



Health-Related Quality of Life Among Patients with Non-Muscle-Invasive Bladder Cancer and Muscle-Invasive Bladder Cancer Undergoing Standard-of-Care Treatment in Japan: A Cross-Sectional Study

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● Abstract

Background: Patients with non-muscle-invasive bladder cancer (NMIBC) and muscle-invasive bladder cancer (MIBC) in Japan face trade-offs among oncologic control, toxicity, and lifestyle impact that can trigger decisional conflict. We aimed to quantify health-related quality of life (HRQoL) and decisional conflict across standard of care (SOC) to identify unmet needs.

Methods: We conducted a cross-sectional survey of adults with NMIBC or MIBC treated within the previous 6 months in Japan across four cohorts: Bacillus Calmette-Guérin (BCG)-treated NMIBC without radical cystectomy (RC); BCG-unresponsive NMIBC with RC; RC-treated MIBC; and bladder-preserved MIBC. HRQoL was assessed using EORTC QLQ-C30 and EORTC bladder cancer (BC) module; decisional conflict with Decisional Conflict Scale (DCS).

Results: We analyzed 215 patients (174 males, 41 females; age 74.9 ± 7.8 years). Global HRQoL was similar across cohorts (mean range 63.6–72.9). All cohorts reported at least moderate decisional conflict (higher with poorer HRQoL) and some functional impairments, with future worries a high BC-specific concern (range 23.6–33.9). Specific impairments varied: the BCG-treated NMIBC without RC cohort scores did not meet clinical relevance thresholds. In contrast, the BCG-unresponsive NMIBC with RC cohort suggested clinically relevant physical/cognitive functioning impairments and high symptom burden. The RC-treated MIBC cohort had clinically relevant physical functioning impairments, dyspnea and nausea/vomiting. The bladder-preserved MIBC cohort suggested similar symptom and functional impairment.

Conclusions: BC patients receiving SOC in Japan experience therapy-specific HRQoL impairments and decisional conflict. Addressing these unmet needs requires individualized treatment strategies, including tolerable, bladder-preserving therapies and enhanced shared decision-making support.

Trial registration: UMIN000056273. Registered 25 November 2024

Keywords: Cross-sectional survey, MIBC, NMIBC, Quality of life, Shared decision making, Unmet needs

BACKGROUND

In 2024, an estimated 18,500 men and 6,100 women in Japan were newly diagnosed with bladder cancer (BC)¹⁾. BC is categorized as non-muscle-invasive bladder cancer (NMIBC) or muscle-invasive bladder cancer (MIBC), each following distinct therapeutic pathways. For high-risk NMIBC, the standard approach is transurethral resection of bladder tumor (TURBT)

followed—according to pathologic grade and stage—by intravesical Bacillus Calmette-Guérin (BCG) instillation²⁾. Although intravesical BCG therapy remains the mainstay of bladder preservation, it fails in roughly 30–50% of patients, who experience persistent or early-relapsing disease^{3,4)}. Once BCG-unresponsive disease is confirmed (i.e., refractory disease or early relapse within 12 months after adequate BCG²⁾), radical cystectomy (RC) constitutes the standard of care (SOC)²⁾. However, RC is

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associated with a high incidence of complications and may result in substantial impairment in health-related quality of life (HRQoL), body image, and sexual function⁵⁻⁷.

In contrast to NMIBC, most cases of MIBC are treated surgically from the outset, with RC remaining the SOC. For cisplatin-eligible patients with MIBC, cisplatin-based neoadjuvant chemotherapy followed by RC is the SOC²⁾. When RC is not an appropriate option or is not desired by the patient, trimodal therapy (TMT)—TURBT followed by concurrent chemoradiotherapy—is employed as a bladder-preserving alternative²⁾. Nevertheless, clinically meaningful acute and late toxicities related to radiotherapy and systemic chemotherapy remain problematic⁸⁾.

Consequently, when weighing the trade-offs between oncologic control, toxicity, and lifestyle impact, patients with NMIBC or MIBC in Japan may experience substantial decisional conflict. However, Japan-specific HRQoL data stratified by treatment modality are scarce, highlighting the need to characterize HRQoL and decisional conflict across currently available therapies.

This study aimed to quantify HRQoL and decisional conflict regarding treatment choice among patients undergoing current SOC for BC and to identify unmet medical needs, information gaps, and areas requiring additional support.

MATERIALS AND METHODS

PARTICIPANTS

We conducted a cross-sectional, anonymous, paper-based survey of patients with BC in Japan. Physicians registered with a physician panel managed by PLAMED Inc. recruited participants using convenience sampling. During routine outpatient visits, these physicians identified eligible patients and invited them to participate voluntarily and provided the questionnaire to those who consented. Patients completed the survey and returned it by post. Data were collected from 2 December 2024 to 9 April 2025. INTAGE Healthcare Inc. managed all incoming mail and data entry, employing a double-checking process to minimize human error, and patients who completed the survey received an honorarium with fair-market value in Japan.

Eligible patients were adults (≥ 18 years) with physician-confirmed NMIBC or MIBC able to provide informed consent. For NMIBC, patients were classified into one of two cohorts: the BCG-treated NMIBC without RC cohort, comprising patients who were currently receiving intravesical BCG or had completed their final instillation within the previous 6 months; or the BCG-unresponsive NMIBC with RC cohort, consisting of patients with BCG-unresponsive disease who had undergone RC within the previous 6 months. For MIBC, patients were classified into either the RC-treated MIBC cohort, defined by RC performed within the previous 6 months; or the bladder-

preserved MIBC cohort, defined by current receipt of—or completion within the previous 6 months of—bladder-preserving therapy, that is, some combination of TURBT, chemotherapy, and/or radiotherapy. Patients were assessed within 6 months after treatment completion to best capture the temporal effects of therapy on HRQoL⁹⁾. Exclusion criteria were metastatic BC, other concurrent cancer, partial RC or a combination of BCG, RC and TMT.

Target sample sizes were 150 (BCG-treated NMIBC without RC), 50 (BCG-unresponsive NMIBC with RC), 100 (RC-treated MIBC), and 50 (bladder-preserved MIBC).

The protocol and all survey materials were approved by the Medical Corporation TOUKEIKAI Kitamachi Clinic ethical review board (approval number KXJ10551).

SURVEY CONTENT

The questionnaire consisted of a 14-item section collecting data on demographics and clinical characteristics, alongside standardized instruments for HRQoL and decisional conflict. Cancer-related HRQoL was assessed using the 30-item European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ)-C30¹⁰⁾. The instrument includes five functioning scales (physical, role, emotional, cognitive, and social), three multi-item symptom scales (fatigue, nausea/vomiting, and pain), six single-item symptom scales (appetite loss, diarrhea, dyspnea, constipation, insomnia, and financial difficulties), and a global health status/QOL (GHS) scale. Scores are linearly transformed to a 0–100 scale. Higher scores indicate better status (functioning and GHS scales) or greater symptom burden (symptom scales). Published thresholds for clinical importance (TCIs) were applied¹¹⁾. Scores below (functioning scales) or above (symptom scales) the TCI suggest a clinically relevant problem. No threshold was published for GHS.

BC-specific HRQoL was assessed using an integrated 34-item EORTC BC module that combines items from the EORTC QLQ-NMIBC24¹²⁾ and EORTC QLQ-BLM30¹³⁾. The integrated module was constructed in accordance with the EORTC guideline¹⁴⁾ to minimize item duplication and respondent burden while preserving the original instrument formats as far as possible. The module contains 14 scales—urinary symptoms, urostomy problems, malaise, future worries, bloating/flatulence, body image, sexual function, male sexual problems, catheter-use problems, intravesical-treatment issues, sexual intimacy, risk of contaminating partner, sexual enjoyment, and female sexual problems—each scored from 0 to 100. Except for sexual function and sexual enjoyment, higher scores reflect more severe symptoms or greater problems.

Decisional conflict related to treatment choice was assessed using the 16-item Decisional Conflict Scale

