EPH185

Clinical, Humanistic, and Economic Benefits of Early Cancer Diagnosis: A Systematic Literature Review

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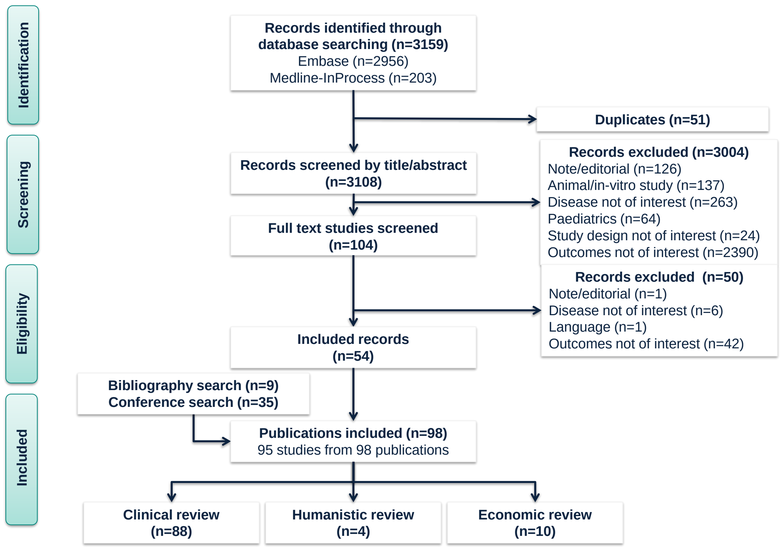
Objectives

- The early diagnosis of cancer impacts treatment decisions and potentially improves survival and health-related-quality-of-life (HRQoL) outcomes, reducing the financial burden associated with later cancer stages
- A narrative systematic review was conducted to understand the value of early cancer diagnosis from the clinical, humanistic and economic perspectives

Methods

- A systematic literature search was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses [PRISMA] methodology
- The Embase® and MEDLINE® databases were searched to identify non-interventional studies published in English, from database inception to August 2022, that reported data relating to the survival, HRQoL and economic impact (direct/indirect costs) of diagnosing patients at earlier vs. later stages of cancer
- The study included patients diagnosed with melanoma (MEL), triple negative breast cancer (TNBC), non-small cell lung cancer (NSCLC), renal-cell carcinoma (RCC), gastric cancer, head and neck cancer (HNC) and bladder cancer (BLA)
- Titles/abstracts of the identified literature were first screened to select potentially relevant studies, followed by full-text screening to define the final list for inclusion. At each stage, two independent reviewers conducted the initial screening, with discrepancies being resolved by a third independent reviewer. Findings were reported by tumor type, adopting a narrative approach

Figure 1. PRISMA flow diagram



Results

- Overall, 95 studies (98 publications) reporting clinical, humanistic and economic outcomes, were selected for inclusion (Figure 1). This poster presents a summary of the evidence for overall survival (OS), HRQoL and economic burden

Results: Overall survival

- Across all tumors with sufficient evidence (MEL, TNBC, NSCLC, BLA), a general trend was observed for increased overall survival (OS) in patients diagnosed with earlier-stage disease (and less severe sub-group stages) vs. later stages (Table 1). Limited data were available for RCC, and no relevant OS data were identified for gastric cancer or HNC.

MEL

- Median overall survival (mOS) ranged from 5.1 months for patients diagnosed with Stage IV M1C melanoma vs. 46 months for those diagnosed with Stage IIC (with no mOS identified for earlier stages)
- 1-, 3-, and 5-yr OS rates demonstrated reduced survival with later stage of disease at diagnosis, but with some notable variations in survival according to sub-stage (i.e., Stage IIB/C vs. Stage IIIA/B)

TNBC

- mOS for patients diagnosed with Stage II TNBC was 77.6 months vs. 5-7 months for patients diagnosed with Stage IV disease
- Stage-specific OS rates (1-, 3-, and 5-year) revealed reduced survival rates with later stages of disease at diagnosis

NSCLC

- Reduced mOS was observed in patients diagnosed with more severe stages, and for patients with Stage I/II/IIIA SQ NSCLC vs. patients diagnosed with NSQ NSCLC within the same stages
- 1-, 3- and 5-yr OS rates generally demonstrated reduced survival with later stage of disease. Overlapping ranges identified for some stages/sub-stages may be due to heterogeneity among patient study populations

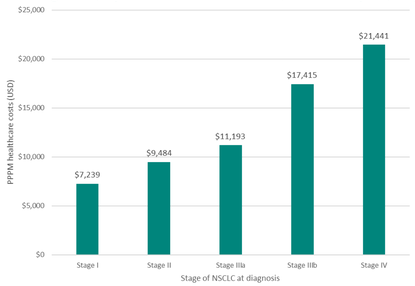
RCC

- Reduced survival (mOS and 5-yr OS rates) was reported for patients with high risk RCC vs. those with intermediate-high risk at diagnosis

