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Original Article

The influence of multidisciplinary team meetings on treatment decisions in advanced bladder cancer

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Objectives

To investigate the role of specialised genitourinary multidisciplinary team meetings (MDTMs) in decision-making and identify factors that influence the probability of receiving a treatment plan with curative intent for patients with muscle invasive bladder cancer (MIBC).

Patients and methods

Data relating to patients with cT2-4aN0/X-1 M0 urothelial cell carcinoma, diagnosed between November 2017 and October 2019, were selected from the nationwide, population-based Netherlands Cancer Registry ('BlaZIB study'). Curative treatment options were defined as radical cystectomy (RC) with or without neoadjuvant chemotherapy, chemoradiation or brachytherapy. Multilevel logistic regression analyses were used to examine the association between MDTM factors and curative treatment advice and how this advice was followed.

Results

Of the 2321 patients, 2048 (88.2%) were discussed in a genitourinary MDTM. Advanced age (>80 years) and poorer World Health Organization performance status (score 1–2 vs 0) were associated with no discussion ($P < 0.001$). Being discussed was associated with undergoing treatment with curative intent (odds ratio [OR] 3.0, 95% confidence interval [CI] 1.9–4.9), as was the involvement of a RC hospital (OR 1.70, 95% CI 1.09–2.65). Involvement of an academic centre was associated with higher rates of bladder-sparing treatment (OR 2.05, 95% CI 1.31–3.21). Patient preference was the main reason for non-adherence to treatment advice.

Conclusions

For patients with MIBC, the probability of being discussed in a MDTM was associated with age, performance status and receiving treatment with curative intent, especially if a representative of a RC hospital was present. Future studies should focus on the impact of MDTM advice on survival data.

Keywords

multidisciplinary team meeting, muscle-invasive bladder cancer, treatment advice, curative intent treatment, radical cystectomy hospital, #BladderCancer, #blcsm, #uroonc

Introduction

Despite advances in the treatment of various cancer types, the prognosis for patients with muscle-invasive bladder cancer (MIBC) is poor [1]. Platinum-based neoadjuvant chemotherapy (NAC) followed by radical cystectomy (RC) is the preferred treatment option for these patients [2]. Chemotherapy-ineligible patients can be treated with RC

alone [3]. An equivalent alternative, for a select group of patients, is bladder-sparing treatment such as chemoradiation (CRT) or brachytherapy (BT) [4,5]. Although BT is currently not recommended in the European Association of Urology (EAU) guideline, it is included in the Dutch guideline as potential curative treatment option [6]. External beam radiotherapy (RT) treatment can be considered in patients unfit for other treatment, but there is controversy as to whether this is a curative option [2,7].

Within this field of complex treatment options, determining the optimal treatment for each individual patient with MIBC requires efficient collaboration between healthcare providers [8]. Today, this interprofessional collaboration takes place in, usually weekly, oncological multidisciplinary team meetings (MDTMs), which are considered essential for disease staging, adherence to guidelines, decision-making and effective planning [9]. Furthermore, limited evidence suggests improvement in overall survival (OS) for patients who have been discussed in a MDTM [9,10]. Several national guidelines, including the Dutch national guideline, therefore recommend discussion of all patients with cancer in a MDTM [11–13]. In the Netherlands guidance for these rules is evaluated in discussions with the Health authorities and insurance companies.

The role of MDTMs has become even more important, as in many countries the care for low-volume cancers or high-complex cancer treatments is centralised. In the Netherlands, since 2015 a minimum of 20 RCs/year/hospital has been required [14]. As a result, there are RC hospitals (including but not limited to academic centres) and non-RC hospitals. Most hospitals have set up interhospital MDTM collaboration to discuss and refer patients with MIBC. MDTM discussions can be live or take place via audio or video conferencing [14]. Their composition may vary (a representative of an academic centre or RC hospital may or may not be present). The Dutch Urological Association (DUA) has issued further MDTM requirements and narrowed them down by setting criteria for the composition of MDTMs. Currently, a MDTM should consist of a urologist, medical oncologist, radiologist, radiation oncologist, pathologist, and a case manager or specialised nurse practitioner [14]. These clinicians may work in the same hospital, i.e., the hospital where the patient is diagnosed, or in different hospitals.