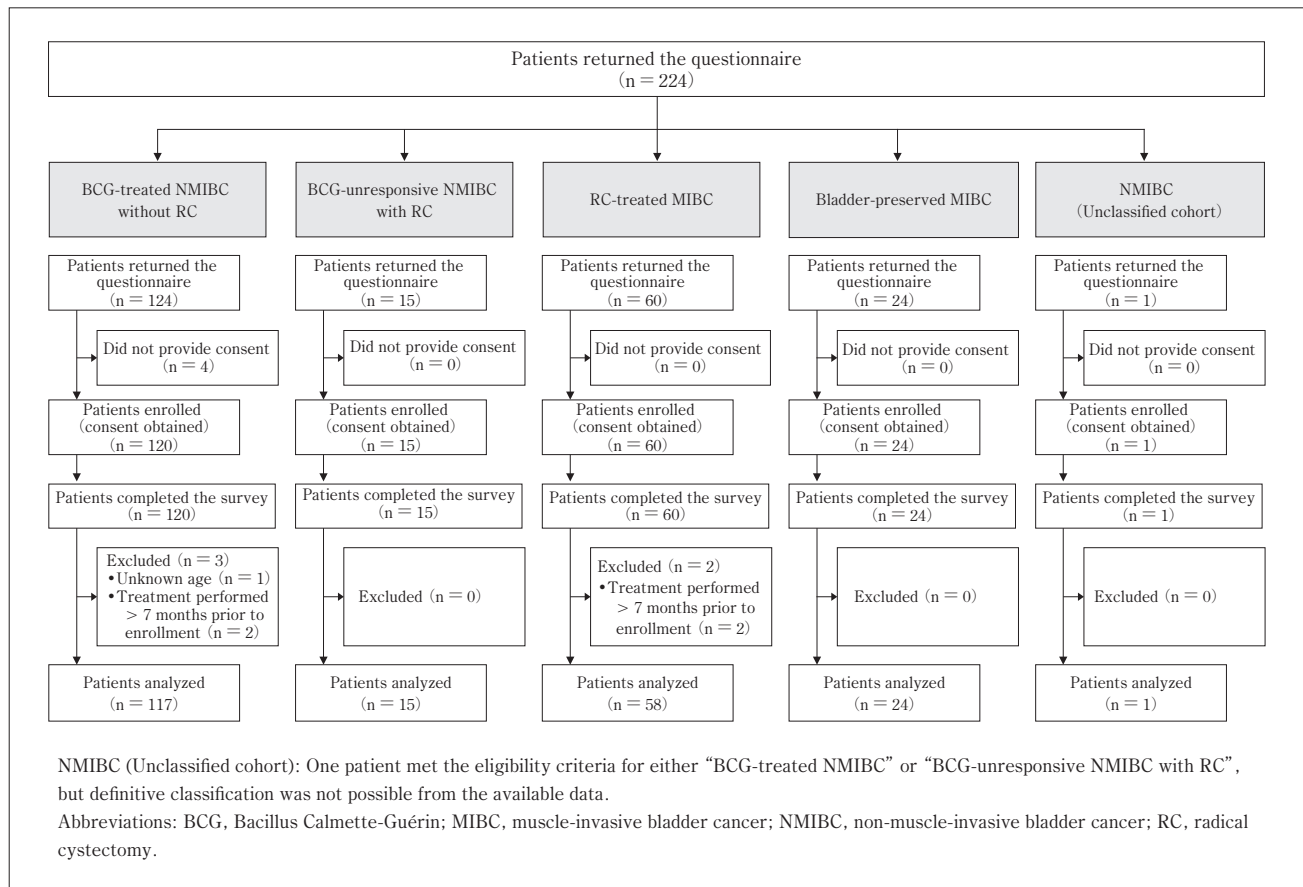


Fig. 1 Flowchart of inclusion

(DCS)¹⁵⁾, yielding a total score and five subscale scores (uncertainty, informed, values clarity, support, and effective decision). Scores range from 0 to 100; higher values indicating greater decisional conflict. Scores are categorized as high (>37.5), moderate (≥ 25 and ≤ 37.5), and low (<25); scores >37.5 are associated with decision delay or uncertainty, whereas scores <25 are associated with decision implementation¹⁶⁾. Items assessed outside the standardized instruments are listed in Additional file 1: Table S1.

STATISTICAL ANALYSIS

Descriptive statistics summarized demographic and clinical characteristics. All scores are presented as mean (95% CI). Based on target sample sizes and a prior study⁷⁾, the expected 95% confidence intervals (CIs) for the mean GHS score were estimated as 68.2–75.4, 65.3–77.1, 68.4–76.6, and 62.3–74.8, respectively. Associations between HRQoL (EORTC QLQ-C30 and EORTC BC module) and decisional conflict (DCS) were evaluated using Spearman’s rank correlation coefficients. Age was dichotomized as <65 years or ≥ 65 years. Subgroup summaries were descriptive only. Missing data were not imputed; when items were missing, scale scores were calculated according to the respective instrument scoring rules. All analyses used R version 4.3.0.

RESULTS

Among the patients who received the questionnaire, 224 returned a completed form. Of these, 220 provided informed consent; five did not meet the eligibility criteria. Accordingly, 215 patients were included in the analyses (**Fig. 1**).

Patients were predominantly male (80.9%), with a mean age of 74.9 years; 90.7% were ≥ 65 years. Overall, 71.6% of patients reported at least one comorbidity, most commonly hypertension (63.0%), followed by diabetes mellitus (35.1%) and heart disease (34.4%) (**Table 1**).

PATIENT-REPORTED OUTCOMES BY COHORT

To evaluate patient-reported outcome (PRO) scores across disease stages and treatments, scores on the EORTC QLQ-C30, the EORTC BC module, and the DCS were summarized for each cohort (**Fig. 2, Additional file 1: Table S2**).

BCG-TREATED NMIBC WITHOUT RC

The mean GHS score was 67.5 (95% CI, 63.7–71.3). While mean EORTC QLQ-C30 scores indicated symptoms and impacts to functioning were present, all five functioning scales exceeded TCIs, and all symptom

Table 1 Demographic and clinical characteristics of participating patients

	All participants (n = 215 ^a)	BCG-treated NMIBC without RC (n = 117)	BCG-unresponsive NMIBC with RC (n = 15)	RC-treated MIBC (n = 58)	Bladder-preserved MIBC (n = 24)
Age, Mean (SD), year	74.9 (7.8)	74.4 (8.1)	77.6 (8.3)	75.4 (7.2)	75.1 (7.2)
Sex, n (%)					
Male	174 (80.9)	91 (77.8)	11 (73.3)	51 (87.9)	20 (83.3)
Female	41 (19.1)	26 (22.2)	4 (26.7)	7 (12.1)	4 (16.7)
Weight ^b , Mean (SD), kg	62.1 (11.0)	61.5 (11.4)	60.5 (12.7)	64 (9.9)	61.5 (11.2)
Height, Mean (SD), cm	163.4 (8.5)	162.7 (8.6)	159.8 (10.2)	165.5 (7.3)	163.9 (8.8)
BMI ^b , Mean (SD), kg/m ²	23.2 (2.9)	23.1 (3.0)	23.4 (2.6)	23.3 (2.8)	22.7 (2.7)
Smoking status, n (%)					
Current	34 (15.8)	18 (15.4)	4 (26.7)	8 (13.8)	4 (16.7)
Past	125 (58.1)	64 (54.7)	7 (46.7)	37 (63.8)	16 (66.7)
Never	56 (26.0)	35 (29.9)	4 (26.7)	13 (22.4)	4 (16.7)
Living status, n (%)					
With someone	181 (84.2)	98 (83.8)	12 (80.0)	49 (84.5)	21 (87.5)
Alone	34 (15.8)	19 (16.2)	3 (20.0)	9 (15.5)	3 (12.5)
Current working status, n (%)					
Employed	73 (34.0)	34 (29.1)	4 (26.7)	23 (39.7)	12 (50.0)
Unemployed	142 (66.0)	83 (70.9)	11 (73.3)	35 (60.3)	12 (50.0)
Presence of comorbidities, n (%)					
Present	154 (71.6)	82 (70.1)	14 (93.3)	43 (74.1)	14 (58.3)
Absent	60 (27.9)	34 (29.1)	1 (6.7)	15 (25.9)	10 (41.7)
Unknown	1 (0.5)	1 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)
Details of comorbidities among patients with ≥1 comorbidity, n (%) ^c					
Diabetes	54 (35.1)	26 (31.7)	7 (50.0)	16 (37.2)	5 (35.7)
Hypertension	97 (63.0)	56 (68.3)	8 (57.1)	27 (62.8)	5 (35.7)
Heart disease	53 (34.4)	24 (29.3)	11 (78.6)	12 (27.9)	6 (42.9)
Kidney disease	14 (9.1)	5 (6.1)	2 (14.3)	5 (11.6)	2 (14.3)
Autoimmune disorders	3 (1.9)	2 (2.4)	0 (0.0)	1 (2.3)	0 (0.0)
Liver disease	2 (1.3)	0 (0.0)	1 (7.1)	1 (2.3)	0 (0.0)
Lung disease	10 (6.5)	3 (3.7)	2 (14.3)	5 (11.6)	0 (0.0)
Other comorbidities	46 (29.9)	24 (29.3)	1 (7.1)	15 (34.9)	5 (35.7)
Experienced treatment in the bladder-preserved MIBC cohort ^d					
TURBT, n (%)					
Performed	19 (79.2)	N/A	N/A	N/A	19 (79.2)
Not performed	3 (12.5)	N/A	N/A	N/A	3 (12.5)
Unknown	2 (8.3)	N/A	N/A	N/A	2 (8.3)
Chemotherapy, n (%)					
Performed	19 (79.2)	N/A	N/A	N/A	19 (79.2)
Not performed	1 (4.2)	N/A	N/A	N/A	1 (4.2)
Unknown	4 (16.7)	N/A	N/A	N/A	4 (16.7)
Radiotherapy, n (%)					
Performed	20 (83.3)	N/A	N/A	N/A	20 (83.3)
Not performed	2 (8.3)	N/A	N/A	N/A	2 (8.3)
Unknown	2 (8.3)	N/A	N/A	N/A	2 (8.3)

^a One patient met the eligibility criteria for either “BCG-treated NMIBC” or “BCG-unresponsive NMIBC with RC”, but definitive classification was not possible from the available data.

^b One patient in the BCG-treated NMIBC group had missing data for weight and BMI; therefore, the denominator is 214 for all participants and 116 for the BCG-treated NMIBC without RC.

^c Denominators are number of patients with “Presence of comorbidities is Present”.

^d Not assessed for other cohorts.

Abbreviations: BCG, Bacillus Calmette-Guérin; BMI, body mass index; MIBC, muscle-invasive bladder cancer; N/A, not applicable; NMIBC, non-muscle-invasive bladder cancer; TURBT, transurethral resection of bladder tumor; RC, radical cystectomy.

