

# Munich Cancer Registry



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## ICD-10 C67: Bladder cancer

### Survival

Year of diagnosis	1988-1997	1998-2019
Patients	2,125	12,245
Diseases	2,125	12,251
Cases evaluated	1,803	7,814
Creation date	01/27/2021	
Database export	01/07/2021	
Population	4.92 m	



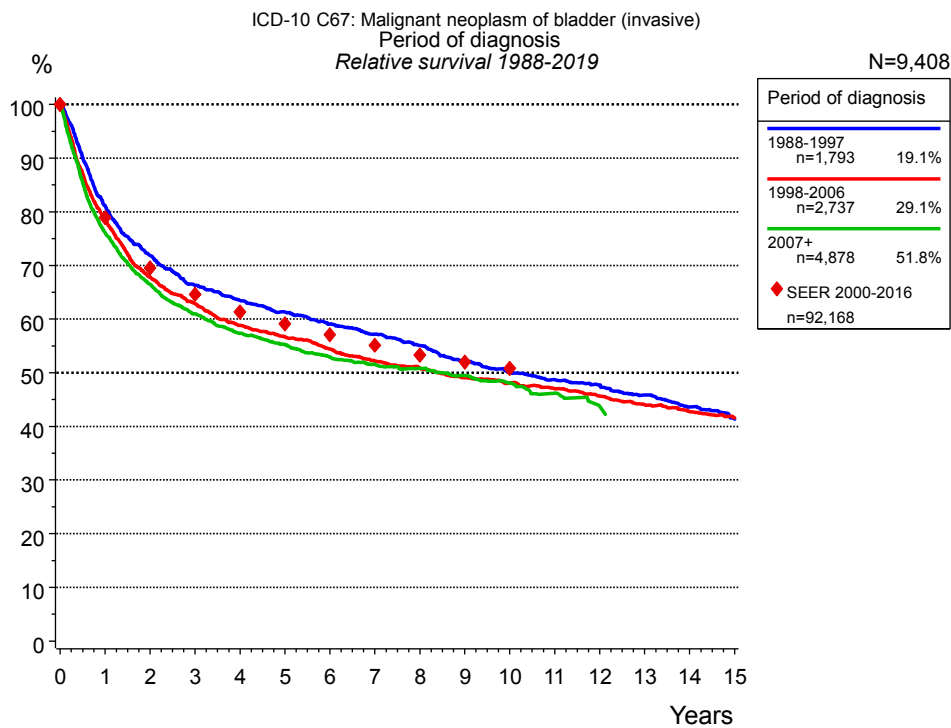
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<https://www.tumorregister-muenchen.de/en>

[https://www.tumorregister-muenchen.de/en/facts/surv/sC67\\_\\_E-ICD-10-C67-Bladder-cancer-survival.pdf](https://www.tumorregister-muenchen.de/en/facts/surv/sC67__E-ICD-10-C67-Bladder-cancer-survival.pdf)

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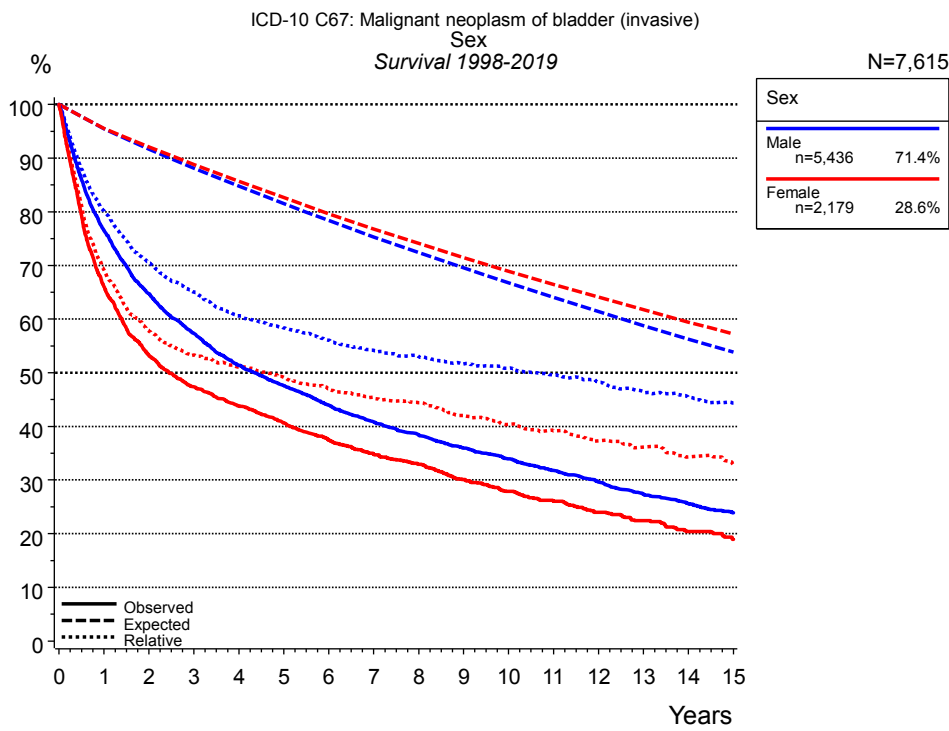
**Figure 1a.** Relative survival of patients with bladder cancer by period of diagnosis. Included in the evaluation are 9,408 cases diagnosed between 1988 and 2019.