In this nationwide study, we aimed to investigate the proportion of patients with MIBC discussed in a genitourinary MDTM, the presence of the required clinicians, and the impact of patient and tumour characteristics on the probability of being discussed. Furthermore, we aimed to investigate whether the composition of the MDTM influences MDTM advice and the type of treatment with curative intent received. We also explored adherence to MDTM advice and reasons for non-adherence.

Patients and Methods

Patient Selection

Patients diagnosed with cT2-4a,N0/X-1,M0 urothelial cell carcinoma diagnosed between 1 November 2017 and 31 October 2019 were identified in the Netherlands Cancer Registry (NCR). Mixed histology with urothelial cell carcinoma as the main component were classified as urothelial cell carcinoma. Other types of histology were not included in our analysis. This cohort consists of patients included in the ongoing Dutch nationwide, population-based prospective BlaZIB study (BlaaskankerZorg In Beeld: Insight into Bladder Cancer Care) [15], which is embedded in the NCR.

Well-trained NCR data managers routinely extract information on diagnosis, tumour stage and treatment from the medical records. In the NCR, topography and morphology are classified according to the International Classification of Diseases for Oncology (ICD-O-3). All cancers were staged according to the TNM Classification of Malignant Tumours system (eighth edition) published by the Union for International Cancer Control (UICC). Clinical staging was generally based on physical examination, findings at cystoscopy and transurethral resection, CT scan of the abdomen/pelvis and chest imaging (at least a chest X-ray). Besides standard NCR data, additional data were collected on MDTM characteristics within the BlaZIB study.

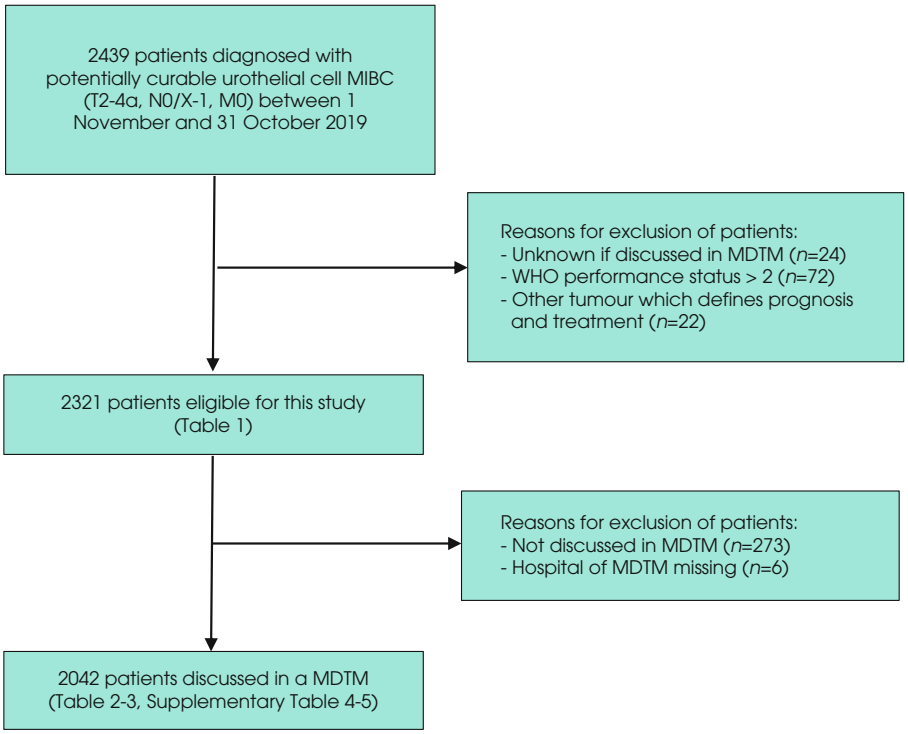
We excluded patients with a WHO performance status score >2, and/or presenting simultaneously with another cancer type with a poor prognosis. Patients for whom data relating to MDTMs were lacking, i.e., whether they were discussed in a MDTM (n = 24) had not been noted, were also excluded (Fig. 1).

