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Prostate cancer diagnosis: The impact on patients' mental health

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ABSTRACT

Because the introduction of PSA testing has increased the reported incidence of prostate cancer, this study assessed the mental impact on men after receiving a diagnosis of prostate cancer.

Participants in a prostate cancer screening trial (ERSPC) completed a questionnaire on health and, if diagnosed with prostate cancer, at two additional time points.

In the pre-screening phase 3800 men (response 88%) completed the questionnaire. Of screen-diagnosed men ($n = 82$) 52 (response 63%) completed two additional assessments. Gleason scores were $\leqslant 7$ in 96% of men. Mental and self-rated overall health worsened significantly immediately after diagnosis ($P \leqslant 0.04$). Six months later these scores improved and no longer differed significantly from the pre-diagnosis score.

After obtaining a pre-diagnosis assessment in prospective prostate cancer patients we found a significant negative mental impact of prostate cancer diagnosis based on PSA testing. We recommend that clinicians share their knowledge on the generally favourable prognosis with their patients. The methodological implication is that considering a post-diagnosis assessment as 'baseline' may lead to an underestimation of the patient's mental health.

1. Introduction

Prostate cancer is highly prevalent in elderly men and the most frequent cause of cancer death after lung cancer in most Western countries. Prostate cancer can often be detected early by testing for prostate-specific antigen (PSA). PSA, a biologic tumour marker that was clinically introduced in the 1980s, has led to a substantially higher proportion of prostate cancers to be diagnosed at earlier stages than before [1,2]. Prostate cancer screening through regular PSA testing (e.g., once every four years) is estimated to advance diagnosis by about 11 years [3]. Whether early detection followed by appropriate treatment will reduce prostate cancer-specific mortality is currently being assessed in two large randomized trials: the Prostate, Lung, Colorectal and Ovary (PLCO) trial in the USA [4]; and the European Randomized Screening for Prostate Cancer (ERSPC) trial in Europe [5]. The outcomes on life years gained are not expected before 2007 [6]. Information on the side-effects of primary prostate cancer treatment is currently available from longitudinal observational studies that typically report mainly erectile and urinary dysfunction after radical prostatectomy, and erectile and bowel dysfunction after external radiotherapy [7–11].

In its early stage, prostate cancer does not usually cause pain or other dysfunction. The average man who is diagnosed through PSA screening may have considered himself healthy before being diagnosed with prostate cancer, a disease often perceived as life threatening [12]. The impact on mental

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health of being diagnosed with prostate cancer after screening is not yet known. Studies on health-related quality of life in prostate cancer patients included patients before the initiation of treatment [10,11,13,14] or shortly thereafter [7], but never before diagnosis. In a previous longitudinal study on primary prostate cancer patients treated by radical prostatectomy or external radiotherapy, we found a striking improvement in reported mental health after primary treatment compared to pre-treatment [8]. We hypothesized that low mental health before treatment might have been caused by the preceding diagnosis of prostate cancer. To realistically assess the impact of prostate cancer diagnosis on mental health, a baseline assessment before diagnosis is required. Such an assessment is usually not feasible since it is unknown who will develop cancer and when, so that the inclusion of a very large cohort would be required. The unique context of the ERSPC, however, enabled the inclusion of a male cohort before screening and thus before diagnosis. In this study, we have conducted a prospective study to assess the impact of being diagnosed with prostate cancer in a screening program on mental and self-rated health in men who did not experience any pain or other prostate cancer symptoms.

2. Patients and methods

2.1. Ethics approval and informed consent

The ethics review committee of the Erasmus MC, University Medical Centre Rotterdam, the Netherlands, approved the research protocol. All participating men gave written informed consent to be interviewed for the study.

2.2. ERSPC

The inclusion of ERSPC participants was initiated in the region of Rotterdam in 1994, and continued until 1999. All male inhabitants of the Rotterdam region between 55 and 74 years of age were identified through the population registry and invited to participate in the trial. Men who gave informed consent (49.2%) were randomly assigned to the study ($n = 21{,}210$) or the control (i.e., unscreened) arm ($n = 21{,}166$). Participation entailed a PSA test once every four years and, if indicated, a biopsy of the prostate. Details on inclusion have been reported before [15].

2.3. Participants

Between January 2003 and May 2004 screen participants who were due for the second ($n = 2798$) or the third screening round ($n = 2024$) received a short baseline questionnaire on health (see below) by mail, attached to the invitation for screening. If men (1) completed the baseline questionnaire before the PSA test in their second or third screening round and (2) were subsequently diagnosed with prostate cancer, they were asked to complete the questionnaire on health (via a telephone interview) two additional times: i.e., before initiation of primary treatment and 6 months afterwards, resulting in three assessments per 'respondent'.

