

Research Article

Advance Care Planning in Head and Neck Cancer: A Comparative Analysis of Advance Directive Utilization in Non-Recurrent vs. Recurrent/Metastatic Head and Neck Cancer Patients

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Abstract

Background: Advance Directives (ADs) play a critical role in ensuring patient autonomy, particularly among patients with Head and Neck Cancer (HNC). However, the factors influencing AD utilization among HNC patients, especially with respect to varying cancer stages and patient care settings, remain understudied. Our study aims to compare the use of AD between patients Free of Recurrence and/or Metastasis (FRM) from HNC with patients with Recurrent and/or Metastatic (RM) HNC.

Methods: In this comparative observational study at a tertiary cancer care center, we analyzed the utilization of ADs in two distinct patient cohorts diagnosed with HNC: Recurrent and/or Metastatic (RM, n = 96) and Free of Recurrence and/or Metastasis (FRM, n = 389). Data collection involved examining the frequency, motivations, and modes of AD creation of both cohorts

Results: Our comparative analysis revealed a higher presence of ADs in the RM cohort compared to the FRM cohort (58.3% vs. 46.5%, p = 0.038). The type of AD or the reasons against its creation were similar in both groups. Motivations differed notably: 52.4% of the RM cohort was influenced by advice from acquaintances or professionals versus 27.6% in the FRM cohort (p = 0.054, Cramer's V = 0.223). Concerns about abandonment or over-therapy motivated 23.4% of the FRM cohort, but only 16.7% of the RM group (p = 0.054, Cramer's V = 0.223). Decisions to defer AD creation were pronounced in the RM group at 67.4% compared to 55.1% in the FRM group. In terms of AD forms, the RM cohort prepared multiple forms significantly more frequently (9.3% vs. 0.7%, p = 0.002*, Cramer's V = 0.294). Both groups predominantly sought legal (26.5% vs. 22.9%, p = 0.624, phi = 0.034) or other consultation (20.0% vs. 39.6%, p = 0.006*, phi = 0.193) during AD formation, with no significant differences in medical consultation (12.9% vs. 12.5%, p > 0.999, phi < 0.001) preferences.

Conclusion: While approximately every other patient with localized disease had an AD, the rate in patients with recurrent and/or metastatic disease was only slightly higher. Related to the drastically worse prognosis of recurrent and/or metastatic disease, effort should be made to encourage these patients to create an AD. This analysis provides evidence that advice from acquaintances or professionals effectively motivated patients with recurrent and/or metastatic disease to consider their end-of-life wishes and document them in the form of an AD or other advance care directives.

ABBREVIATIONS

ACP: Advance Care Planning; AD: Advance Directive; CD: Combined Documents; CI: 95% Confidence Interval; DPAHC: Durable Power of Attorney for Healthcare; ENT: Ear, Nose and Throat; HNC: Head and Neck Cancer; LW: Living Will; M: Mean; FRM: Free of Recurrence and/or Metastasis; N: Number of patients; OR: Odds Ratio; RM: Recurrent and/or Metastatic; SD: Standard Deviation.

INTRODUCTION

Head and Neck Cancers (HNC) continue to have a generally poor prognosis despite rapid advances in medicine. This holds particularly true for advanced and recurrent carcinomas, especially in older patients [1-3]. Compared to other cancer types, patients with HNC are at an increased risk of potentially critical clinical situations. Challenges such as tracheotomy complications, which may result in respiratory distress, and hemorrhage can significantly limit the patient's ability to communicate or consent to medical interventions [4].

Because of these challenges, advance care planning has become increasingly important in managing HNC. In this context, Advance Directives (AD) - such as Durable Power of Attorney for Health Care (DHPAC) and Living Wills (LW) - play a crucial role. A LW allows patients to specify in advance how and to what extent certain therapies should be carried out or discontinued in specific scenarios. ADHPAC, typically a trusted individual, is designated to represent the patient and enforce the patient's wishes as detailed in the LW [5,6]. The combination of both ADs is sensible and often recommended [7].

Notably, after the reforms in advance directives legislation in Germany [8], there has been a significant increase in the number of patients with ADs, as demonstrated by representative surveys and studies across different patient populations in Germany, including both cancer and non-cancer patients. However, data on the prevalence of ADs vary widely both nationally and internationally, with reported ranges between 0-51% [9-17].

In our previous study, we examined the prevalence of ADs in a HNC patient population [18]. However, due to the outpatient setting of the study, the number of patients with advanced cancer stages was limited, resulting in a sample that predominantly consisted of patients with lower Union for International Cancer Control (UICC) and Eastern Cooperative Oncology Group (ECOG) stages. In the present study, we expanded our patient sample by incorporating 39 additional patients from the outpatient setting of

the Department of Radiation Oncology of the University Hospital Erlangen, thereby including more advanced stages. We then performed a comparative analysis of our collective, categorizing patients based on whether they had recurrent and/or metastatic tumor stages versus those without recurrence or metastasis.