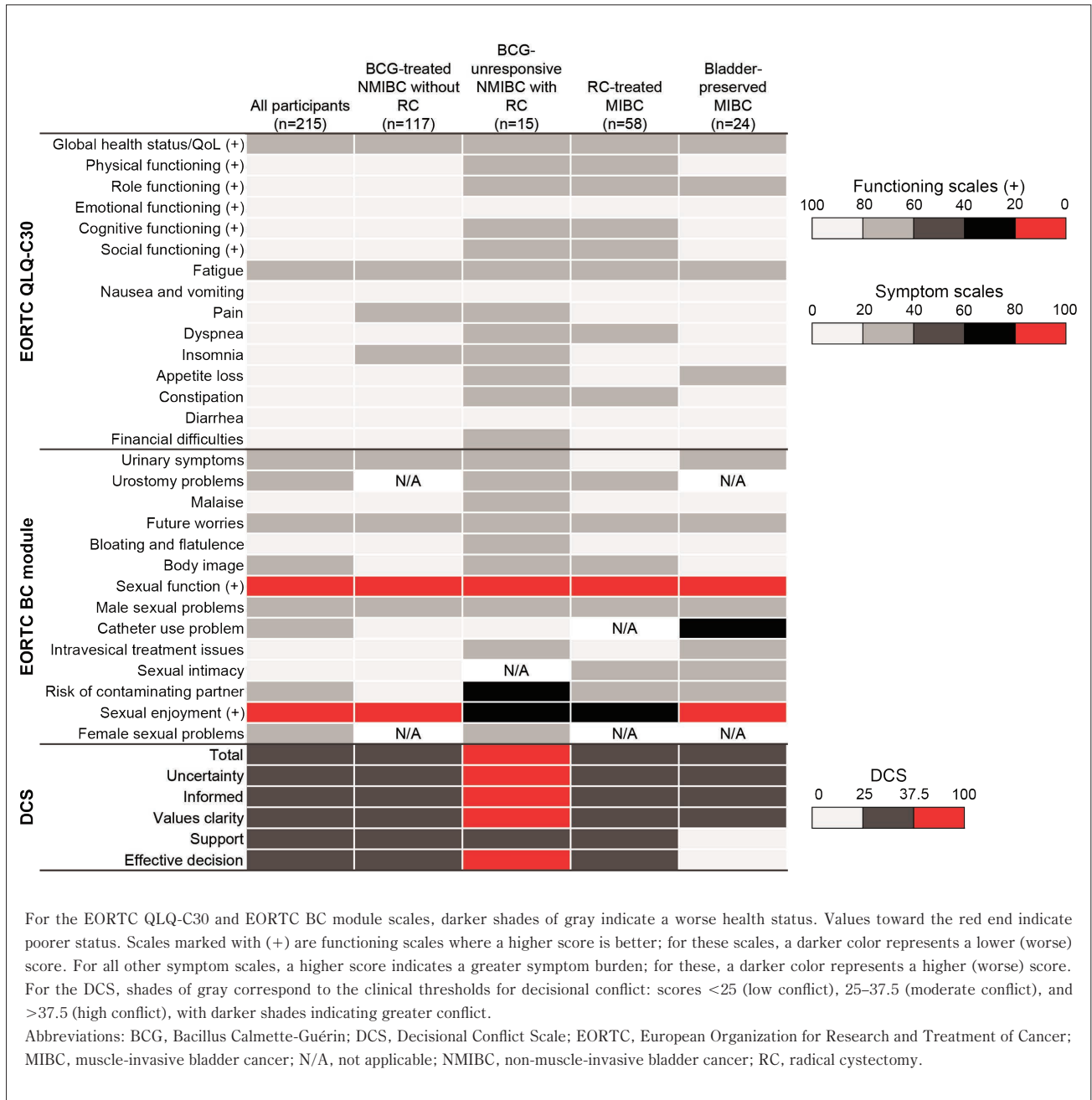


Fig. 2 Heatmap of EORTC QLQ-C30, EORTC BC module, and DCS scores by cohort

scores were below their TCIs. Fatigue was the highest symptom score (mean, 24.2; 95% CI, 21.2–27.1). In the BC module, the highest mean score was observed for future worries (33.9; 95% CI, 29.9–37.9), followed by urinary symptoms (28.6; 95% CI, 25.1–32.1). The mean DCS total score was 31.9 (95% CI, 29.3–34.5), exceeding the threshold for moderate decisional conflict (25), with DCS-uncertainty (34.9; 95% CI, 31.5–38.3) being most prominent.

BCG-UNRESPONSIVE NMIBC WITH RC

The mean GHS score was 67.2 (95% CI, 58.7–75.7). Mean EORTC QLQ-C30 scores for physical (73.3; 95%

CI, 63.8–82.8) and cognitive functioning (66.7; 95% CI, 55.6–77.7) fell below their respective TCIs. In addition, scores for nausea/vomiting (19.0; 95% CI, 8.3–29.8), pain (25.6; 95% CI, 19.3–31.8), dyspnea (28.6; 95% CI, 15.1–42.0), and financial difficulties (mean, 22.2; 95% CI, 10.0–34.4) exceeded their TCIs, and fatigue was the highest mean symptom score (mean, 29.4; 95% CI, 18.8–40.0). In the BC module, future worries (30.7; 95% CI, 20.9–40.5) scored highest, followed by intravesical treatment issues (28.9; 95% CI, 20.2–37.6). The mean DCS total score was 38.3 (95% CI, 32.6–44.1), and four of five subscales exceeded the threshold of 37.5 for severe decisional conflict, while remaining support subscale (36.9; 95% CI,

27.4–46.4) exceeded the threshold of 25.

RC-TREATED MIBC

The mean GHS score was 63.6 (95% CI, 58.6–68.6). The mean score for physical functioning (79.3; 95% CI, 74.9–83.6) fell below the TCI. Among symptom scores, dyspnea (20.7; 95% CI, 14.7–26.7) and nausea/vomiting (8.0; 95% CI, 4.4–11.7) exceeded their respective TCIs and fatigue was the highest symptom score on the EORTC QLQ-C30 (mean, 31.5; 95% CI, 25.8–37.2). In the BC module, the highest mean score was for future worries (31.1; 95% CI, 25.9–36.2), followed by male sexual problems (30.5; 95% CI, 16.7–44.3). The DCS total score was 31.9 (95% CI, 28.3–35.6) and all five subscales exceeded the threshold of 25 for moderate decisional conflict.

BLADDER-PRESERVED MIBC

The mean GHS score was 72.9 (95% CI, 64.7–81.1). The mean score for physical functioning (82.5; 95% CI, 73.8–91.2) was slightly below the TCI of 83. For symptom scores, nausea/vomiting (10.4; 95% CI, 2.6–18.2) and dyspnea (19.4; 95% CI, 8.4–30.5) exceeded their TCIs and fatigue was again the highest mean symptom score on the EORTC QLQ-C30 (mean, 23.1; 95% CI, 14.6–31.7). In the BC module, the highest mean scores were for sexual intimacy (33.3; 95% CI, 15.7–51.0) and risk of contaminating partner (33.3; 95% CI, 13.6–53.0), followed by urinary symptoms (26.8; 95% CI, 17.2–36.4). The DCS total score (27.3; 95% CI, 20.1–34.4) and three of five subscales (uncertainty, informed, and values clarity) exceeded the threshold of 25, indicating moderate decisional conflict.

CORRELATIONS BETWEEN HRQOL AND DECISIONAL CONFLICT

For interpretability, negative correlations for functioning/GHS versus DCS indicate that better HRQoL is associated with less decisional conflict, whereas positive correlations for symptom scales indicate that worse symptoms are associated with greater decisional conflict. Across all participants, poorer HRQoL was broadly associated with greater decisional conflict. Notably, lower physical, emotional, and cognitive functioning, and higher dyspnea, malaise and body image consistently correlated with higher scores across all five DCS subscales (**Fig. 3a, Additional file 1: Table S3**).

In the BCG-treated NMIBC without RC cohort, poorer cognitive functioning was associated with greater decisional conflict. Poorer fatigue, insomnia, and body image also correlated with higher scores on four of five DCS subscales (**Fig. 3b, Additional file 1: Table S4**). In the BCG-unresponsive NMIBC with RC cohort, greater future worries was associated with higher DCS-uncertainty and DCS-effective decision. Additionally, poorer emotional functioning correlated with a greater

need for support (**Fig. 3c, Additional file 1: Table S5**). In the RC-treated MIBC cohort, lower physical functioning and higher urostomy problems were correlated with higher scores on four of five DCS subscales. (**Fig. 3d, Additional file 1: Table S6**). In the bladder-preserved MIBC cohort, greater decisional conflict was associated with poorer emotional and cognitive functioning (**Fig. 3e, Additional file 1: Table S7**).

PATIENT-REPORTED OUTCOMES BY SUBGROUPS

We conducted descriptive analyses to examine PRO scores across age, and comorbidity subgroups. Although the age cutoff for subgroup analysis was initially planned at 65 years, the sample was highly skewed toward older ages (90.7% were ≥ 65 years). For more balanced group sizes for comparison, a 75-year cutoff was used.

Patients aged ≥ 75 years appeared to have numerically lower physical and cognitive functioning than those < 75 years, while other functioning scales were comparable between age groups (**Additional file 1: Figure S1**). Patients ≥ 75 years also tended to report more fatigue, dyspnea, and appetite loss. Patients with comorbidities tended to show numerically lower physical and cognitive functioning, higher dyspnea, and greater decisional conflict than those without comorbidity (**Additional file 1: Figure S2**).

