

ORIGINAL ARTICLE

Trends in the survival of patients diagnosed with kidney or urinary bladder cancer in the Nordic countries 1964–2003 followed up to the end of 2006

GERDA ENGHOLM¹, TIMO HAKULINEN², METTE GISLUM¹,
LAUFEY TRYGGVADÓTTIR^{3,4}, ÅSA KLINT⁵, FREDDIE BRAY^{6,7} & HANS H. STORM¹

¹Department of Cancer Prevention and Documentation, Danish Cancer Society, Copenhagen, Denmark, ²Finnish Cancer Registry, Helsinki, Finland, ³Icelandic Cancer Society, Reykjavik, Iceland, ⁴Department of Medicine, University of Iceland, Reykjavik, Iceland, ⁵Swedish Cancer Registry, National Board of Health and Welfare, Stockholm, Sweden, ⁶Department of Clinical- and Registry-based Research, Cancer Registry of Norway, Oslo, Norway and ⁷Department of Biostatistics, Institute of Basic Medical Sciences, University of Oslo, Norway

Abstract

Background. Previous studies have shown systematic differences between the Nordic Countries in population-based relative survival following a kidney or urinary bladder cancer diagnosis. Comparison of bladder cancer over time and between Nordic registries is complicated by variable coding practices with respect to the inclusion of *in situ* cases with invasive tumours. **Material and methods.** Five-year relative survival of patients with urinary cancer diagnosed in the Nordic countries 1964–2003 and followed up for death through 2006 was studied and contrasted with developments in incidence and mortality. **Results.** The survival following bladder cancer was higher than for kidney cancer and highest for men. Survival increased over the years in all countries, more for kidney cancer than bladder cancer. For Danish kidney cancer patients, the rate of increase over all the years has been lower than in the other countries, especially among women, resulting in a survival in Denmark some 10–20% points lower than elsewhere in 1999–2003. Danish bladder cancer patient survival was in the last period 4% points lower among men and 10% points lower among women than in the other Nordic countries. The differences were mainly found in the first year following diagnosis, where a higher excess mortality in Denmark was observed. Survival decreased with higher age at diagnosis. **Conclusion.** The increasing 5-year relative survival in all the Nordic countries for both kidney and bladder cancer are promising, but for kidney cancer a higher percentage detected coincidentally during an imaging investigation for other diseases could play a role. Denmark had the lowest survival, despite their known practice of including benign conditions with invasive bladder cancers. The lower Danish survival after kidney and bladder cancer in the first year after diagnosis could be due to later diagnosis on average, a higher co-morbidity from smoking-related diseases, and perhaps, less adequate cancer treatment and management in Denmark.

Key Words: *relative survival, excess mortality, Cancer Registry, population-based, urinary system*

Bladder and kidney cancer were the third and 11th most common cancers among men, and ranked 10th and 15th among women in the Nordic countries 1999–2003 [1]. The incidence and mortality of kidney cancer is low in the Nordic countries relative to many European countries, notably in central Europe [2]. Comparisons of bladder cancer between registries and over time are complicated by varying definitions and coding practices over time as to whether *in situ* lesions are reported as invasive bladder cancer cases [2,3].

The risk factors for kidney cancer are largely unknown, but among the known determinants are cigarette smoking, obesity, and hypertension [4]. Smoking is the most important risk factor for bladder cancer and about one-third of all bladder cancers are linked to tobacco consumption [5]. Certain occupational carcinogens have also been reported [3]. In a Nordic study an increased risk of bladder cancer was found for both men and women in several occupations [6].

An earlier study of 5-year relative survival in the Nordic countries including diagnoses from the years

Correspondence: Gerda Engholm, Department Cancer Prevention and Documentation, Danish Cancer Society, Strandboulevarden 49, DK-2100 Copenhagen Ø, Denmark. E-mail: gerda@cancer.dk

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1958–1987 reported that the survival of kidney cancer patients increased gradually over time. Norway had the highest survival throughout the period with the Danish survival consistently the lowest, with the differential to the other countries increasing over time [7].

A EUROCARE-4 study reported a 5-year relative survival for kidney cancer diagnosed 1995–1999 of 45% in Denmark, 58% in Finland, 53% in Iceland,

49% in Norway, and 54% in Sweden. For bladder cancer, the 5-year relative survival ratios in the Nordic countries were around 75%, among the highest in the European Registry populations studied, but six percentage points lower in Denmark [8].

The purpose of this study is to compare the trends in cancer survival of kidney and urinary bladder cancer in the five Nordic countries for patients diagnosed 1964–2003 followed up to the end of 2006.

