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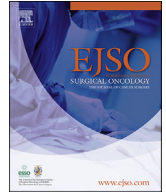
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## Multidisciplinary decision-making in older patients with cancer, does it differ from younger patients?

S. Festen <sup>a, \*</sup>, H. Nijmeijer <sup>a</sup>, B.L. van Leeuwen <sup>b</sup>, B. van Etten <sup>b</sup>, B.C. van Munster <sup>a</sup>, P. de Graeff <sup>a</sup>

<sup>a</sup> University Center for Geriatric Medicine, University of Groningen, University Medical Center Groningen, Groningen, the Netherlands

<sup>b</sup> Department of Surgery, University of Groningen, University Medical Center Groningen, Groningen, the Netherlands

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## ABSTRACT

*Background:* In order to tailor treatment to the individual patient, it is important to take the patients context and preferences into account, especially for older patients. We assessed the quality of information used in the decision-making process in different oncological MDTs and compared this for older ( $\geq 70$  years) and younger patients.

*Patients and methods:* Cross-sectional observations of oncological MDTs were performed, using an observation tool in a University Hospital. Primary outcome measures were quality of input of information into the discussion for older and younger patients. Secondary outcomes were the contribution of different team members, discussion time for each case and whether or not a treatment decision was formulated.

*Results:* Five-hundred and three cases were observed. The median patient age was 63 year, 32% were  $\geq 70$ . In both age groups quality of patient-centered information (psychosocial information and patient's view) was poor. There was no difference in quality of information between older and younger patients, only for comorbidities the quality of information for older patients was better. There was no significant difference in the contributions by team members, discussion time (median 3.54 min) or number of decision reached (87.5%).

*Conclusion:* For both age groups, we observed a lack of patient-centered information. The only difference between the age groups was for information on comorbidities. There were also no differences in contributions by different team members, case discussion time or number of decisions. Decision-making in the observed oncological MDTs was mostly based on medical technical information.

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### Introduction

Many countries have national guidelines demanding multidisciplinary discussion of cancer patients. In the Netherlands between 80 and 99% of oncological patients are discussed in an MDT meeting [1–3]. Oncological MDTs, or tumour boards, are usually organised by tumour type and consist of a group of professionals from different disciplines, including surgeons, medical oncologists, radiation oncologists, pathologist, radiologists and nurses [4]. Most MDTs meet weekly. The aim of these MDTs is to standardise and optimise cancer care according to current guidelines and facilitate

complex decision-making. Discussing cancer patients in an MDT has been shown to result in more appropriate staging, timely treatment, and improved survival [5].

It has, however, been shown that decision-making in oncological MDTs can be suboptimal for older patients, by lacking specific geriatric information [6–10]. This information is important in decision-making for older patients. Due to differences in the aging process, there is increased heterogeneity between older patients, making chronological age an insufficient marker of biological age. Decision-making based on chronological age alone can lead to both under- and overtreatment [11,12]. Another factor complicating

\* Corresponding author. Internist-geriatrician University Center for Geriatric Medicine, University Medical Center Groningen, Hanzeplein 1, 9700 RB, Groningen, the Netherlands.

E-mail address: [s.festen@umcg.nl](mailto:s.festen@umcg.nl) (S. Festen).

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decision-making for older patients, is that most guidelines are based on studies where older patients were excluded [13]. This emphasises the need for tailored decision-making, that is not solely based on cancer characteristics, age, and comorbidity [14]. Incorporating patient specific information into multidisciplinary decision-making has been shown to have an impact on treatment decisions, with alteration of treatment in about a quarter of cases [15–17]. It can also complicate the decision-making, leading to longer discussion time and fewer decisions made [18,19]. Not including this information, however, leads to lower implementation of the MDT recommendations [20].

With the increasing evidence supporting the importance of patient-centered care, taking the patient's context and preferences into account in the decision-making process, we aimed to assess whether this is reflected in the decision-making process in oncological MDT meetings in current practice. We did this by observing different MDT on the quality of the different information used in the decision-making process (both medical technical information such as pathology or radiology as well as patient-centered information) and assessed whether this differed between older and younger patients. We also observed the contribution to the discussion of different team members, time spent on case discussion, and the number of decisions reached.