DISCUSSION

This is the first study to characterize both HRQoL and decisional conflict among patients in Japan receiving current SOC treatments for NMIBC and MIBC. Using the EORTC QLQ-C30 and the BC module, results showed that overall HRQoL (GHS scores) was similar across cohorts, and all cohorts experienced common burdens (notably fatigue and future worries) alongside some differences in symptom/functioning profiles. Furthermore, the DCS indicated clinically meaningful conflict in all four cohorts. These findings highlight unmet needs in Japan's current SOC and real-world clinical environment.

In the BCG-treated NMIBC without RC cohort, symptoms and functional impacts did not meet the clinical relevance thresholds. Within the BC-specific domains, the most prominent issue was future worries, which was accompanied by higher DCS-uncertainty. This pronounced concern about the future may reflect apprehension about repeat intravesical treatments, associated adverse events¹⁷⁾ and the high risk of recurrence³⁾. This suggests a need for continuous shared decision-making (SDM)¹⁸⁾ anticipating potential post-recurrence pathways. For instance, informing patients early that RC may be considered in the event of recurrence with confirmed BCG unresponsiveness could help them avoid abrupt decision-making if that situation

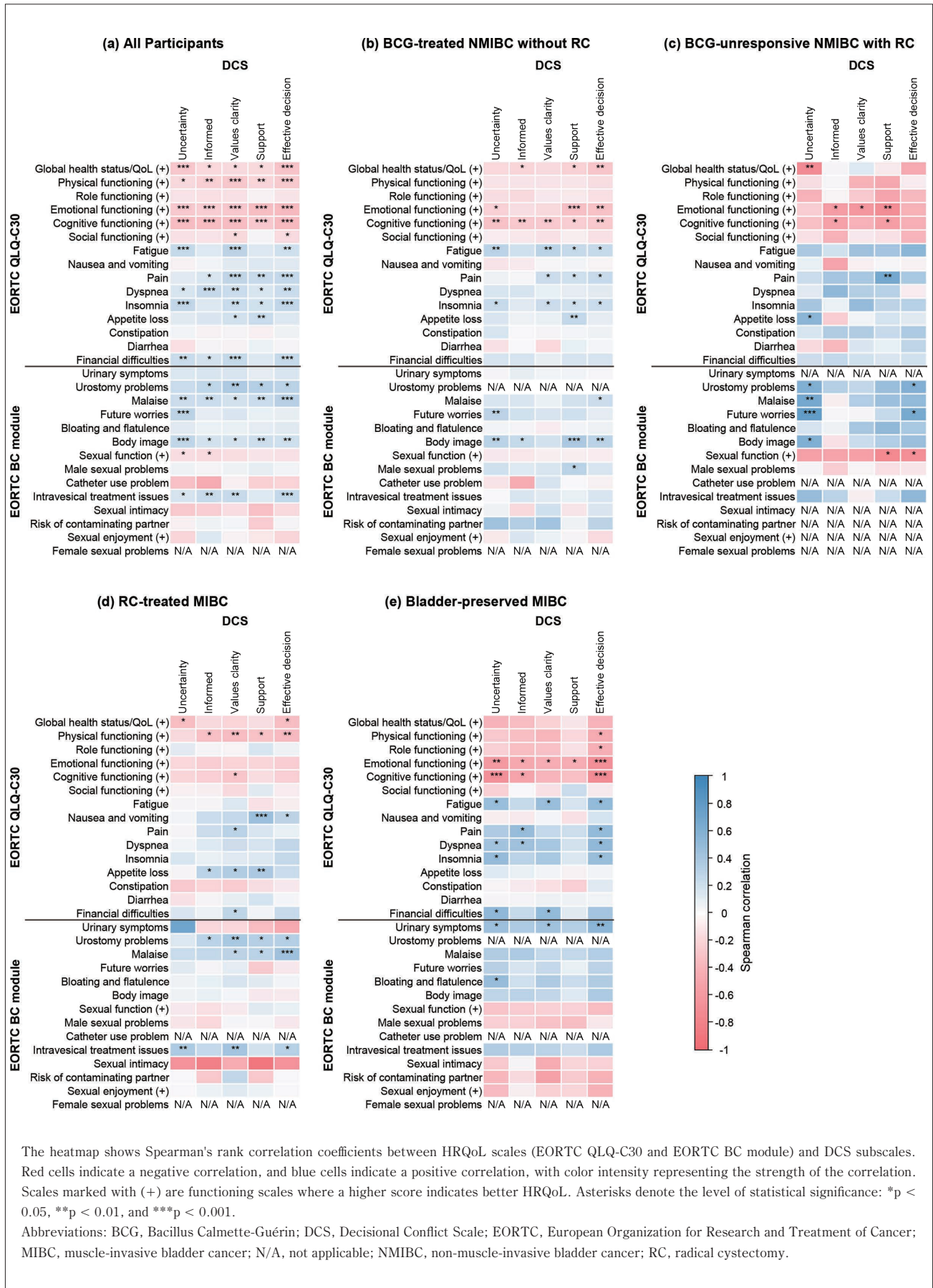


Fig. 3 Heatmap of correlation between HRQoL and DCS

arises. Ultimately, developing tolerable, novel bladder-preserving therapies is highly desired to alleviate this anxiety and reduce difficult treatment choices.

In the BCG-unresponsive NMIBC with RC cohort, multiple clinically relevant problems were identified, and within the BC-specific module, the highest score was for future worries. Notably, DCS scores were high across all subscales, indicating severe decisional conflict. This broad range of impairments and symptoms is consistent with prior reports. A recent review highlighted the extensive impact of RC on multiple QoL dimensions, including physical, emotional, social, and sexual functioning¹⁹⁾. These findings highlight the need for organ-preserving alternatives to RC and a dedicated RC Patient Decision Aid (PtDA)²⁰⁾.

In the RC-treated MIBC cohort, clinically relevant problems were identified for physical functioning, dyspnea, and nausea/vomiting. The DCS total score and all five subscales indicated moderate decisional conflict. The limited availability of alternatives to RC may contribute to decisional conflict in this population.

In the bladder-preserved MIBC cohort, clinically relevant problems with physical functioning, nausea/vomiting, and dyspnea were suggested. Although not the preferred SOC for MIBC, bladder-preserving therapy is a treatment option for select patients, and decisions in this setting likely integrate detailed treatment characteristics with patient preferences. Nevertheless, the DCS total score and three subscales (uncertainty, informed, and values clarity) indicated moderate decisional conflict. This highlights the need for improved SDM strategies or PtDAs to help patients better understand the complex information and clarify their personal values. Notably, this cohort had the highest employment rate (50%, at the time of survey), potentially indicating less daily activity impairment. Flexible outpatient scheduling that supports continued employment should therefore be considered.

We also examined associations between HRQoL and decisional conflict. Although prior studies have reported inconsistent findings^{21,22)}, our data indicate a negative association for all cohorts. In the BCG-unresponsive NMIBC with RC cohort, greater future worries was associated with higher DCS-uncertainty and a lower sense of making DCS-effective decision, while poorer emotional functioning correlated with a greater need for support. These findings highlight the significant psychological burden on patients for whom bladder-preserving therapy has failed, necessitating subsequent major surgery. In the RC-treated MIBC cohort, lower physical functioning and greater urostomy problems were correlated with higher scores on four of five DCS subscales. This indicates that optimal management of postoperative functional recovery is associated with satisfaction with the treatment decision.

We further assessed the outcomes in patient subgroups. Patients aged ≥ 75 years exhibited lower physical and

cognitive functioning than those < 75 years. Notably, while prior studies highlighted financial toxicity in cancer patients^{7,23)}, no apparent difference in financial difficulties was observed between the age groups in our study. This may suggest that Japan's public health insurance system plays a role in mitigating age-related financial burden disparities. Finally, the presence of comorbidities adversely affected physical and cognitive functioning and DCS. Although other studies have shown that a higher comorbidity burden worsens GHS²⁴⁾ and functioning/symptom scores⁷⁾, the impact of comorbidities on HRQoL and decisional conflict in our study was limited.

This study has several limitations. First, all cohorts missed target sample sizes, resulting in wider 95% CIs than estimated and limiting precision, especially for the smaller BCG-unresponsive NMIBC with RC and bladder-preserved MIBC cohorts. Second, although a total of 1,235 blank questionnaires (749 for NMIBC and 486 for MIBC) were provided to cooperating physicians, the exact number distributed to patients was not tracked. Therefore, a true response rate could not be calculated. This may have limited participants to those who were readily reachable and physically and emotionally well enough to complete the survey, thereby introducing potential selection bias. Third, the cross-sectional design cannot determine whether the observed HRQoL scores represent a change from pre-treatment levels. Additionally, the 6-month assessment window focuses on short-term recovery and does not allow for assessment of long-term burden. Fourth, to minimize item redundancy and respondent burden, we used an integrated module combining the EORTC QLQ-BLM30 and QLQ-NMIBC24. This approach, though used in other studies^{7,9)}, may affect the psychometric properties of individual scales.

CONCLUSIONS

In conclusion, patients with BC in Japan experience distinct patterns of HRQoL impairment and decisional conflict that vary by treatment, age and comorbidity. Addressing unmet needs and advancing patient-centered care in Japan will require effective symptom management, comprehensive information provision and PtDAs, supportive care that accounts for employment, and the development and implementation of individualized treatment strategies, including bladder preservation.