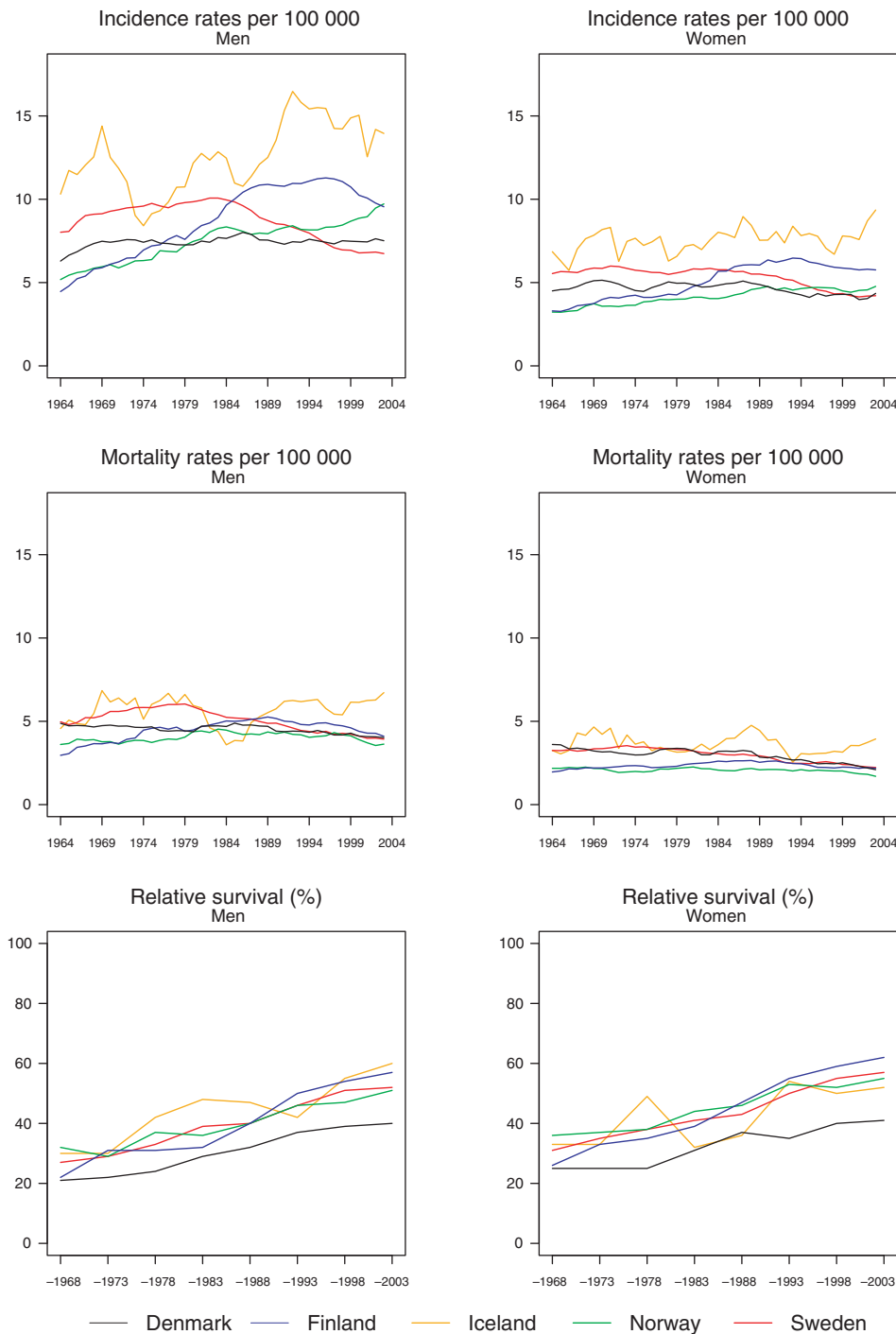


Figure 1. Trends in age-standardised (World) incidence and mortality rates per 100 000 and age-standardised (ICSS) 5-year relative survival for patients of kidney cancer by sex and country. Nordic cancer survival study 1964–2003.

Material and methods

The materials and methods are described in detail elsewhere [9]. In brief, the NORDCAN database contains comparable data on cancer incidence and mortality in the Nordic countries, data are delivered by the national cancer registries, with follow-up information on death or emigration for each cancer patient available up to and including 2006. This paper covers kidney cancer (ICD-10 C64) and bladder cancer (ICD-10 C65-68, D09.0, and D41.4).

We calculated sex-specific 5-year relative survival for each of the diagnostic groups in each country for eight 5-year periods from 1964–1968 to 1999–2003. For the last 5-year period, so-called hybrid methods were used. Country-specific population mortality rates were used for calculating the expected survival. Age-standardisation of survival used the weights of the International Cancer Survival Standard (ICSS) cancer patient populations [10]. We present age-standardised (World) incidence and mortality rates, 5-year relative survival, and excess mortality rates for the follow-up periods of within one month, 1–3 months and 2–5 years following diagnosis, as well as age-specific 5-year relative survival by country, sex and 5-year period.

Results for kidney cancer

Incidence and mortality

The incidence in Finland and Norway increased from 1964, but was followed by a slight decrease in

the former during the 1990s. From the mid-1980s incidence also decreased in Sweden. The Nordic incidence was higher for men than women with age-standardised rates (World) of 8.0 and 4.6 per 100 000 in 1999–2003. The rates were highest in Iceland over the whole study period, but until around 1990 a higher percentage (30–40%) than in the other countries (10–20%) were classified as incidental diagnosis at autopsy or death certificate only.

The mortality followed the same trends as the incidence with smaller absolute differences between countries and a slightly decreasing trend. The Nordic mortality rates in 1999–2003 were 4.0 and 2.2 for men and women respectively (Figure 1).

