reduce the rate of false discovery while maintaining reasonable statistical power to detect factors that impact patient risk perception and treatment preferences. Surveys with 3 or more missing responses in total (out of 29 items) were excluded from the analysis to ensure data quality, and otherwise missing data for particular items were excluded from analysis involving those variables. Fisher's exact test was used to assess the difference between study arms in terms of patient sex, age group, level of education, and familiarity with the concept of incidental imaging findings.

Analyses were performed to compare risk perception, worry, treatment preferences between survey arms, as well as among lesion types. Mann-Whitney tests compared the study arms in terms of perceived level of comprehension of risk for each lesion type, and lesion-specific measures including how worried patients felt, how glad the patients felt to find out about the lesion, and the absolute risk estimate. Wilcoxon-signed rank tests assessed the differences in these lesion-specific measures among the three lesion types within each survey type. Exact Mann-Whitney tests were used to compare gender, education and age groups with respect to the ordinal assessments of worry and risk.

In terms of management preferences, Fischer's exact test was used to compare the variables of patient sex, age group, level of education, and familiarity with the concept of incidental imaging findings in terms of the percentage of patients selecting CT-based surveillance as their treatment preference. Fisher's exact test also was used to compare the study arms in terms of the percentage of patients making a given treatment preference within each scenario. Within a study arm, the McNemar test was used to compare lesion types with respect to the percentage of subjects selecting each treatment option.

Analyses were also performed for the baseline preferences for health interventions instead of expectant management. Mann-Whitney tests were used to compare the scores from the MMMS across study arms, and the treatment preference in terms of the average scores for each lesion type within each survey.

Finally, hierarchical logistic regression was performed to identify predictors of whether a subject preferred surveillance using CT rather than surgical consultation. Stepwise variable selection was used to identify significant independent predictors of treatment preference from among: stage 1) demographic and risk information factors (age, sex, education,

numeric or descriptive risk information); stage 2) outcome assessments (risk, worry); and stage 3) responses to the MMMS. The variables selected in the first three stages were assessed as candidate predictors and stepwise selection identified a final set of significant independent predictors of treatment preference. An interaction analysis was performed to detect two-way interactions between variables that were significant predictors of treatment preference in univariate analysis. For factors identified as part of a set of two or more significant ($p < 0.05$) independent predictors of treatment preference for at least one scene within one survey, a multivariable logistic regression analysis identified sets of independent predictors of treatment preference for each combination of scene and survey.

Results

Of 374 eligible patients, 299 patients (79.9%) participated. We evaluated the responses of 283 patients who answered 90% (at least 27/29) of items, and among these surveys there was 98% completeness of data. Sixty percent of the patients were women, and most patients were over 55 years old; participants were relatively highly educated (Table 1). At baseline, 44.2% of patients were aware of the possibility of incidental findings from an imaging test. The mean score (SD) of the MMMS was 4.73 out of 7.0 (± 1.09), suggesting an overall slight baseline preference for health interventions instead of expectant management. There was no difference between study arms on demographic variables, awareness of incidental findings, or MMMS score (all p values > 0.50). Patients took an average time of 20 minutes to complete the survey.

Effect of Risk Communication Method on Risk Perception, Concern, and Treatment Preference

Patients grossly overestimated the risk associated with renal incidental lesions when provided only descriptive and no numeric risk information. For the 2-cm renal mass, the perceived risk was 34.1% vs. 16.3% for descriptive instead of numeric risk information, respectively ($p < 0.001$); for the 2-cm renal artery aneurysm, risk estimates for descriptive versus numeric risk information were 33.9% vs. 14.1%, respectively ($p < 0.001$). For the 5-cm renal mass, risk estimates were 67.8% vs. 34.7%, respectively ($p < 0.001$).