The primary objective of this study was to assess the prevalence of LW/DPAHC/CD among hospitalized HNC patients at advanced stages of cancer. Secondary objectives included the time of creation and the reasons why patients have decided for or against the creation of such documents.

MATERIAL AND METHODS

This prospective, single-center study was conducted at the Departments of Otorhinolaryngology and Radiation Oncology of the University Hospital of Erlangen-Nuremberg. The study was conducted according to the Declaration of Helsinki, received approval from the Ethics Committee of the University of Erlangen (No.: 76_19 B), and was registered in the German Registry for Clinical Studies (DRKS) (application No.: 00017123). We conducted a comparative analysis of our collective, categorizing patients based on whether they had recurrent and/or metastatic tumor stages (RM) versus those without recurrence or metastasis (FRM).

The study program started on July 1, 2019, in the Department of Otorhinolaryngology [18]. To include more patients with advanced cancer stages, we extended the recruitment period and expanded our methodology. From July 1, 2020, to October 31, 2021, additional 39 patients receiving follow-up care for HNC were recruited during their cancer follow-up appointments in the Radiation Oncology clinic. Patients were approached consecutively during their follow-up or consultations at the Department of Radiation Oncology, University Hospital of Erlangen-Nuremberg. Upon providing information about the study, patients who met the inclusion criteria were invited to participate. Those who agreed to participate gave their informed consent.

The inclusion criteria for participation were: a past or current diagnosis of HNC at any tumor stage according to the Union for International Cancer Control (UICC) classification [19], age 18 years or older, and sufficient cognitive and language skills to independently complete the questionnaire and written consent. Exclusion criteria included a lack of HNC diagnosis, cognitive impairment, or refusal to participate in the study. In addition to the questionnaire, we collected data on clinical and oncological characteristics from the patients' medical records. These included the time elapsed since the initial diagnosis,

the patient's regular medication regimen, existing comorbidities, Eastern Cooperative Oncology Group (ECOG) status [20], the location of the cancer, the treatment method used, and any instances of cancer recurrence. We grouped comorbidities into five categories: cardiovascular, pulmonary, oncological, neurological, and infectiological. We defined secondary malignancy as the reappearance of a tumor disease in a patient who has previously been diagnosed with another tumor disease. We distinguished between synchronous and metachronous secondary carcinomas.

Tumor staging was performed using the 8th edition of the Tumor Node Metastasis (TNM) classification and the UICC classification. Patients were categorized into early (UICC I and II) and advanced (UICC III and IV) stages based on their UICC stages [19]. As the recurrent diseases are not classified according to the UICC classification, no statistical comparison was performed in this regard.

The treatment modalities were categorized as follows: exclusive surgical treatment, definitive chemoradiation, initial surgical treatment followed by adjuvant therapy (which could be radiation or chemoradiation), and salvage surgery following the unsuccessful any initial cancer treatment. In the FRM cohort, salvage operations were performed due to residual cancer. We defined an advance directive (AD) as either a living will (LW), a durable power of attorney for healthcare (DPAHC), or a combined directive (CD) that incorporates both. We specifically examined the frequency and characteristics of ADs, noting significant differences and similarities between the RM and FRM cohorts in terms of presence, type, motivations, and support structures associated with AD creation.

Statistical Analysis

Categorical variables were reported as absolute frequencies (n) with percentages (%), and continuous variables as mean (M) with Standard Deviation (SD) for normally distributed variables, or as Median [25. / 75. Percentile] if not normally distributed or ordinally scaled.

For the assessment of significant differences between patient collectives in normally distributed continuous variables, independent t-tests were used. In the case of ordinal or continuous variables that were not normally distributed, the Mann-Whitney U-test was employed. Nominal variables were evaluated for group differences using cross tables and the Chi-square test. When dealing with >2x2 dimensional cross tables, post hoc comparisons were performed using column-wise comparisons in SPSS. Results are corrected for multiple comparisons (Bonferroni), significant results are marked with an asterisk (*).

Effect sizes were calculated for each test: For the Mann-Whitney-U Test and the independent t-test, r was reported; for 2x2 cross tables, phi was used, and in the case of > 2x2 dimensional cross tables, Cramer's V was utilized. All analyses were conducted using SPSS Statistics version 28.0 software (IBM, New York, USA).

RESULTS

The comparative assessment between recurrent/metastatic (RM, n = 96) and non-recurrent/metastatic (FRM, n = 389) cohorts revealed significant differences in patient characteristics, clinical, oncological and therapeutic data, as well as the frequency and characteristics of Advance Directives (ADs) (Tables 1-4).

