Research Article

Mini nutritional assessment as a screening tool for muscle-invasive bladder cancer patients: A cross-sectional study in a high-volume center

Aldrin Eder da Silva[1], Narjara Pereira Leite[1], Khalil Smaidi[1,2]*, Alexandre Kyoshi Hidaka[1], Rafael Ehrenfreund[1], Fernando Korkes[1]

[1]Centro Universitário FMABC, Santo André, SP, 09060-870, Brazil
[2]Avenida Lauro Gomes, 2000, Vila Sacadura Cabral, Santo André, SP, 09060-870, Brazil

Abstract

Background: Bladder cancer (BC) is an aggressive disease that begins in the cells lining the bladder, which grows abnormally due to mutations. One of the aggravating factors during treatment is the nutritional risk, contributing to increased morbidity and mortality. Nutritional screening can be extremely important for these patients since the nutritional condition can deteriorate during treatment and due to the progression of the disease. **Objectives:** This cross-sectional observational study aimed to compare the results of using the Mini Nutritional Assessment (MNA) nutritional screening tool obtained by urologists and nutritionists at our center. **Methods:** The target audience were adult patients diagnosed with BC. They were followed up at the urology outpatient clinic and were asked to answer the questions in the short version of MAN during a nutritional screening conducted by a medical team, and later answer the questions contained in the full version of the instrument during a nutritional consultation by nutritionists. The data were analyzed and organized by employing a RedCap database. Statistical analysis of data was performed using the SPSS software package. For comparison between continuous variables, the Mann–Whitney U-test and Student's *t*-test were utilized. For analyses of the categorical variables, the Wilcoxon Matched Pairs test and the Cohen Kappa test were used. A significance level of 5% ($P \leq 0.05$) with a confidence level of 95% was set for all statistical tests. **Results:** A total of 46 patients were evaluated. The medical team identified 18 (39.1%) with normal nutritional status, while the nutrition team identified 13 (28.3%). In comparison, the use of the full version of the MNA administered by the nutrition team found that 32 (69.6%) patients were at nutritional risk. Individual questions of the short-version MNA were also compared between the two groups and the Wilcoxon Matched Pairs test was performed. The short-version MNA was found to be an excellent screening tool. When applied by a urologist, it yielded a sensitivity of 87.5% ($P = 0.87$) and a sensitivity of 93.7% ($P = 0.76$) when used by the nutritionist. A raw match rate was 71.7% achieved by both questionnaires, and the Cohen Kappa test showed that the agreement was moderate, with an agreement rate of 77.9% (k = 0.50). **Conclusion:** The application of short-version MNA has a high sensitivity. However, the full-version MNA is necessary for nutritional screening to improve the sensitivity of the assessment and to serve as a guide for nutritionists and the multidisciplinary care team.

Keywords: Bladder cancer, Mini nutrition assessment, Nutritional screening, Nutritional risk, Multidisciplinary care team

1. INTRODUCTION

In Brazil, it is estimated that 15,854 new cases of bladder cancer (BC) are diagnosed per year and there were 5630 BC-related deaths in 2020 [1]. These represent approximately 2.7% of all diagnoses and 2.2% of deaths in the country, with an incidence of 43,545 cases [2]. Among the causes of BC, smoking is one of the main risk factors, given the action of carcinogenic substances in the bladder urothelium [3,4].

BC management is complicated and expensive. Many patients present with several issues, including social, economic, and nutritional ones. Therefore, a multidisciplinary effort is necessary to achieve better outcomes. One of the most relevant issues is the nutritional risk, a major factor

***Corresponding author:**
Khalil Smaidi (khalilsmaidi@gmail.com)

Received: 05 June 2024; Revision received: 26 June 2024; Accepted: 11 July 2024; Published: 05 September 2024

How to cite this article: da Silva AE, Leite NP, Smaidi K, Hidaka AK, Ehrenfreund R, Korkes F. Mini nutritional assessment as a screening tool for muscle-invasive bladder cancer patients: A cross-sectional study in a high-volume center. *Bladder.* 2024;11(1): e21200002. DOI: 10.14440/bladder.2024.0006

responsible for increased morbidity and mortality. In addition, BC has a higher incidence in elderly patients, meaning that the disease poses a greater risk for death [5,6].

