



Cost Effectiveness of Stereotactic Ablative Radiotherapy (SABR) alone in comparison with Systemic Treatment and SABR in Oligometastatic Head and Neck Cancer in the GORTEC 2014-04 OMET Randomized phase II study

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Purpose: The randomized phase II GORTEC 2014-04 study showed deeper deterioration of the quality of life (HRQoL) and dramatically higher severe toxicity rates with similar overall survival rates using SABR alone compared to chemo-SABR in oligometastatic head and neck cancer (HNSCC) patients. We evaluated the costs associated with SABR-alone *versus* chemo-SABR.

Materials and Methods: 69 HNSCC patients with 1-3 oligometastases and a controlled primary were randomized from September 2015 to October 2022. HRQoL by the QLQ-C30, QLQ-HN35, descriptive EQ5D-3L and visual EQ-VAS self-rated questionnaires were completed for clinical and economic appraisal. Direct medical treatment-related costs (radiotherapy, anticancer drugs, hospital stays, serious adverse event management, medical imaging, biological surveillance and medical transports) were analyzed from randomization until 12 months (M12, including per protocol and salvage treatments) or death. Utility index scores and deterioration rates were derived to select the most appropriate economic evaluation method.

Results: Median EQ-5D-3L utility index scores were 0.84 at baseline and 0.87 at M12 for SABR-alone; corresponding to 0.85 and 0.57 for chemo-SABR (Table 1).

Rates of patients free of definitive EQ-VAS deterioration at M12 were 76.9% and 63.8% for SABR-alone and chemo-SABR.

Mean quality-adjusted PFS was 12.1 and 11.0 months with SABR-alone and chemo-SABR.

Consequently, cost-minimization analysis was the appropriate economic evaluation method. The mean total costs from the French Public health system perspective were €8,498 ± 3,599 for SABR-alone, and €48,034 ± 58,228 for chemo-SABR ($p < 10^{-4}$) (Table 2).

Sensitivity analyses confirmed cost savings around €35,000-€40,000 per patient using SABR-alone.

Anticancer drugs and hospital stays were cost drivers (Tables 3A,B).

The economic burden increased by 269 ± 66% with chemo-SABR compared to SABR-alone ($p < 10^{-4}$).

Conclusions: in addition to clinical benefits, SABR-alone appears as the least costly option (by a factor of 5) for the management of oligometastases from HNSCC.

Table 1: EQ-5D-3L utility index score and EQ VAS at each follow-up timepoint for patients included in SABR-alone and Chemo-SABR arms

Follow-up timepoint	SABR-alone arm			Chemo-SABR arm			p-value
	n	Median	IQR	n	Median	IQR	
EQ-5D-3L utility index score							
Baseline	31	0.84	0.73-0.91	35	0.85	0.73-1.00	0.73
M3	22	0.89	0.64-0.91	27	0.76	0.58-0.89	0.19
M6	14	0.89	0.80-0.91	20	0.70	0.55-0.96	0.18
M9	7	0.89	0.58-1.00	13	0.89	0.73-0.91	0.87
M12	4	0.87	0.61-0.89	10	0.57	0.41-0.89	0.62
EQ VAS							
Baseline	33	80	55-85	35	69	50-85	0.43
M3	19	80	59-80	26	70	60-80	0.45
M6	13	80	65-90	18	73	60-85	0.15
M9	7	80	75-100	13	65	60-75	0.03
M12	4	78	70-88	9	69	40-75	0.14

Abbreviations: EQ-5D-3L = 3-level version of EuroQOL-5 dimensions instrument; EQ VAS = EuroQOL-5D visual analogue scale; IQR = interquartile range; M = month; n = number; SABR = Stereotactic Ablative Radiotherapy

Table 3a: Univariate analysis of explanatory factors of the economic burden for 69 patients included in the OMET study