The men who were diagnosed with prostate cancer through screening but refused to complete further assessments are referred to here as 'non-respondents'; their baseline evaluations (i.e., before diagnosis) are used to assess non-response bias. The men who completed the questionnaire on health before screening and who were found not to have prostate cancer are referred to here as 'screen-negative men'; their baseline assessments are used to compare respondents and screen-negative men.

2.4. Questionnaire

The questionnaire on health consisted of (1) the SF-36 scales on mental health and vitality and (2) the EQ valuation of Own Health.

1. The complete SF-36 (Short-Form 36) consists of 8 scales on physical and mental domains of health. Because the present study focused on mental health and in order to reduce the questionnaire burden for screen participants, we used the two scales on mental health (5 items on being nervous, down, peaceful, depressed and happy) and vitality (4 items on being full of life, having a lot of energy, being worn out and tired), and excluded the remaining SF-36 scales. Scales were transformed to ranges of 0–100 with higher scores indicating better mental health and vitality [16]. Differences of at least 7.9 points are considered clinically meaningful [17].
2. The EQ (EuroQol) 5D valuation of Own Health assesses self-rating of own overall health, which we expected would be influenced by receiving the diagnosis of prostate cancer. The 'EQ-5D valuation of Own Health' is a vertical Visual Analog Scale (VAS; a thermometer), anchored at the lower end (0) by 'worst imaginable health state' and at the upper end (100) by 'best imaginable health state'. Participants were asked to indicate on the thermometer how good or bad they perceived their current health to be [18].

Additionally, information on age, screening history and Gleason score was obtained through the screening office.

2.5. Statistical analysis

Paired t tests were used to test for statistical significance of the within-subject differences in outcomes from baseline to 7 months post-diagnosis. Cohen's effect sizes (d) were used to assess the magnitude of the differences between the assessments, and interpreted as follows: $0.2 < d < 0.5$ indicates a small; $0.5 \leqslant d < 0.8$ a moderate; and $d \geqslant 0.8$ a large effect size [19].

Unpaired t tests were used to analyse non-response bias by testing differences between respondents and non-respondents and to test the differences between respondents and screen-negative men at baseline, which was 2 months prior to diagnosis.

3. Results

3.1. Respondents

Of the men who were invited for screening, 4193 participated (2599 second screenings and 1594 third screenings). Reasons

not to participate were, for example, having moved home, being in bad health, or no longer motivated. Of the screen participants, 3800 (response 88%) completed the mailed questionnaire before screening. Of this group, 82 men were subsequently diagnosed with prostate cancer and 52 (response 63%) gave informed consent for two additional assessments. Another two men, who gave informed consent only after initiation of their therapy, were excluded from the interview study and included in the group of non-respondents. The average age of respondents at baseline was 67.3 (SD ±4.4) years (range 60–74 years). All respondents completed the first telephone assessment before treatment was initiated, at a median time of 31 days after diagnosis (25th percentile 21 days, 75th percentile 48 days). One respondent refused the second telephone assessment.

Data on screening history showed that 40 respondents were diagnosed with prostate cancer in their second screening round. Of these men, 24 had not previously been referred for a prostate biopsy and 16 had received a negative biopsy result in the first screening round. Twelve respondents were diagnosed with prostate cancer in their third screening round; of these men, 9 had not been referred for a biopsy before and 3 had received a negative biopsy result in their second screening round. The Gleason score was $\leqslant 7$ in the majority of patients (Table 1). Between 1 and 7 months after diagnosis, primary prostate cancer treatment was initiated in the majority of men, consisting of radical prostatectomy ($n = 25$), brachytherapy ($n = 13$), external radiotherapy ($n = 3$), or hormonal treatment ($n = 1$). Nine men opted for watchful waiting and one man had not yet decided (Table 1).