Patient Characteristics

Sociodemographic data: A comparative assessment between recurrent/metastatic (RM, n = 96) and non-recurrent/metastatic (FRM, n = 389) cohorts revealed significant differences in patient characteristics (Table 1). The RM cohort was older on average (64.79 ± 11.29 years) compared to the FRM cohort (61.85 ± 11.98 years, $p = 0.030$, $d = 0.249$). Marital status varied significantly ($p < 0.001$, Cramer's $V = 0.378$), with more married individuals in the FRM cohort (68.6%) and more individuals in a permanent partnership in the RM cohort (27.1%). Living arrangements differed, with more FRM patients living independently (87.1% vs. 74.2%) and more RM patients living with assistance (25.8% vs. 11.5%, $p = 0.001$, Cramer's $V = 0.172$). Religiosity was higher in the FRM cohort (93.1% vs. 77.8%) ($p < 0.001$, $\phi = 0.204$), and there were significant differences in religious affiliations ($p = 0.001$, Cramer's $V = 0.213$), with more Protestants and Roman Catholics in the FRM cohort. These findings highlight distinct demographic and socio-cultural differences between the cohorts.

Clinical data: The FRM cohort had a mean time since diagnosis of 3.75 ± 3.71 years, similar to the RM cohort's 3.67 ± 3.68 years ($p = 0.861$, $d = 0.021$). However, fewer RM patients were surveyed within the first year of diagnosis (18.8% vs. 26.5% in FRM), while a higher proportion of RM patients were between 1 to 5 years post-diagnosis (46.9% vs. 40.4%).

Both cohorts were comparable regarding the presence of at least one comorbidity (83.3% in RM vs. 78.1% in FRM, $p = 0.263$, $\phi = 0.051$). However, the RM cohort had a significantly higher prevalence of cardiovascular comorbidities (50.0% vs. 38.6%, $p = 0.041$, $\phi = 0.093$). Significant differences in Eastern Cooperative Oncology Group (ECOG) performance statuses were found between

Table 1: Comparative Analysis of Sociodemographic Data between FRM and RM Cohorts

	FRM	RM	Statistical comparison
Sociodemographic data	n = 389 (100%)	n = 96 (100%)	
Female gender	104/389 (26.7%)	20/96 (20.8%)	p = 0.235, phi = 0.054
Age* in years (Mean (SD))	61.85 (11.98)	64.79 (11.29)	p = 0.030*, d = 0.249
< 30	6/389 (1.5%)	0/96 (0%)	
31-45	21/389 (5.4%)	4/96 (4.2%)	
46-65	214/389 (55.0%)	50/96 (52.1%)	
66-75	95/389 (24.4%)	23/96 (24.0%)	
> 75	53/389 (13.6%)	19/96 (19.8%)	
Marital status*			
Single	47/389 (12.4%)	15/96 (15.6%)	p < 0.001*, Cramer's V = 0.378
Married*	260/389 (68.6%)	39/96 (40.6%)	
Permanent partnership*	11/389 (2.9%)	26/96 (27.1%)	
Divorced	30/389 (7.9%)	9/96 (9.4%)	
Widowed	31/389 (8.2%)	7/96 (7.3%)	
Religiosity (yes)*	337/362 (93.1%)	70/90 (77.8%)	p < 0.001*, phi = 0.204
Religion*			
Protestant	153/362 (42.3%)	29/90 (32.2%)	p = 0.001*, Cramer's V = 0.213
Roman-Catholic	156/362 (43.1%)	32/90 (35.6%)	
Muslim	4/362 (1.1%)	2/90 (2.2%)	
Other Religion	24/362 (6.6%)	7/90 (7.8%)	
Atheist*	25/362 (6.9%)	20/90 (22.2%)	
Living environment*			
Independently at home*	311/357 (87.1%)	69/93 (74.2%)	p = 0.001*, Cramer's V = 0.172
At home with assistance*	41 (11.5%)	24/93 (25.8%)	
Care facility	5 (1.4%)	0 (0%)	

Table 1. Sociodemographic data of all patients included. □Abbreviations: FRM: Patients with non-recurrent / metastatic HNC. RM: Patients with recurrent or metastatic HNC. In case of missing data, n (%) of the subgroup has been added behind the variable. Statistically significant p-values are marked with an asterisk (*).