Patients also worried more when they received only descriptive rather than numeric risk information. For example, for the 2-cm renal mass, the mean score (SD) for worry was 4.12 (± 0.92) with descriptive information compared with 3.56 (± 1.09) with numeric risk information ($p < 0.001$) [Table 3]. Despite risk overestimation, patients in both survey arms generally endorsed a high degree of comprehension of the risks associated with lesions (4.23 [± 0.85] versus 4.41 [± 0.81], $p = 0.031$). Mean scores for being glad to have discovered the lesion (ranging from 4.41–4.81) were not significantly different between survey arms for any lesion type (Table 3).

While nearly all patients (282/283) desired some form of further management for the 2-cm renal mass, the selected type of treatment differed by how the risk information was presented. With receipt of only descriptive risk information, 46.9% (67/143) of patients preferred surgical consultation to remove the 2-cm renal mass, but with the addition of numeric risk information, 29.3% (41/140) of patients preferred surgical consultation

($p=0.003$) (Table 2). Instead, a larger proportion selected CT surveillance for the 2-cm tumor (53.1% vs. 70.0%, $p=0.005$). For the 5-cm renal mass, the majority of patients favored surgical consultation in both arms (91.6% vs. 83.6%, $p=0.047$). For the 2-cm renal artery aneurysm, risk information type did not affect the proportion of patients favoring surgical consultation; 33.6% (48/143) of patients with descriptive information and 27.9% (39/140) of patients with numeric information preferred surgical consultation ($p=0.306$).

Comparison of Risk Perception, Concern, and Treatment Preference Among Lesion Types

Risk estimates were significantly higher for the 5-cm renal mass than for the 2-cm renal mass and renal artery aneurysm in both study arms, in accordance with greater risk described for disease progression in both survey arms (for example in the descriptive risk information survey, 67.8% vs. 34.1% and 33.9%, respectively, p values <0.001) [Table 3].

Worry scores were highest for the 5-cm renal tumor compared with other lesion types in both survey arms (results in Table 3, all p values <0.001). Patients also expressed greater worry about the 2-cm renal mass than the renal artery aneurysm, in both study arms. Finally, in both survey arms the discovery of the 5-cm renal mass was valued significantly more than the other lesions, but with overall high scores across all lesion types for how glad patients felt to know about the finding (4.79–4.81 vs. 4.55–4.60 for 2-cm renal mass, 4.41–4.46 for renal artery aneurysm, all p values <0.001).

Comparing treatment selection among lesion types within each study arm, more patients selected surgical consultation for the 2-cm renal mass than the renal artery aneurysm with descriptive risk information (Table 2, 46.9% vs. 33.6%, $p=0.004$) but these proportions were nearly equivalent when numeric risk information was provided (29.3% vs. 27.9%, $p=0.695$). The 5-cm renal mass was associated with higher proportions of patients desiring surgical consultation than for both other lesion types in both study arms (83.6–91.6% vs. 29.3–46.9% for 2-cm renal mass, and 27.9–33.6% for renal artery aneurysm; all p values <0.001).

Patient-Level Factors as Predictors of Treatment Preference and Perception

In both survey arms, sex and education were not significantly different between groups choosing each treatment type for any of the three lesions. Nearly all patients ≤ 35 years (80/82) chose surgical consultation for the 5-cm renal mass regardless of risk information type (Supplemental Table 1). Patients >35 years old trended toward choosing surgery less often than younger patients for the 5-cm renal mass with receipt of numeric risk information, though not reaching statistical significance (Supplemental Table 2), for example with 97.1% choosing surgery for age ≤ 35 years vs. 81.1% for age 36–55 years, and 76.9% for age ≥ 56 years ($p=0.012$ – 0.044).

Multiple variables were significant predictors of treatment preference across the three scenarios in univariable analysis, including age, estimated risk, worry score, form of risk information, and the MMMS score (Table 4). An analysis for interaction between these variables showed no significant two-way interactions.