ABBREVIATIONS

BC: Bladder cancer
 BCG: Bacillus Calmette-Guérin
 CI: Confidence interval
 DCS: Decisional Conflict Scale
 EORTC: European Organization for Research and Treatment of Cancer
 GHS: Global health status
 HRQoL: Health-related quality of life
 MIBC: Muscle-invasive bladder cancer
 NMIBC: Non-muscle-invasive bladder cancer

PRO: Patient-reported outcome
 PtDA: Patient decision aid
 RC: Radical cystectomy
 SD: Standard deviation
 SDM: Shared decision-making
 SOC: Standard of care
 TCI: Threshold for clinical importance
 TMT: Trimodal therapy
 TURBT: Transurethral resection of bladder tumor

DECLARATIONS

Ethics approval and consent to participate

The study was performed in line with the principles of the Declaration of Helsinki and approved by the Medical Corporation TOUKEIKAI Kitamachi Clinic ethical review board (Approval number: KXJ10551). Informed consent was obtained from all participants prior to their participation in the study.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available due to the need to protect participant privacy but are available from the corresponding author on reasonable request.

Competing interests

RT reports honoraria from Ono, Astellas, Janssen, Nippon Kayaku, Merck Biopharma, AstraZeneca, and MSD. MN and HT are employees of Johnson & Johnson. MN also reports stock ownership in Johnson & Johnson. HK reports honoraria from Astellas, AstraZeneca, Bristol-Myers Squibb, Chugai, Eisai, Ferring, Johnson & Johnson/Janssen, Nippon Shinyaku, Merck Biopharma, MSD, Nippon Kayaku, Pfizer, Sanofi, and Takeda; and research funding from Johnson & Johnson/Janssen.

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AUTHORS' CONTRIBUTIONS

RT contributed to the study conceptualization, formal analysis, and writing – review and editing. MN contributed to the study conceptualization, data curation, formal analysis, investigation, writing – original draft, and writing – review and editing. HT contributed to the study conceptualization, data curation, formal analysis, investigation, and writing – review and editing. HK contributed to the study conceptualization, formal analysis, project administration, supervision, and writing – review and editing. All authors read and approved the final manuscript.

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Table S1 Questionnaire used in this survey

No	Respondent				Questions	Responses
	BCG-treated NMIBC without RC	BCG-unresponsive NMIBC with RC	RC-treated MIBC	Bladder-preserved MIBC		
1	✓	✓	✓	✓	Age	_____ years
2	✓	✓	✓	✓	Sex	1. Male 2. Female
3	✓	✓	✓	✓	Height	_____ cm
4	✓	✓	✓	✓	Weight	_____ kg
5	✓	✓	✓	✓	Smoking status	1. Current 2. Past 3. Never
6	✓	✓	✓	✓	Living status	1. Living with someone (including residence in a care facility) 2. Living alone
7	✓	✓	✓	✓	Employment status	1. Employed 2. Not employed
8	✓	✓	✓	✓	Presence of comorbidities	1. Present 2. Absent 3. Unknown
9	✓	✓	✓	✓	Details of comorbidities	1. Diabetes mellitus 2. Hypertension 3. Heart disease 4. Kidney disease 5. Autoimmune disorders 6. Liver disease 7. Lung disease 8. Other comorbidities
10		✓	✓		Current urinary diversion methods	1. I have a urinary stoma (urostomy) 2. I have a continent urinary diversion (neobladder)
11				✓	Receipt of TURBT within the past 6 months	1. Performed 2. Not performed 3. Unknown
12				✓	Receipt of chemotherapy within the past 6 months	1. Performed 2. Not performed 3. Unknown
13				✓	Details of chemotherapy	1. Gemcitabine 2. Cisplatin 3. Methotrexate 4. Vinblastine 5. Doxorubicin 6. Other 7. Unknown
14				✓	Receipt of radiotherapy within the past 6 months	1. Performed 2. Not performed 3. Unknown

Abbreviations: BCG, Bacillus Calmette-Guérin; MIBC, muscle-invasive bladder cancer; N/A, not applicable; NMIBC, non-muscle-invasive bladder cancer; TURBT, transurethral resection of bladder tumor; RC, radical cystectomy

Table S2 EORTC QLQ-C30, EORTC BC module, and DCS scores by cohort

	All participants (n = 215)			BCG-treated NMIBC without RC (n = 117)			BCG-unresponsive NMIBC with RC (n = 15)			RC-treated MIBC (n = 58)			Bladder-preserved MIBC (n = 24)		
	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI	n	Mean	95% CI
EORTC QLQ-C30															
Global health status/QoL	213	66.9	64.2–69.6	116	67.5	63.7–71.3	15	67.2	58.7–75.7	57	63.6	58.6–68.6	24	72.9	64.7–81.1
Physical functioning	214	83.7	81.5–86.0	117	87.4	84.8–90.0	14	73.3	63.8–82.8	58	79.3	74.9–83.6	24	82.5	73.8–91.2
Role functioning	214	82.0	79.3–84.7	117	87.5	84.4–90.5	14	79.8	69.4–90.1	58	72.7	67.5–78.0	24	79.9	69.3–90.4
Emotional functioning	215	87.3	85.5–89.1	117	88.8	86.5–91.1	15	80.6	73.7–87.4	58	85.7	82.5–88.9	24	88.2	81.9–94.5
Cognitive functioning	215	81.2	78.6–83.7	117	84.0	81.0–87.0	15	66.7	55.6–77.7	58	77.9	72.3–83.5	24	84.0	75.8–92.2
Social functioning	215	81.5	78.6–84.4	117	84.6	81.1–88.2	15	76.7	63.6–89.7	58	73.9	67.8–79.9	24	86.8	78.0–95.6
Fatigue	214	26.4	23.8–28.9	117	24.2	21.2–27.1	14	29.4	18.8–40.0	58	31.5	25.8–37.2	24	23.1	14.6–31.7
Nausea and vomiting	214	6.9	5.0–8.7	117	4.1	2.2–6.0	14	19.0	8.3–29.8	58	8.0	4.4–11.7	24	10.4	2.6–18.2
Pain	215	19.7	17.1–22.3	117	20.2	16.3–24.1	15	25.6	19.3–31.8	58	18.7	14.5–22.9	24	15.3	7.9–22.6
Dyspnea	212	16.8	13.8–19.9	115	13.0	9.3–16.8	14	28.6	15.1–42.0	58	20.7	14.7–26.7	24	19.4	8.4–30.5
Insomnia	213	20.0	16.9–23.1	117	20.2	15.9–24.6	14	26.2	12.2–40.2	57	18.1	13.2–23.1	24	19.4	9.1–29.8
Appetite loss	214	16.4	13.7–19.0	117	12.3	8.8–15.7	14	28.6	19.2–37.9	58	19.5	14.7–24.4	24	22.2	12.9–31.6
Constipation	211	16.9	14.0–19.8	117	14.5	10.9–18.2	13	20.5	8.7–32.3	57	21.1	15.0–27.1	23	17.4	7.4–27.3
Diarrhea	215	7.9	5.8–10.0	117	6.0	3.7–8.3	15	11.1	2.9–19.3	58	8.6	3.7–13.6	24	13.9	7.2–20.6
Financial difficulties	215	10.9	8.1–13.6	117	9.1	5.6–12.6	15	22.2	10.0–34.4	58	12.1	6.8–17.3	24	9.7	-0.3–19.7
EORTC BC module															
Urinary symptoms [†]	145	27.9	24.7–31.1	114	28.6	25.1–32.1	1	23.8	N/A	5	19.0	10.7–27.4	24	26.8	17.2–36.4
Urostomy problems [†]	65	24.8	21.3–28.3	0	N/A	N/A	13	24.8	16.6–32.9	52	24.8	20.9–28.7	0	N/A	N/A
Malaise	209	14.6	12.6–16.6	114	13.7	11.0–16.5	15	22.2	14.6–29.8	55	13.6	9.8–17.4	24	16.7	10.8–22.6
Future worries	209	31.8	28.9–34.8	114	33.9	29.9–37.9	15	30.7	20.9–40.5	55	31.1	25.9–36.2	24	23.6	13.4–33.9
Bloating and flatulence	209	18.5	15.8–21.2	114	17.0	13.4–20.5	15	24.4	15.5–33.4	55	19.1	14.5–23.7	24	19.4	9.1–29.8
Body image	209	20.4	17.5–23.2	114	17.6	14.4–20.8	15	26.7	13.4–39.9	55	27.3	20.5–34.1	24	13.9	5.9–21.9
Sexual function	188	7.4	5.4–9.3	108	6.9	4.5–9.3	11	7.6	-2.6–17.8	48	4.9	1.5–8.2	20	15.0	6.5–23.5
Male sexual problems	143	23.8	18.1–29.5	77	20.6	14.0–27.1	8	27.1	-0.5–54.6	41	30.5	16.7–44.3	16	21.9	8.0–35.8
Catheter use problem [‡]	13	23.1	7.6–38.6	10	16.7	5.8–27.6	1	0.0	N/A	0	N/A	N/A	2	66.7	1.3–132.0
Intravesical treatment issues	208	18.4	15.7–21.2	114	16.7	13.1–20.2	15	28.9	20.2–37.6	54	17.9	12.2–23.6	24	22.2	13.7–30.7
Sexual intimacy	37	18.9	10.3–27.5	21	9.5	2.9–16.1	0	N/A	N/A	5	26.7	-11.4–64.8	11	33.3	15.7–51.0
Risk of contaminating partner	36	20.4	10.5–30.2	20	10.0	1.7–18.3	1	66.7	N/A	4	25.0	-24.0–74.0	11	33.3	13.6–53.0
Sexual enjoyment	36	12.0	4.6–19.5	20	6.7	0.7–12.7	1	33.3	N/A	4	33.3	-12.9–79.5	11	12.1	-1.2–25.4
Female sexual problems	1	33.3	N/A	0	N/A	N/A	1	33.3	N/A	0	N/A	N/A	0	N/A	N/A
DCS															
Total	200	31.7	29.7–33.7	106	31.9	29.3–34.5	13	38.3	32.6–44.1	56	31.9	28.3–35.6	24	27.3	20.1–34.4
Uncertainty	208	34.5	32.1–36.9	112	34.9	31.5–38.3	15	39.4	30.5–48.4	56	35.0	31.0–39.0	24	28.1	20.1–36.2
Informed	205	33.3	30.8–35.7	109	32.6	29.6–35.5	15	41.7	34.9–48.4	56	33.0	28.1–38.0	24	32.3	23.2–41.4
Values clarity	204	33.4	30.8–35.9	108	32.0	28.6–35.4	15	41.7	34.0–49.3	56	35.0	30.5–39.4	24	31.3	21.3–41.2
Support	207	30.8	28.4–33.2	112	32.0	28.5–35.5	14	36.9	27.4–46.4	56	30.2	26.3–34.1	24	22.9	16.0–29.8
Effective decision	205	28.5	26.5–30.5	110	28.5	25.9–31.2	14	40.6	34.0–47.3	56	27.8	24.0–31.6	24	23.2	16.8–29.6