Table 2: Comparative Analysis of Clinical Data between FRM and RM Cohorts

	FRM	RM	Statistical comparison
Clinical data	N = 389 (100%)	N = 96 (100%)	
Time between initial diagnosis and survey period			
Time in years (Mean (SD))	3.75 (3.71)	3.67 (3.68)	p = 0.861, d = 0.021
< 1 year	103/389 (26.5%)	18/96 (18.8%)	
≥ 1 year < 5 years	157/389 (40.4%)	45/96 (46.9%)	
≥ 5 years	78/389 (20.1%)	20/96 (20.8%)	
≥ 10 years	51/389 (13.1%)	13/96 (13.5%)	
Comorbidities			
At least one	304/389 (78.1%)	80 /96 (83.3%)	p = 0.263, phi = 0.051
Cardiovascular*	150/389 (38.6%)	48/96 (50.0%)	p = 0.041*, phi = 0.093
Pulmonal	54/389 (13.9%)	16/96 (16.7%)	p = 0.487, phi = 0.032
Oncological	85/389 (21.9%)	23/96 (24.0%)	p = 0.657, phi = 0.020
Neurological	41/389 (10.5%)	13/96 (13.5%)	p = 0.402, phi = 0.038
Infectiological*	17/389 (4.4%)	10/96 (10.4%)	p = 0.021*, phi = 0.105
Medication intake (yes)	245/347 (70.6%)	73/93 (78.5%)	p = 0.131, phi = 0.072
ECOG* (Md [25.;75.P])	0 [0;2]	0 [0;2]	p < 0.001*, r = 0.352
0	251/331 (75.8%)	49/94 (52.1%)	
1	59/331 (17.8%)	20/94 (21.3%)	
2	17/331 (5.1%)	7/94 (7.4%)	
3	3/331 (0.9%)	11/94 (11.7%)	
4	1/331 (0.3%)	7/94 (7.4%)	

Table 2. Sociodemographic data of all patients included. Abbreviations: FRM: Patients with non-recurrent / metastatic HNC. RM: Patients with recurrent or metastatic HNC. ECOG: Eastern Cooperative Oncology Group. In case of missing data, n (%) of the subgroup has been added behind the variable. Statistically significant p-values are marked with an asterisk (*).

Table 3: Comparative Analysis of Oncological and Therapeutical Data between FRM and RM Cohorts

Oncological data		FRM N = 389 (100%)	RM N = 96 (100%)	Statistical comparison
Cancer localization				
Oral cavity and oropharynx		134/389 (34.4%)	25/96 (26.0%)	p = 0.116, phi = 0.071
Hypopharynx and larynx		97/389 (24.9%)	25/96 (26.0%)	p = 0.823, phi = 0.010
Nose and nasopharynx		29/389 (7.5%)	8/96 (8.3%)	p = 0.772, phi = 0.013
Salivary gland		54/389 (13.9%)	10/96 (10.4%)	p = 0.369, phi = 0.041
Other head and neck cancer entities		60/389 (15.4%)	21/96 (21.9%)	p = 0.129, phi = 0.069
Multi-tier carcinoma		15/389 (3.9%)	7/96 (7.3%)	Fisher's z: p = 0.169, phi = 0.066
UICC Stadium*	Md [25.;75.P]	II [I; IV]	RM is not classified according to UICC	
I		118/335 (35.8%)		
II		64/335 (19.4%)		
III		55/335 (16.7%)		
IVA/B		87/335 (26.4%)		
unknown		54		
Secondary malignancies*		312/376 (83.0%)	74/95 (77.9%)	p < 0.001, Cramer's V = 0.180
Yes, metachronous		48/376 (12.8%)	7/95 (7.4%)	p < 0.001, Cramer's V = 0.180
Yes, synchronous*		16/376 (4.3%)	14/95 (14.7%)	
Recurrence of cancer*				
Loco-regional recurrence only		0/389 (0%)	79/96 (82.3%)	p < 0.001*, V = 0.868
Distant metastasis +/- loco-regional recurrence		0/389 (0%)	17 (17.7%)	
Therapy*				
Surgery*		154/389 (39.6%)	24/96 (25.0%)	p = 0.031*, Cramer's V = 0.136
Primary surgery plus adjuvant therapy		166/389 (42.7%)	48/96 (50.0%)	
Definitive radiochemotherapy*		65/389 (16.7%)	21/96 (21.9%)	
Salvage surgery		4/389 (1.0%)	3/96 (3.1%)	
Intention of therapy*				
Palliative		1/389 (0.3%)	24/96 (25.0%)	p < 0.001*, phi = 0.446
Curative		388/389 (99.7%)	72/96 (75.0%)	

Table 3. Sociodemographic data of all patients included. Abbreviations: FRM: Patients with non-recurrent / metastatic HNC. RM: Patients with recurrent or metastatic HNC, UICC: Union internationale contre le cancer. In case of missing data, n (%) of the subgroup has been added behind the variable. Statistically significant p- values are marked with an asterisk (*).

the cohorts ($p < 0.001$, $r = 0.352$). The RM cohort had a broader range of ECOG status, with higher levels of impairment, while the FRM cohort predominantly showed an ECOG status of 0, indicating full activity (75.8% in FRM vs. 52.1% in RM). Higher ECOG statuses, indicating greater disease impairment, were more prevalent in the RM cohort compared to FRM.