The form of risk information was a significant predictor of management preference in univariable analysis ($p=0.003$) for the 2-cm. However, in multivariable analysis, the type of

risk information was no longer a significant predictor of treatment preference ($p=0.084$), and therefore a mediation analysis was performed using the method developed by Baron and Kenny (27). This mediation analysis showed that for the scenario regarding 2-cm renal tumors, the relationship between the type of risk information and the treatment preference was fully mediated by the degree of worry and risk perception (for prediction of worry and risk perception by type of risk information, all $p < 0.001$) (27).

Patients' worry and risk scores were the most consistent independent predictors of treatment selection in multivariable analysis across all three lesion types. The mean MMMS score remained a significant predictor of treatment preference for only the 2-cm renal mass in both survey arms. For the 2-cm mass, age combined with the worry score and the MMMS score predicted the treatment preference with an area under the curve (AUC) of 0.77. The AUC for prediction of treatment preference using risk estimate and worry was 0.736 and 0.794 for the renal artery aneurysm and 5-cm renal mass, respectively.

Discussion

Incidental findings are commonly discovered on diagnostic imaging tests and associated with highly variable degrees of risk and non-uniform recommendations for additional tests and specialty consultations. Due to a high degree of uncertainty around the natural history of some lesions or clinical equipoise due to the overall low risk associated with some lesions, management decisions around many incidental findings justifiably incorporate patient preferences for shared decision-making (28). However, patients' perception of such incidental findings and the influence of patient-centered risk communication techniques on risk comprehension and management preferences are understudied (3, 29). We found that patient concern, risk perception, and management preferences regarding incidental lesions on diagnostic imaging are influenced by the method of risk information, underscoring the importance of risk communication techniques to support informed decision-making. In this randomized survey study, patients provided with routinely used descriptors of risk (e.g. probably, most likely) worried more and substantially overestimated their risk of serious adverse events compared with patients who also received numeric and graphical representation of risk.

While our study did not qualitatively examine the reasons for different levels of concern between the 2-cm renal tumor and 2-cm renal artery aneurysm, it is possible that patients weighted the potential consequence of metastatic disease more negatively than the possibility of hemorrhage associated with a high risk for mortality, given the chronic state of symptoms related to the disease as well as treatment (30, 31). Both of these types of lesions are representative of recently questioned harms of a universally aggressive management approach for largely indolent lesions (11, 24, 32); our findings underscore the potential for improved risk communication to decrease patients' distress and ability to weigh benefits and harms more accurately.

The Presidential Commission for the Study of Bioethical Issues stated in its 2013 report on incidental and secondary findings in diagnostic testing that physicians should "anticipate and communicate" the possibility of unexpected findings and elicit patients' preferences around

the discovery of such findings before the test is performed (33). While it is impractical to consider counseling patients on every possible incidental finding before a CT scan, the high rates of incidental findings and associated costs underscore a need to improve counseling for low-risk lesions in particular after they are discovered (34). We assessed patients' general preferences for maximizing/minimizing health interventions, and found that this preference was a significant predictor of treatment selection for the 2-cm renal tumor; in this setting, a patient's decisional alignment with their MMMS score may potentially be a marker of decisional quality. Through enabling greater sensitivity to baseline preferences that patients may have about management of medical problems based on the level of risk, and improving the accuracy of risk perception and comprehension, our findings support the development of shared decision-making tools for low risk incidental lesions. This patient-centered approach would incorporate graphical representation of numeric information (known as pictographs or icon arrays), which has previously been demonstrated to improve patient comprehension of the benefits and harms of treatment options (12). Radiologists can therefore improve communication about risk categories and collaborate on consensus recommendations for treatment and/or preference-dependent management as appropriate, particularly as patients are able to receive test results and research diseases with increasing autonomy.