BLA

- mOS ranged from 5.8-9.4 months for patients diagnosed with Stage IV urothelial carcinoma to 80.5 in patients diagnosed with Stage 0-1 disease. 5-yr OS rates were lower for patients diagnosed with more severe stages

Figure 2. Comparison of PPPM total healthcare costs by stage following NSCLC diagnosis; Optum Research Database, 2007-2011 (n=1,210)[38]



p<0.001 for Stage I vs. Stage II, IIIa, IIIb, or IV

Table 1. Data summary for OS outcomes by tumor type and disease stage

Tumor type	Patient population	Endpoints: mOS after diagnosis [cancer-specific[a]] (months)	mOS postrecurrence [postprogression[b]] (months)	1-year OS [cancer-specific[a]] (%)	3-year OS [cancer-specific[a]] (%)	5-year OS [cancer-specific[a]] (%)
MEL	AJCC 6th, 7th or unspecified:					
	Stage I	-	[29.5[b]][1]	99.0[2]	-	-
	Stage IA	-	[34[b]][1]	99.0[3]	97.0[3]	94.0[3]
	Stage IB	-	[29.5[b]][1]	99.0[3]	95.0[3]	90.0[3]
	Stage II	-	[14.9[b]][1]	94.0[2]	-	-
	Stage IIA	-	[16.1[b]][1]	96.0[3]	87.0[3]	78.0[3]
	Stage IIB	-	[19.3[b]][1]	94.0[3]	76.0[3]	64.0[3]
	Stage IIC	46[3]	[9.9[b]][1]	87.0[3]	57.0[3]	39.0[3]
	Stage III	-	[15.1[b]][1]	90.0[2]	-	-
	Stage IIIA	-	[15.7[b]][1]	98.0[3]	86.0[3]	79.0[3]
	Stage IIIB	-	[15.5[b]][1]	94.0[3]	69.0[3]	57.0[3]
	Stage IIIB/C	24.3[4]	-	67.2[4]	32.1[1]	-
	Stage IIIC	36 [40[b]][3]	[11.2[b]][1]	82.0[3]	50.0[3]	38.0[3]
	Stage IV	9 [10[b]][3]	-	41.0-48.0[2,3]	24.0[3]	20.0[3]
	Stage IV M1A	22.3[4]	-	64.5[4]	26.4[4]	-
	Stage IV M1B	11.2[4]	-	43.8[4]	13.8[4]	-
	Stage IV M1C	5.1[4]	-	22.3[4]	4.7[4]	-
	AJCC 8th					
	Stage I	-	29.04[5]	-	-	-
	Stage IA	-	-	99.0[3]	96.0[3]	93.0 [99.0[b]][3]
	Stage IB	-	-	98.0[3]	94.0[3]	89.0 [96.0[b]][3]
	Stage II	-	27.24[5]	-	-	-
	Stage IIA	-	-	96.0[3]	87.0[3]	78.0 [88.0[b]][3]
	Stage IIB	-	-	94.0[3]	74.5 - 76.0[3,6]	64.0 [80.0[b]][3]
	Stage IIC	46[3]	-	87.0[3]	48.7-57.0[3,6]	39.0 [59.0[b]][3]
	Stage III	-	20.4[5]	-	-	-
	Stage IIIA	-	-	98.0[3]	87.0-91.5[3,6]	82.0 [84.0[b]][3]
	Stage IIIB	-	-	96.0[3]	76.7-81.0[3,6]	69.0 [73.0[b]][3]
	Stage IIIC	46 [56[b]][3]	-	88.0[3]	56.0-63.1[3,6]	44.0 [50.0[b]][3]
	Stage IIID	22 [22[b]][3]	-	65.0[3]	30.0-55.4[3,6]	0.0 [<1.0[b]][3]
	Stage IV	9 [10[b]][3]	-	41.0[3]	24.0-63.7[3,6]	20.0[3]
TNBC	Stage I	-	-	-	-	92.3[7]
	Stage II	77.6[8]	-	-	-	86.5[7]
	Stage III	21.8-43.1[8,9]	-	76.0[9]	44[9]	57.8[7]
	Stage IV	5-7.0[8,10]	-	29[9]	11[9]	9.0[7]
NSCLC	Stage I	NSQ: Not reached/ SQ: 52.8[11]	-	-	68.8[12]	45.6-68.9[12-15]
	Stage IA	-	-	86.3[16]	-	-
	Stage IB	-	-	73.1[16]	-	-
	Stage II	NSQ: 43.2/SQ: 23.6[11]	-	78.7[17]	55.3[17]	27.5-61.0[14,15,17]
	Stage IIA	-	-	77.5[16]	-	-
	Stage IIB	-	-	64[16]	-	-
	Stage III	7-48.6[18-24]	-	55.1-72.5[19,25]	26.3-37[19,25]	17.5-25.0[18,24,25]
	Stage IIIA	28.2-52.5[18,22,24] NSQ: 26.7/SQ: 20.4[11]	-	53.8-66.5[16,17]	37.2[17]	25.0-26.2[14,17]
	Stage IIIB	12.5-27.7[18,22,24,26] NSQ: 12.5/SQ: 12.9[11]	-	38.3-54.3[16,17]	25.4[17]	17.3[17]
	Stage IV	5.0-10[19,20,26] NSQ: 7.6/SQ: 6.1[11]	-	22.6-65.9[16,17,19,25]	7.4-24.6[17,19,25]	4.0-9.0[17,19,25]
RCC	Intermediate-high risk RCC	83.4[27]	-	-	-	69[27,28]
	High-risk RCC	78.4[27]	-	-	-	36.0-58.0[27,28]
BLA	Stages 0-I	80.5[29]	-	-	-	-
	Stage I	-	-	[96-97+][30]	[90-91+][30]	67 [85.0-86.0+][30,31]
	Stage II	-	-	[71-74+][30]	[52-55+][30]	45 [45.0-48.0+][30, 31]
	Stages II-III	35.7[29]	-	-	-	-
	Stage III	-	-	[65-66+][30]	[42-45+][30]	15 [35.0-37.0+][30,31]
	Stage IV	5.8-9.4[29,32,33]	-	40.4 [42.0-44.0+][30,33]	[18-19+][30]	[7.0-8.0+][30]