Oncological and Therapeutical Data: Assessing cancer localization revealed no significant differences between the cohorts. However, there was a slight increase in multi-tier carcinomas in the RM cohort compared to the FRM cohort (7.3% vs. 3.9%), although this difference was not statistically significant ($p = 0.169$, $\phi = 0.066$).

Delving into secondary malignancies, significant discrepancies were discerned ($p < 0.001$, Cramer's $V = 0.180$), with the synchronous occurrence distinctly higher in the RM cohort (14.7% vs. 4.3% in FRM).

Our investigation of therapy modalities unveiled

notable distinctions, with surgical interventions (as only treatment) being more prevalent in the FRM cohort, whereas the RM cohort exhibited a higher inclination towards definitive radiochemotherapy (21.9% vs. 16.7%, 39.6% vs. 25.0%, $p = 0.031$, Cramer's $V = 0.136$).

The RM cohort exhibited a significantly higher occurrence of cancer recurrence, with 82.3% experiencing loco-regional recurrence only and 17.7% having distant metastasis with or without loco-regional recurrence, while no recurrences were observed in the FRM cohort ($p < 0.001$, $V = 0.868$).

Furthermore, our findings indicated a marked difference in the intentions of therapy; the RM cohort predominantly leaned towards palliative approaches, reflecting in 25.0% of the cases as opposed to a mere 0.3% in the FRM cohort ($p < 0.001$, $\phi = 0.446$). This inclination denotes the escalated severity and advanced conditions predominant within the RM cohort.

Table 4: Comparative Analysis of Frequency of ADs, Reasons for and against the Creation and further Characteristics of ADs between FRM and RM Cohorts

Data on ADs	FRM N = 389 (%)	RM N = 96 (%)	Statistical comparison
Presence of Advance directives*			
Yes	181/389 (46.5%)	56/96 (58.3%)	p = 0.038*, phi =0.094
AD type			
DPOAH	17/181 (9.4%)	1/56 (1.8%)	p = 0.170, Cramer's V = 0.122
LW	67/181 (37.0%)	23/56 (41.1%)	
CD	97/181 (53.6%)	32/56 (57.1%)	
Document submitted to hospital			
Yes	47/181 (26.0%)	18/50 (36.0%)	p = 0.163, phi =0.092
Reasons against creation of an AD			
Fear of inadequate medical care	2/185 (1.1%)	0/43 (0%)	p = 0.555, Cramer's V = 0.115
No interest to deal with topic	12/185 (6.5%)	3/43 (7.0%)	
Never thought about it	67/185 (36.2%)	11/43 (25.6%)	
Decision postponed until later	102/185 (55.1%)	29/43 (67.4%)	
Multiple reasons	2/185 (1.1%)	0/43 (0%)	
Reasons for creation of an AD			
Positive / negative experience from the past	23/145 (15.9%)	4/42 (9.5%)	p = 0.054, Cramer's V = 0.223
Advice from a friend, relative or family doctor*	40/145 (27.6%)	22/42 (52.4%)	
Fear of being abandoned, lack of self-determination, over-therapy	34/145 (23.4%)	7/42 (16.7%)	
Motivation by media, public relations or advertising	9/145 (6.2%)	1/42 (2.4%)	
Multiple reasons	39/145 (26.9%)	8/42 (19.0%)	
AD creation period			
Before the onset of tumor disease	74/141 (52.5%)	28/47 (59.6%)	p = 0.645, Cramer's V = 0.068
With the onset of tumor disease	46/141 (32.6%)	14/47 (29.8%)	
With knowledge about hospitalization	21/141 (14.9%)	5/47 (10.6%)	
Form of AD*			
Preprint	82/152 (53.9%)	27/43 (62.8%)	p = 0.002*, Cramer's V = 0.294
Individually written*	23/152 (15.1%)	1/43 (2.3%)	
Mixed form	19/152 (12.5%)	2/43 (4.7%)	
General power of attorney	27/152 (17.8%)	9/43 (20.9%)	
Multiple forms*	1/152 (0.7%)	4/43 (9.3%)	
Support in the creation of the AD (yes)*	96/155 (61.9%)	37/48 (77.1%)	p = 0.054, phi = 0.135
Medical consultation	20/155 (12.9%)	6/48 (12.5%)	p > 0.999, phi < 0.001
Legal consulting	41/155 (26.5%)	11/48 (22.9%)	p = 0.624, phi = 0.034
Other consulting*	31/155 (20.0%)	19/48 (39.6%)	p = 0.006*, phi = 0.193
Multiple consultations	4/155 (2.6%)	1/48 (2.1%)	Fish. Z: p = 0.846, phi = 0.014
Statement on organ donation included			
Yes	31/152 (20.4%)	12/48 (25.0%)	p = 0.498, phi = 0.048

