Emotional Distress Increases the Likelihood of Undergoing Surgery among Men with Localized Prostate Cancer

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Purpose: We determined whether among men with clinically localized prostate cancer, particularly men with low risk disease, greater emotional distress increases the likelihood of undergoing surgery vs radiation or active surveillance.

Materials and Methods: Participants were 1,531 patients recruited from 2 academic and 3 community facilities (nonHispanic white 83%, nonHispanic black 11% and Hispanic 6%; low risk 36%, intermediate risk 49% and high risk 15%; choice of active surveillance 24%, radiation 27% and surgery 48%). Emotional distress was assessed shortly after diagnosis and after men made a treatment decision with the Distress Thermometer. We used multinomial logistic regression with robust standard errors to test if emotional distress at either point predicted treatment choice in the sample as a whole and after stratifying by D'Amico risk score.

Results: In the sample as a whole the participants who were more emotionally distressed at diagnosis were more likely to choose surgery over active surveillance (RRR 1.07; 95% CI 1.01, 1.14; p=0.02). Men who were more distressed close to the time they made a treatment choice were more likely to have chosen surgery over active surveillance (RRR 1.16; 95% CI 1.09, 1.24; p <0.001) or surgery over radiation (RRR 1.12; 95% CI 1.05, 1.19; p=0.001). This pattern was also found in men with low risk disease.

Conclusions: Emotional distress may motivate men with low risk prostate cancer to choose more aggressive treatment. Addressing emotional distress before and during treatment decision making may reduce a barrier to the uptake of active surveillance.

Key Words: prostatic neoplasms; stress, psychological; watchful waiting; clinical decision-making

THE overtreatment of prostate cancer has become a significant concern in prostate cancer care. Estimates of the magnitude of overtreatment vary widely, but nearly all studies point to some degree of unnecessary treatment,[1] in particular among men with low risk disease, which has a very low mortality risk.[2] For men with low risk disease active surveillance or periodic monitoring for cancer progression, with the potential to convert to definitive therapy such as surgery or radiation, is often a viable course.[2,3] Research on the underuse of active surveillance has focused on patient clinical characteristics such as age and comorbid disease,[4] and to some degree patient beliefs and preferences.[5,6] However, it is well established that emotions also drive patient decision making, including cancer

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related decision making.[7] Understanding the role of emotion in PCa treatment decision making has the potential to reveal new approaches to helping men make treatment decisions that are informed by an understanding of treatment options, outcomes and side effects, and preferences and values. In this study we examine whether patients with PCa who are more emotionally distressed after diagnosis choose surgery over radiation or active surveillance.

A number of patient beliefs are associated with choosing more aggressive treatment. Men who are concerned about cancer progression and place importance on tumor removal are more likely to choose surgery[8,9] and more likely to convert to definitive therapy if on active surveillance.[10] A desire to take action in the face of the cancer threat may also motivate the choice of definitive therapy.[11] Among definitive therapies surgery may be viewed as the most aggressive by many patients who reason that radiation offers adequate cancer control with fewer side effects.[8]

We know that many men, by most estimates a quarter to a third of men, experience significant distress when diagnosed with PCa.[12-14] As there are effective interventions for emotional distress in patients with cancer,[15] there is considerable usefulness in testing whether patient distress is partially driving the overtreatment of low risk PCa. In 1 study distress during decision making was associated with choosing surgery over radiation or active surveillance.[9] However, we do not know whether emotional distress at diagnosis predicts choosing surgery. For our study we hypothesized that emotional distress at diagnosis and emotional distress soon after treatment decision making would be associated with a higher likelihood of choosing surgery over radiation or active surveillance. We tested these hypotheses in the sample as a whole and, of particular interest, in men with low risk disease. If early emotional distress influences treatment choice, it might be possible to intervene shortly after diagnosis and improve the quality of the treatment decision making process as well as patient quality of life.