## Material and methods

### Setting and patients

Between March 2017 and June 2019 observations of different oncological MDTs (colorectal, bone and soft tissue, upper gastrointestinal, hepatobiliary, thyroid, breast and the head and neck) were performed by independent observers in the University Medical center Groningen, The Netherlands. The UMCG is a tertiary university hospital, delivering complex care. According to Dutch guidelines, at least 90% of patients with cancer have to be discussed in an MDT meeting prior to the start of their oncological treatment. These MDTs are organised by tumour type and have to meet weekly. The mandatory professionals differ by tumour type, but minimally consist of a medical oncologist, surgeon, radiation oncologist, radiologist, pathologist, and a nurse [3]. There are no clear guidelines regarding the preparation for other participants for each case, only for the presenting specialist [21]. Within the different MDTs, discussion of all patient cases were observed, independent of age. Patient cases could be presented for the first time, or for follow-up during treatment.

### Materials

Each MDT was observed by an independent, non-participating observer, using a validated scoring list; the 'Metric for the Observation of Decision-making (MDT-MODE)' (Fig. 1) [22,23]. This is a tool to evaluate the quality of information presented (case history, radiology, pathology, psychosocial, comorbidities, and patient views (i.e. the patient's wishes or opinions regarding treatment)). It also evaluates the contribution to the discussion of different specialties (surgeon, oncologist, pathologist, radiologist and nurse) and whether a decision was reached. The MDT-MODE has been shown to have an interrater agreement varying from high agreement for radiology information and contributions from oncologists, pathologists, and nurses, moderate agreement for case history and contribution of surgeons, and poor agreement for pathology information [23]. The original tool can be found on the website of the 'Center for Patient Safety and Service Quality' of Imperial College London [24]. For our study we used an adjusted version of the MDT-

MODE: age was added in order to make an age-based comparison and 'nurses input' was added to the information section since we were interested as to whether patient specific information was brought into the MDT by nurses (Fig. 1).

Using the observation tool, information regarding the quality of input of different information and contributions to the discussion was rated on a 5-point Likert scale with a rating of 5 representing optimal quality of presented information or optimal contribution. The instrument uses predefined anchor (example) behaviors regarding the level of quality in order to facilitate the rating of the observations (Fig. 1). A rating of 1 represents low quality of information or contribution, a rating of 3 average quality of information or contribution, and a rating of 5 good quality of information or contribution. Similarly, the contribution of different team members in the discussion was rated. Because the function of chair was performed by one of the oncological specialists, input was scored for the role of chair. The patient's age and gender were noted, as well as the time it took to discuss each case. It was also noted whether the MDT reached a decision, or whether this was deferred or not reached/unclear. The information was observed and scored by one of the three trained observers. In order to evaluate interrater reliability, four MDTs were observed by two observers at the same moment, blinded to each other's ratings. The responsible chair of the different MDTs was contacted and approved the study. The other participants were unaware of the observations. Since the observations performed concerned the quality of information discussed by the members of the MDT and patient files were not studied, no patient consent was necessary. The study was registered in the UMCG research register under number 202000352.

### Outcome measures

The primary outcome was the quality of information and whether this differed between older ( $\geq 70$ ) and younger patients. The secondary outcome measures were the contribution of the different MDT members, the single case discussion time and the number of decisions reached (versus a deferred decision or no decision). These outcomes were also compared between older and younger patients.

### Statistical analysis

Characteristics of patients' cases and MDTs observations were analyzed using descriptive statistics and were described as numbers and percentage or median and IQR, as appropriate. For comparison between older and younger patients, Pearson's Chi-square tests were applied for categorised data, and independent T-tests and Mann-Whitney U tests for continuous variables. The MDT-mode provides a 5 point Likert scale, but we found that only scores for which an anchor question was provided (1,3 and 5) for quality of information and contribution in discussion, were rated. These variables were therefore analyzed as categorical and tested with Chi-square tests per item.