The MDTM Characteristics

We included only information concerning MDTMs before the start of treatment or a patient's decision to waive treatment.

We noted whether all required clinicians were present and which clinicians were not present, based on DUA MDTM requirements [14]. In addition, we noted which hospitals were represented in the MDTM by one or more clinicians, to determine whether another hospital (regional, academic, or RC hospital) was involved. Data on MDTM composition that could not be retrieved from the medical records for each individual patient (n = 281, 11%), were supplemented with data from a questionnaire answered by urologists drawn from 82% of Dutch hospitals involved in bladder cancer care (see Appendix S1 for the questionnaire). The agreement between the data we noted, and questionnaire data was fair to good

Fig. 1 Study flow chart.



(see Appendix S2). From the questionnaire, we also retrieved data on the communication method (categorised in live, audio or video conferencing) used by hospitals for MDTMs.

Data on treatment advice and reasons for non-adherence to treatment advice were retrieved from the medical records.

Patient Characteristics

The patient characteristics sex, age (categorised as: <60/60–70/70–80/>80 years), body mass index (BMI; categorised as: <20/20–25/25–30/≥30 kg/m^2), previous abdominal surgery or RT, and deceased <90 days after diagnosis were included in this study. In addition, performance status was included and was based on the WHO performance status and Karnofsky performance scores, converted to WHO performance status scores (0/1/2) according to the NCR's standard registration practices [16]. Comorbidities listed in the Charlson Comorbidity Index (CCI) were counted with weighting (categorised as: 0/1/≥2) [17]. Socioeconomic status (SES) was based on six-digit postal code data from Statistics Netherlands (CBS) and categorised as low/middle/high [18].

Hospital Characteristics

In the Netherlands there are 75 hospitals, 31 of which perform RCs, including seven of the eight academic centres. Hospital characteristics included type of hospital (categorised as: non-teaching, teaching, and academic), RC hospital (yes/no), and inhouse RT (yes/no). The data were hierarchically structured as patients are clustered in hospitals and hospitals are clustered in collaborative oncology networks between hospitals in the Netherlands [19].

Outcomes

Our primary outcome measure was the influence of MDTM characteristics on the probability of receiving treatment with curative intent, defined as RC with and without NAC, CRT, or BT. Secondary outcomes include factors associated with being discussed in a MDTM, adherence to the treatment advice, and reasons for non-adherence.

Statistical Analyses

The percentage of patients discussed in the MDTM, and the patient, tumour and hospital characteristics listed above that may influence the percentage of patients discussed in the MDTM were analysed using univariable analyses.

Patients who were not discussed in a MDTM (273 patients [11.7%]) or had no data on hospital of MDTM (six [0.3%]) were excluded from further analyses (Fig. 1). Missing data were imputed using multiple imputation (n = 50, see Appendix S3 for more details).

The further analyses included univariable analyses on the influence of MDTM and hospital characteristics on the probability of treatment with curative intent being advised and received. In addition, multilevel logistic regression was used to examine the association between patient, tumour and MDTM characteristics on curative treatment receipt. The effect of each characteristic was expressed using odds ratios (ORs) with 95% CIs. Finally, we analysed adherence to the treatment advice for each patient and in case of non-adherence, we collected reasons for non-adherence.

All statistical analyses were performed using the Statistical Analysis System (SAS), version 9.4 (SAS Institute Inc., Cary, NC, USA).