Survival

The survival has been increasing in all countries over the time period, but to a lesser degree in Denmark (Figure 1 and Table I). Finland and Denmark had historically low 5-year relative survival ratios of around 20% for men and 25% for women in the mid-1960s, 5–10 percentage points below the other countries. The greatest increases subsequently were in Finland, leading to the highest relative survival for Finnish men and women at 57% and 62%, respectively, in the last period. Denmark had the least rapid increase over time with 5-year relative survival at 40% in men and 41% in women, 10–20 percentage points below the other countries for diagnoses 1999–2003, with larger survival differences seen among women.

Table I. Trends in survival for kidney cancer by sex and country. Number of tumours (N) included and the 5-year age-standardised (ICSS) relative survival in percent with 95% confidence intervals (RS (CI)). Nordic cancer survival study 1964–2003.

	Denmark		Finland		Iceland		Norway		Sweden	
	N	RS (CI)	N	RS (CI)	N	RS (CI)	N	RS (CI)	N	RS (CI)
Men										
1964–1968	946	21 (18–24)	520	22 (18–27)	38	30 (23–41)	623	32 (28–38)	2 492	27 (25–29)
1969–1973	1 250	22 (19–24)	635	31 (25–39)	51	30 (23–41)	709	29 (25–34)	2 772	29 (27–31)
1974–1978	1 260	24 (22–27)	801	31 (27–37)	51	42 (29–62)	877	37 (33–42)	2 561	33 (31–36)
1979–1983	1 200	29 (26–32)	996	32 (29–36)	64	48 (35–64)	1 005	36 (33–40)	2 631	39 (37–42)
1984–1988	1 225	32 (29–36)	1 398	40 (36–43)	65	47 (33–66)	1 137	40 (37–44)	2 720	40 (38–43)
1989–1993	1 249	37 (34–40)	1 610	50 (47–54)	97	42 (32–55)	1 262	46 (42–49)	2 654	46 (43–48)
1994–1998	1 330	39 (35–42)	1 839	54 (51–57)	113	55 (45–67)	1 302	47 (44–51)	2 419	51 (48–53)
1999–2003	1 475	40 (38–43)	1 838	57 (54–59)	110	60 (51–70)	1 457	51 (49–54)	2 326	52 (50–54)
Women										
1964–1968	743	25 (21–28)	459	26 (22–30)	23	33 (23–47)	428	36 (31–41)	1 822	31 (29–34)
1969–1973	958	25 (22–28)	593	33 (29–37)	34	33 (23–47)	521	37 (33–42)	2 069	35 (32–37)
1974–1978	965	25 (22–28)	672	35 (32–39)	39	49 (36–66)	572	38 (34–43)	1 784	38 (36–41)
1979–1983	959	31 (28–34)	855	39 (36–43)	45	32 (21–50)	678	44 (40–48)	1 864	41 (39–44)
1984–1988	970	37 (34–40)	1 199	47 (44–51)	56	36 (25–50)	772	46 (43–50)	1 989	43 (40–45)
1989–1993	980	35 (32–38)	1 333	55 (52–58)	61	54 (40–71)	856	53 (50–57)	2 005	50 (47–52)
1994–1998	975	40 (36–43)	1 441	59 (56–62)	69	50 (38–65)	931	52 (48–56)	1 839	55 (52–58)
1999–2003	960	41 (38–43)	1 508	62 (60–64)	79	52 (43–63)	936	55 (52–58)	1 654	57 (55–59)

Numbers in *italics* indicate that two or more cells had to be combined to get sufficient number of patients to calculate survival.