Agreement on whether or not a decision was reached was calculated both in an absolute way and using the unweighted kappa. For agreement regarding time spent per case, the intraclass correlation coefficient (ICC) was used. Inter-rater reliability for the quality of information presented (case history, radiology, pathology, psychosocial, comorbidities, patient views, and nurses input) and the input of different participants in the discussion was calculated in an absolute way and using the weighted quadratic kappa. A p-value smaller than 0.05 was considered significant. Data analysis was performed using the software package IBM SPSS Statistics, version 23.0 for Windows (SPSS, Inc., Chicago, IL, USA).

nr	age	gender	MDT	Information							Discussion							Decision	Time
				Hx	Xray	path	psy/soc	comorb	Pt view	nurse	chair	surg	radioth	oncol	nurse	radiol	path	other	Y/N/D
1																			
2																			
3																			
4																			

History (Hx)	5	Fluent, comprehensive case history	Patient view	5	Comprehensive first-hand knowledge of patient's wishes or opinions regarding treatment
	3	Partial case history		3	Vague first-hand knowledge or good second-hand knowledge of patient's wishes or opinions regarding treatment
	1	No patient case history		1	No knowledge of patient's wishes or opinions regarding treatment
Radiology (X-ray)	5	Radiological images	Nurse input (input of information)	5	Input of good first-hand information about the patient
	3	Radiological information from report/account		3	Input of vague first-hand or good second-hand information about the patient
	1	No provision of radiological information		1	No input of information about the patient
Pathology	5	Histopathological information from pathologist	Chair	5	Good leadership enhanced team discussion and decision making
	3	Histopathological information from report/account		3	Leadership neither enhanced or impeded team discussion and decision making
	1	No provision of histopathological information		1	Poor/inadequate leadership impeded team discussion and decision making
Psychosocial	5	Comprehensive, first-hand knowledge of patients' personal circumstances, social and psychological issues	Members (input in the case discussion)	5	Clear contribution of speciality
	3	Vague first hand-knowledge or good second-hand knowledge of personal circumstances, social and psychological issues		3	Contribution inarticulate or vague
	1	No knowledge of personal circumstances, social and psychological issues		1	No contribution
Comorbidity	5	Comprehensive first-hand knowledge of past medical history and performance status	Decision	Y	Clear decision about treatment(s) to be offered
	3	Vague first-hand knowledge or good second-hand knowledge of personal circumstances, social and psychological issues		D	Decision to defer to next MDT
	1	No knowledge of personal circumstances, social and psychological issues		N	No decision/decision unclear

Fig. 1. The tool that was used for the quantitative observations: adjusted 'Metric for the Observation of Decision-making'.

Results

Patients

In total 503 patient cases were observed; 342 (68%) were younger than 70 years and 161 (32%) were 70 years and older. Table 1 shows the characteristics of the patient cases observed, stratified by age. Median age was 63 (IQR 51–72) for the total group; 56 years (IQR 46–63) for the younger group and 75 years (IQR 72–79) for the older group. In the total group, 253 (50.3%) were male and 250 (49.7%) female, with a higher percentage of males in the older group (59% vs 46.2%,  $p = 0.007$ ).

MDT meetings

Table 2 shows the characteristics of the different MDTs. MDTs for the following tumour types were observed: colorectal (131 cases;

26%), bone and soft tissue (88 cases; 17.5%), upper gastro-intestinal (81 cases; 16.1%), hepatobiliary (77 cases; 15.3%), thyroid (40 cases; 8%), breast (41 cases; 8.2%), and the head and neck MDT (45 cases; 8.9%). The number of patients of 70 years and older differed between the different MDTs, with the highest relative number of older patients in the head and neck MDT (57.8%), followed by the upper GI (37%) and the colorectal MDT (36.6%). Discussion time was slightly longer for older (median time 4:09 min, IQR 02:30–05:38) than for younger patients (median time 3:50 min, IQR 02:20–5:38) for the whole group and for the different MDTs, but this was not statistically significant ( $p = 0.2$ ). Median discussion time per patient was longest in the breast MDT (04:32 min) and upper GI MDT (04:29 min) and shortest in the colorectal (03:20 min, IQR 02:13–05:10) and bone and soft tissue MDT (03:24 min, IQR 01:42–04:43) (Table 3). For two patients, the discussion time was unavailable.

Table 1

Baseline characteristics of the patients stratified by age.