Results

Of the 2321 patients, 2048 (88.2%) were discussed in a MDTM. Patients discussed in a MDTM were significantly younger, physically more fit, were not overweight, had fewer comorbidities, and did not die within 90 days after diagnosis compared to patients not discussed in a MDTM. However, gender, SES, previous abdominal surgery or RT, tumour stage, type of hospital, RC hospital, or inhouse RT did not influence the probability of being discussed in a MDTM (Table 1). Treatment with curative intent was more often given to patients discussed in a MDTM compared to those not discussed in a MDTM, i.e., 67% vs 26%. After adjustment for case mix (factors shown in Table 1), being discussed in a MDTM remained significantly associated with undergoing treatment with curative intent (OR 3.0, 95% CI 1.9–4.9). The association was less pronounced after excluding patients who most likely could not undergo treatment (dying within 90 days after diagnosis) (152 patients, OR 2.4, 95% CI 1.4–4.0).

Of the 2042 patients discussed in a MDTM, 1539 (75.4%) were advised to undergo treatment with curative intent and 1373 (67.2%) underwent such treatment. In 55% of the MDTMs one or more of the DUA recommended specialists were not present. On the other hand, urologists, medical oncologists, and radiotherapists were together present in >94% of all MDTMs. Most MDTMs (65%) were regional, with the involvement of a RC hospital via video conferencing (Table 2).

Involvement of an academic centre in a MDTM was associated with a higher percentage of patients undergoing bladder-sparing treatment (OR 2.05, 95% CI 1.31–3.21), while involvement of a RC hospital in a MDTM was associated with higher proportion of patients undergoing curative intent treatment (OR 1.70, 95% CI 1.09–2.65) and RC (OR 2.10, 95% CI 1.33–3.31). Furthermore, we found negative associations between receiving treatment with curative intent and increasing age, impaired performance status, higher comorbidity, and higher tumour stage (Table 3).

In total, 86.5% of patients who received a curative intent treatment advice did undergo such treatment. Of these, 75.3% received the advised treatment option (Table S1). Patient preference was the main reason for not being advised or not receiving treatment with curative intent. Other reasons for non-adherence to the curative intent treatment advice included the patient's physical condition including comorbidity, progression, and death before or during treatment (Table S2).

Discussion

In this study, we found that most patients with potentially curable MIBC were discussed in a genitourinary MDTM (88.2%). Older patients and patients with lower performance status were less often discussed. Being discussed was associated with a higher probability of receiving treatment with curative intent. Moreover, the involvement of a RC hospital was associated with receiving such treatment. Presence of an academic centre was associated with receiving bladder-sparing treatment. Non-adherence to the MDTM treatment advice was mainly due to patient preference.

Patients of advanced age and/or poorer performance status were less frequently discussed in a MDTM, despite the fact that one might think that these patients would be the ones who would benefit from discussion as they may be candidates for bladder-sparing treatment if they are unfit for RC. Furthermore, the proportion of patients receiving no treatment was higher among those not discussed compared to those discussed. Similar to our findings, two recent studies involving large numbers of patients (205 000 and 105 000) with various cancer types, showed that advanced age and not receiving treatment were related to not being discussed [20,21]. A possible explanation is that the treating physician assumes that these potentially more vulnerable patients are not candidates for a (multidisciplinary) treatment option, as result of which they refrain from discussing the patient's case in the MDTM [21]. This assumption might be incorrect as Scarberry et al. [22] (2018) reported that discussing patients in a genitourinary MDTM led to an adjustment in treatment plan in 57 of 321 (17.8%) patients. This association was independent of patient age. We therefore support the recommendation included in many national guidelines to discuss all patients with cancer in an oncological MDTM to explore the optimal individual treatment plan [11,13,23,24]. However, we acknowledge that MDTMs are under pressure due to the existence of an increasing number of different (multidisciplinary) treatment options and an increasing number of patients to be discussed.

Selecting cases to exclude from MDTM discussion, nowadays called streamlining, plays a role in several Western countries [25–27]. Further research on patient case selection is needed.

Table 1 Description of patients discussed and not discussed in a MDTM.