In 2019, the BC Group (CABEM) was formed, with an objective to improve the efficacy of muscle-invasive BC (MIBC) treatment in the public health system. Our institution covers a region of nearly 2 million people. All newly diagnosed MIBCs in the public health system are taken to the CABEM center to centralize the management of this outrageous disease. As a multidisciplinary team, we witnessed a significant and promising early impact of this initiative on this group of patients [7]. A nutritional follow-up may have an upstream impact on the complication rates and survival of MIBC patients. We are currently uncertain about the best tool to use for evaluating nutritional status since no clear consensus is available in the literature. Various nutritional metrics are now being used, including the prognostic nutritional index (PNI), controlling nutritional status (CONUT), and the geriatric nutritional risk index [8].

Early nutritional assessment is extremely important and must be carried out using anthropometric indicators, biochemical methods, food consumption measures, and nutritional screening [9]. One of the instruments that can be used in nutritional screening is the Mini Nutritional Assessment (MNA), which is a validated, reliable, and rapid screening method [10].

The study aimed to compare the applicability of the MNA nutritional screening tool between medical and nutrition teams during the initial presentation of MIBC patients.

2. METHODS

2.1. Patients

This was a cross-sectional observational study. All patients were asked to fill out the MNA short version (MNA-SF) in the first medical presentation and a full version in the nutritional presentation, respectively. Included in this study were all adult patients diagnosed with MIBC and evaluated by urologists and nutritionists and then by the MIBC group of the urology department (CABEM) of the University Center FMABC from January 2019 to January 2023. This study was carried out upon approval by the Local Ethic Committee (CAAE: 69806723.4.0000.0082).

2.2. Nutritional assessment method

MNA is a nutritional assessment method developed for evaluating the nutritional status of the elderly population, including healthy and debilitated people. It is designed to identify elderly patients with malnutrition or at risk of malnutrition and those who may benefit from early intervention [11]. The maximum score, in the full version, is 30 points. A score between 24 and 30 points indicates that the elderly person has a normal nutritional status, points 17 to 23.5 are indicative of the risky status of malnutrition, and scores lower than 17 points mean that the patient is malnourished. The summarized/short version of the instrument contains the subjective questions: Changes in food intake in the past 3 months (severe, moderate, or no decrease), weight loss in the past 3 months (more than 3 kg, between 1 and 3 kg, don't know, or had no weight loss), mobility (bed-ridden or in a wheelchair, ambulatory, but do not leave the house or move around normally), presence of psychological stress or acute illness in the past 3 months, and neuropsychological problems (severe dementia or depression, mild dementia, or have no problem). As to the objective information, the questions cover the anthropometric data (weight, height, and calf circumference). When nutritional status is rated according to the MNA summarized version, the sum of the scores is used, with 14 points being the highest score. The nutritional status is classified on the summarized version as follows: Adequate nutritional status (MNA 12 – 14 points), risk of malnutrition (MNA 8 – 11 points), and malnutrition (MNA 0 – 7 points).

The primary outcome of the study was to compare the malnutrition risk according to the MNA-SF scores awarded by the urologist (Appendix, Figure 1) and nutritionist (Appendix, Figure 2), respectively. The secondary outcome was to compare the sensitivity and agreement of short-version MNA when given by urologists and nutritionists (Appendix, Figure 3).

2.3. Statistical analysis

The data were analyzed and organized using the RedCap database. The statistical analyses were conducted by employing SPSS, version 23 for Windows. For demographic data, the distribution of variables was described as mean and standard deviation or frequency and proportion, whenever applicable. For comparison between continuous variables, the Mann–Whitney U test and Student's *t*-test were used, depending on the distributions found. For the categorical variables, the Wilcoxon Matched Pairs test and the Cohen Kappa test were utilized. A significance level of 5% ($P \leq 0.05$) with a confidence level of 95% was set for all statistical tests.