To our knowledge, this is the first study of the impact of improved risk communication on patient risk perception and treatment preferences for incidental lesions on imaging. Freiman et al conducted a survey of patients who had incidental lung nodules on CT, specifically assessing perceived risk for cancer, and patient demographic and health characteristics serving as independent predictors of the degree of distress (35). The authors found that patients overestimated the risk of a lung nodule representing a cancer and that one-half experienced distress due to the lesion (35), but did not attempt to assess a specific intervention to improve patient risk comprehension and perception. We found that although patients highly valued the discovery of the incidental renal lesions and self-reported a high degree of understanding the risk descriptions, they overestimated risk and reported a high degree of worry and preference for consultations with surgeons when only descriptive information was provided. Meanwhile, patients were able to incorporate numeric, graphical risk information with lessened preference for surgical management, mediated by decreased distress and a lesser degree of risk overestimation.

Limitations of this study include the single center data, despite the large urban setting and patients referred from multiple different areas of the city. The use of hypothetical scenarios may mean that patients' decisions on a self-reported questionnaire may vary from actual decisions regarding findings on imaging tests. The study population of patients scheduled for imaging studies may be more likely than the general population to prefer medical intervention or testing. Patients who were awaiting examinations other than abdominal/abdominopelvic CT with history of lesions similar to the incidental findings in the presented scenarios (e.g. aneurysm of a cerebral artery or benign brain tumor) were not excluded and experience with such lesions may have influenced survey responses. The patient sample was relatively highly educated, with at least some high-school level education for nearly all patients. Although patient anxiety and treatment preferences did not differ according to education, results may not capture the impact of numeric/graphical risk communication in patients with grade school or middle school education only; however, the overestimation of

risk and levels of anxiety may plausibly be similar or greater among less educated patients. Further studies are needed to assess the potential effect of unexpected, asymptomatic findings on decision-making that may stray from existing preferences for seeking health interventions, and build upon our study findings that shared decision-making for common incidental findings may be facilitated for many patients through simple risk communication techniques. Given the lack of prior work in this area of decision-making, we conducted statistical analyses without multiple comparison corrections in order to optimize statistical power to detect factors influencing patient risk perception and treatment preferences; this limitation was balanced by applying a 1% significance level to reduce the rate of false discovery. Finally, we did not counterbalance the scenarios to prevent the highest risk lesion (5-cm renal mass) from preceding the lower risk renal mass and influencing patient concern and risk perception but it is possible that a lack of counterbalancing may have had other unforeseen effects on patient risk perception.

In conclusion, reduction in patient distress, risk overestimation, and preference for surgical evaluation may be possible when patients received specific numeric and graphical risk information instead of only qualitative risk descriptors. With more accurate risk comprehension, patients still worried more about a low-risk tumor than a non-tumorous lesion, yet favored surgical consultation at the same rate for both lesions, and the treatment preference was predicted by baseline preferences for health interventions as opposed to expectant management. These findings may warrant prospective study of the impact of radiologists' risk communication and management recommendations on patient decision-making, given how commonly incidental lesions are encountered.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Characteristics of Survey Sample (n=283)

Patient Characteristic	Descriptive Risk Information ^a (n=143)	Numeric Risk Information ^b (n=140)	P value
Female (%)	89 (62.2)	82 (58.6)	0.545
Male (%)	54 (37.8)	58 (41.4)	
Age group			0.631
18–25 years (%)	13 (9.1)	9 (6.4)	
26–35 years (%)	34 (23.8)	26 (18.6)	
36–45 years (%)	22 (15.4)	27 (19.3)	
46–55 years (%)	22 (15.4)	26 (18.6)	
>56 years (%)	52 (36.4)	52 (37.1)	
Highest grade completed			0.799
Elementary school	0	0	
6 th –8 th grade (%)	1 (0.7)	1 (0.7)	
9 th –12 th grade (%)	13 (9.1)	18 (12.9)	
At least some college (%)	78 (54.6)	75 (53.6)	
At least some graduate school (%)	51 (35.7)	46 (32.9)	
Baseline awareness of incidental lesions (%)	65 (45.5)	60 (42.9)	0.720
Medical Maximizer-Minimizer Scale ^b	4.73	4.73	1.0

^aColumn values may not add up to 143 due to missing values^bUtilizes a 7-point scale with highest score reflecting preference to maximize medical interventions; individuals' scores are summarized as mean values. Values in these columns reflects mean of mean scores.