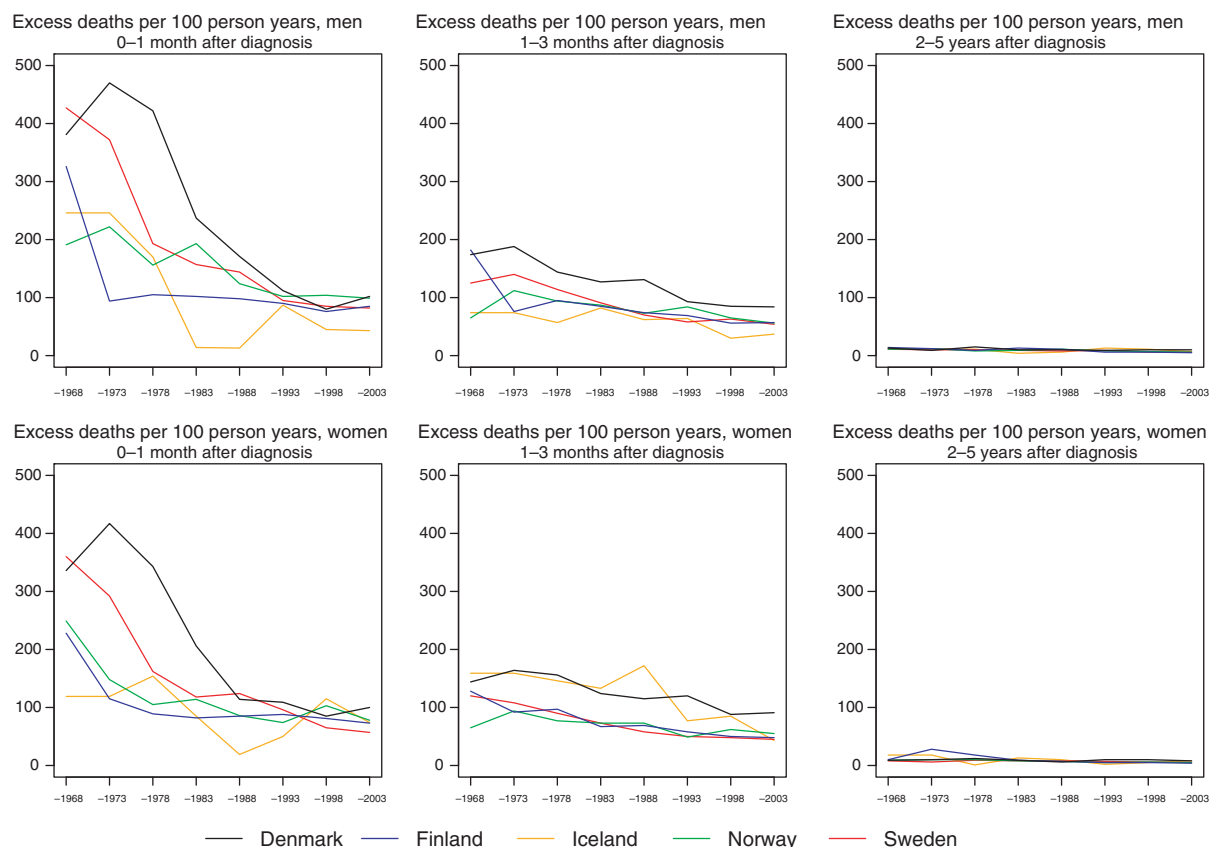


Figure 2. Trends in age-standardised (ICSS) excess death rates per 100 person years for kidney cancer by sex, country, and time since diagnosis in Nordic cancer survival study 1964–2003.

The excess mortality trends in Figure 2 show that during the first month following diagnosis, high levels of excess mortality were most notable for Denmark until around 1990. Sweden has also historically had a rather high excess mortality rate within the first month after diagnosis, but in the latest three 5-year periods, no substantive differences were found between countries. Considering the whole time span 1964–2003, a consistently higher excess mortality among Danish men and women was observed for the follow-up periods 1–3 months and 3–12 months after diagnosis (data for latter not shown), but few differences were seen between countries one year after diagnosis. Comparing countries, the age-specific 5-year relative survival indicated that the lower levels of survival in Denmark were largely restricted to patients diagnosed at age 50 or over (Table II).

Results for bladder cancer

Incidence and mortality

The age-standardised incidence rates increased for all countries over time until the 1990s. Incidence rates were consistently more than three times higher in men

than women, and also higher in Denmark than in the other countries (Figure 3). The Finnish incidence rates were the lowest and about half those observed in Denmark. A decline in incidence started in Denmark from around 1990 and in Finnish men from 1995. During the last decade, the incidence rates in men were fairly stable in the other three countries, though at a lower level in Sweden. The trends in mortality rates were comparable to those of incidence, although mortality rates were at a much lower level and the increase over time less profound (Figure 3).

Survival

The age-standardised 5-year relative survival ratios have been steadily increasing over the whole study period, with Sweden and Iceland observed to have the highest survival and Denmark consistently some 5 percentage points lower. Survival in Finland and Norway was 10 percentage points lower than in Denmark during the start of the study period but then overtook Denmark, ending at similar level as Sweden and Iceland, at around 75% and 70% in men and women, respectively (Figure 3, Table III). The increase in relative survival was also higher in men than in women.