The survival results of the SEER program (Surveillance, Epidemiology, and End Results) of the American National Cancer Institute (NCI) are summarized as the period of diagnosis from 2000 to 2016, and are represented by colored diamonds in order to facilitate comparisons between MCR and SEER.

The presented survival curves are derived from clinical records with valid follow-up informations, which means that death certificate cases (DCO) cases are omitted from the analysis. With this one restriction, the MCR has provided population-based statistics since 1998, collecting data on all cancer cases in the region of southern Bavaria. Historical data of previous time periods can be heavily selected, therefore, univariate survival comparisons of the presented time periods must be carefully considered. Nonetheless, all calculable survival curves are depicted to facilitate the comparison of long time follow-up analyses of relative survival between particular cancers.

Years	Period of diagnosis					
	1988-1997 n=1,793		1998-2006 n=2,737		2007+ n=4,878	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0
1	77.2	81.2	75.0	78.6	72.7	76.1
2	65.2	71.9	62.1	67.8	61.1	66.5
3	57.6	66.3	55.4	62.9	53.9	61.0
4	53.0	63.5	49.9	58.8	48.8	57.3
5	49.1	61.3	46.3	56.6	45.2	55.2
6	45.4	59.1	42.8	54.4	41.7	52.9
7	42.2	57.2	39.5	52.1	39.1	51.6
8	39.0	55.1	37.1	50.8	36.9	50.8
9	35.6	52.2	34.4	49.0	34.6	49.5
10	32.9	50.2	32.4	48.1	32.3	48.1
11	30.7	48.7	30.4	47.0	29.8	46.2
12	29.0	47.7	28.4	45.6	27.1	43.8
13	26.7	45.8	26.3	44.0		
14	24.4	43.6	24.5	42.7		
15	22.2	41.3	22.8	41.6		
Median	4.7		4.0		3.8	

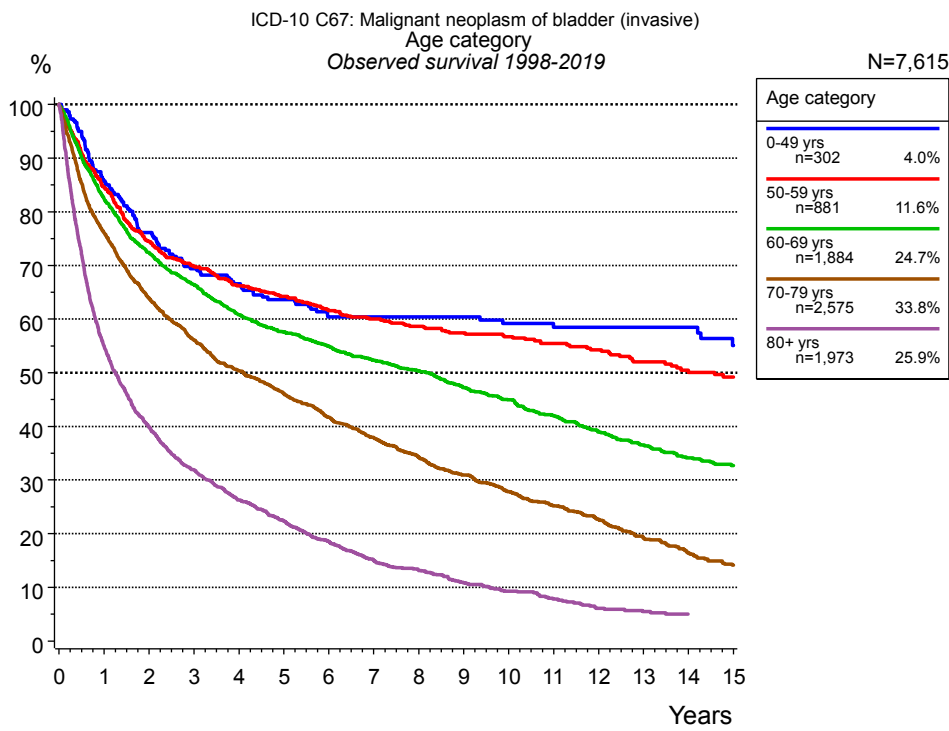
**Table 1b.** Observed (obs.) and relative (rel.) survival of patients with bladder cancer by period of diagnosis for period 1988-2019 (N=9,408).