	Patients discussed in MDTM	Patients not discussed in MDTM	P*
Total, *n* (%)	2048 (88.2)	273 (11.8)	
Patient characteristics, *n* (%)			
Gender			
Male	1472 (71.9)	191 (70.0)	0.51
Female	576 (28.1)	82 (30.0)	
Age, years, mean (SD)	72.2 (10.0)	78.6 (10.1)	
Age (years), *n* (%)			
<60	241 (11.8)	14 (5.1)	<0.001
60–70	497 (24.3)	36 (13.2)	
70–80	819 (40.0)	72 (26.4)	
>80	491 (24.0)	151 (55.3)	
WHO performance status**, *n* (%)			
0	1065 (52.0)	68 (24.9)	<0.001
1	726 (35.4)	78 (28.6)	
2	257 (12.5)	127 (46.5)	
BMI**, *n* (%)			
<20	100 (4.9)	23 (8.4)	<0.001
20–25	767 (37.56)	129 (47.34)	
25–30	833 (40.7)	87 (31.9)	
≥30	348 (17.0)	34 (12.5)	
CCI**, *n* (%)			
0	858 (41.9)	82 (30.0)	<0.001
1	611 (29.8)	84 (30.8)	
≥2	579 (28.3)	107 (39.2)	
SES**, *n* (%)			
Low	654 (31.9)	110 (40.3)	0.02
Middle	798 (39.0)	91 (33.3)	
High	595 (29.1)	72 (26.4)	
Deceased <90 days after diagnosis, *n* (%)	90 (4.4)	62 (22.7)	<0.001
Previous abdominal surgery**, *n* (%)			
No	1501 (73.3)	193 (70.7)	0.36
Yes	547 (26.7)	80 (29.3)	
Previous abdominal RT**, *n* (%)			
No	1975 (96.4)	255 (93.4)	0.01
Yes	73 (3.6)	18 (6.6)	
Tumour characteristics, *n* (%)			
Stage			
cT2, cN0	1333 (65.1)	181 (66.3)	0.84
cT3, cN0	443 (21.6)	61 (22.3)	
cT4a, cN0	117 (5.7)	14 (5.1)	
cN1	155 (7.6)	17 (6.2)	
Hospital characteristics†, *n* (%)			
Type of hospital††			
Non-teaching	847 (41.4)	142 (52.0)	0.003
Teaching	1075 (52.5)	120 (44.0)	
Academic	126 (6.2)	11 (4.0)	
RC hospital††, *n* (%)			
Yes	1194 (58.3)	149 (54.6)	0.24
No	854 (41.7)	124 (45.4)	
Inhouse RT††, *n* (%)			
Yes	308 (15.0)	31 (11.4)	0.11
No	1741 (85.0)	242 (88.6)	
Receive treatment with curative intent, *n* (%)	1377 (67.2)	71 (26.0)	<0.001
NAC + RC	342 (16.7)	12 (4.4)	
RC alone	724 (35.4)	47 (17.2)	
CRT	274 (13.4)	7 (2.6)	
BT	37 (1.8)	5 (1.8)	

*Chi-square test. **The counts for this variable are rounded numbers based on multiple imputation. As a consequence, the sum of counts for these variables might be one lower or higher than the total count. †Hospital characteristics were based on the hospital of (histological) confirmation of the tumour and, in case of progression from a cT1-tumour to MIBC (n = 159), on hospital of treatment. ††Based on hospital of diagnosis.

In only 45% of cases, all necessary medical disciplines as defined by the DUA were present at the MDTM. This is in accordance with findings of a previous Dutch study (2013) where the attendance of core MDTM members was scored; they found an attendance rate of 49% (n = 69) for various tumour-specific MDTMs [28]. However, several other articles reported an attendance rate of >90% of core MDTM members [29,30]. It was noteworthy that the attendance rates of the clinical disciplines were high: urologist 100%, medical oncologist 98%, and radiation oncologist 95%. Unfortunately, we did not note the individual attendance rates of the diagnostic and supporting disciplines (i.e., pathologist, radiologist, specialised nurse practitioner, and case manager). Whether the presence of each member of the core team is of equal importance is unknown. However, what is known is that non-attendance of core MDTM members in general contributes to inefficient decision-making in MDTMs, highlighting the importance of the presence of all involved disciplines [31,32].