3. RESULTS

Forty-six patients were included, of whom 37 (80.4%) were male. The median age was 67.0 ± 9.7 years. With regard to the decrease in intake in the past 3 months, the short-version MNA survey by the medical team showed that 4 (8.7%) patients had a moderate decrease, while the nutrition team found 17 (37.0%) fell into the same category. As to patients without decreased intake, 32 (69.6%) were

identified by the medical team and 25 (54.3%) by the nutrition team. Regarding weight loss in the past 3 months, 22 (47.8%) individuals were identified as losing more than three kilos (kg) by the medical team, while 21 (45.6%) were identified by the nutrition team. Regarding psychological stress or acute illness in the past 3 months, the medical team identified 22 (47.8%) individuals, while the nutrition team found that 36 (78.3%) of the individuals had related symptoms. As to the body mass index (BMI), 31 (67.5%) were found to have a BMI ≥23 kg/m^2 by the medical team and 26 (56.5%) were identified by the nutrition team. With the six questions in the summarized/short version of the MNA, the medical team found that 20 (43.5%) patients were at risk of malnutrition, while the nutrition team identified 25 (54.3%) patients. The medical team found that 18 (39.1%) patients had normal nutritional status, while the nutrition team identified 13 (28.3%). Comparatively, using a full version of the MNA, the nutrition team identified 32 (69.6%) patients at nutritional risk (Table 1).

Comparison of individual questions of the short-version MNA between the two groups by the Wilcoxon Matched Pairs test showed that it might serve as an excellent screening tool. When given by a urologist, it attained a sensitivity of 87.5% ($P = 0.87$) and a sensitivity of 93.7% ($P = 0.76$) when administered by a nutritionist. A raw match rate of 71.7% was observed between the two questionnaires, and the Cohen kappa test showed that the agreement was moderate, with an agreement rate of 77.9% (k = 0.50). Regarding the short version, both groups had no difference in the screening scenario ($P = 0.02$). With the full-version MNA and in terms of the malnutrition risk, the medical team had a higher false-negative rate (21.7%) when compared with the nutrition team (8.6%), but the difference was not statistically significant.

4. DISCUSSION

In the elderly population, malnutrition and the risk of malnutrition are associated with increased mortality, regardless of the cause of death, which highlights the need for nutritional screening to identify these patients to improve their nutritional status and related therapies [12]. In the present study, a significant portion of individuals had reduced oral intake and weight loss of more than three kilograms (kg) in the past 3 months, with 69.6% of subjects identified to be at nutritional risk when evaluated by the short-version MNA administered by the nutrition team. The study by Vieira *et al*. [13] investigated 146 elderly people, hospitalized at the National Cancer Institute (INCA), assessed the nutritional profile of individuals with cancer on the short-version MNA, and made the comparison in terms of anthropometric parameters, tumor location, and length of hospital stay. The short-version MNA survey identified the patients with reduced food intake and weight loss in the past 3 months and found that 49.3% of the individuals suffered from malnutrition, with a mortality rate of 13.7%, and the majority of them were malnourished (55.5%).

A cross-sectional study carried out in an oncological hospital in the city of Salvador, Bahia, examined 371 elderly patients over 65 with malignant tumors, regardless of location or stage. The study was part of a multicenter study conducted by the José Alencar Gomes da Silva - INCA in 50 institutions and was designed to help cancer patients in several cities in Brazil and Portugal [14]. The sample consisted of elderly people, admitted to the clinical and surgical hospital wards, from September to October 2014. The study results showed that the majority of patients were male (61%), and in terms of nutritional state, the short-version MNA assessment found that the majority of patients were in the status of inadequate nutrition (59.0%). In addition to having some psychological stress or acute illness in the past 3 months (72.0%), similar to the present study, 43.5% of their subjects were at nutritional risk as revealed by the short-version MNA administered by the medical team and 54.3% had the risk as evaluated by the nutrition team using the same instrument. Moreover, the nutrition team using the instrument found that 78.3% of the individuals presented some psychological stress or acute illness in the past 3 months [15]. Similar results were observed in a multicenter study conducted by INCA in 2015. Another larger study recruited 3257 patients (from institutions in Brazil and Portugal). Of these subjects, 73% had malnutrition and were at nutritional risk according to the MNA results, while 60.6% and 64.6% had adequate nutrition in terms of BMI and CP, respectively [16].