METHODS

Procedure
Data were from the Live Well Live Long! study of PCa treatment decision making and survivorship.[16] Participants with newly diagnosed clinically localized PCa were approached at 2 comprehensive cancer centers and 3 community facilities between July 2010 and August 2014. Of the 3,337 patients approached to participate 2,476 were consented and 2,008 completed the first survey. Data for the present analyses were from this first survey completed upon consent and from a second survey completed after

participants had made a treatment decision but before treatment, and were abstracted from participant medical records. A total of 1,631 men completed both surveys and had medical record data. There were 23 men who reported a race/ethnicity other than nonHispanic black, non-Hispanic white and Hispanic who were not included due to the small size of this group. Data were also excluded for participants (77) who had missing observations for any of the model covariates (D'Amico risk, comorbidities, education, race/ethnicity, marital status, employment status, age at diagnosis, recruiting site), which yielded a final sample of 1,531 men. Study procedures were institutional review board approved and participants completed a written informed consent.

Measures
We measured emotional distress with the Distress Thermometer, an 11-point single-item visual analog scale ranging from 0 (no distress) to 10 (extreme distress) shortly after consent (baseline) and again as soon as participants had made a treatment decision. The Distress Thermometer has been validated and is a recommended distress screening tool for use in patients with PCa,[17-20] with good specificity and sensitivity for detecting cancer specific distress.[18]

We stratified participant disease risk by D'Amico risk score, a widely used system for categorizing PCa disease risk.[21] To calculate the scores we abstracted clinical stage, pretreatment biopsy Gleason score and pretreatment PSA from participant medical records. Low risk PCa was defined as PSA 10 ng/ml or less, Gleason score 6 or less and AJCC less than cT2b.[22] Intermediate risk PCa was defined as PSA 11 to 20 ng/ml, or Gleason 7 disease or AJCC cT2b. High risk disease was defined as PSA greater than 20 ng/ml or Gleason 8–10 disease or AJCC cT2c or higher.[22]

We assessed several potential comorbidities. Whether participants had diagnoses of CVD (myocardial infarction, coronary artery disease, congestive heart failure, peripheral vascular disease, cerebrovascular disease), diabetes or hypertension was abstracted from patient medical records. For 122 participants whether they had coronary artery disease was not abstracted. These cases were coded as having coronary artery disease if the condition was self-reported at baseline.

We assessed self-reported years of education, household income, race/ethnicity, marital status, employment status (employed vs not employed) and date of birth, from which age at diagnosis was calculated. Recruiting site was recorded by participant recruiters. All assessments were made at baseline.

We assessed men's confidence in cancer control or beliefs that the cancer would not progress with the cancer control subscale of the multidimensional PCa quality of life scale of Clark et al.[23] Two items were slightly adapted to be more appropriate for patients not yet treated. Participants responded to 5 statements using a 5-point Likert-type response format (1—strongly agree, 5—strongly disagree) ($\alpha=0.75$). Example items included, "I am confident that the cancer will be brought under control" and "I worry about the cancer spreading."

Data Analyses

We used multinomial logistic regression to test whether distress at diagnosis or after having made the treatment decision was associated with a greater likelihood of choosing surgery over radiation or active surveillance. We tested models for baseline and treatment decision making distress in the full sample and after stratifying by disease risk (D'Amico score). We controlled for disease risk except when it was a stratification variable. We also controlled for comorbidities that can contraindicate surgery (cardiovascular disease, diabetes, hypertension) as well as for demographic variables potentially associated with differences in the type of treatment received (education, race/ethnicity, employment status, marital status and age). We controlled for recruiting site, although this variable is not included in the tables as the choice of referent site is arbitrary. We also repeated all analyses after adding a measure of confidence in cancer control to verify that associations between distress and type of treatment received were not due solely to concern about cancer progression. Shared recruiting site introduced nonindependence into the data. Therefore, we used robust standard errors in all models so that if the correlation structure was not correctly specified, the standard errors would still be valid.

RESULTS

Participant Characteristics

Most participants had low risk (35.7%) or intermediate risk (49.1%) disease rather than high risk disease (15.2%). They were most likely to have been treated with surgery (48.4%), followed by radiation (27.4%) and active surveillance (24.2%). Mean emotional distress at baseline was 4.37 (SD 2.56) out of 10 and was somewhat reduced after the men had made a treatment decision (4.10, SD 2.58) (t[1,462] = 5.36, p <0.001). Distress and confidence in cancer control were negatively associated at baseline (r = −0.38, p <0.001) and soon after having made the treatment decision (r = −0.34, p <0.001). Participant characteristics are described in detail in table 1.