Table II. Trends in 5-year age-specific relative survival in percent after kidney cancer by sex and country. Nordic cancer survival study 1964–2003.

Age	Men						Women					
	0–49	50–59	60–69	70–79	80–89	90+	0–49	50–59	60–69	70–79	80–89	90+
Denmark												
1964–1968	33	29	23	15	9	*	35	33	31	17	9	0
1969–1973	44	33	20	15	5	0	46	35	24	20	7	0
1974–1978	48	32	25	19	3	0	43	34	30	18	5	0
1979–1983	51	37	29	23	13	0	51	31	35	28	11	0
1984–1988	52	42	31	24	24	0	59	39	34	33	28	0
1989–1993	56	41	39	33	19	0	60	42	32	33	13	99
1994–1998	60	40	38	38	21	0	76	51	40	30	16	22
1999–2003	64	46	39	39	17	0	76	54	37	33	17	12
Finland												
1964–1968	38	24	20	26	0	*	47	41	24	22	0	*
1969–1973	48	33	28	18	46	*	50	39	45	28	0	*
1974–1978	46	34	30	31	20	*	62	51	37	30	4	*
1979–1983	49	43	35	26	12	*	58	50	41	32	22	*
1984–1988	63	50	38	38	17	*	77	60	44	44	22	0
1989–1993	64	50	51	49	41	*	79	68	58	47	33	0
1994–1998	70	54	57	50	43	0	79	72	61	55	36	0
1999–2003	73	57	59	56	41	0	81	70	67	56	40	13
Iceland												
1964–1968	34	68	36	18	*	*	67	67	20	28	*	*
1969–1973	34	68	36	18	*	*	67	67	20	28	*	*
1974–1978	47	71	31	43	25	*	78	78	61	33	*	*
1979–1983	31	40	82	40	22	*	47	47	43	25	*	*
1984–1988	42	42	59	45	37	*	54	54	38	34	*	*
1989–1993	55	61	46	27	33	*	64	64	44	53	52	*
1994–1998	80	54	74	39	33	*	60	60	58	50	18	*
1999–2003	74	60	67	49	54	*	64	64	51	61	12	*
Norway												
1964–1968	49	36	24	29	37	*	57	59	33	25	18	*
1969–1973	46	43	32	20	13	*	55	56	37	28	17	*
1974–1978	62	43	33	26	40	*	59	41	42	33	20	*
1979–1983	60	44	34	31	22	*	68	48	49	39	17	0
1984–1988	66	52	37	35	21	0	71	53	53	39	20	52
1989–1993	65	56	52	35	29	0	83	56	54	49	34	0
1994–1998	61	54	51	39	36	0	71	61	60	43	28	0
1999–2003	66	58	58	43	35	0	79	64	62	47	31	21
Sweden												
1964–1968	45	36	31	19	9	28	49	46	36	22	9	0
1969–1973	56	37	32	20	8	0	61	44	40	25	12	0
1974–1978	54	45	36	24	16	0	66	49	44	30	10	0
1979–1983	56	46	41	37	20	0	63	53	45	33	20	0
1984–1988	63	49	42	34	21	0	63	52	43	38	25	14
1989–1993	66	52	44	43	32	0	70	59	51	45	30	13
1994–1998	66	56	51	48	37	0	74	57	56	52	40	0
1999–2003	69	58	53	50	36	46	74	62	57	55	43	21