When the full-version MNA was used, a higher percentage of patients were found to be at risk of malnutrition (69.6%) compared to findings of the short-version MNA applied by the medical team and by the nutrition team, which were 43.5% and 54.3%, respectively. Zukeran [17], in his study, investigated the association between frailty syndrome and nutritional risk assessed against the MNA and found no difference in the applicability of the instrument between the summarized version and the full version. Of the 580 individuals in the study, 42.1% were found to be at risk of malnutrition when the short version of the MNA was used and the percentage was 42.8% when the full-version MNA was applied. However, a study by Albay and Tutuncu [18] analyzed whether the short-version MNA sufficed to detect the risk of malnutrition in 75 patients with Parkinson's disease and found that 32.5% of patients with the disease were classified as having normal nutritional status in terms of MNA-SF scores but as being at risk of malnutrition when full-version MNA was used. Their findings were consistent with the results from the present study.

The MNA-SF may be an important tool at the first medical presentation to identify suspected malnutrition or risk of

Table 1. Sex, age of individuals, nutritional screening (MNA) applied by the medical team and nutrition team, and statistical analysis

Sex and age of participants			
Variables	**Feminine**	**Masculine**	**Total**
Sex (n, %)	9 (19.6%)	37 (80.4%)	46 (100%)
Age (median, SD)	61 (9.2)	70 (8.2)	67 (9.7)
Questionnaire "screening" section of the MNA			
Variables		**MNA urology (%)**	**MNA nutrition (%)**
Question 1 - Decrease in food intake in the past 3 months		*n*	*n*
Severe decrease in intake		10 (21.7)	4 (8.7)
Moderate decrease in intake		4 (8.7)	17 (37.0)
No reduction in intake		32 (69.6)	25 (54.3)
Total		46 (100.0)	46 (100.0)
Question 2 - Weight loss in the past 3 months		*n*	*n*
More than three kilos		22 (47.8)	21 (45.6)
Don't know how to inform		2 (4.4)	4 (8.7)
Between one and three kilos		4 (8.7)	2 (4.4)
No weight loss		18 (39.1)	19 (41.3)
Total		46 (100.0)	46 (100.0)
Question 3 - Mobility		*n*	*n*
Restricted to bed or wheelchair		1 (2.2)	1 (2.2)
Walks but is unable to leave the house		1 (2.2)	1 (2.2)
Normal		44 (95.6)	44 (95.6)
Total		46 (100.0)	46 (100.0)
Question 4 - Psychological stress or acute illness in the past 3 months		*n*	*n*
Yes		22 (47.8)	36 (78.3)
No		24 (52.2)	10 (21.7)
Total		46 (100.0)	46 (100.0)
Question 5 - Neuropsychological problems		*n*	*n*
Severe dementia or depression		2 (4.4)	1 (2.2)
Mild dementia		5 (10.8)	0 (0.0)
No psychological problems		39 (84.8)	45 (97.8)
Total		46 (100.0)	46 (100.0)
Question 6 - BMI		*n*	*n*
BMI <19		1 (2.2)	3 (6.5)
19 ≤BMI <21		5 (10.8)	6 (13.1)
21 ≤BMI <23		9 (19.5)	11 (23.9)
BMI ≥23		31 (67.5)	26 (56.5)
Total		46 (100.0)	46 (100.0)
Punctuation		*n*	*n*
12 – 14 points: Normal nutritional status		18 (39.1)	13 (28.3)
8 – 11 points: At risk of malnutrition		20 (43.5)	25 (54.3)
0 – 7 points: Malnourished		8 (17.4)	8 (17.4)
Total		46 (100.0)	46 (100.0)
Full MNA score applied by the nutrition team			*n*
24 – 30 points: Normal nutritional status			10 (21.7)
17 – 23.5 points: At risk of malnutrition			32 (69.6)
Less than points: Malnourished			4 (8.7)
Total			46 (100.0)

BMI: Body mass index; SD: Standard deviation; MNA: Mini nutritional assessment.

malnutrition. In this study, similar sensitivity was noticed when it was applied by a medical or nutrition team, being 87.5% and 93.7%, respectively. Similar data were reported by Zhang and Edwards [19], who, in a review study, observed that the accuracy of MAN in elderly cancer patients was high (sensitivity = 0.77 and specificity = 0.96, area under the curve = 0.83). Therefore, the moderate agreement rate between the two kinds of observers (k = 0.5; $P = 0.02$) may put

the patient on a more careful and early nutritional intervention when a specific evaluation against full-version MNA needs to be carried out by an expert nutrition team. Nutritional management through a multidisciplinary care team is a major game changer in BC management.