[†] “Urinary symptoms” was answered only by patients without a urostomy, whereas “Urostomy problems” was answered exclusively by patients with a urostomy.

[‡] “Catheter use problem” was answered only by patients who were using catheter.

Abbreviations: BCG, Bacillus Calmette-Guérin; CI, Confidence Interval; DCS, Decisional Conflict Scale; EORTC, European Organization for Research and Treatment of Cancer; MIBC, muscle-invasive bladder cancer; N/A, not applicable; NMIBC, non-muscle-invasive bladder cancer; RC, radical cystectomy.

Table S3 Correlation between HRQoL and DCS scores (All Participants)

	Uncertainty			Informed			Values clarity			Support			Effective decision		
	n	r	p	n	r	p	n	r	p	n	r	p	n	r	p
EORTC QLQ-C30															
Global health status/QoL	206	-0.28	<0.001	203	-0.17	0.014	202	-0.16	0.023	205	-0.17	0.015	203	-0.30	<0.001
Physical functioning	207	-0.16	0.019	204	-0.22	0.002	203	-0.28	<0.001	206	-0.19	0.007	204	-0.26	<0.001
Role functioning	207	-0.11	0.114	204	-0.14	0.053	203	-0.13	0.067	206	-0.04	0.554	204	-0.11	0.126
Emotional functioning	208	-0.26	<0.001	205	-0.24	<0.001	204	-0.27	<0.001	207	-0.33	<0.001	205	-0.35	<0.001
Cognitive functioning	208	-0.34	<0.001	205	-0.33	<0.001	204	-0.34	<0.001	207	-0.27	<0.001	205	-0.35	<0.001
Social functioning	208	-0.12	0.076	205	-0.11	0.112	204	-0.17	0.015	207	-0.01	0.903	205	-0.16	0.027
Fatigue	207	0.24	<0.001	204	0.12	0.093	203	0.27	<0.001	206	0.12	0.076	204	0.19	0.007
Nausea and vomiting	207	-0.04	0.539	204	0.03	0.705	203	0.10	0.140	206	0.13	0.072	204	0.11	0.117
Pain	208	0.11	0.120	205	0.15	0.035	204	0.27	<0.001	207	0.23	0.001	205	0.24	<0.001
Dyspnea	205	0.14	0.040	202	0.24	<0.001	201	0.22	0.002	204	0.15	0.037	202	0.22	0.002
Insomnia	206	0.26	<0.001	203	0.13	0.066	202	0.22	0.002	205	0.18	0.012	203	0.26	<0.001
Appetite loss	207	0.10	0.138	204	0.13	0.056	203	0.17	0.017	206	0.21	0.002	204	0.13	0.066
Constipation	204	0.03	0.650	201	-0.04	0.540	200	-0.03	0.728	203	-0.05	0.478	201	0.04	0.570
Diarrhea	208	-0.13	0.055	205	-0.02	0.828	204	-0.04	0.599	207	0.06	0.357	205	0.02	0.741
Financial difficulties	208	0.22	0.002	205	0.17	0.016	204	0.24	<0.001	207	0.12	0.074	205	0.23	<0.001
EORTC BC module															
Urinary symptoms	140	0.13	0.127	137	0.14	0.099	136	0.14	0.108	139	0.09	0.275	138	0.14	0.107
Urostomy problems	63	0.22	0.090	63	0.26	0.039	63	0.35	0.005	63	0.31	0.013	62	0.29	0.023
Malaise	202	0.21	0.003	199	0.21	0.003	198	0.18	0.012	201	0.21	0.002	199	0.31	<0.001
Future worries	202	0.27	<0.001	199	0.09	0.206	198	0.13	0.059	201	0.07	0.336	199	0.08	0.237
Bloating and flatulence	202	0.11	0.115	199	0.06	0.374	198	0.07	0.301	201	0.09	0.186	199	0.10	0.166
Body image	202	0.26	<0.001	199	0.17	0.015	198	0.17	0.016	201	0.20	0.004	199	0.19	0.006
Sexual function	182	-0.15	0.047	180	-0.17	0.026	179	-0.14	0.058	181	-0.10	0.162	181	-0.12	0.110
Male sexual problems	138	0.05	0.567	136	-0.03	0.755	135	0.04	0.629	137	0.08	0.361	137	0.04	0.687
Catheter use problem	13	-0.31	0.304	11	-0.44	0.172	10	-0.05	0.884	13	-0.22	0.463	12	-0.20	0.532
Intravesical treatment issues	201	0.15	0.030	198	0.23	0.001	197	0.23	0.001	200	0.12	0.097	198	0.24	<0.001
Sexual intimacy	37	-0.27	0.104	37	-0.24	0.152	37	-0.15	0.387	37	-0.31	0.058	36	-0.16	0.364
Risk of contaminating partner	36	-0.05	0.782	36	0.04	0.802	36	0.02	0.925	36	-0.25	0.143	35	-0.03	0.879
Sexual enjoyment	36	-0.19	0.277	36	0.12	0.470	36	-0.05	0.795	36	-0.10	0.582	35	-0.18	0.291
Female sexual problems	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A

Notes: test used = Spearman correlation coefficient (r).

Abbreviations: EORTC, European Organization for Research and Treatment of Cancer; N/A, not applicable.

Table S4 Correlation between HRQoL and DCS scores (BCG-treated NMIBC without RC)

	Uncertainty			Informed			Values clarity			Support			Effective decision		
	n	r	p	n	r	p	n	r	p	n	r	p	n	r	p
EORTC QLQ-C30															
Global health status/QoL	111	-0.17	0.071	108	-0.19	0.049	107	-0.16	0.100	111	-0.21	0.027	109	-0.29	0.003
Physical functioning	112	-0.12	0.227	109	-0.11	0.271	108	-0.11	0.239	112	-0.10	0.297	110	-0.14	0.140
Role functioning	112	-0.14	0.147	109	-0.17	0.082	108	-0.08	0.421	112	-0.09	0.363	110	-0.14	0.156
Emotional functioning	112	-0.21	0.025	109	-0.14	0.145	108	-0.16	0.092	112	-0.31	<0.001	110	-0.31	0.001
Cognitive functioning	112	-0.30	0.001	109	-0.28	0.004	108	-0.26	0.006	112	-0.24	0.012	110	-0.27	0.004
Social functioning	112	-0.06	0.505	109	-0.09	0.337	108	-0.12	0.232	112	-0.06	0.533	110	-0.13	0.190
Fatigue	112	0.29	0.002	109	0.19	0.053	108	0.28	0.004	112	0.23	0.014	110	0.23	0.014
Nausea and vomiting	112	-0.11	0.268	109	-0.07	0.478	108	0.00	0.979	112	0.03	0.725	110	-0.03	0.725
Pain	112	0.05	0.571	109	0.00	0.984	108	0.21	0.031	112	0.20	0.039	110	0.22	0.019
Dyspnea	110	0.14	0.137	107	0.15	0.114	106	0.08	0.430	110	0.10	0.316	108	0.10	0.296
Insomnia	112	0.22	0.017	109	0.11	0.253	108	0.20	0.034	112	0.19	0.045	110	0.21	0.027
Appetite loss	112	0.14	0.139	109	0.05	0.582	108	0.07	0.464	112	0.25	0.008	110	0.09	0.360
Constipation	112	0.15	0.117	109	0.00	0.977	108	0.02	0.840	112	0.02	0.876	110	0.05	0.643
Diarrhea	112	-0.12	0.202	109	0.00	0.974	108	-0.17	0.074	112	0.08	0.427	110	0.01	0.887
Financial difficulties	112	0.15	0.106	109	0.16	0.096	108	0.09	0.382	112	0.15	0.114	110	0.15	0.109
EORTC BC module															
Urinary symptoms	109	0.02	0.830	106	0.08	0.400	105	0.04	0.711	109	0.03	0.739	107	0.01	0.927
Urostomy problems	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A
Malaise	109	0.14	0.147	106	0.14	0.162	105	0.07	0.481	109	0.17	0.079	107	0.21	0.032
Future worries	109	0.28	0.003	106	0.18	0.061	105	0.15	0.121	109	0.19	0.053	107	0.10	0.330
Bloating and flatulence	109	0.03	0.785	106	0.02	0.854	105	-0.07	0.500	109	0.03	0.777	107	0.06	0.577
Body image	109	0.29	0.002	106	0.24	0.015	105	0.17	0.079	109	0.36	<0.001	107	0.28	0.003
Sexual function	103	-0.08	0.434	101	-0.09	0.350	100	-0.06	0.552	103	-0.06	0.581	102	-0.07	0.505
Male sexual problems	73	0.19	0.108	71	0.12	0.337	70	0.14	0.241	73	0.29	0.012	72	0.14	0.254
Catheter use problem	10	-0.11	0.771	8	-0.44	0.273	7	0.15	0.744	10	0.00	1.000	9	-0.04	0.910
Intravesical treatment issues	109	0.00	0.983	106	0.14	0.156	105	0.10	0.300	109	0.07	0.473	107	0.14	0.160
Sexual intimacy	21	0.04	0.848	21	-0.17	0.463	21	0.19	0.415	21	-0.10	0.675	20	0.13	0.572
Risk of contaminating partner	20	0.43	0.060	20	0.32	0.165	20	0.42	0.065	20	0.05	0.840	19	0.28	0.252
Sexual enjoyment	20	-0.09	0.711	20	0.13	0.576	20	0.07	0.779	20	-0.02	0.927	19	-0.16	0.526
Female sexual problems	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A