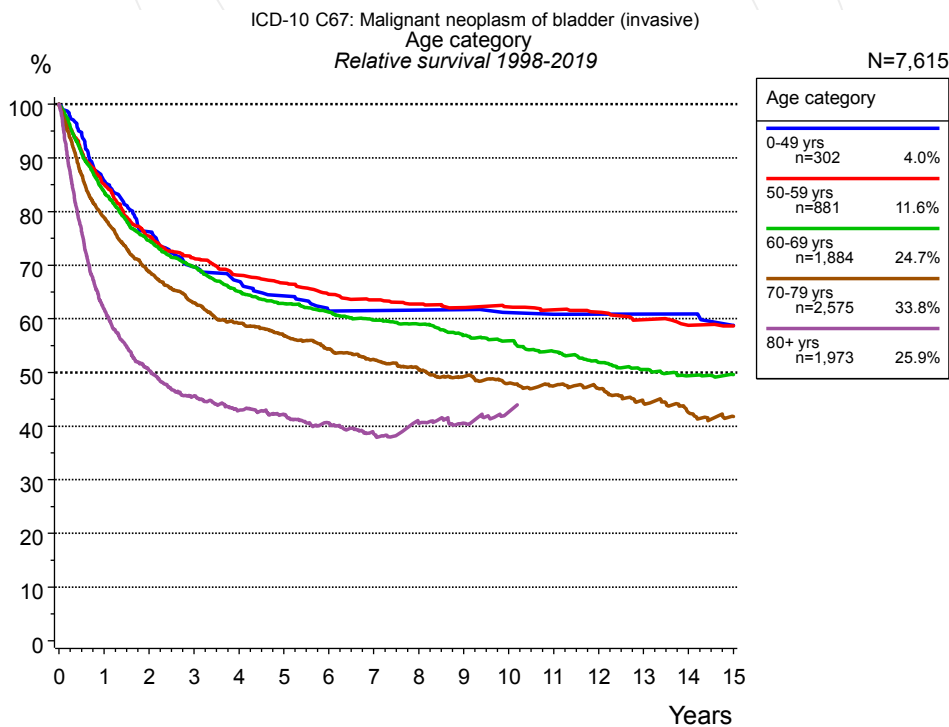
**Figure 2a.** Survival of patients with bladder cancer by sex. Included in the evaluation are 7,615 cases diagnosed between 1998 and 2019.

Years	Sex			
	Male n=5,436		Female n=2,179	
	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0
1	76.5	80.1	66.1	69.2
2	64.7	70.6	53.3	57.8
3	57.3	65.0	47.4	53.3
4	51.4	60.6	43.8	51.1
5	47.6	58.4	40.7	49.1
6	43.9	56.1	37.5	47.0
7	40.8	54.2	34.8	45.3
8	38.4	53.0	32.9	44.4
9	35.9	51.6	30.1	42.1
10	33.9	50.8	27.9	40.4
11	31.7	49.5	26.0	39.1
12	29.6	48.2	24.0	37.3
13	27.4	46.5	22.4	36.1
14	25.6	45.5	20.4	34.3
15	23.9	44.4	18.9	32.8
Median	4.4		2.4	

**Table 2b.** Observed (obs.) and relative (rel.) survival of patients with bladder cancer by sex for period 1998-2019 (N=7,615).



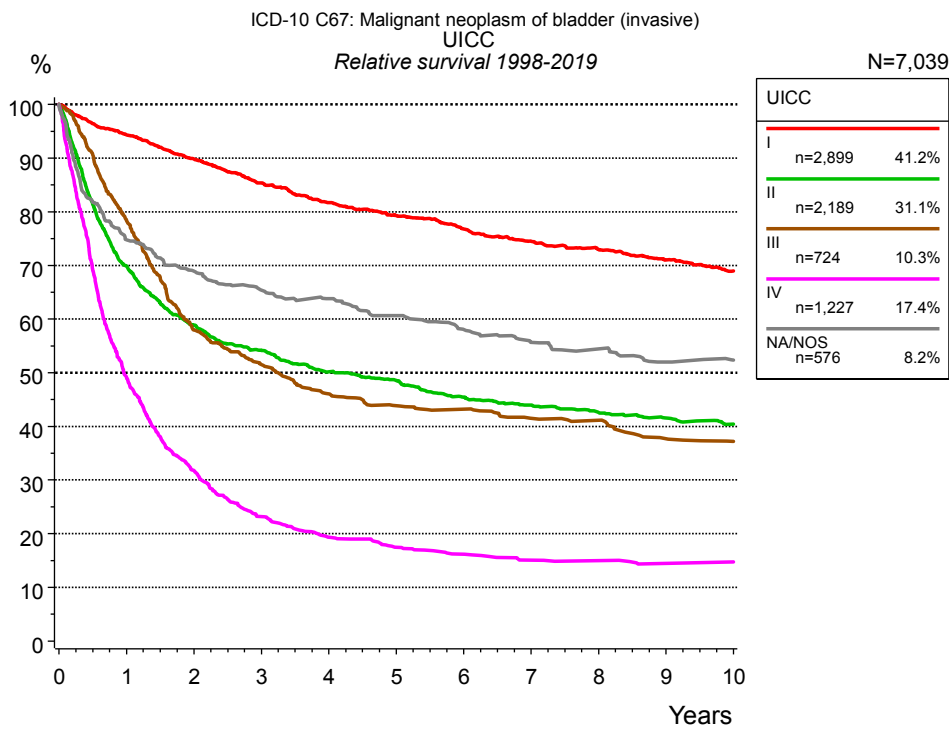
**Figure 3a.** Observed survival of patients with bladder cancer by age category. Included in the evaluation are 7,615 cases diagnosed between 1998 and 2019.



**Figure 3b.** Relative survival of patients with bladder cancer by age category. Included in the evaluation are 7,615 cases diagnosed between 1998 and 2019.