The presence of a RC hospital representative is important, as we found that this was associated with a higher probability of receiving treatment with curative intent, although a trend towards a negative association was found for the probability of receiving bladder-sparing treatment. The higher probability of patients receiving treatment with curative intent when a RC hospital was involved (OR 1.70, 95% CI 1.09–2.65) is therefore explained by the fact that the vast majority of patients were treated with RC. One might suggest that a representative of a RC hospital has a better understanding of the technical feasibility of RC or tends unconsciously towards a surgical approach.

The presence of an academic centre representative was associated with higher probability of receiving bladder-sparing treatment (OR 2.05, 95% CI 1.31–3.21). CRT is an emerging treatment strategy for patients with MIBC, particularly as a suitable alternative for patients at high risk of surgical complications [4,33,34]. BT is another, less widely used bladder-sparing treatment strategy in the Netherlands. Voskuilen et al. [5] (2019) found comparable 5-year OS data compared to RC (66% vs 68%) in carefully selected patients. We hypothesise that patients are more likely to be advised bladder-sparing treatment when an academic centre is involved, because specialists from the academic centres might be more closely involved in these recent changes in evidence.

Adherence to an advised treatment with curative intent was good. The greatest discrepancy between MDTM advice and receipt was found in relation to NAC + RC; 15.6% ultimately only had a RC, which could be explained by patients being unfit for or unwilling to undergo chemotherapy. The main reason for non-adherence to the treatment advice was patient preference. Several studies have shown that there needs to be a patient representative (e.g., clinician in charge) in the

Table 2 The influence of MDTM characteristics on advice and receipt of treatment with curative intent.

	Total, *n** (%)	Treatment with curative intent advised, *n** (%)	Treatment with curative intent received, *n** (%)
N	2042 (100)	1539 (75.4)	1373 (67.2)
Medical specialists involved			
Presence medical specialists			
All specialists present	924 (45.3)	705 (76.3)	617 (66.8)
One specialist missing	686 (33.6)	524 (76.4)	480 (70.0)
Two specialists missing	226 (11.1)	167 (73.9)	154 (68.1)
Three or more specialists missing	205 (10.0)	142 (69.3)	123 (60.0)
Presence urologist**			
Yes	2042 (100)	1539 (75.4)	1373 (67.2)
Presence medical-oncologist			
Yes	2006 (98.2)	1515 (75.5)	1354 (67.5)
No	36 (1.8)	24 (66.7)	19 (52.8)
Presence radiotherapist			
Yes	1937 (94.9)	1463 (75.5)	1308 (67.5)
No	105 (5.1)	76 (72.4)	65 (61.9)
Involved hospitals			
Local/regional MDTM			
Local	713 (34.9)	528 (74.1)	470 (65.9)
Regional	1329 (65.1)	1011 (76.1)	903 (67.9)
Hospital of diagnosis involved			
Yes	1727 (84.6)	1276 (73.9)	1120 (64.9)
No	315 (15.4)	263 (83.5)	253 (80.3)
Academic centre involved			
Yes	1008 (49.4)	797 (79.1)	725 (71.9)
No	1034 (50.6)	742 (71.8)	648 (62.7)
RC hospital involved			
Yes	1772 (86.8)	1374 (77.5)	1236 (69.8)
No	270 (13.2)	165 (61.1)	137 (50.7)
RT hospital involved			
Yes	1280 (62.7)	986 (77.0)	892 (69.7)
No	762 (37.3)	553 (72.6)	481 (63.1)
Means of communication with involved hospitals†			
Live	544 (26.6)	421 (77.4)	396 (72.8)
Video	1419 (69.5)	1053 (74.2)	916 (64.6)
Audio	79 (3.9)	65 (82.3)	61 (77.2)