Notes: test used = Spearman correlation coefficient (r).
Abbreviations: EORTC, European Organization for Research and Treatment of Cancer; N/A, not applicable.

Table S5 Correlation between HRQoL and DCS scores (BCG-unresponsive NMIBC with RC)

	Uncertainty			Informed			Values clarity			Support			Effective decision		
	n	r	p	n	r	p	n	r	p	n	r	p	n	r	p
EORTC QLQ-C30															
Global health status/QoL	15	-0.71	0.003	15	-0.01	0.974	15	0.12	0.676	14	-0.09	0.767	14	-0.46	0.098
Physical functioning	14	-0.14	0.636	14	0.00	0.997	14	-0.41	0.142	13	-0.47	0.106	13	-0.07	0.825
Role functioning	14	-0.41	0.151	14	-0.03	0.911	14	-0.26	0.363	13	-0.50	0.084	13	-0.35	0.236
Emotional functioning	15	-0.23	0.400	15	-0.57	0.028	15	-0.61	0.015	14	-0.69	0.006	14	-0.41	0.142
Cognitive functioning	15	-0.32	0.249	15	-0.53	0.044	15	-0.41	0.130	14	-0.55	0.043	14	-0.42	0.134
Social functioning	15	-0.13	0.652	15	-0.41	0.127	15	-0.08	0.777	14	-0.12	0.688	14	-0.38	0.178
Fatigue	14	0.37	0.199	14	0.18	0.537	14	0.44	0.111	13	0.41	0.161	13	0.54	0.060
Nausea and vomiting	14	0.07	0.818	14	-0.50	0.069	14	-0.05	0.870	13	0.01	0.977	13	-0.04	0.888
Pain	15	0.21	0.443	15	0.40	0.145	15	0.39	0.147	14	0.67	0.009	14	0.38	0.186
Dyspnea	14	0.11	0.708	14	0.51	0.060	14	0.32	0.261	13	0.31	0.307	13	-0.06	0.841
Insomnia	14	0.39	0.173	14	0.06	0.832	14	0.48	0.079	13	0.27	0.368	13	0.30	0.313
Appetite loss	14	0.55	0.044	14	-0.24	0.411	14	0.04	0.901	13	0.17	0.589	13	0.10	0.737
Constipation	13	0.15	0.629	13	0.34	0.251	13	0.34	0.257	12	0.22	0.487	12	0.35	0.258
Diarrhea	15	-0.17	0.551	15	-0.37	0.179	15	0.13	0.637	14	0.08	0.796	14	0.27	0.349
Financial difficulties	15	0.20	0.471	15	0.24	0.383	15	0.17	0.536	14	0.14	0.643	14	0.18	0.537
EORTC BC module															
Urinary symptoms	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A	0	N/A	N/A	1	N/A	N/A
Urostomy problems	13	0.59	0.034	13	0.31	0.302	13	0.26	0.394	13	0.46	0.114	12	0.60	0.040
Malaise	15	0.67	0.006	15	-0.06	0.833	15	0.33	0.229	14	0.45	0.110	14	0.50	0.071
Future worries	15	0.78	<0.001	15	-0.01	0.987	15	-0.01	0.981	14	0.23	0.423	14	0.66	0.011
Bloating and flatulence	15	0.16	0.570	15	0.05	0.861	15	0.39	0.149	14	0.51	0.065	14	0.38	0.185
Body image	15	0.59	0.020	15	-0.12	0.672	15	0.21	0.445	14	0.33	0.248	14	0.45	0.104
Sexual function	11	-0.54	0.086	11	-0.51	0.109	11	-0.55	0.083	10	-0.73	0.018	11	-0.69	0.020
Male sexual problems	8	-0.01	0.974	8	-0.24	0.573	8	-0.03	0.948	7	-0.14	0.773	8	-0.10	0.820
Catheter use problem	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A
Intravesical treatment issues	15	0.48	0.071	15	0.28	0.305	15	-0.06	0.842	14	0.22	0.452	14	0.51	0.063
Sexual intimacy	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A
Risk of contaminating partner	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A
Sexual enjoyment	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A
Female sexual problems	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A	1	N/A	N/A

Notes: test used = Spearman correlation coefficient (r).

Abbreviations: EORTC, European Organization for Research and Treatment of Cancer; N/A, not applicable.

Table S6 Correlation between HRQoL and DCS scores (RC-treated MIBC)

	Uncertainty			Informed			Values clarity			Support			Effective decision		
	n	r	p	n	r	p	n	r	p	n	r	p	n	r	p
EORTC QLQ-C30															
Global health status/QoL	55	-0.33	0.013	55	-0.16	0.250	55	-0.19	0.159	55	-0.14	0.312	55	-0.33	0.014
Physical functioning	56	-0.17	0.222	56	-0.31	0.019	56	-0.35	0.009	56	-0.30	0.026	56	-0.35	0.009
Role functioning	56	0.10	0.477	56	-0.02	0.885	56	-0.03	0.802	56	0.15	0.287	56	0.05	0.736
Emotional functioning	56	-0.18	0.187	56	-0.24	0.073	56	-0.20	0.132	56	-0.19	0.167	56	-0.24	0.076
Cognitive functioning	56	-0.19	0.169	56	-0.23	0.093	56	-0.29	0.033	56	-0.15	0.274	56	-0.23	0.092
Social functioning	56	-0.05	0.701	56	-0.06	0.673	56	-0.16	0.232	56	0.10	0.449	56	-0.07	0.620
Fatigue	56	-0.01	0.916	56	-0.01	0.947	56	0.13	0.354	56	-0.13	0.350	56	-0.06	0.674
Nausea and vomiting	56	0.03	0.819	56	0.21	0.120	56	0.24	0.078	56	0.45	<0.001	56	0.27	0.042
Pain	56	-0.01	0.917	56	0.21	0.124	56	0.30	0.027	56	0.14	0.308	56	0.07	0.613
Dyspnea	56	0.03	0.851	56	0.12	0.388	56	0.20	0.135	56	0.16	0.242	56	0.26	0.058
Insomnia	55	0.15	0.284	55	0.07	0.590	55	0.11	0.433	55	0.13	0.348	55	0.25	0.070
Appetite loss	56	-0.03	0.854	56	0.29	0.032	56	0.34	0.011	56	0.36	0.006	56	0.22	0.107
Constipation	55	-0.26	0.053	55	-0.20	0.146	55	-0.25	0.072	55	-0.14	0.315	55	-0.08	0.555
Diarrhea	56	-0.13	0.355	56	-0.03	0.854	56	0.08	0.538	56	0.16	0.251	56	0.01	0.956
Financial difficulties	56	0.13	0.328	56	0.06	0.654	56	0.27	0.044	56	0.03	0.804	56	0.23	0.096
EORTC BC module															
Urinary symptoms	5	0.70	0.185	5	-0.18	0.770	5	-0.18	0.770	5	-0.34	0.571	5	-0.46	0.436
Urostomy problems	50	0.13	0.374	50	0.29	0.043	50	0.38	0.007	50	0.32	0.024	50	0.31	0.029
Malaise	53	0.22	0.115	53	0.25	0.073	53	0.28	0.045	53	0.29	0.039	53	0.44	<0.001
Future worries	53	0.10	0.480	53	0.02	0.878	53	0.10	0.499	53	-0.26	0.062	53	-0.08	0.569
Bloating and flatulence	53	0.05	0.729	53	0.08	0.580	53	0.15	0.270	53	0.10	0.471	53	0.03	0.823
Body image	53	0.04	0.766	53	0.07	0.606	53	0.02	0.916	53	-0.08	0.563	53	-0.07	0.623
Sexual function	47	-0.08	0.591	47	-0.13	0.381	47	-0.07	0.622	47	0.10	0.489	47	0.07	0.648
Male sexual problems	40	-0.10	0.538	40	-0.17	0.288	40	0.01	0.960	40	0.00	0.985	40	-0.08	0.636
Catheter use problem	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A
Intravesical treatment issues	52	0.36	0.009	52	0.24	0.086	52	0.40	0.003	52	0.17	0.233	52	0.30	0.028
Sexual intimacy	5	-0.65	0.237	5	-0.80	0.102	5	-0.45	0.450	5	-0.88	0.052	5	-0.65	0.237
Risk of contaminating partner	4	0.00	1.000	4	-0.27	0.728	4	0.26	0.742	4	-0.27	0.728	4	0.00	1.000
Sexual enjoyment	4	0.00	1.000	4	0.06	0.944	4	0.11	0.895	4	0.06	0.944	4	0.00	1.000
Female sexual problems	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A

Notes: test used = Spearman correlation coefficient (r).