Years	Age category									
	0-49 yrs n=302		50-59 yrs n=881		60-69 yrs n=1,884		70-79 yrs n=2,575		80+ yrs n=1,973	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1	85.7	85.8	84.6	85.1	82.5	83.7	76.1	78.8	55.0	61.8
2	76.1	76.2	74.4	75.4	72.4	74.6	63.8	68.7	39.9	50.4
3	69.4	69.7	69.8	71.3	66.4	69.6	56.1	63.0	31.9	45.7
4	66.6	66.9	66.2	68.1	60.8	65.0	50.4	59.2	26.3	42.9
5	63.6	64.2	64.2	66.7	57.6	62.8	46.1	56.9	22.3	42.1
6	60.4	61.5	61.6	64.6	54.9	61.3	41.7	54.4	18.6	40.6
7	60.4	61.5	60.0	63.5	52.3	59.7	37.9	52.4	15.0	38.5
8	60.4	61.6	58.6	62.7	50.3	59.0	34.2	50.6	13.2	40.5
9	60.4	61.7	57.4	62.1	47.2	56.9	30.9	49.2	10.8	40.6
10	59.2	61.2	56.7	62.2	44.9	55.9	27.8	48.0	9.3	42.6
11	58.5	60.8	55.4	61.7	42.0	53.9	25.2	47.5	7.8	44.9
12	58.5	60.9	54.3	61.2	38.9	51.9	22.6	47.0	6.1	44.9
13	58.5	60.9	52.0	59.8	36.5	50.5	19.4	44.4	5.5	53.8
14	58.5	60.9	50.0	58.8	34.1	49.4	16.3	42.5	5.0	64.7
15	55.1	58.8	49.2	58.6	32.7	49.6	14.1	41.7		
Median			14.6		8.2		4.1		1.2	

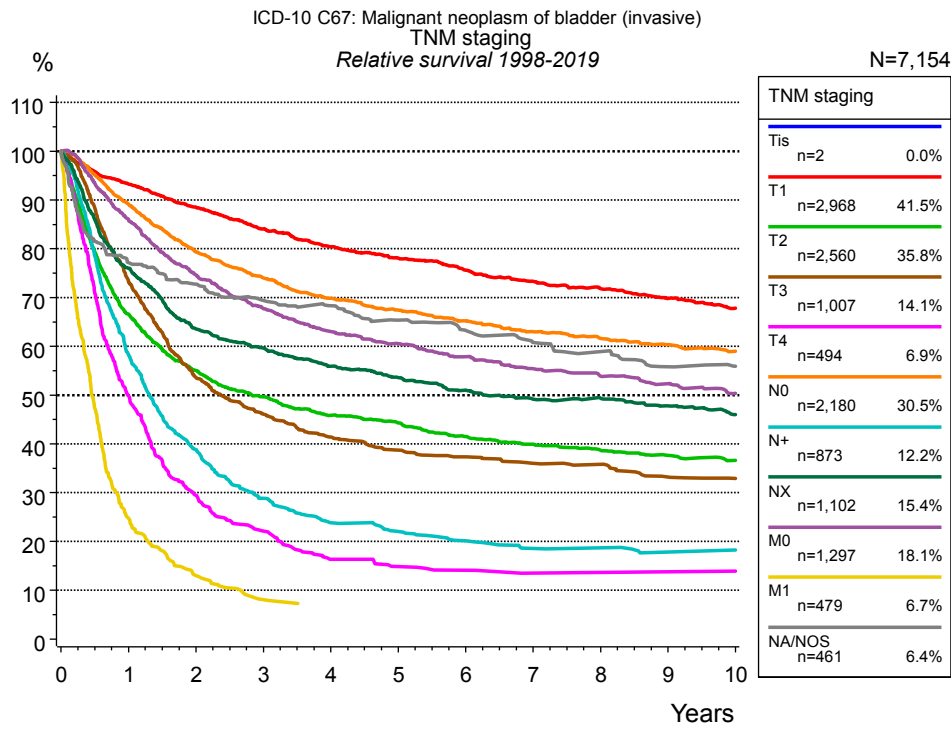
**Table 3c.** Observed (obs.) and relative (rel.) survival of patients with bladder cancer by age category for period 1998-2019 (N=7,615).



**Figure 4a.** Relative survival of patients with bladder cancer by UICC. For 7,157 of 7,615 cases diagnosed between 1998 and 2019 valid data could be obtained for this item. For a total of 7,039 cases an evaluable classification was established. The grey line represents the subgroup of 576 patients with missing values regarding UICC (7.6 % of 7,615 patients, the percent values of all other categories are related to n=7,039).

Years	UICC									
	I n=2,899		II n=2,189		III n=724		IV n=1,227		NA/NOS n=576	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1	90.2	94.3	65.9	69.9	75.7	78.2	47.6	49.0	71.2	74.8
2	82.4	89.8	53.0	58.8	54.5	58.0	30.1	31.8	63.0	68.9
3	75.2	85.4	46.8	54.2	47.1	51.5	21.4	23.2	57.5	65.4
4	69.1	81.7	41.6	50.2	40.9	46.1	17.4	19.3	54.0	63.8
5	64.5	79.3	38.7	48.5	37.7	43.8	15.3	17.5	49.4	60.6
6	60.1	76.8	34.8	45.4	36.1	43.2	13.9	16.2	45.6	58.1
7	56.0	74.5	32.4	43.9	33.4	41.5	12.5	15.1	42.1	55.7
8	52.6	72.9	30.2	42.6	32.3	41.2	12.2	15.0	39.8	54.4
9	49.2	71.0	28.3	41.6	28.5	37.7	11.2	14.4	36.8	52.0
10	45.8	69.0	26.4	40.4	27.1	37.2	11.2	14.8	35.7	52.4
Median	8.8		2.3		2.5		0.9		4.8	

**Table 4b.** Observed (obs.) and relative (rel.) survival of patients with bladder cancer by UICC for period 1998-2019 (N=7,039).