Potential explanatory factors	number	Total cost (Euros)		p-value
		Mean ± Sd	Median [range]	
Gender				0.89
Female	13	36,754 ± 68,442	13,440 [4,559 - 259,643]	
Male	56	26,648 ± 39,399	10,937 [4,509 - 228,427]	
Age at inclusion, years				0.92
≤ 65	39	29,478 ± 52,997	11,241 [4,559 - 259,643]	
> 65	30	27,340 ± 35,164	11,826 [4,509 - 164,848]	
Spearman correlation coefficient		Rho = 0.03		0.80
Primary tumor site				0.78
Oropharynx	30	29,525 ± 49,114	9,908 [4,509 - 228,427]	
Oral cavity	12	24,616 ± 30,747	15,186 [7,099 - 118,016]	
Larynx	10	39,639 ± 78,231	9,973 [5,136 - 259,643]	
Hypopharynx	11	23,742 ± 18,920	19,884 [4,596 - 57,388]	
Lymphadenopathies of unknown primary	6	21,906 ± 18,364	11,826 [7,742 - 50,441]	
T stage*				0.13
T1-T2	21	41,724 ± 63,547	18,796 [4,509 - 259,643]	
T3-T4	45	22,851 ± 35,492	10,897 [4,559 - 228,427]	
N stage*				0.995
N0-N1	27	31,196 ± 55,352	11,756 [4,509 - 259,643]	
N2-N3	41	27,267 ± 39,496	10,976 [4,596 - 228,427]	
Primary tumor resection				0.06
No	40	27,178 ± 52,397	9,925 [4,509 - 259,643]	
Yes	29	30,448 ± 35,563	17,893 [4,960 - 164,848]	
Systemic treatment				0.53
No	21	20,141 ± 26,172	9,830 [4,509 - 118,016]	
Yes	48	32,232 ± 51,947	11,453 [4,559 - 259,643]	
Number of Metastatic sites				0.03
1	40	31,489 ± 58,396	9,519 [4,509 - 259,643]	
2-3	29	24,502 ± 17,776	17,406 [4,559 - 60,659]	
Metastatic site				0.52
Pulmonary only	57	27,933 ± 46,359	11,241 [4,509 - 259,643]	
Others	12	31,494 ± 44,910	14,191 [6,748 - 164,848]	
Performance status at inclusion*				0.34
0	31	37,077 ± 58,601	11,756 [4,509 - 259,643]	
1-2	34	22,235 ± 32,299	11,453 [4,509 - 259,643]	
Quality of life at inclusion				0.77
0-66	24	18,684 ± 15,723	10,941 [4,509 - 57,388]	
66-100	45	33,815 ± 55,061	11,241 [4,559 - 259,643]	
Arm				< 10 ⁻⁴
Chemo-SABR	35	48,034 ± 58,228	28,881 [5,826 - 259,643]	
SABR-only	34	8,498 ± 3,599	7,330 [4,509 - 19,884]	

Abbreviations: n = number; Sd = Standard deviation

Table 2: Base-case and sensitivity analyses results of cost-minimization analysis

Cost item	SABR-alone arm, n = 34		chemo-SABR arm, n = 35		p-value
	Mean ± standard deviation	Median [range]	Mean ± standard deviation	Median [range]	
Base-case analysis					
Hospital stays					
Radiotherapy	6,707 ± 3,130	5,700 [3,920-18,253]	8,502 ± 5,689	5,975 [3,920-27,380]	0.19
Anticancer drugs administration	/	/	12,228 ± 20,183	3,134 [0-86,848]	<10 ⁻⁴
Serious adverse event management	391 ± 1,468	0 [0-7,792]	2,440 ± 3,822	0 [0-15,254]	2.10 ⁻³
Anticancer drugs	/	/	19,494 ± 34,551	8,368 [0-150,745]	<10 ⁻⁴
Biological monitoring	108 ± 95	88 [0-484]	302 ± 120	308 [88-484]	<10 ⁻⁴
Radiological monitoring	592 ± 538	543 [0-2,054]	882 ± 638	775 [0-2,037]	0.06
Medical transport	700 ± 284	680 [453-1,586]	4,185 ± 4,961	2,039 [453-20,927]	<10 ⁻⁴
Total cost	8,498 ± 3,599	7,330 [4,509-19,884]	48,034 ± 58,228	28,881 [5,826-259,643]	<10⁻⁴
Sensitivity analyses: total cost					
Price reduction of 20% of hospital stay	8,498 ± 3,599	7,330 [4,509-19,884]	45,588 ± 54,335	27,897 [5,826-242,274]	<10 ⁻⁴
for outpatient chemotherapy session					
Price reduction of 20% of cetuximab	8,498 ± 3,599	7,330 [4,509-19,884]	44,160 ± 51,486	28,513 [5,826-229,549]	<10 ⁻⁴
Price increase of radiological – level 2	8,663 ± 3,563	7,657 [4,528-19,824]	48,243 ± 58,228	29,147 [6,110-259,881]	<10 ⁻⁴
Price increase of radiological – level 3	8,828 ± 3,535	7,863 [4,548-19,963]	48,452 ± 58,227	29,411 [6,395-260,119]	<10 ⁻⁴