Variable	<70 (n = 342)	≥70 (n = 161)	p
Age (median, IQR)	56 (46–63)	75 (72–79)	na
Gender	Male	95 (59.0)	0.007
Tumour type	Colorectal	48 (29.8)	<0.001
	Bone and soft tissue	70 (20.5)	18 (11.2)
	Upper GI	51 (14.9)	30 (18.6)
	Hepatobiliary	51 (14.9)	26 (16.1)
	Thyroid	36 (10.5)	4 (2.5)
	Breast	32 (9.4)	9 (5.6)
	Head and Neck	19 (5.6)	26 (16.1)

All numbers are given as n(%) unless otherwise specified, na = not applicable, GI = gastro intestinal.

**Table 2**  
Characteristics of the observed MDTs.

Tumour MDT	Cases (n,%)	Age, median (IQR)	Time per case, median (IQR)		p
			Age <70	Age ≥70	
Colorectal	131 (26.0)	64 (55–74)	03:16 (02:13–05:07)	03:44 (02:15–05:27)	0.7
Bone and soft tissue	88 (17.5)	58 (33.5–68)	03:15 (01:23–04:46)	03:31 (02:27–04:44)	0.4
Upper GI	81 (16.1)	66 (61–74.5)	04:22 (03:35–05:44)	05:00 (03:13–06:11)	0.6
Hepatobiliary	77 (15.3)	66 (52.5–72)	04:15 (02:25–06:26)	04:31 (02:35–06:25)	0.8
Thyroid	40 (8.0)	50 (29.8–63.5)	03:39 (01:57–05:50)	04:02 (02:23–05:59)	0.7
Breast	41 (8.2)	53 (46.5–69)	04:27 (02:58–05:44)	04:45 (03:33–07:28)	0.5
Head and Neck	45 (8.9)	71 (59.5–83)	03:06 (02:00–04:45)	04:00 (02:16–04:45)	0.5

**Table 3**  
Interrater reliability between the reached decisions, discussion time, observed quality of information, and observed quality of input.

Observed item	Patients (n)	absolute agreement (%)	test
Decision	46	91.3	0.701 (0.434-0.968) <sup>1</sup>
Time	33	–	0.966 (0.932-0.983) <sup>2</sup>
Information rowhead			
Case history	46	71.7	0.160 (-0.80-0.400) <sup>3</sup>
Radiology	46	91.3	0.618 (0.279-0.957) <sup>3</sup>
Pathology	46	47.8	0.500 (0.286-0.713) <sup>3</sup>
Psych/social	46	91.3	0.176 (-0.144-0.496) <sup>3</sup>
Comorbidity	46	76.1	0.738 (0.549-0.926) <sup>3</sup>
Patient view	45	97.8	0.904 (0.686-1.123) <sup>3</sup>
Nurse input	37	100	NA <sup>4</sup>
Contribution in discussion rowhead			
Chair	46	58.7	0.027 (-0.218-0.273) <sup>3</sup>
Surgeon	46	80.4	0.466 (0.184-0.749) <sup>3</sup>
Radiation oncologist	46	97.8	0.973 (0.918-1.028) <sup>3</sup>
Medical oncologist	46	93.5	0.898 (0.760-1.036) <sup>3</sup>
Nurse	46		NA <sup>4</sup>
Radiologist	46	73.9	0.584 (0.367-0.800) <sup>3</sup>
Pathologist	46	89.1	0.337 (-0.153-0.828) <sup>3</sup>
Other	46	80.4	0.645 (0.411-0.878) <sup>3</sup>

1= Unweighted kappa (95% CI), 2= Intraclass correlation (95%CI), 3= Weighted quadratic kappa, 4= zero variance.

Quality of information

Fig. 2 shows the quality of information on different items stratified by age. For the whole group the information was most

comprehensive for case history (good quality in 65.6%), radiology (good quality in 81.7%) and pathology (good quality in 38.9%), and lowest on psychosocial information (good quality in 2%), patients view (good quality in 3%), and nurse input (good quality