Numbers in *italics* indicate that two or more cells had to be combined to get sufficient number of patients to calculate survival.

*Too few patients to calculate survival, see ref. [9].

The excess death rates of bladder cancer patients decreased markedly over time, particularly within the first three months after diagnosis (Figure 4). The inter-country differences in these rates diminished over time, especially in men, but in the first year after diagnosis, the excess mortality rates were higher for Danish patients than in the other countries (data for

months 3–12 not shown). Following the first year of diagnosis very few differences in excess mortality between countries were observed.

The relative survival in all five countries consistently decreased with increasing age at diagnosis (Table IV). Marked increases in survival occurred over time in the oldest age groups, whereas the survival

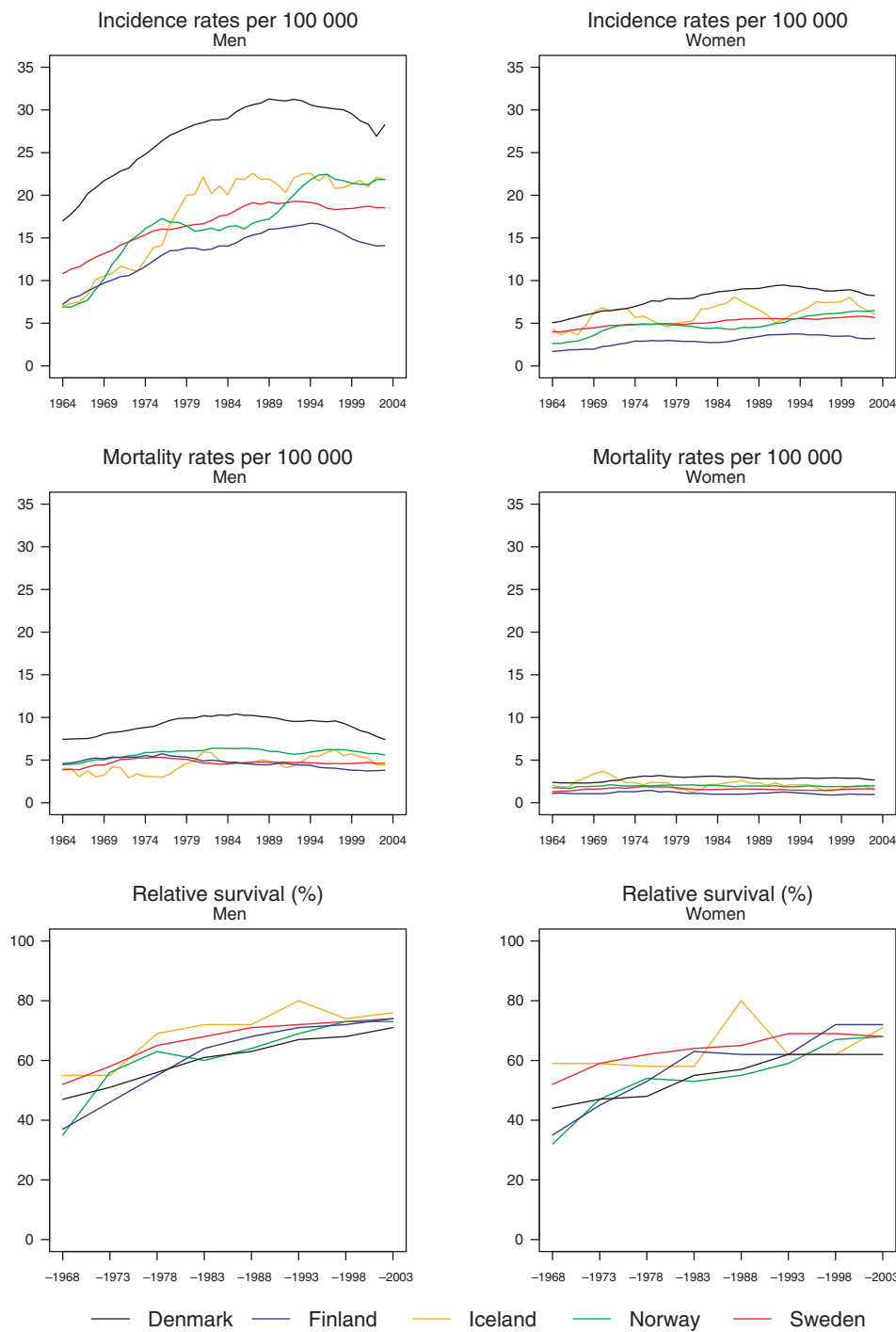


Figure 3. Trends in age-standardised (World) incidence and mortality rates per 100 000 and age-standardised (ICSS) 5-year relative survival for patients of bladder cancer by sex and country. Nordic cancer survival study 1964–2003.

for patients below 50 years of age at diagnosis did not alter materially during the last two decades.

Discussion

The survival of patients diagnosed with cancers of the urinary system has improved consistently over

the last decades in all Nordic countries, but in recent years more so for kidney than bladder cancer. The level of survival was considerably higher for bladder than for kidney cancer. The improvements were largest in Finland, although the other countries were close behind, with the exception of Denmark, particularly for kidney cancer among women. The higher

Table III. Trends in survival for bladder cancer by sex and country. Number of tumours (N) included and the 5-year age-standardised (ICSS) relative survival in percent with 95% confidence intervals (RS (CI)). Nordic cancer survival study 1964–2003.

	Denmark		Finland		Iceland		Norway		Sweden	
	N	RS (CI)	N	RS (CI)	N	RS (CI)	N	RS (CI)	N	RS (CI)
Men										
1964–1968	2 939	47 (45–50)	880	37 (33–41)	37	55 (43–70)	983	35 (31–39)	3 490	52 (50–55)
1969–1973	3 924	51 (49–53)	1 205	46 (42–50)	61	55 (43–70)	1 882	56 (53–59)	4 557	58 (56–60)
1974–1978	4 834	56 (54–58)	1 641	55 (52–59)	82	69 (57–84)	2 644	63 (60–65)	5 414	65 (64–67)
1979–1983	5 482	61 (60–63)	1 933	64 (61–67)	142	72 (63–82)	2 627	60 (57–62)	5 968	68 (67–70)
1984–1988	6 037	63 (62–65)	2 334	68 (65–70)	150	72 (63–82)	2 816	64 (62–67)	7 030	71 (69–72)
1989–1993	6 390	67 (65–68)	2 738	71 (69–74)	166	80 (71–89)	3 408	69 (67–71)	7 564	72 (71–74)
1994–1998	6 476	68 (67–70)	3 096	72 (70–75)	199	74 (66–83)	4 129	73 (71–74)	7 683	73 (72–74)
1999–2003	6 534	71 (69–72)	3 050	74 (73–76)	213	76 (70–82)	4 158	73 (72–75)	8 169	74 (73–75)
Women										
1964–1968	983	44 (41–48)	299	35 (30–42)	23	59 (46–76)	465	32 (27–37)	1 438	52 (49–56)
1969–1973	1 306	47 (44–51)	415	45 (40–51)	36	59 (46–76)	791	47 (43–51)	1 814	59 (57–62)
1974–1978	1 682	48 (46–51)	585	53 (49–58)	37	58 (46–72)	951	54 (50–58)	1 960	62 (59–65)
1979–1983	1 908	55 (52–57)	658	63 (58–67)	47	58 (46–72)	995	53 (49–57)	2 176	64 (62–67)
1984–1988	2 186	57 (54–59)	765	62 (58–66)	68	80 (69–93)	1 015	55 (51–59)	2 521	65 (63–67)
1989–1993	2 368	62 (60–64)	1 008	62 (58–65)	45	62 (52–73)	1 153	59 (56–63)	2 673	69 (67–71)
1994–1998	2 338	62 (60–65)	1 058	72 (69–75)	78	62 (52–73)	1 438	67 (64–70)	2 840	69 (67–71)
1999–2003	2 417	62 (60–64)	1 058	72 (69–75)	81	71 (62–81)	1 565	68 (66–70)	3 098	68 (67–70)

Numbers in *italics* indicate that two or more cells had to be combined to get sufficient number of patients to calculate survival.