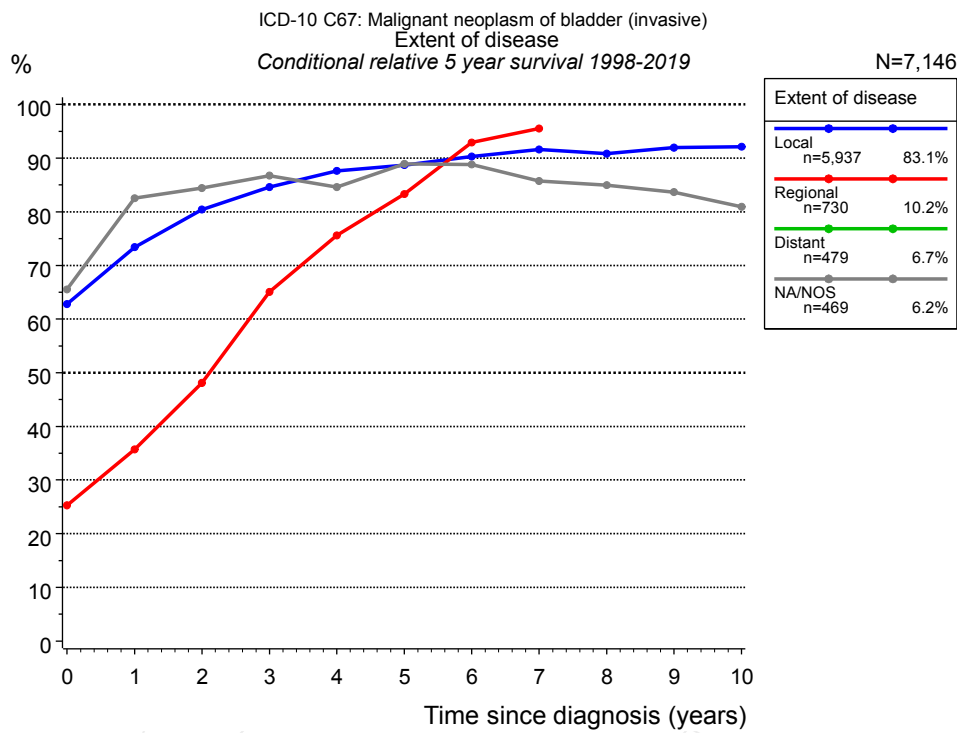
**Figure 4e.** Relative survival of patients with bladder cancer by TNM staging. For 7,157 of 7,615 cases diagnosed between 1998 and 2019 valid data could be obtained for this item. For a total of 7,154 cases an evaluable classification was established. The accumulated percentage exceeds the 100 % value because patients are potentially considered in more than one subgroup. The grey line represents the subgroup of 461 patients with missing values regarding TNM staging (6.1 % of 7,615 patients, the percent values of all other categories are related to n=7,154). Subgroups with sample size <20 are omitted from the chart.

Years	TNM staging													
	T1 n=2,968		T2 n=2,560		T3 n=1,007		T4 n=494		N0 n=2,180		N+ n=873		NX n=1,102	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1	89.2	93.3	63.1	66.6	71.0	73.2	48.1	49.9	86.6	89.1	56.7	58.2	71.7	76.0
2	81.3	88.5	49.8	55.0	50.6	53.6	27.7	29.5	74.8	79.3	37.0	38.9	57.1	63.6
3	74.1	84.1	43.2	49.7	42.4	46.1	20.1	22.1	67.8	74.0	26.8	28.8	51.2	59.7
4	68.1	80.4	38.4	45.9	37.0	41.4	14.4	16.3	62.0	69.9	21.5	23.8	45.8	55.9
5	63.6	78.1	35.6	44.3	33.6	38.7	12.8	14.9	58.0	67.4	19.4	22.0	42.0	53.6
6	59.2	75.6	32.1	41.5	31.6	37.3	11.9	14.1	54.3	65.2	17.4	20.1	38.3	51.0
7	55.1	73.4	29.7	39.9	29.3	36.0	10.9	13.5	50.8	63.0	15.5	18.5	35.3	49.2
8	51.8	71.8	27.7	38.7	28.5	35.8	10.9	13.6	48.0	61.6	15.3	18.7	34.0	49.4
9	48.4	69.8	25.9	37.6	25.5	33.2	10.5	13.8	45.5	60.4	14.0	17.8	31.4	47.8
10	45.1	67.8	24.2	36.6	24.4	32.9	10.5	13.9	42.9	59.0	14.0	18.2	28.9	46.0
Median	8.5		2.0		2.1		0.9		7.3		1.3		3.2	



<i>cont'd</i>	TNM staging					
	M0 n=1,297		M1 n=479		NA/NOS n=461	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
Years						
0	100.0	100.0	100.0	100.0	100.0	100.0
1	83.1	85.9	23.9	24.7	73.6	77.2
2	70.0	74.6	12.2	13.0	66.7	72.7
3	61.6	67.8	7.5	8.0	61.2	69.4
4	55.5	63.0			57.9	68.3
5	51.6	60.5			53.3	65.4
6	47.7	57.9			49.7	63.3
7	44.1	55.4			46.0	60.8
8	41.5	53.9			43.2	59.0
9	39.1	52.4			39.5	55.8
10	36.2	50.3			38.1	55.9
Median	5.4		0.4		6.0	

**Table 4f.** Observed (obs.) and relative (rel.) survival of patients with bladder cancer by TNM staging for period 1998-2019 (N=7,154).