Multivariable Analyses

The overall pattern of associations between distress and treatment choice were similar for distress shortly after diagnosis and after treatment decision making, although associations were stronger for the latter. Distress shortly after diagnosis predicted choosing surgery over AS (RRR 1.07; 95% CI 1.01, 1.14; p=0.021, table 2). Distress shortly after the treatment decision was associated with having chosen surgery over AS (RRR 1.16; 95% CI 1.09, 1.24; p <0.001) and surgery over radiation (RRR 1.12; 95% CI 1.05, 1.19; p=0.001, table 3). In the group of primary interest, men with low risk disease, distress shortly after diagnosis was associated with choosing surgery over AS (RRR 1.11; 95%

Table 1. Participant characteristics

No. D'Amico risk (%):		
Low	547	(35.73)
Intermediate	752	(49.12)
High	232	(15.15)
No. CVD (%)	188	(12.28)
No. hypertension (%)	752	(49.12)
No. diabetes (%)	200	(13.06)
No. yrs of education (%):		
Less than 12	48	(3.14)
12	275	(17.96)
13—16	699	(45.65)
17—20	509	(33.24)
No. income (%):		
Less than $25,000	80	(6.18)
$25,000—$49,999	149	(11.50)
$50,000—$74,999	195	(15.06)
$75,000—$99,999	186	(14.36)
$100,000 or Greater	685	(52.90)
No. race/ethnicity (%):		
NonHispanic white	1,268	(82.82)
NonHispanic black	164	(10.71)
Hispanic	99	(6.47)
No. married (%)	1,290	(84.26)
No. employed (%)	894	(58.39)
Mean age at diagnosis (SD)	63.20	(7.98)
No. treatment received (%):		
AS	361	(24.20)
Radiation	409	(27.41)
Surgery	722	(48.39)
Mean distress at baseline (SD) in 1,476	4.37	(2.56)
Mean distress at decision making (SD) in 1,516	4.10	(2.58)

Percentages were calculated based on valid data.

CI 1.02, 1.22; p=0.019; supplementary table 1, http://jurology.com/). Distress at the treatment decision was associated with choosing surgery over active surveillance (RRR 1.21; 95% CI 1.10, 1.34; p <0.001) and surgery over radiation (RRR 1.25; 95% CI 1.09, 1.45; p=0.002; supplementary table 2, http://jurology.com/). In men with intermediate risk disease distress at decision making but not distress shortly after diagnosis was associated with a greater likelihood of choosing surgery over active surveillance (RRR 1.15; 95% CI 1.03, 1.28; p=0.014) and surgery over radiation (RRR 1.09; 95% CI 1.00, 1.19; p=0.05, not shown in tables). In men with high risk disease, distress was not associated with treatment choice (not shown in tables). Findings were also replicated, and in fact strengthened, when we controlled for confidence in cancer control (supplementary tables 3 and 4, http://jurology.com/).

Other Determinants of Treatment Choice

The pattern of associations between covariates and treatment choice was nearly identical for models that included distress at baseline (table 2) or distress just after decision making (table 3). Having higher risk disease was associated with choosing surgery or radiation over active surveillance, and having CVD was associated with a lower likelihood of choosing surgery over active surveillance or

Table 2. *Treatment choice as a function of baseline emotional distress (in 1,440)*