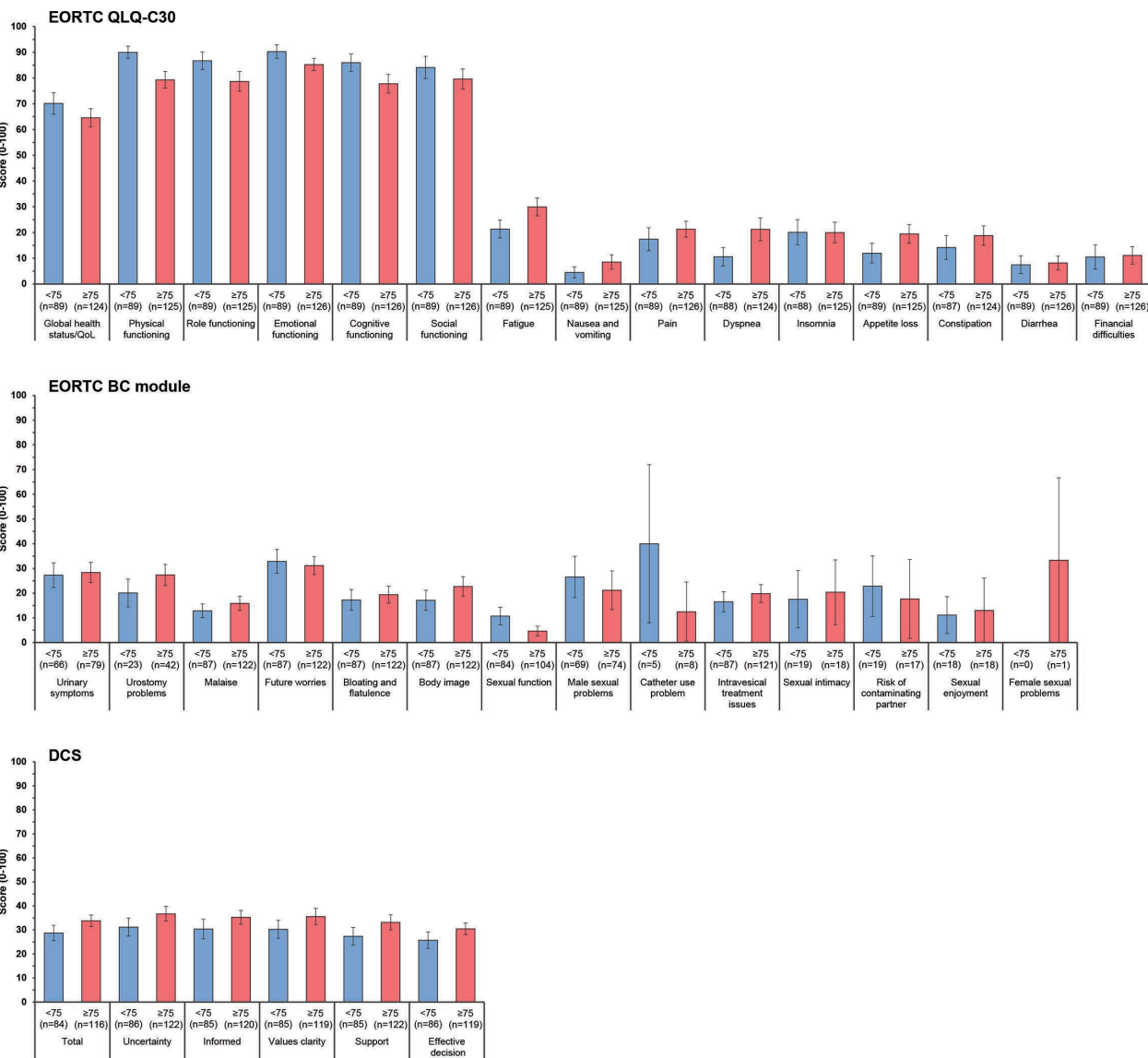
Abbreviations: EORTC, European Organization for Research and Treatment of Cancer; N/A, not applicable.

Table S7 Correlation between HRQoL and DCS scores (Bladder-preserved MIBC)

	Uncertainty			Informed			Values clarity			Support			Effective decision		
	n	r	p	n	r	p	n	r	p	n	r	p	n	r	p
EORTC QLQ-C30															
Global health status/QoL	24	-0.39	0.061	24	-0.34	0.108	24	-0.21	0.324	24	-0.10	0.641	24	-0.40	0.051
Physical functioning	24	-0.27	0.205	24	-0.32	0.123	24	-0.38	0.068	24	-0.18	0.409	24	-0.46	0.025
Role functioning	24	-0.22	0.305	24	-0.33	0.112	24	-0.31	0.145	24	-0.12	0.569	24	-0.42	0.041
Emotional functioning	24	-0.59	0.003	24	-0.47	0.021	24	-0.44	0.033	24	-0.44	0.033	24	-0.67	<0.001
Cognitive functioning	24	-0.66	<0.001	24	-0.51	0.011	24	-0.38	0.064	24	-0.32	0.128	24	-0.70	<0.001
Social functioning	24	-0.22	0.301	24	0.01	0.983	24	-0.12	0.586	24	0.21	0.321	24	-0.07	0.731
Fatigue	24	0.47	0.022	24	0.23	0.282	24	0.47	0.021	24	0.15	0.479	24	0.50	0.014
Nausea and vomiting	24	-0.06	0.780	24	-0.08	0.702	24	0.01	0.953	24	-0.13	0.548	24	0.16	0.464
Pain	24	0.35	0.093	24	0.48	0.018	24	0.24	0.251	24	0.20	0.345	24	0.50	0.014
Dyspnea	24	0.42	0.043	24	0.44	0.031	24	0.39	0.058	24	0.18	0.402	24	0.51	0.012
Insomnia	24	0.49	0.014	24	0.29	0.168	24	0.38	0.069	24	0.13	0.544	24	0.46	0.023
Appetite loss	24	0.11	0.603	24	0.07	0.749	24	0.03	0.893	24	-0.04	0.844	24	0.03	0.897
Constipation	23	-0.03	0.878	23	-0.07	0.737	23	-0.13	0.553	23	-0.23	0.302	23	0.11	0.616
Diarrhea	24	-0.01	0.954	24	0.02	0.931	24	0.06	0.797	24	0.04	0.840	24	0.04	0.864
Financial difficulties	24	0.51	0.011	24	0.23	0.273	24	0.49	0.016	24	0.10	0.638	24	0.40	0.054
EORTC BC module															
Urinary symptoms	24	0.45	0.029	24	0.36	0.089	24	0.43	0.037	24	0.31	0.139	24	0.55	0.005
Urostomy problems	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A
Malaise	24	0.34	0.108	24	0.35	0.092	24	0.24	0.255	24	0.25	0.237	24	0.33	0.112
Future worries	24	0.31	0.143	24	0.15	0.473	24	0.24	0.263	24	0.07	0.747	24	0.28	0.184
Bloating and flatulence	24	0.48	0.019	24	0.19	0.366	24	0.35	0.093	24	0.22	0.300	24	0.34	0.106
Body image	24	0.27	0.201	24	0.29	0.177	24	0.26	0.224	24	0.12	0.594	24	0.35	0.089
Sexual function	20	-0.29	0.221	20	-0.25	0.290	20	-0.22	0.352	20	-0.21	0.367	20	-0.34	0.146
Male sexual problems	16	-0.23	0.400	16	-0.22	0.425	16	-0.30	0.254	16	-0.32	0.226	16	-0.09	0.734
Catheter use problem	2	N/A	N/A	2	N/A	N/A	2	N/A	N/A	2	N/A	N/A	2	N/A	N/A
Intravesical treatment issues	24	0.35	0.099	24	0.32	0.130	24	0.30	0.160	24	0.21	0.333	24	0.36	0.085
Sexual intimacy	11	-0.27	0.427	11	-0.02	0.946	11	-0.45	0.168	11	-0.19	0.579	11	-0.21	0.531
Risk of contaminating partner	11	-0.37	0.261	11	-0.16	0.647	11	-0.53	0.095	11	-0.26	0.445	11	-0.41	0.213
Sexual enjoyment	11	-0.35	0.294	11	-0.06	0.863	11	-0.22	0.509	11	-0.19	0.578	11	-0.41	0.214
Female sexual problems	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A

Notes: test used = Spearman correlation coefficient (r).

Abbreviations: EORTC, European Organization for Research and Treatment of Cancer; N/A, not applicable.



Error bars represent 95% confidence intervals
Abbreviations: BC, Bladder cancer; DCS, Decisional Conflict Scale; EORTC, European Organization for Research and Treatment of Cancer

Figure S1 EORTC QLQ-C30, EORTC BC module, and DCS scores by age



Figure S2 EORTC QLQ-C30, EORTC BC module, and DCS scores by presence of comorbidities