Increased consumption of whole grains, yogurt, fruits, vegetables, fluids, and dietary fibers has been linked to a reduced risk of BC [20]. However, the most recent study by the World Cancer Research Fund/American Institute for Cancer Research found that the idea that a substantial diet of fruits and vegetables can lower the risk of BC is not fully supported by available data [21]. Although previous investigations, including two meta-analyses of observational studies, have suggested a link between consuming fruits and vegetables and a decreased risk of BC, research examining patient cohorts has not found any association between fruit and vegetable consumption and the risk of BC [22,23]. Further research is needed to determine whether dietary consumption of fruits, vegetables, and their nutrients affects the development of BC. Notably, increased consumption of red and processed meat has been identified as a significant risk factor for BC, increasing the risk by 17% and 10%, respectively [24].

Studies have shown that malnourished patients undergoing cystectomy have a 22% higher risk of post-procedure complications, with up to 15% of them potentially developing infections due to their nutritional deficiencies [25]. These findings align with earlier research on radical cystectomy, which found higher rates of morbidity and mortality in undernourished subjects [25]. Moreover, the physiological response to surgery-related stress may render individuals previously in good nutritional condition vulnerable to malnutrition [26]. Therefore, implementing a perioperative nutritional support approach seems advisable.

In this context, "nutrition support" refers to providing access to nutrients in addition to regular food to enhance or maintain nutrient consumption.

Methods of delivering nutrition support include parenteral nutrition (PN), enteral feeds (formulations injected through a tube into the gastrointestinal system), oral nutrition supplements, fortified foods, additional food or beverages, and enteral feeds (feeds infused directly into a vein) [26]. Previous research has shown that patients receiving PN after surgery experienced significantly shorter hospital stays compared to those receiving only 5% dextrose, possibly due to a slower recovery from physical activity in patients who were given dextrose [27]. In addition, a meta-analysis of 27 randomized controlled trials in 2001 found that PN administration may reduce complications but not mortality [28].

Furthermore, there is growing interest in prehabilitation during tumor surgery, where nutrition is a key component of multimodal preoperative treatments [29]. Since the 1990s, enhanced recovery after surgery (ERAS), also known as multi-disciplinary fast-track surgery, has significantly contributed to perioperative recovery management [30]. The ERAS protocol is designed to accelerate peristalsis, resume early oral intake, emphasize the importance of initiating nutritional interventions from ambulation, and potentially reduce hospital stay. A study by Lin *et al*. found that the median time for bowel movement in the ERAS group was 12 h shorter than that in the CRAS group among patients undergoing RC. In addition, the ERAS group showed faster recovery in terms of fluid and regular diet tolerance, as well as ambulation [31]. Maffezzini *et al*. also reported that BC patients who underwent a multi-modal perioperative plan had a significantly shorter median time to recover from a regular diet (4 days) compared to those in the conventional group without a multi-modal plan (7 days) [32].

This study has its limitations. The retrospective nature is a major limitation of this study. A retrospective analysis of a small patient sample in a cross-sectional manner may provide an over- or under-estimation of the results.

Multiple questionnaires are used to evaluate the nutritional status of BC patients, such as the PNI and the CONUT. These tools help predict the overall survival and recurrence-free survival outcomes in BC patients [8,33]. We anticipate that the MNA score will also demonstrate similar predictive power. As this analysis had a cross-sectional design, it did not report any postoperative outcomes.

5. CONCLUSION

The MNA is a helpful nutritional screening tool, and it yields similar results independent of professionals who use it. The application of the full version for nutritional screening is necessary to improve the sensitivity of assessment on the nutritional risk of malnutrition to guide management by the nutritionist and the multidisciplinary care team. Therefore, the involvement of nutritionists in a multidisciplinary care team contributes to improve the clinical and surgical management of BC patients and more favorable outcomes.