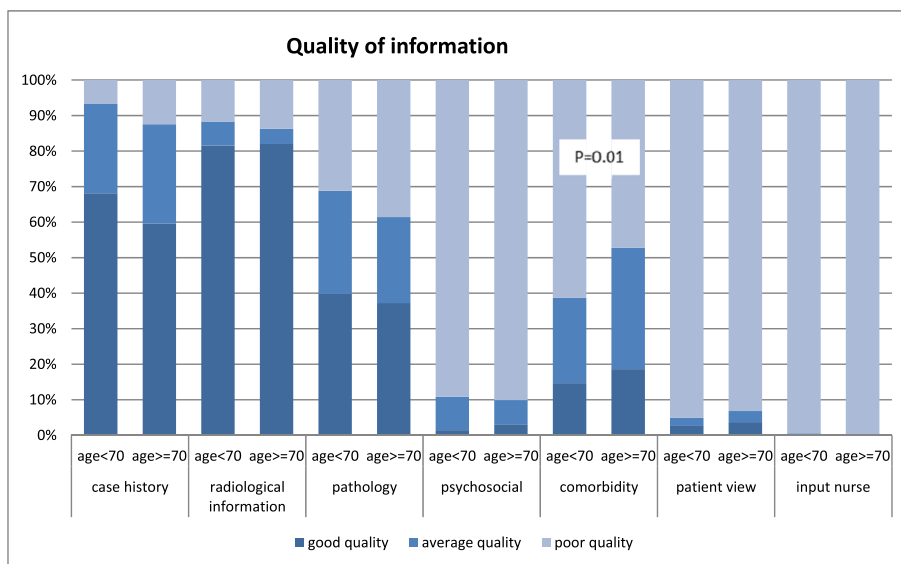
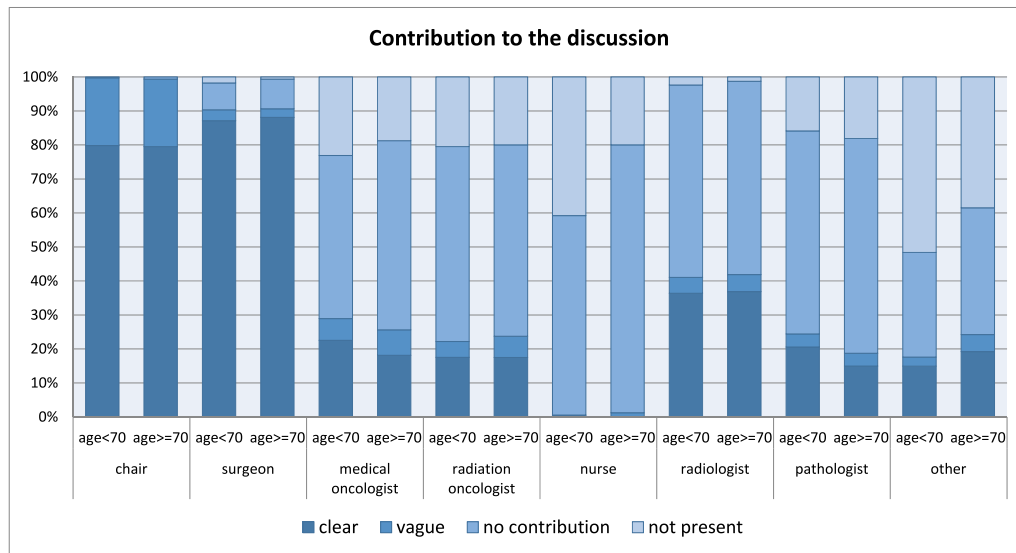


Fig. 2. Quality of information during the MDTs on different variables (%).





Other = other team members such as gastroenterologist, endocrinologist

**Fig. 3.** Contribution to the discussion of different MDT members  
Other = other team members such as gastroenterologist, endocrinologist.

information in 0%). On comorbidity, there was good quality information for 15.9%. Only for comorbidities, there was a significant difference in the quality of information between older and younger patients (good quality in 18.6% and low quality in 47.2% for older patients versus good quality in 14.6% and low quality in 61.1% for younger patients,  $p = 0.01$ ). The quality of information on the other items was similar between older and younger patients.

When dividing the discussion time in high and low by using the mean discussion time (3.54 min) as a cut-off between these two categories, there were no significant differences for quality of information on case history, pathology, patient-centered information (psychosocial information and patient views) and nurses input. For comorbidities and radiology, information was slightly better when the discussion time was longer (comorbidities: comprehensive in 21.9% for a longer discussion time versus 10% for a shorter time,  $p < 0.001$ , radiology: 89.6% versus 74%,  $p < 0.001$ ). Median discussion time for comorbidities ranged from 03:28 min for low quality information to 04:46 min for high quality information. For radiology information the median time ranged from 02:28 min for low quality information to 04:09 min for high quality information. (data not shown).