Table 4. Data on Frequency of ADs, Reasons for and against the Creation and further Characteristics of ADs of all patients included. Abbreviations: AD: Advance Directive. DPOAH: Durable Power of Attorney for Healthcare. LW: Living Will. CD: Combination Document. FRM: Patients with non-recurrent / metastatic HNC. RM: Patients with recurrent or metastatic HN. UICC: Union internationale contre le cancer. In case of missing data, n (%) of the subgroup has been added behind the variable. Statistically significant p-values are marked with an asterisk (*).

Additionally, while the majority of both cohorts are aligned in implementing primary surgery plus adjuvant therapy (FRM: 42.7%, RM: 50.0%), the RM cohort demonstrated a slightly higher occurrence of salvage surgery (3.1% vs. 1.0% in FRM).

6.1.4. Frequency and further characteristics the presence of Ads: The RM cohort had a higher presence of ADs (58.3%) compared to the FRM cohort (46.5%), a difference which is statistically significant (p = 0.038*, phi = 0.094). Despite this, there were no significant disparities

between cohorts concerning the type of AD prepared by the patients (p = 0.170, Cramer's V = 0.122), the number of documents submitted to the hospital (p = 0.163, phi =0.092), or the reasons against the creation of an AD (p = 0.555, Cramer's V = 0.115).

The overall comparison of motivations for creating an AD showed a trend towards significance (p = 0.054, Cramer's V = 0.223). Notably, the subcategory of advice from a friend, relative, or family doctor showed a significant difference between cohorts (27.6% in FRM vs.

52.4% in RM). Other motivations did not show significant differences, although trends were observed in fears of abandonment or over-therapy (23.4% in FRM vs. 16.7% in RM) and positive or negative experiences from the past (15.9% in FRM vs. 9.5% in RM).

Reasons against the creation of an AD also varied between the cohorts. A higher proportion of the FRM cohort (36.2%) indicated that they “never thought about it” compared to the RM cohort (25.6%). Conversely, the decision to “postpone until later” was more prevalent in the RM cohort (67.4%) than in the FRM cohort (55.1%). Other reasons, such as fear of inadequate medical care (1.1% in FRM, 0% in RM), no interest in the topic (6.5% in FRM, 7.0% in RM), and multiple reasons (1.1% in FRM, 0% in RM), showed similar percentages across both cohorts ($p = 0.555$, Cramer’s $V = 0.115$). Regarding the period of AD creation, the proportions were generally akin between the cohorts, revealing no significant disparities ($p = 0.645$, Cramer’s $V = 0.068$). When it comes to the form of AD, an overall difference was observed between cohorts ($p = 0.002$, Cramer’s $V = 0.294$), with post-hoc comparisons indicating that the RM cohort prepared multiple forms significantly more often (9.3% vs. 0.7%, $p = 0.008$, $\phi = 0.266$).

Additionally, both cohorts showed a preference for legal and other consulting as the most prevalent forms of support during the creation of the AD. There was a significant difference in the use of other consulting (20.0% in FRM vs. 39.6% in RM, $p = 0.006$, $\phi = 0.193$). However, there was no significant difference in the use of medical consultation, which was rare in both groups (12.9% in FRM vs. 12.5% in RM, $p > 0.999$, $\phi < 0.001$). The inclusion of a statement on organ donation in ADs was also comparable between the cohorts (20.4% in FRM vs. 25.0% in RM, $p = 0.498$, $\phi = 0.048$).

Lastly, the RM cohort showed a higher preference for preprinted forms (62.8% vs. 53.9% in FRM, $p = 0.002$, Cramer’s $V = 0.294$). Individually written ADs were significantly less common in the RM cohort (2.3% vs. 15.1% in FRM). Additionally, the RM cohort had a higher occurrence of using multiple forms (9.3% vs. 0.7% in FRM). Other forms such as mixed forms and general power of attorney did not show significant differences between the cohorts.

DISCUSSION

The presence of ADs in the FRM cohort was observed at 46.5%, aligning with prevailing interdisciplinary data and representing a relatively good percentage. In contrast, the RM cohort exhibited a significantly higher prevalence of

ADs at 58.3%. This increased presence can be attributed to the more complicated and serious nature of their medical problems and the fact that patients are aware of this. However, due to the dramatically different prognosis of patients with loco-regional versus recurrent/metastatic disease, one would have expected clearer differences in the existence of ADs.