ACKNOWLEDGMENTS

None.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

Conceptualization: Narjara Pereira Leite, Khalil Smaidi,

Alexandre Kyoshi Hidaka, Rafael Ehrenfreund, Fernando Korkes

Data curation: Aldrin Eder da Silva

Formal analysis: Narjara Pereira Leite, Khalil Smaidi, Alexandre Kyoshi Hidaka, Rafael Ehrenfreund, Fernando Korkes

Investigation: Aldrin Eder da Silva, Narjara Pereira Leite, Fernando Korkes

Methodology: Narjara Pereira Leite, Khalil Smaidi, Alexandre Kyoshi Hidaka, Rafael Ehrenfreund, Fernando Korkes

Writing – original draft: Narjara Pereira Leite, Khalil Smaidi, Alexandre Kyoshi Hidaka, Rafael Ehrenfreund, Fernando Korkes

Writing – review & editing: Narjara Pereira Leite, Khalil Smaidi, Alexandre Kyoshi Hidaka, Rafael Ehrenfreund, Fernando Korkes

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Local Ethic Committee (CAAE: 69806723.4.0000.0082). All the patients gave their consent to publish their data in this study.

CONSENT FOR PUBLICATION

All the patients gave their consent to publish their data in this study.

AVAILABILITY OF DATA

The authors confirm that the data supporting the findings of this study are available within the article.

REFERENCES

1. Conte D. Riscos prevalentes para câncer de bexiga: Uma revisão da literatura. *Rev Bras Anál Clín*. 2021;53(1):28-31. *doi: 10.21877/2448-3877.202101991*
2. Sung H, Ferlay J, Siegel RL, *et al*. Global Cancer Statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2021;71(3):209-249. doi: 10.3322/caac.21660
3. Korkes F, Cunha FTS, Nascimento MP, Rodrigues AFS, Baccaglini W, Glina S. Mortality after radical cystectomy is strongly related to the institution's volume of surgeries. *Einstein* (*São Paulo*). 2020;18:eAO5628. doi: 10.31744/einstein_journal/2020AO5628
4. Instituto Nacional de Câncer José Alencar Gomes da Silva. (n.d.). *Bladder Cancer*. Available from: https://www.gov.br/inca/pt-br/assuntos/cancer/tipos/bexiga [Last accessed on 2024 Jul 22].
5. Teoh JYC, Huang J, Ko WYK, *et al*. Global trends of bladder cancer incidence and mortality, and their associations with tobacco use and gross domestic product per capita. *Eur Urol*. 2020;78(6):893-906. doi: 10.1016/j.eururo.2020.09.006
6. *Consenso Nacional De Nutrição Oncológica Ministério Da Saúde Instituto Nacional de Câncer José Alencar Gomes da Silva (INCA)*. Available from: https://www.inca.gov.br/sites/ufu.sti.inca.local/files//media/document/consenso_nacional_de_nutricao_oncologica_-_2a_edicao_2015_completo_0.pdf [Last accessed on 2024 Jul 22].
7. Korkes F, Timóteo F, Martins S, *et al*. Dramatic impact of centralization and a multidisciplinary bladder cancer program in reducing mortality: The CABEM project. *JCO Glob Oncol*. 2021;7:1547-1555. doi: 10.1200/GO.21.00104
8. Jiao H, Wang L, Zhou X, Wu J, Li T. Prognostic ability of nutritional indices for outcomes of bladder cancer: A systematic review and meta-analysis. *Urol Int*. 2023;107(9):886-894. doi: 10.1159/000531884
9. Wyers CE, Reijven PLM, Breedveld-Peters JJL, *et al*. Efficacy of nutritional intervention in elderly after hip fracture: A multicenter randomized controlled trial. *J Gerontol A Biol Sci Med Sci*. 2018;73(10):1429-1437. doi: 10.1093/gerona/gly030
10. Silva M, Marucci M, Roediger M. Tratado de Nutrição em Gerontologia. 1st ed. Manole: São Paulo, Brazil; 2014. p. 224-224.
11. Kaiser MJ, Bauer JM, Ramsch C, *et al*. Validation of the Mini Nutritional Assessment short-form (MNA®-SF): A practical tool for identification of nutritional status. *J Nutr Health Aging*. 2009;13(9):782-788. doi: 10.1007/s12603-009-0214-7
12. Söderström L, Rosenblad A, Thors Adolfsson E, Bergkvist L. Malnutrition is associated with increased mortality in older adults regardless of the cause of death. *Br J Nutr*. 2017;117(4):532-540. doi: 10.1017/S0007114517000435
13. Vieira VSL. Triagem Nutricional em Pacientes Idosos Oncológicos: Um Estudo Multicêntrico Luso-brasileiro. Lisboa: Universidade De Lisboa; 2016. p. 45.
14. Inquérito Luso-brasileiro de Nutrição Oncológica do Idoso: Um estudo multicêntrico/Instituto Nacional de Câncer José Alencar Gomes da Silva; Nivaldo Barroso de Pinho (organizador). Rio de Janeiro: INCA; 2015. p. 76.
15. Oliveira LPM, Anunciação TA, Costa MLV. Nutritional status of elderly cancer patients using different methods. *Rev Bras Cancerol*. 2018;64(2):209-215. doi: 10.32635/2176-9745.RBC.2018v64n2.80
16. D'Almeida CA, Rodrigues, Viviane D, *et al*. Calf circumference as a predictor factor of mortality in elderly cancer in Brazil and Portugal. INCA. Rio de Janeiro, Brazil. 2016. Available from: https://ninho.inca.gov.br/jspui/handle/123456789/4322 [Last accessed on 2024 May 30].
17. Zukeran MS. Identificação da Fragilidade em Idosos a Partir do Risco Nutricional. São Paulo: Universidade de São Paulo; 2017. p. 56.
18. Albay VB, Tutuncu M. MNA-SF is not sufficient without questioning protein and fruit-vegetable consumption to detect malnutrition risk in Parkinson's disease. *Acta Neurol Belg*. 2021;121(1):71-78.