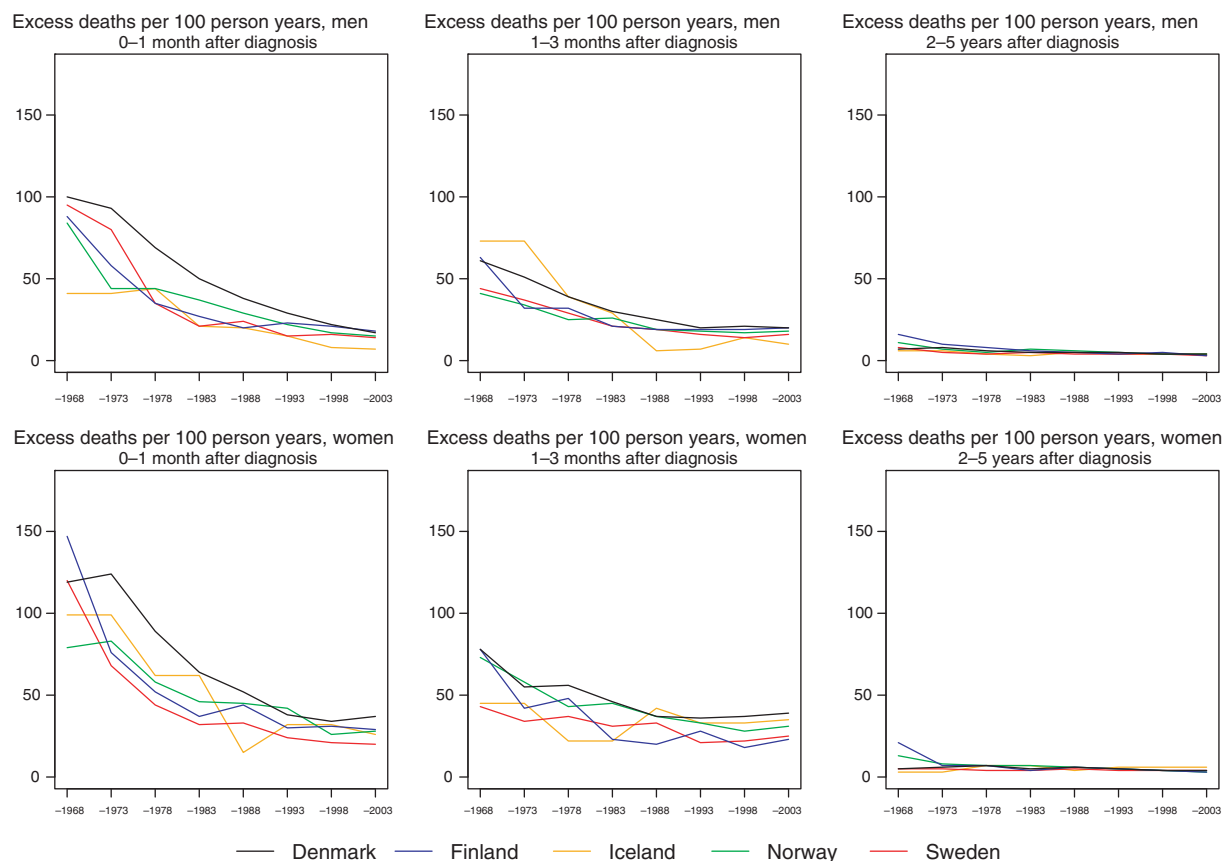


Figure 4. Trends in age-standardised (ICSS) excess death rates per 100 person years for bladder cancer by sex, country, and time since diagnosis in Nordic cancer survival study 1964–2003.

Table IV. Trends in 5-year age-specific relative survival in percent after bladder cancer by sex and country. Nordic cancer survival study 1964–2003.

Age	Men						Women					
	0–49	50–59	60–69	70–79	80–89	90+	0–49	50–59	60–69	70–79	80–89	90+
Denmark												
1964–1968	67	61	49	39	29	24	50	53	45	44	30	0
1969–1973	77	63	55	42	24	0	67	55	46	41	37	26
1974–1978	78	70	58	46	36	26	62	60	49	46	25	0
1979–1983	86	72	63	54	40	35	70	63	57	47	43	13
1984–1988	87	72	65	56	46	7	82	66	63	47	33	15
1989–1993	88	79	70	59	47	46	85	72	61	56	44	48
1994–1998	88	79	68	62	52	33	85	77	66	56	33	19
1999–2003	87	79	72	66	54	43	84	75	66	53	38	26
Finland												
1964–1968	64	48	39	33	7	*	73	53	39	22	5	*
1969–1973	65	67	48	35	24	*	83	56	46	33	24	*
1974–1978	75	68	55	50	34	0	78	64	58	40	37	*
1979–1983	83	74	66	55	51	72	80	77	62	59	40	73
1984–1988	87	77	68	59	59	73	80	72	68	54	41	0
1989–1993	89	80	70	70	52	63	84	77	66	53	37	12
1994–1998	89	83	73	67	57	46	88	88	77	63	49	49
1999–2003	89	83	75	70	61	44	88	82	77	63	58	41
Iceland												
1964–1968	58	62	64	41	55	*	71	71	68	50	37	*
1969–1973	58	62	64	41	55	*	71	71	68	50	37	*
1974–1978	102	78	66	70	36	*	65	65	62	56	40	*
1979–1983	102	88	64	63	62	*	65	65	62	56	40	*
1984–1988	102	93	74	55	52	*	75	75	94	36	152	*
1989–1993	96	90	69	84	64	*	63	63	74	63	33	*
1994–1998	79	84	68	82	52	82	63	63	74	63	33	*
1999–2003	93	87	78	62	71	61	87	87	77	66	40	*
Norway												
1964–1968	44	45	38	29	22	0	56	40	31	25	15	0
1969–1973	80	64	54	48	44	0	60	65	49	39	26	25
1974–1978	83	73	64	57	46	23	67	63	60	46	36	29
1979–1983	88	68	62	54	37	58	71	71	51	47	31	0
1984–1988	83	76	66	55	50	78	69	63	64	44	41	34
1989–1993	85	80	71	62	51	64	71	70	64	51	46	19
1994–1998	89	81	74	65	60	29	85	76	69	63	45	30
1999–2003	90	82	75	69	56	42	86	75	73	61	50	20
Sweden												
1964–1968	79	68	55	43	26	0	66	62	53	50	35	16
1969–1973	82	70	62	50	34	0	90	72	63	51	31	19
1974–1978	84	78	67	57	49	57	79	70	64	54	51	53
1979–1983	89	77	72	58	54	54	87	69	67	61	44	26
1984–1988	90	80	73	64	54	33	89	76	69	58	41	27
1989–1993	88	80	75	67	58	43	87	82	68	63	53	35
1994–1998	87	83	76	68	54	56	84	77	80	61	46	46
1999–2003	88	83	76	69	58	43	77	80	76	60	49	42