The RM cohort showed a preference for preprinted AD forms and multiple forms, reflecting their need for standardized and comprehensive documentation due to complex medical decisions. Individually written ADs were less common in this group, indicating a reliance on structured guidance. Most ADs in both cohorts were created before the onset of the disease, which can result in outdated documents not reflecting patients’ current wishes. This trend suggests that while patients anticipate the need for ADs early, there is a risk of their directives not being adequately tailored to their evolving conditions.

The intricate nature of recurrent or metastatic conditions in the RM cohort appears to be a significant catalyst for the creation of ADs. Wright et al., elucidated that advanced illnesses compel patients to confront complex treatment decisions, emphasizing the potential consequences and quality of life considerations [21], which aligns with our findings, where the RM cohort showed a higher prevalence of ADs, likely due to the increased complexity and severity of their conditions.

Further intensifying these engagements, Temel et al., highlighted that such conditions invariably lead to more regular interactions with healthcare professionals, fostering discussions on prognosis and individual goals [22]. Mack and colleagues pinpointed in 2010, that an awareness of the uncertainties surrounding a grim prognosis can act as a driving force for securing future health wishes [23]. Finally, Sudore and Fried, underscored that the trajectory of grave illnesses—particularly those that are recurrent or metastatic—accentuates the imperative of preparing for imminent healthcare decisions [24]. These studies collectively serve as foundational pillars, underscoring the heightened inclination of RM patients towards formulating ADs.

The profound influence of one’s social and professional network in decisions related to ADs is corroborated by various studies. Silveira et al., emphasized that older adults with ADs had discussions ensuring their healthcare preferences were understood and followed [25].

This supports our finding that 52.4% of the RM cohort relied on advice from acquaintances, family, or primary care providers. This highlights the critical role of patient

consultation, as advice from relatives or doctors can significantly impact the decision to create an AD.

This was also confirmed by Rao et al., who further identified that discussions with healthcare providers or loved ones increased the likelihood of AD completion, underscoring the role of personal networks [26]. This might explain the heightened percentage in the RM cohort as compared to the 27.6% of the FRM cohort. Finally, Song et al. demonstrated that structured interventions, although in a non-cancer collective, involving both professionals and family can notably enhance the completion of ADs [27], suggesting that a concerted, multifaceted approach is key, especially pertinent for patients like those in our RM cohort facing a complex clinical trajectory.

Our findings reveal that a notable 59.6% of the RM cohort had premeditatedly established their ADs before their cancer diagnosis. This proactive step, although marginally surpassing the 52.5% in the FRM cohort, signifies the anticipatory mindset of these patients. Silveira et al.'s work highlights that many individuals formulate their ADs long before their terminal stages, suggesting influencers beyond their current health scenario [25]. This inclination towards earlier AD consideration can be rooted in the complexities of end-of-life planning, which, as identified by Fried et al., is often shaped by prior health encounters [28]. Moorman and Inoue's research lends credence to this observation, noting that many commence their end-of-life decisions in mid-life, steered by diverse experiences ranging from witnessing a loved one's health decline to personal health scares [29]. Furthermore, Wendler and Rid have accentuated the profound impact on surrogates tasked with decision-making for incapacitated patients, indicating that such experiences can motivate AD establishment in anticipation of unforeseen health setbacks [30].

Teno et al., found that the use of standardized, preprinted AD forms aligns care more closely with patient preferences, suggesting that such forms provide clarity, especially beneficial for patients with urgent medical conditions [31]. This might explain the preference of 62.8% of the RM cohort for such standardized documentation. Ramsaroop et al., accentuated the significance of structured guidance for completing ADs, indicating that clear guidelines reduce ambiguity and facilitate the process [32]. This can further substantiate the observed reliance on structured guidance within the RM cohort.

Contrarily, Sudore & Fried observed that a segment of patients inclines toward a more tailored documentation of their end-of-life wishes, emphasizing the balance

between those seeking customization and those opting for standardized directives [24]. This could account for the 15.1% of the FRM cohort who demonstrated a predilection for individually penned ADs. Perkins, highlighting the value of clarity in ADs, proposed that structured, preprinted forms expedite decision-making and ensure alignment with medical standards, especially in exigent scenarios [33]. This further bolsters the claim that the RM cohort's leanings might be driven by urgency and a need for clarity, in contrast to the FRM cohort's more individualistic approach.

