

Premature mortality in pancreatic cancer: Analysis of lost life-years and quality-adjusted life-years (QALYs) in Europe

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BACKGROUND AND OBJECTIVES

Pancreatic Cancer (PanC) is the fourth most common cause of cancer-related mortality worldwide, and is associated with a very poor prognosis and a high patient burden [1]. The objective of this analysis was to quantify the aggregate number of life years (LYs) and quality-adjusted life years (QALYs) lost due to PanC in Europe each year.

METHODS

Estimates of incidence, life expectancy and quality-of-life were derived from Globocan [2] and from a systematic review (SR) of the literature on PanC disease burden in Europe based on a search of MEDLINE and other major bibliographic databases up to April 2013. Equivalent data for age-matched European population norms were obtained from Eurostat [3].

Estimates of LYs lost were calculated by comparing predicted life-expectancy for PanC patients with age-matched population norms. QALYs lost were estimated by incorporating EQ-5D health-utility estimates for both cohorts. Aggregate LYs and QALYs lost were estimated by accounting for annual PanC incidence across EU-28 countries. We performed analyses for both the overall PanC population and metastatic (mets.) patients.

RESULTS

- *Table 1* shows the epidemiological parameters used in the analysis. The general population in the EU-28 countries was just over 507 million.
- The estimated annual number of incident PanC patients in Europe ranged from nearly 53,000 to almost 80,000 depending upon the source of incidence data and the methodology used.
- Incidence rates obtained from the systematic review reflected crude rates and rates that were age-standardised based on the European population, and ranged from 10.4 to 12.3 per 100,000.
- Incidence rates age-standardised to the World Population were not included in the analysis, as these tended to be much lower (e.g., 3 to 7 per 100,000), and are based on population pyramids that do not closely reflect those of European populations.
- The annual number of incident patients with metastatic PanC ranged from almost 30,000 to around 45,000 depending on the source, and represented slightly more than half of all patients.
- The utility of PanC patients was 0.65 (at mean age of 64 years as per source; estimates for other ages not available) compared to a population norm utility of between 0.78 and 0.80.

Table 1. Epidemiology and Quality of Life Parameters

Parameters				
Population norms				
Population size (Eurostat, EU-28)		507,162,571		
Metastatic PanC				
Proportion of PanC patients that are Stage IV* (Bjerregaard 2013; N=579)		56.6%		
Incident cases of PanC				
		PanC (all)	PanC (mets.)	
- Globocan-based approach (EU-28 2012)				
		79,331	44,901	
- Systematic Review (SR) Incidence -based approach				
	Annual incidence (%)			
SR Age-adjusted (Europe standard) incidence (4 studies/sub-studies) (median = 10.43/100 000)	0.0104%	52,872	29,925	
SR Crude incidence (5 studies/sub-studies) (median = 12.27/100 000)	0.0123%	62,203	35,207	
Health-Related Quality of Life				
		Age	HRQL	
PanC Quality of Life: Müller-Nordhorn 2006 (German study)				
		64	0.65	
General QoL: Weighted Health State Index (UK, 1993)				
		55-64	0.80	
		65-74	0.78	

Müller-Nordhorn et al. Digestion 2006; 74: 118-125.

Bjerregaard et al. Eur J Cancer 2013; 49: 98-105.

* Out of all patients in Stages I-IV

- Survival of PanC patients vs. population norms are shown in *Table 2*. The median age of PanC patients at diagnosis was 70.5 years (data from SR).
- In the overall PanC population, median life expectancy at diagnosis was 0.38 years (4.6 months), compared to 15.1 years for an age-matched population norm. Subtracting one from the other, this equates to **14.7 LYs lost per person due to PanC overall**.
- Median life expectancy at diagnosis in patients with metastatic disease was 0.32 years (3.8 months), equating to **14.8 LYs lost per person due to metastatic PanC**.