#### Contribution of members

Fig. 3 shows the contribution to the discussion for different specialties. The chair and the surgeons had the largest contribution in the observed MDT and were present the most. Nurses were present in 65.9%, but their contribution to the discussion was poor for both age groups. The attending nurses were all oncology nurses and sometime nurse practitioners.

#### Decisions reached

For 63 patient cases (12.5%) no decision was reached during the MDT meeting; for 60 cases (11.9%) the decision was deferred, and for three patient cases (0.6%) a decision was not reached/unclear. For one patient this information was missing. The number of patients where a decision was not reached/deferred was similar in the older group vs the younger group (14.4% vs 11.7%,  $p = 0.4$ ). There

were different reasons for a decision to be deferred. Sometimes patients needed additional investigations (like a biopsy or scan) and sometimes they needed to be referred to a different specialist, or both. In some cases, the treating physician wanted to discuss the case in their own team before making a final decision.

#### Interrater reliability

Interrater reliability was calculated for 46 cases from four different MDTs. Absolute agreement for the rating of the quality of information ranged from 71.7% to 100%, with an exception of pathology with an absolute agreement of 47.8%, with a moderate weighted quadratic kappa of 0.505. Weighted quadratic kappas were moderate to good for radiology, comorbidities, and patient views. There were low kappa values on case history and psychosocial information due to a lack of variance in measurements. For nurses input, a kappa could not be calculated since there was zero variance between the observers. Absolute agreement on the observations of the contribution in the discussion of different members of the MDT between observers ranged from 58.7% to 97.8%. Agreement was poor for the observations of the contribution of the chair, possibly due to the fact that this was mostly one of the team members who performed another role in the MDT as well. There was zero variance in observations of the nurses' role (no role). Agreement was fair to moderate for the contribution of the surgeon, pathologist, and radiologist and good to very good for the observations on the contribution of the medical oncologist, pathologist, and radiologist. Agreement on time measurements could be calculated for 33 cases. There was excellent interrater reliability for time spend per case, ICC = 0.966 (0.932–0.983). There was a good agreement for whether or not a decision could be reached (91.3% absolute agreement, unweighted kappa = 0.701). (Table 3).

#### Discussion

This study assesses the quality of information discussed in oncological MDTs and whether this differed between older and younger patients. To our knowledge, this is the first study

comparing the discussion of older patients with the discussion of younger patients in MDTs. We had expected more patient-centered information and a longer discussion time for older patients, reflecting the higher level of frailty and multimorbidity in this age group, but found no differences between younger and older patients. The focus of the MDTs was mostly disease-centered and technical. These findings do not necessarily mean that patient-centered information is not considered and weighed by the individual specialist in the decision-making process. However, by leaving this out of the MDTs, the gathering and interpretation of this information is left up to the individual medical specialist and therefore not guaranteed for all patients.

There were also no differences in contribution of different team members, or number of decisions reached between the older and younger patients. Discussion time for each individual case varied between MDTs, but was short (median 3.54 min). The short discussion time might have impacted the availability and information quality. For radiology information and information on comorbidities we found a relation between quality of information and discussion time. However, we cannot assess whether this was due to the fact that patients with more (complex) disease and comorbidity were discussed more extensively, or that a longer discussion time led to providing more comprehensive information.

The short discussion time per case could be a result of a high case load in the MDTs and the limited available time of attending specialists. In the Netherlands, guidelines state that all patients have to be discussed in a multidisciplinary setting in order to provide optimal quality treatment proposals for all patients, however, this also puts a burden upon oncological specialists, as these meetings are often time consuming. There was a difference in contribution of different team members, with surgeons contributing most often. This was likely due to the fact that the surgeon was often the presenting specialist or that surgery was the primary treatment modality in the discussed patients. The contribution of a radiologist and pathologist was mostly related to whether there were pathology or radiology results to discuss.

MDTs play an important role in cancer care. The impact of MDTs on outcomes is, however, still unclear. Systematic reviews have shown an impact on diagnosis and management, but mostly disease related such as improved staging and adherence to guidelines [25,26]. The lack of patient-centered information we found is in line with other observational studies [27,28]. Even information regarding comorbidities has been found to be unstructured and often poor in oncological MDT discussions [29,30]. To improve decision-making in MDTs, a minimum dataset has been suggested, based on a national survey in the UK among MDT members and on meetings with different stakeholders. The suggested dataset included diagnostic information (radiology and pathology), clinical information (i.e. comorbidities and psychosocial information), and patient history, views, and preferences (when known) [31,32].