	Surgery vs AS			Surgery vs Radiation			Radiation vs AS		
	RRR	95% CI	p Value	RRR	95% CI	p Value	RRR	95% CI	p Value
Distress	1.07	1.01, 1.14	0.021	1.02	0.96, 1.10	0.493	1.05	0.97, 1.13	0.203
D'Amico risk:									
Intermediate	11.50	7.95, 16.63	0.000	1.16	0.76, 1.76	0.497	9.94	6.35, 15.56	0.000
High	21.86	11.16, 42.82	0.000	1.39	0.80, 2.41	0.242	15.74	7.78, 31.85	0.000
Hypertension	1.02	0.75, 1.40	0.888	0.92	0.65, 1.30	0.645	1.11	0.76, 1.63	0.598
Diabetes	0.90	0.57, 1.42	0.658	0.72	0.45, 1.15	0.166	1.26	0.75, 2.10	0.380
CVD	0.59	0.36, 0.96	0.034	0.28	0.17, 0.46	0.000	2.09	1.26, 3.45	0.004
Yrs of education	0.94	0.89, 0.99	0.026	1.03	0.97, 1.09	0.336	0.91	0.85, 0.98	0.007
Race:									
NonHispanic black	0.97	0.52, 1.82	0.928	0.43	0.26, 0.71	0.001	2.26	1.23, 4.14	0.008
Hispanic	0.89	0.40, 1.99	0.782	0.64	0.33, 1.25	0.189	1.40	0.63, 3.11	0.415
Married/cohabitating	1.86	1.18, 2.95	0.008	1.44	0.90, 2.32	0.131	1.29	0.78, 2.15	0.325
Employed	0.95	0.67, 1.36	0.794	1.09	0.74, 1.59	0.665	0.88	0.58, 1.33	0.540
Age	0.89	0.87, 0.92	0.000	0.88	0.86, 0.91	0.000	1.02	0.98, 1.05	0.372

Referent groups were low risk and nonHispanic white. All models controlled for recruitment site.

radiation and a higher likelihood of choosing radiation over active surveillance. Being more educated was associated with a lower likelihood of choosing surgery or radiation over active surveillance. Being black vs white was associated with a higher likelihood of choosing radiation over active surveillance or surgery. Being married was associated with a higher likelihood of choosing surgery over active surveillance and in the distress at decision making model a greater likelihood of choosing surgery over radiation. Being older was associated with a lower likelihood of choosing surgery over active surveillance or radiation.

DISCUSSION

The level of emotional distress in men shortly after diagnosis predicted a greater likelihood of choosing surgery over active surveillance. Importantly, this was true for men with low risk disease, for whom active surveillance may be a clinically viable option and the side effects of surgery or radiation might be unnecessary. Distress was slightly decreased after the men had made a treatment decision, but it remained a predictor of having chosen surgery over active surveillance and surgery over radiation in the sample as a whole and in men with low risk disease. A number of studies have shown that emotional distress is relatively high in newly diagnosed men,[12,16,24] but our study is novel as it demonstrates prospectively and cross-sectionally that emotional distress motivates patients with PCa to choose more aggressive treatment.

It is well established that the key reasons men choose surgery is belief that PCa is a serious disease[9] and that surgery is the best option for cancer control.[8,9,25] Fear of cancer progression and death is likely one source of distress for patients with PCa, and may partially account for the

Table 3. *Treatment decision as a function of treatment decision making distress (in 1,477)*

	Surgery vs AS			Surgery vs Radiation			Radiation vs AS		
	RRR	95% CI	p Value	RRR	95% CI	p Value	RRR	95% CI	p Value
Distress	1.16	1.09, 1.24	0.000	1.12	1.05, 1.19	0.001	1.04	0.97, 1.12	0.296
D'Amico risk:									
Intermediate	12.42	8.56, 18.02	0.000	1.20	0.79, 1.82	0.404	10.39	6.62, 16.30	0.000
High	22.08	11.39, 42.78	0.000	1.43	0.83, 2.47	0.196	15.41	7.71, 30.79	0.000
Hypertension	1.00	0.73, 1.38	0.975	0.91	0.65, 1.27	0.580	1.11	0.76, 1.62	0.605
Diabetes	0.96	0.61, 1.51	0.846	0.76	0.48, 1.21	0.246	1.25	0.75, 2.10	0.387
CVD	0.56	0.34, 0.91	0.019	0.28	0.17, 0.45	0.000	2.03	1.23, 3.34	0.005
Yrs of education	0.94	0.89, 0.99	0.025	1.02	0.96, 1.09	0.448	0.92	0.86, 0.98	0.012
Race:									
NonHispanic black	0.98	0.53, 1.81	0.936	0.46	0.28, 0.76	0.002	2.11	1.17, 3.80	0.013
Hispanic	0.96	0.42, 2.18	0.919	0.70	0.36, 1.38	0.300	1.37	0.61, 3.09	0.447
Married/cohabitating	1.94	1.23, 3.07	0.005	1.61	1.01, 2.56	0.046	1.21	0.73, 1.99	0.460
Employed	0.94	0.66, 1.34	0.748	1.10	0.75, 1.60	0.632	0.86	0.57, 1.30	0.480
Age	0.90	0.87, 0.92	0.000	0.89	0.86, 0.91	0.000	1.01	0.98, 1.05	0.480