doi: 10.1007/s13760-020-01350-1
19. Zhang X, Edwards BJ. Malnutrition in older adults with cancer. *Curr Oncol Rep.* 2019;21(9):80. doi: 10.1007/s11912-019-0829-8
20. Acham M, Wesselius A, van Osch FHM, *et al*. Intake of milk and other dairy products and the risk of bladder cancer: A pooled analysis of 13 cohort studies. *Eur J Clin Nutr*. 2020;74:28-35. doi: 10.1038/s41430-019-0453-6
21. Norat T, Aune D, Chan D, Romaguera D. Fruits and vegetables: Updating the epidemiologic evidence for the WCRF/AICR lifestyle recommendations for cancer prevention. *Cancer Treat Res*. 2014;159:35-50. doi: 10.1007/978-3-642-38007-5_3
22. Xu C, Zeng XT, Liu TZ, *et al*. Fruits and vegetables intake and risk of bladder cancer: A PRISMA-compliant systematic review and dose-response meta-analysis of prospective cohort studies. *Medicine* (*Baltimore*). 2015;94:e759. doi: 10.1097/MD.0000000000000759
23. Wang C, Jiang H. Meat intake and risk of bladder cancer: A meta-analysis. *Med Oncol*. 2012;29:848-855. doi: 10.1007/s12032-011-9985-x
24. Roth B, Birkhäuser FD, Zehnder P, *et al*. Parenteral nutrition does not improve postoperative recovery from radical cystectomy: Results of a prospective randomised trial. *Eur Urol*. 2013;63:475-482. doi: 10.1016/j.eururo.2012.05.052
25. Terry WJ, Bueschen AJ. Complications of radical cystectomy and correlation with nutritional assessment. *Urology*. 1986;27:229-232. doi: 10.1016/0090-4295(86)90279-7
26. Burden S, Billson HA, Lal S, Owen KA, Muneer A. Perioperative nutrition for the treatment of bladder cancer by radical cystectomy. *Cochrane Database Syst Rev*. 2019;5:CD010127. doi: 10.1002/14651858.CD010127.pub2
27. Askanazi J, Hensle TW, Starker PM, *et al*. Effect of immediate postoperative nutritional support on length of hospitalization. *Ann Surg*. 1986;203:236-239. doi: 10.1097/00000658-198603000-00002
28. Heyland DK, Montalvo M, MacDonald S, Keefe L, Su XY, Drover JW. Total parenteral nutrition in the surgical patient: A meta-analysis. *Can J Surg*. 2001;44:102-111.
29. Jensen BT, Lauridsen SV, Jensen JB. Prehabilitation for major abdominal urologic oncology surgery. *Curr Opin Urol*. 2018;28:243-250. doi: 10.1097/MOU.0000000000000487
30. Kehlet H. Multimodal approach to control postoperative pathophysiology and rehabilitation. *Br J Anaesth*. 1997;78: 606-617. doi: 10.1093/bja/78.5.606
31. Lin T, Li K, Liu H, *et al*. Enhanced recovery after surgery for radical cystectomy with ileal urinary diversion: A multi-institutional, randomized, controlled trial from the Chinese bladder cancer consortium. *World J Urol*. 2018;36:41-50. doi: 10.1007/s00345-017-2108-3
32. Maffezzini M, Gerbi G, Campodonico F, Parodi D. Multimodal perioperative plan for radical cystectomy and intestinal urinary diversion. I. Effect on recovery of intestinal function and occurrence of complications. *Urology*. 2007;69:1107-111. doi: 10.1016/j.urology.2007.02.062
33. Yang F, Liu G, Wei J, Dong Y, Zhang X, Zheng Y. Relationship between bladder cancer, nutritional supply, and treatment strategies: A comprehensive review. *Nutrients*. 2023;15(17):3812. doi: 10.3390/nu15173812