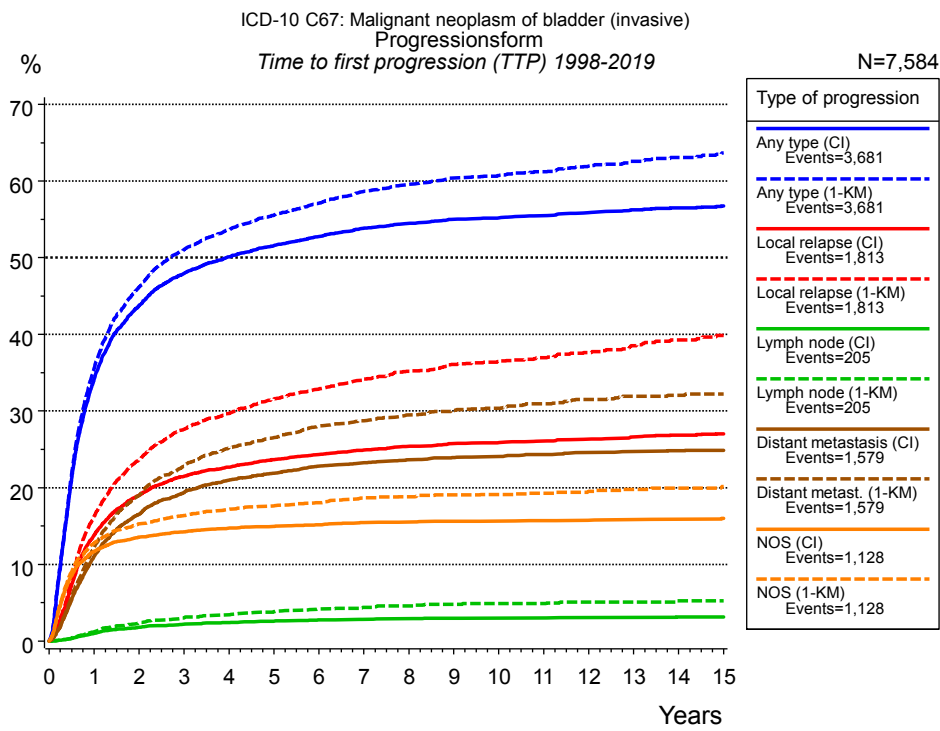


**Figure 4i.** Conditional relative 5-year survival of patients with bladder cancer by extent of disease. For 7,157 of 7,615 cases diagnosed between 1998 and 2019 valid data could be obtained for this item. For a total of 7,146 cases an evaluable classification was established. The grey line represents the subgroup of 469 patients with missing values regarding extent of disease (6.2 % of 7,615 patients, the percent values of all other categories are related to n=7,146).

Years	Extent of disease							
	Local		Regional		Distant		NA/NOS	
	n	Cond. surv. % 5 yrs	n	Cond. surv. % 5 yrs	n	Cond. surv. % 5 yrs	n	Cond. surv. % 5 yrs
0	5,937	62.8	730	25.3	479		469	65.5
1	4,425	73.4	430	35.7			322	82.6
2	3,572	80.4	264	48.1			279	84.4
3	3,019	84.6	176	65.1			246	86.7
4	2,576	87.6	135	75.6			220	84.6
5	2,229	88.7	103	83.3			200	88.9
6	1,898	90.3	79	92.9			180	88.8
7	1,618	91.6	59	95.5			156	85.7
8	1,389	90.8					141	85.0
9	1,164	92.0					122	83.7
10	977	92.1					113	80.9

**Table 4j.** Conditional relative 5-year survival of patients with bladder cancer by extent of disease for period 1998-2019 (N=7,146).

Conditional relative survival rates refer to the relative survival probability, in this case for 5 years after cancer diagnosis, compared to the age- and sex-matched population (=100 %) under the condition of being alive for a certain time period (x-axis in Figure 4g). The results illustrate to what extent the cancer induced mortality of particular subgroups declines in the subsequent years after detection of the malignancy. For instance, according to the presented survival statistics, patients in the subgroup extent of disease="Local", who are alive at least 3 years after cancer diagnosis, the conditional relative 5-year survival rate is 84.6% (n=3,019).