Referent groups were low risk and nonHispanic white. All models controlled for recruitment site.

relationship between distress and choosing surgery over other treatment modalities. Indeed, in our sample confidence in cancer control was inversely associated with emotional distress, and was uniquely associated with choosing surgery over active surveillance and radiation. It seems that the men considering or who chose surgery were more confident that their cancer would be cured. It is also true that distress predicted choosing surgery even when controlling for confidence in cancer control. We previously reported that low self-efficacy for decision making, low confidence in cancer control and masculine identity threat are also associated with distress at diagnosis, and dispositional optimism and resilience protected against distress.[16] Intervening in any of these determinants of early distress might have the additional benefit of reducing overtreatment.

Patterns of associations between demographic characteristics and treatment choice were consistent with other reports in the literature. For example, younger patients with PCa (ie with a longer life expectancy) are more likely to receive aggressive treatment than older patients.[4,8] Married men also choose more aggressive treatment.[26,27] Family roles and partners' social influence may lead partnered men to choose a treatment that they believe will maximize their chance of cure and longevity.[28] In contrast, some unmarried men may place relatively greater value on sexual function and avoid surgery because they believe it poses the greatest threat of erectile dysfunction. In our sample and nationally, black men are disproportionately more likely to receive radiation. However, unlike in national samples, black participants did not undergo surgery at a lower rate than white men.[29] As CVD can be a contraindication for surgery it is not surprising that it was associated with a lower likelihood of choosing surgery. However, in our sample having CVD was counterintuitively associated with a greater likelihood of choosing radiation over active surveillance. One would have expected significant comorbidity to be associated with a lower projected life expectancy and a lower likelihood of receiving definitive therapy.

Our study had several limitations. Our sample is not nationally representative of all men diagnosed with clinically localized disease and had a relatively high mean socioeconomic status. We may have underestimated the effect of distress on choosing aggressive treatment if men who were more emotionally distressed were less likely to participate. The Distress Thermometer is a widely used screening tool for psychological distress. However, it is a single item with associated potential for measurement error. Future research might replicate this study using a multidimensional scale such as the HADS (Hospital Anxiety and Depression Scale). We might also test whether knowing patients' history of affective disorders could help screen for individuals who will choose aggressive therapy due to emotional distress. Future work might also examine if partner distress motivates uptake of aggressive treatment.

CONCLUSIONS

Emotional distress before treatment decision making is not only a concern with respect to patients' psychosocial well-being. It may also impact the treatment decision making process, motivating men to choose surgery over other treatments. Significantly, we found this pattern to be true for men with low risk disease who might be good candidates for active surveillance. Effects may be direct through men's preferences (ie more distressed men prefer the best chance of cure), or indirect if physicians recommend more aggressive treatment to men who are more anxious about cancer control.[30] In both scenarios early interventions to reduce distress (eg additional explanation about PCa prognosis, decision aids, brief cognitive behavioral therapy, use of relaxation or mindfulness apps) may benefit the treatment decision making process and patients' psychosocial well-being. Our findings support recent trends in promoting screening for emotional distress, but highlight the value of doing so early on, before men make treatment decisions. Early work on treatment choice primarily focused on cognitive determinants such as physician recommendations, beliefs, preferences and the influence of anecdotal information.[8,9,25] Our study and recent work on the role of fear of treatment and side effects indicate the importance of emotional processes in men's PCa treatment decisions.

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