*If multiple treatment options were advised without a clear preference, then the given treatment was considered the advised MDTM treatment (i.e., adherence). *Based on imputed data. As a consequence, the sum of counts for one variable can be one lower or higher than the total count. **Data on the presence of urologists in the MDTM were not available for 207 (10.1%) patients. As there were no MDTMs with completed data in which urologists were absent, the missing values could not be imputed, and it was assumed that at least one urologist was present during the MDTM of the patients with missing data on this variable. †If multiple techniques were used to facilitate communication between hospitals participating in the MDTM, the means of communication was based on the most restrictive communication method.*

MDTM to express the wishes and preferences of the patient; lack of such representation is the most important factor in failure to follow treatment advice [8,35]. We have not been able to demonstrate whether the absence of a patient representative explains non-adherence, as we have no data on the presence of patient representatives.

Our findings need to be interpreted in the light of several limitations. First, the questionnaire we used was not validated because no validated questionnaire on the topic of MDTM composition and treatment for patients with MIBC is available in the Dutch language. However, we believe that for the type of questions being asked, it is also less important to use a validated questionnaire. Second, although we collected a large amount of data, some detailed data on MDTMs and patient characteristics were missing. These missing values were either the result of non-reporting in the electronic medical records or, less frequently, the inability of the data manager to find the required data in the electronic medical records. Multiple imputation allowed us to analyse these incomplete data. Third, some information was not collected in this study, in particular the presence of the treating physician, reasons not to discuss a patient in a MDTM, and reasons for bladder-sparing treatment advice. We have not collected these data because often it cannot be sufficiently extracted from the medical records. Fourth, we only have Dutch data. The setup of the MDTM may differ in different Western countries, with one country implementing streamlining of cases and the other discussing each patient. However, the centralisation of care and role of MDTMs are

Table 3 Association between patient, tumour and MDTM characteristics and received treatment with curative intent.

	Received treatment with curative intent			
	All curative intent treatment (*n* = 1373) OR (95% CI)	**RC + NAC* (*n* = 343) OR (95% CI)**	**RC (*n* = 1065) OR (95% CI)**	**Bladder-sparing treatment** (*n* = 311) OR (95% CI)**
Patient characteristics				
Gender				
Male	Ref	Ref	Ref	Ref
Female	0.88 (0.66–1.16)	0.98 (0.73–1.32)	0.97 (0.75–1.24)	0.94 (0.69–1.28)
Age (years)				
<60	Ref	ref	Ref	Ref
60–70	0.81 (0.50–1.34)	0.62 (0.44–0.88)	0.84 (0.58–1.23)	1.14 (0.72–1.81)
70–80	0.73 (0.46–1.16)	0.29 (0.21–0.42)	0.73 (0.51–1.04)	1.40 (0.90–2.18)
>80	0.09 (0.05–0.14)	NA†	0.10 (0.06-0.15)	1.08 (0.65–1.81)
WHO performance status				
0	Ref	Ref	Ref	Ref
1	0.34 (0.24–0.47)	0.96 (0.69–1.33)	0.42 (0.31–0.59)	1.03 (0.72–1.48)
2	0.04 (0.03–0.07)	0.15 (0.05–0.46)	0.06 (0.03–0.10)	0.34 (0.19–0.62)
CCI				
0	Ref	Ref	Ref	Ref
1	0.75 (0.54–1.04)	0.70 (0.51–0.96)	0.72 (0.55–0.95)	1.22 (0.88–1.70)
≥2	0.49 (0.42–0.82)	0.35 (0.23–0.53)	0.60 (0.44–0.81)	1.17 (0.71–1.66)
SES				
Low	Ref	Ref	Ref	Ref
Middle	1.16 (0.85–1.59)	1.27 (0.90–1.79)	1.12 (0.84–1.50)	1.03 (0.72–1.48)
High	1.43 (1.01–2.03)	1.19 (0.83–1.72)	0.96 (0.71–1.31)	1.51 (1.04–2.18)
BMI				
<20	0.49 (0.27–0.87)	1.12 (0.57–2.20)	0.73 (0.42–1.28)	0.58 (0.27–1.25)
20–25	Ref	Ref	Ref	Ref
25–30	1.07 (0.80–1.44)	1.02 (0.74–1.40)	1.25 (0.97–1.62)	0.80 (0.58–1.09)
>30	1.51 (1.02–2.25)	1.21 (0.82–1.78)	1.17 (0.84–1.64)	1.24 (0.84–1.82)
Previous abdominal RT				
No	Ref	Ref	Ref	Ref
Yes	1.46 (0.73–2.90)	0.56 (0.21–1.48)	3.39 (1.75–6.55)	0.06 (0.01–0.45)
Tumour characteristics				
Stage				
cT2, cN0	Ref	Ref	Ref	Ref
cT3, cN0	0.83 (0.60–1.15)	2.32 (1.69–3.19)	1.12 (0.85–1.49)	0.69 (0.49–0.95)
cT4, cN0	0.31 (0.19–0.51)	2.21 (1.31–3.70)	0.58 (0.36–0.92)	0.48 (0.25–0.93)
any T, cN1	0.25 (0.16–0.39)	3.18 (2.07–4.90)	0.65 (0.44–0.98)	0.31 (0.17–0.57)
MDTM characteristics				
Academic hospital involved				
No	Ref	Ref	Ref	Ref
Yes	1.23 (0.88–1.73)	0.88 (0.67–1.16)	0.75 (0.53–1.06)	2.05 (1.31–3.21)
RC operating hospital involved				
No	Ref	Ref	Ref	Ref
Yes	1.70 (1.09–2.65)	1.19 (0.76–1.87)	2.10 (1.33–3.31)	0.64 (0.36–1.17)