APPENDIX

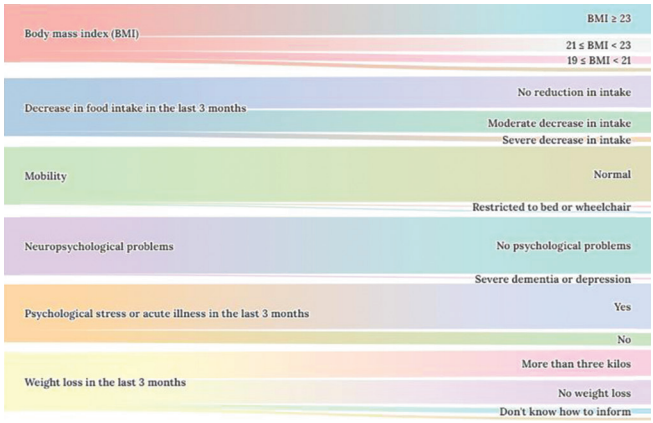

Figure 1. MNA urology team. Result of MNA data collection applied by the urology team
BMI: Body mass index; MNA: Mini nutritional assessment.

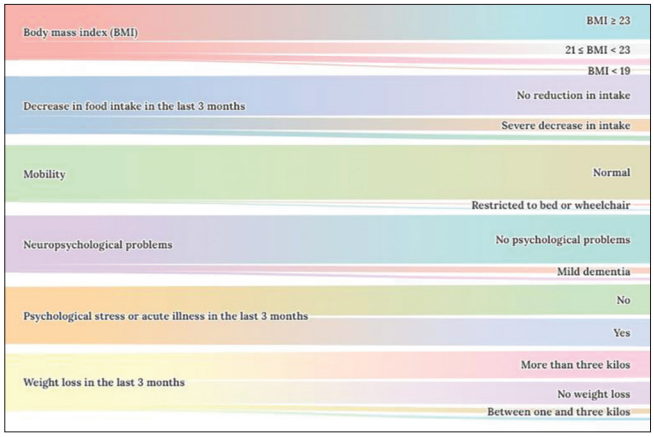

Figure 2. MNA nutrition team. Result of the MNA data collection applied by the nutrition team
BMI: Body mass index; MNA: Mini nutritional assessment.

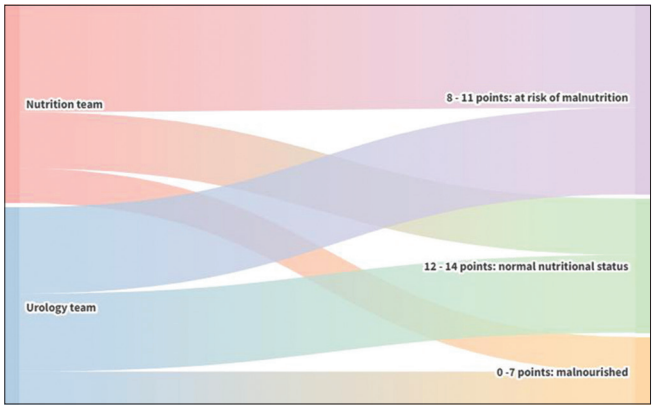

Figure 3. MNA total score. The overall result of MNA data collection applied by the urology and nutrition team
MNA: Mini nutritional assessment.