Abbreviations: AJCC: American Joint Commission on Cancer; BLA: bladder cancer; MEL: melanoma; mOS: median overall survival; NSCLC: non-small cell lung cancer; NSQ: non-squamous; OS: overall survival; RCC: renal-cell carcinoma; SQ: squamous; TNBC: triple negative breast cancer. Note: [a]Indicates cancer-specific survival data. [b]Indicates post-progression survival data

Results: HRQoL

- Among the four studies identified in the humanistic burden review, patient reported outcomes (PRO) data was only available for patients with NSCLC (n=2), BLA (n=1) and MEL (n=1). PRO instruments used were heterogeneous and included European Organization for Research and Treatment of Cancer (EORTC) questionnaires (n=2), Edmonton Symptom Assessment System questionnaire (n=2) and Brief Cope Inventory (n=1)[34-37]
- Only one study evaluated the impact of disease stage on QoL domains at the time of diagnosis. Higher stages had a statistically significant detrimental impact on global HRQoL domain, role functioning and social functioning. In the symptom domains, a significant adverse impact of higher stage was observed on fatigue, pain, insomnia, and appetite loss (EORTC Quality of Life questionnaire-C30)[37]

Results: Economic burden

- Ten studies were identified in the economic review, with data only available for TNBC (n=4)[8-10,42], NSCLC (n=3)[16,38-39], HNC (oral; n=1) [40] and BLA[33,41] (n=2). Measures of economic burden were heterogeneous between studies, and not all studies provided direct comparison of cost/ healthcare resource utilization by stage. In general, patients diagnosed at advanced/metastatic stages incurred higher healthcare costs

TNBC

- Patients (≥65) diagnosed with stage IV TNBC had higher per patient per month (PPPM) mean total costs vs. stage III ($9,159 vs. $4,810, respectively; 2013 US$)[9]

NSCLC

- In studies considering all stages at diagnosis, healthcare costs increased with increasing stage at diagnosis[16,38]. Patients diagnosed with Stage IV lung cancer had the highest PPPM total healthcare costs ($21,441), while those diagnosed with Stage I presented the lowest (US$7,239; 2007-2011; Figure 2)[38]. In another study assessing patients with early-stage NSCLC, differences in healthcare resource and costs by disease stage were mostly non-significant[39]

HNC

- In an Indian public hospital setting, the total health care costs among patients with oral cancer increased on average by 17% per additional stage (2019-20)[40]

BLA

- Lifetime costs for patients with urothelial cancer were lowest for patients diagnosed at Stage IV ($117,503) and highest for those diagnosed at stage III, with non-cystectomy hospitalizations being the major cost driver[41]

Conclusions

- Patients diagnosed with cancer at earlier stages had better survival (with evidence for MEL, TNBC, BLA, NSCLC) and HRQoL (with limited evidence for BLA) than those diagnosed at later stages
- When available, total healthcare costs were generally significantly lower when patients were diagnosed at earlier stages (for TNBC, NSCLC and HNC), highlighting the clinical, humanistic and economic benefits associated with early diagnosis

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