Appointing a patient advocate to represent the patient's perspective, for instance, a nurse, can also support patient-centered decision-making [10,28]. Nurses often possess useful, patient-centered, information which makes them ideal as case managers. Providing them with a substantial role in MDTs, in order to share this information, might enhance tailored decision-making [33,34]. Unfortunately, the input of nurses in the observed MDTs was also almost nonexistent as was the input of patient-centered information, such as patient preferences and psychosocial information. The limited input of nurses has been observed in other studies [35]. In MDT meetings, medical specialists are often dominant, and not everyone experiences an equal opportunity to provide their opinion [36]. A qualitative study revealed that, during oncology MDT meetings, nurses tend to only participate when asked specific questions and their opinions were sometimes given less weight

[37]. The authors suggest that nurses should get a more prominent role in the discussion of every patient, as does another study among MDT participants [31]. It has been shown that incorporating patient-centered information from nurses and involving geriatricians in an oncological MDT, led to a change in treatment plan in 25% [16]. Due to the observational nature of the current study, we cannot assess if the absence of nurses input and the lack of information on patient specific information were related. We also do not know whether nurses talked to the patients about the patients perspective before the meetings. It is unclear why patient-centered information was lacking, but this might be related to a disease-centered focus and to a high number of patients that needed to be discussed within a limited amount of time.

In order to discuss patient specific information in MDTs, this information has to be gathered beforehand and shared in the discussion. For older patients, geriatric assessment (GA) is a manner of structurally assessing insight in age related problems and level of frailty and doing this has been shown to influence multidisciplinary decision-making [15,38,39]. This can be performed by the oncology team supported by geriatric expertise, or by a geriatrician [16]. General practitioners can also provide valuable contextual information [40]. We cannot assess whether a GA was performed in the discussed patients, however, this was not reflected in the observed MDTs and geriatricians did not attend these meetings. Knowing the patients context and preferences is equally important for younger patients with cancer, as age alone is an insufficient marker of frailty and assessing goals and preferences is an important aspect of shared decision-making for all patients [41].

There are some limitations to this study worth mentioning. First, due to the observational nature of this study, the quality of information as discussed within the MDT could only be noted as it was observed. We do, however, not know whether participants received or read information beforehand or if patients were discussed with colleagues afterward. It is also unknown if patient-centered information was collected later on during the process of shared decision-making. Furthermore, the presence of an observer could have led to the 'Hawthorne effect', where the behaviour of teams is affected by the presence of an observer. However, since all observations were done in an academic center, most attendants of MDTs were comfortable with different people attending the MDT (such as students and trainees), and the effect has likely been small.

In conclusion, with the increasing number of older and frail patients presenting with cancer, the complexity of the decision-making will increase. Even though there has been increased attention to the importance of patient-centered information to optimise decision-making, this is was not reflected in the observed oncological MDTs. Establishing a minimum dataset of available information and appointing a patient advocate for all patients, such as a nurse, could be a means to optimise the decision-making process [42]. Geriatric expertise can provide added value in the treatment decision-making for older patients. Incorporating patient-centered information into MDT decision-making and involving all relevant disciplines into these meetings, is an opportunity to deliver true patient-center care for all patients [43]. Future studies should focus on how to optimise MDT decision-making, without an increasing the burden upon oncology specialist of more or longer meetings. It should also be assessed how the treatment proposals formulated by the MDTs are translated to the shared decision-making process with the patient and whether this leads to improved outcomes from the patients point of view.

#### Credit author statement

Suzanne Festen: Conceptualization, Methodology, Investigation, Supervision, Formal analysis, Writing – original draft, Visualization.

Hilda Nijmeijer: Investigation, Formal analysis, Writing – original draft, Visualization. Barbara van Leeuwen: Investigation, Writing – review & editing. Boudewijn van Etten: Investigation, Writing – review & editing. Barbara van Munster: Conceptualization, Methodology, Supervision, Writing – review & editing. Pauline de Graeff: Conceptualization, Methodology, Supervision, Writing – review & editing.

### Declaration of competing interest

None.

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