Table 2. Survival: PanC vs. Population Norms

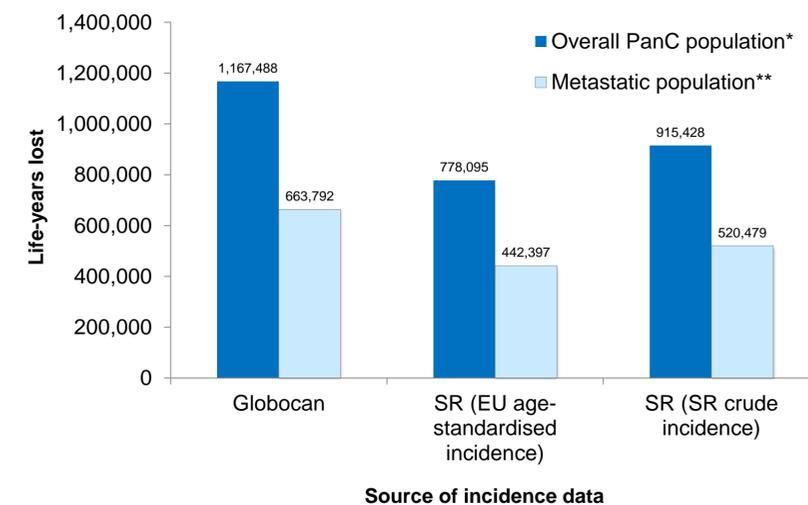
	Pancreatic Cancer Survival			Population norms (28 EU countries [3])	
	Age at diagnosis	Survival in months	Survival in years	Age**	Survival in years
Overall PanC Population	70.5	Source: Median age at diagnosis across medians/means of all 12 studies in SR that report survival *	4.6	Source: Median survival across medians/means of all 12 studies in SR that report survival *	0.38
Metastatic Population	70.5	Source: As per age at diagnosis of overall PanC population.	3.8	Source: Median of 3 medians/means from SR reporting mets. survival.	0.32

* Range of medians/means: 62 - 76. In two studies median/mean age was not reported. Sum of patients in 11 of the 12 studies = 44,956 (one study did not report number of patients).

**As per PanC age at diagnosis, rounded.

- *Figure 3* shows the number of LYs lost to PanC annually in Europe in the overall and metastatic populations using incidence data from different sources.
- Depending on the source of the incidence data and the methodology used, the overall number of LYs lost to PanC overall varied from around 780,000 (SR) to almost 1.2 million (Globocan).
- More than half all LYs lost were due to metastatic disease, which accounted for up to 660,000 LYs lost, depending on the source.

Figure 3. Number of Life-years Lost Annually across the EU



*based on 14.72 LYs lost per person (median of 12 medians from the SR).

**based on 14.78 LY lost per person (median of 3 medians from the SR).

- The number of QALYs lost to PanC is presented in *Table 4*.
- At diagnosis, PanC patients can expect between 0.21 (metastatic) to 0.25 (all PanC) QALYs. In comparison, the general population of the same ages can expect 11.8 QALYs.
- On average, 11.5 QALYs are lost per person with PanC.
- When multiplied by the number of incident cases in Europe, this amounts to approximately 910,000 QALYs lost in total (all PanC), and 520,000 QALYs lost to metastatic disease using the Globocan incident estimates. Slightly lower figures were obtained using the incident estimates obtained from the systematic review (610,000 – 720,000 QALYs lost for all PanC and 350,000 – 410,000 QALYs lost for metastatic disease).

Table 4. Number of QALYs Lost

	PanC QALYs	General QALYs	Proportional shortfall*	QALYs lost			
				Per person	Aggregated across Europe		
	Per person	Per person	Per person		Globocan	SR, EU-age-stand.	SR, crude incidence
Overall PanC Population	0.25	11.8	97.9%	11.5	914,594	609,549	717,134
Metastatic Population	0.21		98.3%	11.6	519,606	346,301	407,423

*Proportional shortfall ranges from 0% (no loss of healthy life) to 100% (complete loss of remaining healthy life) and is estimated as a ratio of the disease-related QALY loss as a proportion of the remaining patient QALY expectation in the absence of disease [4].

CONCLUSIONS

Up to 1.2 million LYs are lost to PanC in Europe yearly, with nearly 1 million QALYs lost. Measurements of the LYs and QALYs lost may provide a method to compare the relative burden of different cancers. Similar methodology for comparing the relative burden of diseases is currently under consideration by the National Institute for Health and Clinical Excellence (NICE) in the United Kingdom in the context of Value Based Pricing.

The estimates of aggregate life-years and QALYs lost to pancreatic cancer in Europe demonstrate the magnitude of the disease's impact from a regional perspective, and raise the question of how health systems are managing this burden.

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