Our data suggests a pronounced inclination within the RM cohort to seek assistance in AD formulation, with 77.1% of this group actively pursuing guidance, compared to the 61.9% in the FRM group. Fagerlin and Schneider observed that ADs can often be intricate, potentially leading those with complex medical profiles, like the RM cohort, to lean on additional expertise for clarity and accuracy [34]. Reinforcing this, the research by Wendler and Rid underscores the emotional weight of treatment decisions, insinuating that the RM cohort's gravitas might motivate them to share the decision-making responsibility [30]. Silveira et al. further posited that patients equipped with living wills frequently confronted nuanced medical choices, emphasizing the importance of assistance in these contexts [25]. Lastly, even in unprecedented times, as emphasized by Moore et al. during the COVID-19 era, the indispensability of guidance during end-of-life deliberations stands out, especially amidst complex medical terrains akin to those faced by the RM cohort [35]. Collectively, these studies bolster our findings, suggesting that the RM cohort's distinct medical backdrop fosters a heightened reliance on professional and external guidance in their AD formulation. Equally notable is the parallel 20.0% of both cohorts resorting to "other" forms of consultation. This parity raises intriguing questions about the spectrum of resources or consultative services that both groups find pivotal, warranting further exploration.

In summary, while the numerical differences in AD tendencies between the two cohorts are evident, it is the intricate tapestry of clinical severity, external influences, and the temporal aspect of decision-making that truly distinguishes the RM cohort. The advanced stage or recurrent nature of their ailments, in tandem with the influences from their support network and clinical advisories, coalesces into a more robust consideration and operationalization of their prospective medical choices compared to the FRM cohort.

Our study, while comprehensive, has certain limitations. The study design did not allow for insights from those

patients unable to attend follow-up visits due to severe health conditions or those who had completed their 5-year follow-up. Consequently, the representation of patients with locoregional recurrence and distant metastatic cancer might be somewhat limited.

The study was conducted in an outpatient setting. Even though the inclusion of patients from the Department of Radiation Oncology resulted in more patients with advanced tumor stages, the majority of patients are still in good overall condition, which is reflected in the distribution of ECOG stages.

The distribution of questionnaires was not randomized but rather consecutively, potentially introducing a selection bias, albeit unintentional and unquantifiable. Despite this, the broad spectrum of HNC cases covered, the extensive patient number, and the prolonged study duration lend a degree of representativeness to our findings.

Our analysis concentrated on the disparities in ADs between RM and FRM HNC cohorts, without delving into the underlying reasons for these differences. The impact of various clinical and sociodemographic factors on the decision-making process for ADs was not explored and remains an area for future research. This exploration is crucial to better understand and meet the specific needs of these patient groups.

CONCLUSION

This investigation compared the utilization of ADs in two distinct patient groups diagnosed with HNC. A higher prevalence of ADs in the RM cohort accentuates the heightened complexities and anticipatory needs associated with their medical conditions. Notably, the RM cohort demonstrated a strong reliance on personal and professional networks for AD formulation, further reflecting their complex medical landscape. Additionally, a significant proportion of the RM group proactively sought structured guidance in AD creation, underscoring the intricate decision-making landscape they navigate. In summary, while both groups showed awareness of ADs, the RM cohort's unique medical challenges, coupled with external influences and a forward-looking mindset, distinctively influenced their approach to ADs. Future research could delve deeper into the precise resources both groups prioritize, refining patient-centric care strategies.

DECLARATIONS

- Ethics approval and consent to participate: The Ethics Committee of the University of Erlangen-Nuremberg has approved the presented work (approval number: 76_19 B).

- This study was carried out according to the Declaration of Helsinki (in accordance with the relevant guidelines and regulations).
- Consent for publication: Not applicable.
- Availability of data and materials: The datasets used and/or analysed during the current study available from the corresponding author on reasonable request, because the data cannot be anonymized.
- Competing interests: Not applicable.
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- Conflict of interest: None.
- This article was created using the STROBE [36] guidelines.
- Statement: During the preparation of this manuscript, the authors utilized the services of ChatGPT-4o and the deepl.com translation tool for the purpose of translating texts into English and for checking grammar and spelling. Following the use of these tools, the authors thoroughly reviewed and edited the content as necessary. The authors take full responsibility for the content of the publication, ensuring its accuracy and coherence after the application of these language assistance tools.

AUTHORS' CONTRIBUTIONS

- MA: conception and design, acquisition of data, analysis and interpretation of data, wrote the main manuscript.
- OA: conceptualization, analysis and critical revision of the article.
- MB: conceptualization, methodology and critical revision of the article.
- RR: conceptualization, acquisition of data and critical revision of the article.
- MS: acquisition of data, methodology and critical revision of the article.
- SM: acquisition of data, methodology and critical revision of the article.
- HI: critical revision of the article, final approval of the version to be published.
- MK: critical revision of the article, final approval of the version to be published.

- MG: conception and design, analysis and interpretation of data, final approval of the version to be published.
- SH: drafting and critical revision of the article.
- TW: drafting and critical revision of the article.
- MH: acquisition of data, critical revision of the article, final approval of the version to be published.
- EW: drafting and critical revision of the article.
- AG: conception and design, acquisition of data, analysis and interpretation of data, drafting and critical revision of the article, final approval of the version to be published.

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