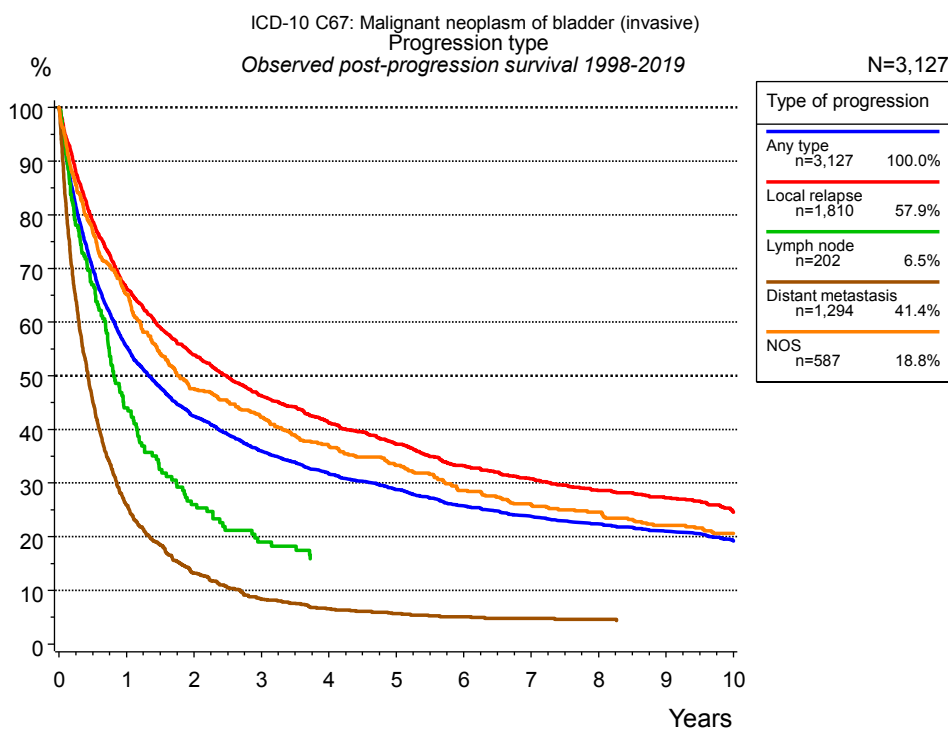


**Figure 5a.** Time to first progression of 7,584 patients with bladder cancer diagnosed between 1998 and 2019 (in solid cancers M0 only) estimated by cumulative incidence function (CI, solid line) accounting for death as competing risk and by inverse Kaplan-Meier estimate (1-KM, dashed line). The frequency of events may be underestimated due to underreporting.

	Type of progression						
	Any type (CI)	Any type (1-KM)	Local relapse (CI)	Local relapse (1-KM)	Lymph node (CI)	Lymph node (1-KM)	Distant metastasis (CI)
N	7,132	7,132	7,582	7,582	7,583	7,583	7,135
Events	3,674	3,674	1,810	1,810	203	203	1,572
compet.	1,344		3,437		4,508		2,788
Years	%	%	%	%	%	%	%
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	34.2	35.6	13.9	16.3	1.0	1.2	11.0
2	43.7	46.1	19.0	23.6	1.8	2.4	16.5
3	47.9	51.0	21.5	27.6	2.2	3.0	19.3
4	50.1	53.7	22.7	29.7	2.4	3.4	21.0
5	51.6	55.6	23.7	31.6	2.6	3.9	21.9
6	52.7	57.1	24.3	32.8	2.8	4.2	22.8
7	53.9	58.7	24.9	34.2	2.8	4.4	23.2
8	54.5	59.6	25.4	35.2	2.9	4.6	23.7
9	55.0	60.4	25.8	36.1	3.0	4.8	23.9
10	55.2	60.7	25.9	36.4	3.0	4.9	24.1
11	55.5	61.2	26.1	36.9	3.0	4.9	24.4
12	55.9	62.0	26.3	37.6	3.1	5.1	24.6
13	56.2	62.6	26.6	38.5	3.1	5.1	24.8
14	56.5	63.1	26.9	39.3	3.1	5.3	24.8
15	56.8	63.7	27.1	39.9	3.1	5.3	24.9

<i>cont'd</i>	Type of progression		
	Distant metast. (1- KM)	NOS (CI)	NOS (1-KM)
N	7,135	7,583	7,583
Events	1,572	1,128	1,128
compet.		3,667	
Years	%	%	%
0	0.0	0.0	0.0
1	12.2	11.7	12.8
2	19.0	13.6	15.3
3	22.8	14.3	16.4
4	25.2	14.7	17.2
5	26.6	15.0	17.6
6	28.1	15.2	18.1
7	28.7	15.5	18.7
8	29.5	15.5	18.8
9	30.1	15.6	19.1
10	30.3	15.7	19.1
11	30.9	15.7	19.3
12	31.5	15.8	19.5
13	31.9	15.9	19.8
14	32.1	15.9	19.9
15	32.2	16.0	20.2

**Table 5b.** Time to first progression of patients with bladder cancer for period 1998-2019 (N=7,584), also showing the total of progression events (Events) and of deaths as competing risk (compet.).