Table 2

The percentage (number) of participants who indicated a treatment preference of “CT within 6 months” or “See specialist” within each scenario for the numeric risk and descriptive surveys. P values are from a Fisher exact test to compare surveys in terms of the percentage of patients making the given choice within each scenario. The option of “do nothing” was not analyzed, as a minimal number of patients selected this option in each scenario.

Scenario	CT Surveillance			Surgical Consultation		
	Proportion in Descriptive Risk Arm (n)	Proportion in Numeric Risk Arm (n)	P value	Proportion in Descriptive Risk Arm (n)	Proportion in Numeric Risk Arm (n)	P value
2-cm Renal Mass	53.1% (76)	70.0% (98)	0.005	46.9% (67)	29.3% (41)	0.003
5-cm Renal Mass	8.4% (12)	16.4% (23)	0.047	91.6% (131)	83.6% (117)	0.047
2-cm Renal Artery Aneurysm	63.6% (91)	70.0% (98)	0.260	33.6% (48)	27.9% (39)	0.306

The mean, standard deviation (SD), median and inter-quartile range of each ordinal assessment from each survey. P values are from Mann-Whitney tests to compare the surveys.

Table 3

Question	Descriptive Risk Information (n=143)		Numeric Risk Information (n=140)		P Value
	Mean	SD	Mean	SD	
How well do you understand the risk associated with the abnormal findings?	4.23	0.85	4.41	0.81	0.031
Do you feel the CT was helpful?	4.66	0.65	4.58	0.78	0.540
MMMS ^a Mean	4.72	0.93	4.73	1.02	0.998
Glad to Know (2-cm mass)	4.55	0.86	4.60	0.78	0.735
Glad to know (5-cm mass)	4.79	0.55	4.81	0.54	0.758
Glad to know (2-cm renal aneurysm)	4.46	0.89	4.41	0.92	0.628
How Worried (2-cm mass)	4.12	0.92	3.56	1.09	<0.001
How Worried (5 cm mass)	4.79	0.53	4.52	0.80	0.001
How Worried (2-cm renal aneurysm)	3.68	0.94	3.29	1.13	0.003
Perceived Risk (2-cm mass)	34.07	22.53	16.33	24.45	<0.001
Perceived Risk (5-cm mass)	67.77	24.11	34.69	25.96	<0.001
Perceived Risk (2-cm renal aneurysm)	33.94	23.09	14.06	23.29	<0.001

^aMMMS = Medical Maximizer/Minimizer Scale

Table 4

P values from Mann-Whitney tests to compare treatment preferences in terms of the average scores from the scale for maximizing/minimizing health interventions. Results are only shown for comparisons with sufficient data to permit calculation of the p value.

Survey	Lesion	Treatments Compared		P value
Descriptive Risk Information	2-cm Renal Mass	CT surveillance	Surgical Consultation	0.004
	5-cm Renal Mass	CT surveillance	Surgical Consultation	0.564
	Renal artery aneurysm	CT surveillance	Surgical Consultation	0.052
		CT surveillance	Do Nothing	0.998
		Surgical Consultation	Do Nothing	0.501
Numeric and Descriptive Risk Information	2-cm Renal Mass	CT surveillance	Surgical Consultation	<0.001
		CT surveillance	Do Nothing	0.492
		Surgical Consultation	Do Nothing	0.131
	5-cm Renal Mass	CT surveillance	Surgical Consultation	0.549
	Renal artery aneurysm	CT surveillance	Surgical Consultation	<0.001
		CT surveillance	Do Nothing	0.033
		Surgical Consultation	Do Nothing	0.001