Table 3b: Multivariate analysis of explanatory factors of the economic burden for 69 patients included in the OMET study

Explanatory factors	Parameter estimate	Standard error	p-value	Percentage increase in cost for switch	
				inter independent variable, %*	in cost for switch inter independent variable, %**
Intercept	8.9911	0.1819	< 10 ⁻⁴	/	/
Arm			< 10 ⁻⁴		
Chemo-SABR versus SABR-only	1.3046	0.1779		269	66
Primary tumor resection			0.23		
No versus Yes	0.2153	0.1769			
Number of metastatic sites			0.35		
1 versus 2-3	-0.1669	0.1776			
T stage			0.66		
T1-T2 versus T3-T4	0.0869	0.1940			
Adjusted R-square	0.32				

Abbreviation: SABR = Stereotactic Ablative Radiotherapy
Legend: * = exp(β)-1; ** = exp(β) × S₀

Figure 1: Time-to-deterioration (0.08 points) of a) EQ-5D-3L utility index scores and b) EQ-VAS for patients undergoing chemo-SABR (arm A) or SABR-alone (arm B)

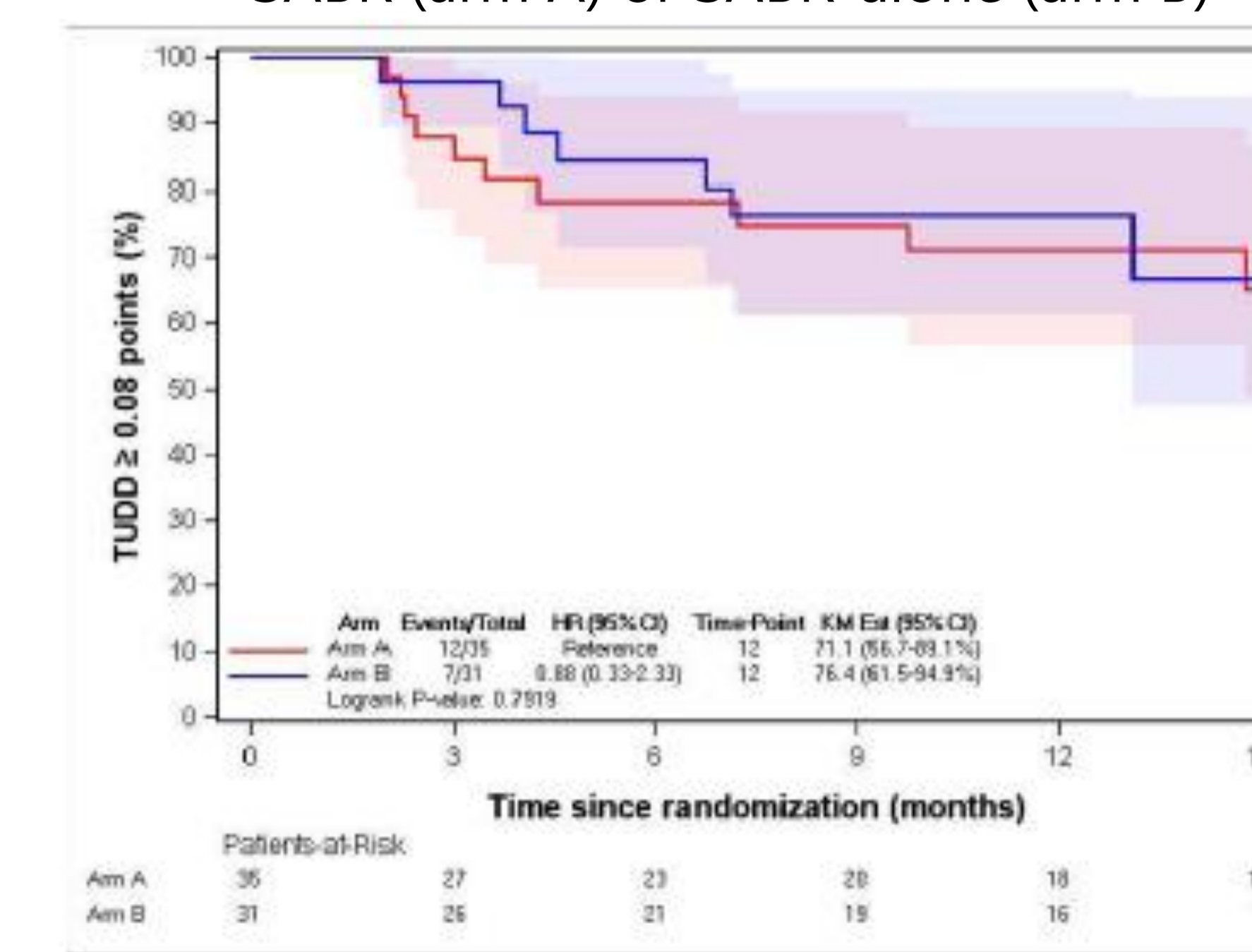
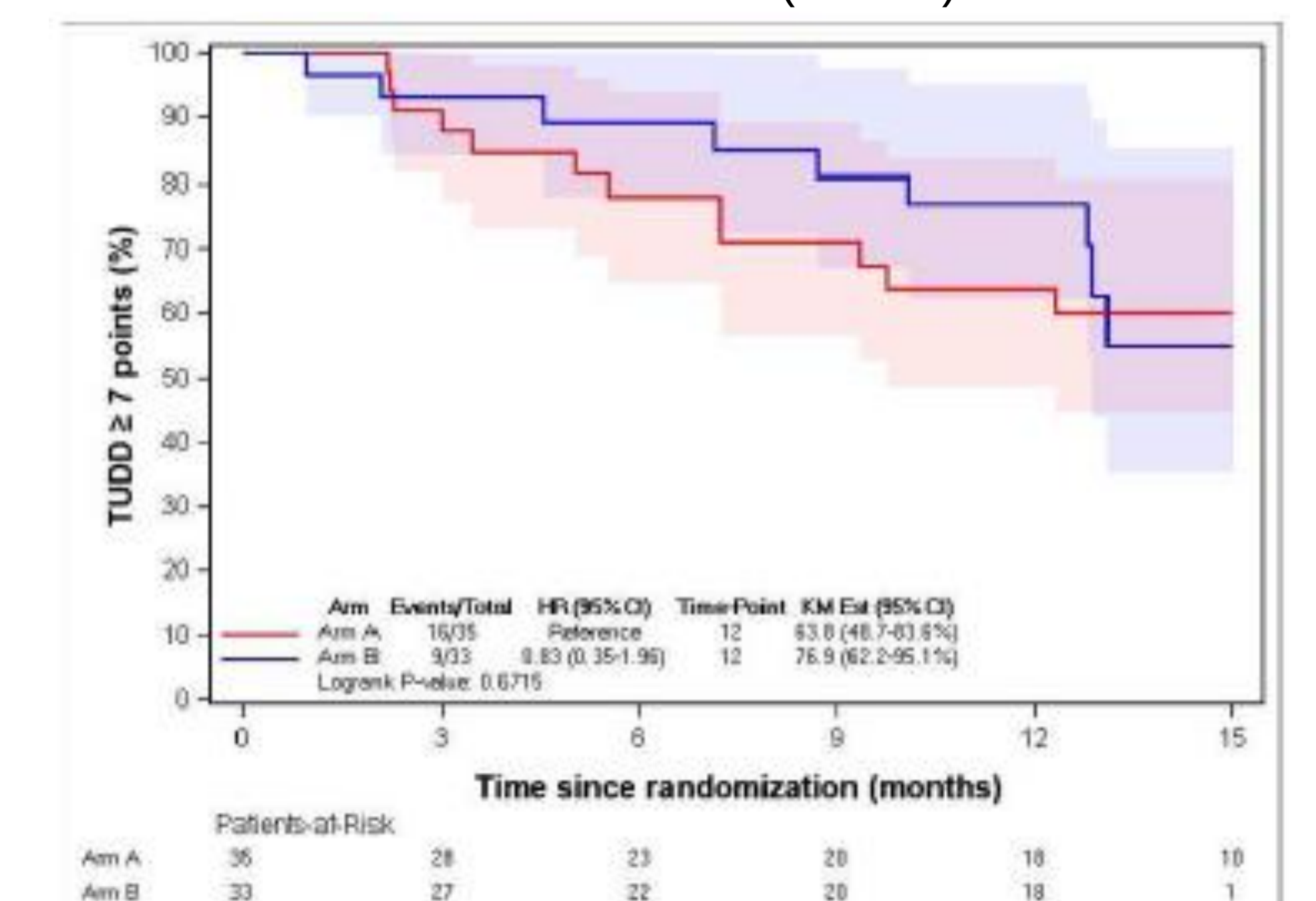


Figure 2: Time-to-deterioration (7 points) of a) EQ-5D-3L utility index scores and b) EQ-VAS for patients undergoing chemo-SABR (arm A) or SABR-alone (arm B)



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