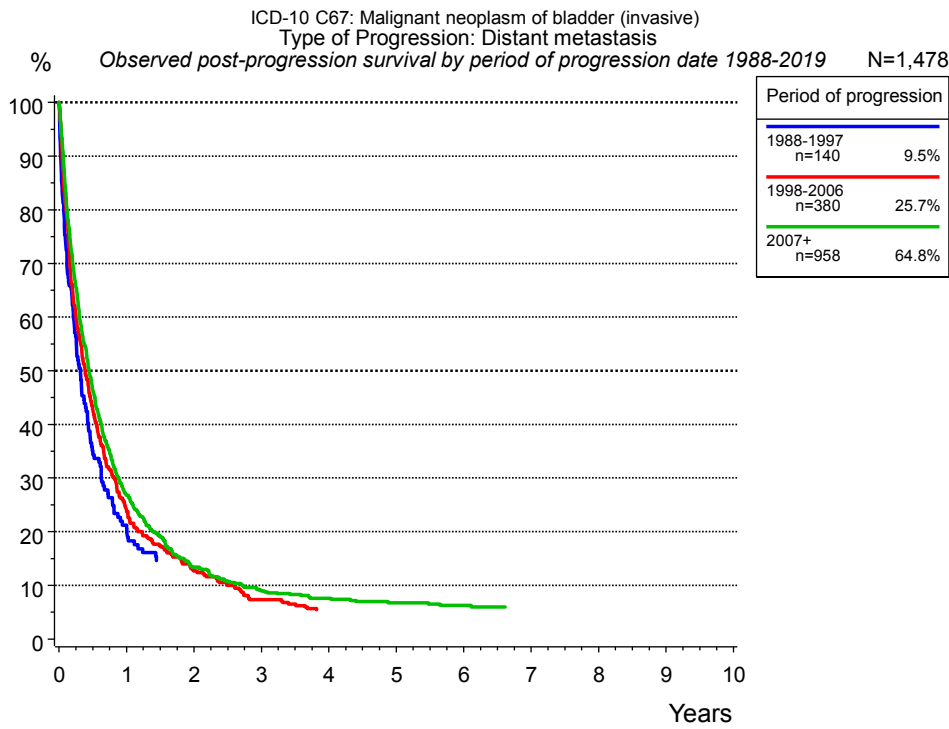


**Figure 5c.** Observed post-progression survival of 3,127 patients with bladder cancer diagnosed between 1998 and 2019. These 3,127 patients with documented progression events during their course of disease represent 41.2 % of the totally 7,584 evaluated cases (incl. M1, n=452, 6.0 %). Patients with cancer relapse documented via death certificates only were excluded (n=1,006, 13.3 %). Multiple progression types on different sites are included in the evaluation even when not occurring synchronously. The NOS (not otherwise specified) class is included under the condition, that it is the one and only progression type during the course of disease.

Medical record documentation often lacks the linguistic severity to distinguish between local relapse, regional lymph node metastasis and distant spread in solid cancers. Frequently, the statement “not specified” is the only information in registries regarding relapse of the disease. The category “Any type” denotes all cases who suffered from at least one relapse during the course of disease (incl. primary M1-status). Although, the real number of relapsed patients is likely to be much higher. The accumulated percentage of patients with local relapse or distant metastasis exceeds the 100 % value because patients are potentially considered in more than one subgroup.

Years	Type of progression				
	Any type n=3,127 %	Local relapse n=1,810 %	Lymph node n=202 %	Distant metastasis n=1,294 %	NOS n=587 %
0	100.0	100.0	100.0	100.0	100.0
1	55.5	66.3	44.0	25.9	65.1
2	42.4	53.8	26.0	13.2	47.6
3	35.9	46.2	19.0	8.4	42.3
4	31.7	41.2		6.6	37.0
5	28.7	37.2		5.7	33.3
6	25.7	33.2		5.1	28.6
7	23.8	30.8		4.8	25.9
8	22.4	28.6		4.6	24.6
9	20.9	27.2			22.1
10	19.2	24.6			20.6

**Table 5d.** Observed post-progression survival of patients with bladder cancer for period 1998-2019 (N=3,127).



**Figure 5e.** Observed post-progression (distant metastasis) survival of 1,478 patients with bladder cancer diagnosed between 1988 and 2019 by period of progression.

Years	Period of progression		
	1988-1997 n=140 %	1988-2006 n=380 %	2007+ n=958 %
0	100.0	100.0	100.0
1	20.5	23.9	26.8
2		12.6	13.4
3		7.3	8.9
4			7.5
5			6.7
6			6.2

**Table 5f.** Observed post-progression (distant metastasis) survival of patients with bladder cancer for period 1988-2019 by period of progression (N=1,478).

## Shortcuts

MCR Munich Cancer Registry, Germany

NCI National Cancer Institute, USA

SEER Surveillance, Epidemiology, and End Results, USA

UICC Union for International Cancer Control, Geneva

DCO Death certificate only Death certificate provides the only notification to the registry.

NA Not available

NOS Not otherwise specified

OS Overall/Observed survival Overall/Observed survival (Kaplan-Meier estimate)  
Date of entry: diagnosis  
Event: death from any cause

RS Relative survival Survival compared to “general population”,  
ratio of observed to expected survival (Ederer II method),  
reflecting cancer specific survival

AS Assembled survival Assembled chart of  
observed, expected, relative survival

CS Conditional survival Survival probability under the condition of surviving  
a given period of time

TTP Time to progression Time to first progression / relapse  
Date of entry: diagnosis  
Event: (progression / relapse): first local-, lymph node recurrence,  
distant metastasis or unspecified progression

1-KM 1 minus Kaplan-Meier estimator  
 (“inverse” Kaplan-Meier estimator)

CI Cumulative incidence  
Death as competing risk (according to Kalbfleisch und Prentice)

PPS Post-progression survival Survival since first progression / relapse (Kaplan-Meier estimate)  
Date of entry (progression / relapse): first local-, lymph node  
recurrence, distant metastasis or unspecified progression  
Event: death from any cause

## Recommended Citation

Munich Cancer Registry. Survival ICD-10 C67: Bladder cancer [Internet]. 2021 [updated 2021 Jan 27; cited 2021 Mar 1]. Available from: [https://www.tumorregister-muenchen.de/en/facts/surv/sC67\\_\\_E-ICD-10-C67-Bladder-cancer-survival.pdf](https://www.tumorregister-muenchen.de/en/facts/surv/sC67__E-ICD-10-C67-Bladder-cancer-survival.pdf)

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