Table 1 – Gleason scores and treatment modality of the screen-detected prostate cancer patients (n = 52)

	Gleason score <7 ($n = 42$)	Gleason score 7 ($n = 8$)	Gleason score >7 ($n = 2$)	Total ($n = 52$)
Radical prostatectomy	18	6	1	25
External radiotherapy	1	2		3
Brachytherapy	13			13
Watchful waiting	9			9
Hormonal treatment			1	1
Undecided	1			1

3.2. *Mental and self-rating of overall health*

Compared to pre-diagnosis, the average mental health and self-rating of own overall health scores significantly decreased 1 month after diagnosis. Effect sizes were medium (Table 2 and Fig. 1), indicating that mental and self-rated health worsened after being notified of the diagnosis of prostate cancer. After the initiation of treatment the average scores of mental and self-rated health improved; although these scores did not return to the original level, the scores no longer differed significantly from the scores preceding the diagnosis. The average vitality score decreased throughout follow-up, ranging from 75.3 before diagnosis to 73.0 at 7 months post-diagnosis (difference not significant).

We repeated the above-described analysis including the men who opted for 'active treatment' ($n = 42$) and excluding those who opted for watchful waiting or had not yet decided on treatment. The results of these analyses (*P*-values and effect sizes) were similar to those of the entire cohort.

3.3. *Non-response analysis*

In the non-responding men diagnosed with prostate cancer ($n = 30$) the average age at baseline was 66.7 (SD ±4.3, range 59–73) years. The non-respondents did not differ significantly from the respondents on age or any other health measures (Table 3).

3.4. *Comparability of respondents versus screen-negative men*

With a baseline average age of 68.1 (SD ±4.2, range 60–77) years, screen-negative men ($n = 2066$) were on average slightly older than the respondents. Average mental health and self-rated health scores of screen-negative men and respondents were similar (Table 3).

4. Discussion

Despite its favourable prognosis, we found that being notified of prostate cancer diagnosis after PSA testing had a significant negative impact on men's mental and self-rated overall health. This negative impact indicates that a first assessment before treatment but after diagnosis is not a realistic baseline assessment in the sense of representing the situation without

Table 2 – Average scores (SD) on the health questionnaire of screen-detected prostate cancer patients (n = 52)

Scales (0–100)	2 Months before diagnosis	1 Month after diagnosis	7 Months after diagnosis	*P*-value*	Effect size[a,*]	*P*-value**	Effect size**	*P*-value***	Effect size***
SF-36 mental health	83.2 (12)	75.8 (17)	80.0 (14)	0.001	0.64	0.07	0.25	0.10	0.28
SF-36 vitality	75.3 (16)	74.8 (14)	72.8 (18)	0.77	0.04	0.23	0.13	0.28	0.16
EQ valuation of own health	80.2 (12)	74.5 (15)	77.4 (14)	0.01	0.49	0.18	0.19	0.20	0.24

a Cohen's effect size: >0.2 = small effect; >0.5 = medium effect; >0.8 = large effect.
* Regarding differences between 2 months before diagnosis and 1 month after diagnosis.
** Regarding differences between 1 and 7 months after diagnosis.
*** Regarding differences between 2 months before diagnosis and 7 months after diagnosis.

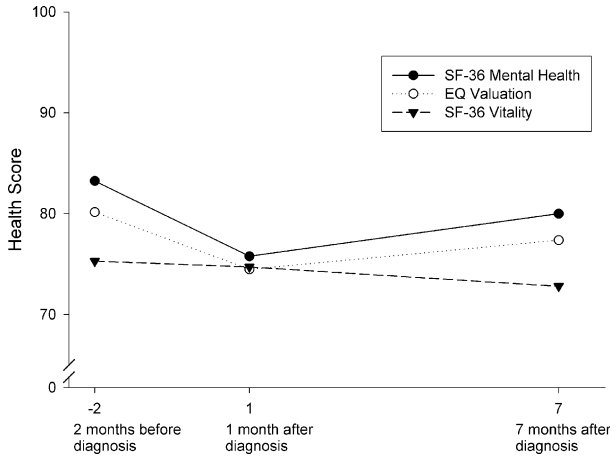

Fig. 1 – Average scores on the health questionnaire of screen-detected prostate cancer patients (*n* = 52) before and after diagnosis.

prostate cancer. The current study had several strengths and limitations. We consider the study design to be one of its strengths; the unique context of the ERSPC allowed the inclusion of patients before they knew whether or not they would be diagnosed with cancer, which is usually unfeasible. This study is the first to have obtained a pre-diagnosis assessment of quality of life, and can thus describe the impact of the diagnosis itself on mental and self-rated health. Additional strengths are the large proportion of screen participants that completed the baseline assessment (88%) and the fact that it is unlikely that non-response bias influenced the results of this study. The limited number of respondents can be explained by the low detection rate in the group of 3800 men who completed the baseline questionnaire. Furthermore, we acknowledge that offering questionnaires in two different modes (i.e., self-administered questionnaires before diagnosis versus telephone interviews afterwards) was sub-optimal. The rationale for this was that telephone assessments of 3800 screen participants was considered unfeasible, as was self-administered questionnaires after diagnosis because we had to be sure that the questionnaire was completed before the initiation of treatment.