**Patients were not nested in hospital of MDTM. **Hospitals of MDTM were nested in hospital collaborations. †There were no patients aged >80 years that received NAC + RC, therefore the OR could not be estimated.*

themes relevant in all Western countries. The impact of being discussed and the composition of the MDTM is important to be appreciated worldwide. Lastly, we observed that the number of patients receiving advice to undergo treatment with curative intent was relatively low if no RC hospital representative was present at the MDTM, as was the number receiving advice to undergo a bladder-sparing strategy when there was no representative of an academic centre at the MDTM. It would be interesting to explore if this difference in advice given influences the ultimate outcome/survival. However, this item was outside the scope of our study. Future studies should focus on survival data in relation to the MDTM treatment advice and on the composition of the MDTM, in order to gain even better insight into the large differences in treatment advice given to patients with MIBC.

Conclusion

For patients with MIBC, being discussed in MDTMs is associated with a higher probability of receiving treatment with curative intent. Where oncological care is centralised, the presence of experts from centralised centres in local

MDTMs is necessary to increase the likelihood that all possible treatment options will be discussed. Therefore, we recommend discussing every patient in a well-represented MDTM.

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Disclosure of Interests

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Abbreviations: BlaZIB study, BlaaskankerZorg In Beeld: Insight into Bladder Cancer Care; BMI, body mass index; BT, brachytherapy; CCI, Charlson Comorbidity Index; CRT, chemoradiation; DUA, Dutch Urological Association; MIBC, muscle-invasive bladder cancer; MDTM, multidisciplinary team meeting; NAC, neoadjuvant chemotherapy; NCR, Netherlands Cancer Registry; OR, odds ratio; RC, radical cystectomy; RT, radiotherapy; SES, socioeconomic status.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1 Adherence to MDTM treatment advice.
Table S2 Reasons for non-adherence to MDTM advice.
Appendix S1 Questionnaire to urologists.
Appendix S2 Comparison of MDTM characteristics based on registration and questionnaire data.
Appendix S3 Multiple imputation.