Very few patients in the moderate- and high-risk categories were entered in our study. This is certainly related to the fact that respondents in our study were being screened for the second or third time; thus, many large tumours are not expected at this stage. To include more patients in the higher risk categories, a study similar to ours could be conducted among screen participants who attend for the first time.

To our knowledge such a study design has not been used before to report on prostate cancer or other types of cancer. Montazeri and colleagues investigated knowledge of cancer diagnosis and quality of life and found no difference in average scores between lung cancer patients who knew their diagnosis ($n = 30$) and patients who had not yet heard that they had lung cancer ($n = 99$). The authors concluded that "a baseline assessment of quality of life in cancer patients with knowledge of their diagnosis can be considered valid" [20]. We agree that such an assessment can be considered a 'valid baseline assessment' if, for example, the effects on quality of life of two different therapies are compared. However, we do not consider such an assessment after diagnosis to be 'valid' to represent the quality of life of someone without cancer, for example in burden-of-disease studies. An important distinction between the study on lung cancer patients and ours was that the lung cancer patients experienced symptoms and were in the process of being diagnosed, i.e., the diagnosis might have confirmed what they already feared. Our screen participants, however, typically did not experience any symptoms. Although their health did not change after diagnosis in the sense of dysfunction or pain, their self-rated overall health decreased significantly. Norm data of men without prostate cancer can be an alternative source of 'baseline' scores, for instance as reported by Litwin [21].

The significant negative impact of diagnosis after screening on mental and self-rated overall health, as reported here may be an underestimation of this impact since the respondents in the present study were participants in a screening trial. They knew that they could be diagnosed with prostate cancer, in contrast to men who undergo a routine health check-up and may not be aware that this includes a PSA test. In what they claim to be the first longitudinal study on psychological and decision-related adjustment after prostate cancer treatment, Steginga and colleagues followed a cohort of 111 men with localized prostate cancer up to 12 months afterwards; they found that psychological and decision-related distress decreased with time, independent of treatment modality [22]. This corresponds with our finding that 7 months after diagnosis, when treatment had been initiated for most men, mental

Table 3 – Baseline average scores (SD) of screen-detected prostate cancer patients, both respondents (n = 52) and non-respondents (n = 30), and screen negative men

Scales (0–100)	Prospective screen-detected respondents (*n* = 52)	Prospective screen-detected non-respondents (*n* = 30)	Prospective screen-negative men (*n* = 2066)	*P*-value*	*P*-value**
SF-36 mental health	83 (12)	84 (11)	82 (14)	0.77	0.59
SF-36 vitality	75 (16)	79 (15)	75 (17)	0.26	0.86
EQ valuation of own health	80 (12)	83 (12)	81 (20)	0.39	0.81

* *P*-value of differences between prospective screen-detected respondents and prospective screen-detected non-respondents.
** *P*-value of differences between prospective screen-detected respondents and prospective screen-negative men.

and self-rated overall health scores no longer differed significantly from baseline scores indicating that the majority of men felt better again.

Men diagnosed with prostate cancer after PSA testing generally have a favourable prognosis. The American Cancer Society reported a relative 5-year survival rate in prostate cancer patients of 98% [1], and among patients who were diagnosed with well or moderately differentiated localized/regional prostate cancers even 5- and 10-year relative survival rates have been recorded that indicate the lack of any excess mortality [23]. Clinicians, who are aware of the favourable prognosis of early detected prostate cancer, may not always realize the magnitude of the impact that receiving a prostate cancer diagnosis nonetheless has on their patients. We recommend that clinicians should share their knowledge on favourable prognoses with newly diagnosed prostate cancer patients. We do not consider our results as a recommendation for or against the uptake of screening, but as useful information for men who may undergo PSA testing and for physicians or others who inform such men about screening and its possible implications.

We found that in spite of its favourable prognosis, receiving a prostate cancer diagnosis after PSA testing had a significant negative impact on men's mental and self-rated overall health. This may have clinical implications for counselling. The methodological implication is that considering a post-diagnosis assessment of quality of life as 'baseline' may lead to an underestimation of the mental health of prostate cancer patients. This may also apply to other screen-detected or clinically diagnosed cancers as well.

Conflict of interest statement

None of the authors has any financial or personal relationship with other people or organizations that could inappropriately influence or bias their work.

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