Numbers in *italics* indicate that two or more cells had to be combined to get sufficient number of patients to calculate survival

*Too few patients to calculate survival, see ref. [9].

excess mortality in Denmark was notable in the first year following diagnosis.

A recent paper has attributed the improved survival in kidney cancer in England to lead time as a result of earlier diagnosis rather than improved treatment, in combination with a higher percentage of tumours

detected coincidentally during imaging investigations [11]. The percentage of tumours detected through death certificate only or incidental autopsy (and excluded in the survival calculations) in our study is high compared to many other cancers, and peaked during the 1980s. The detection of slow-growing

tumours which previously would be undetected would lead to higher survival—thus supporting the above hypothesis.

The definition and subsequent recording and reporting of bladder cancer are subject to some debate, and it is likely that there is some heterogeneity in practices between registries [12]. In Denmark, the Registry has from its inception recorded papillomas and grade 1 lesions as bladder cancer, however it is unknown whether reporting is consistent inasmuch as the term *benign* papilloma often is used. In Finland, bladder papilloma is not reported in the incidence figures. Since Finland has the lowest incidence and Denmark the highest, one can speculate that part of the difference in incidence might be due to variations in registration practices. If this is the case, survival should be higher in Denmark due to the inclusion of very early cancers, and increases in survival in all countries (other than Finland), could partly reflect a more comprehensive recording of early cancers. Since the mortality rates for bladder were highest in Denmark as well, some of the differences in case-fatality are likely to be free from biases due to differing registration practices.

Bladder cancer is one of a handful of cancers where survival is commonly observed to be higher among men than women. In a US SEER-based study female bladder cancer patients were found to be diagnosed with an average higher stage and more unfavourable histology than male patients, with women having poorer survival even when adjusting for these factors. The authors speculated that other possible contributing factors included access to health care, delay in diagnosis and therapy, choice of treatment options, host factors and missing tumour sub-staging within the SEER database [13]. An editorial comment conjectured that a presumptive diagnosis of urinary tract infection among women when presenting with hematuria to primary care physicians could result in a delay in the diagnosis of bladder cancer [14].

Part of the observed improvement in all countries for bladder cancer patients is likely to be real, and is probably related to improved therapy. This is also reflected in the decline in mortality observed almost at the same time as the decline in incidence among men. A recent UK paper commenting on the development of bladder cancer survival over time reported that invasive bladder cancer treatment has largely remained unchanged during the 1980s and 1990s [15]. Others have however claimed that the improvement in survival can largely be ascribed to improved peri-operative treatment and that the focus in later years has been on supplementing the treatment of curative intent with chemotherapy based on the view of bladder cancer as a systemic disease [16]. In support of this, a meta analysis on neo-adjuvant

chemotherapy in invasive bladder cancer demonstrated a small but significantly improved survival following cystectomy and radiotherapy in patients with a bladder cancer invading the muscle tissue [17].

In a Danish study examining the impact of social inequality on cancer incidence and survival, an excess mortality for urinary cancer was seen in the first year for women with a low level of education and among men and women unavailable for employment [18]. Similar gaps in survival according to socioeconomic status were seen for kidney cancer in the UK among men, but not women [19]. In the Danish study bladder cancer was also associated with lower survival both one and five years after diagnosis in both sexes, for those with a lower education and with a higher co-morbidity, and for male bladder cancer patients grouped as having a low income [18]. For bladder cancer patients in the UK and Wales the improvement in survival was found in the time period from 1986 through 1999 and the deprivation gap was large and significant [20]. Social inequality in cancer incidence and survival in Denmark was mainly found for smoking-dependent cancers [21]. In Denmark smoking is reported more frequent among groups with low socioeconomic position measured by low education [22]. The lower Danish survival compared to the other Nordic countries is likely attributable to a higher smoking prevalence in Denmark, especially among women, resulting in a higher co-morbidity.

In summary, the increasing 5-year relative survival in all the Nordic countries for both kidney and bladder cancer is encouraging, but for Danish kidney cancer patients the extent of the increase in survival appears to be lower than in the other countries, resulting in a survival 10–20 percentage points lower at five years for diagnoses 1999–2003. Further studies should examine if the survival improvement could be explained by earlier diagnosis or other factors. Danish bladder cancer patient survival in the last period was lower for both men and women than in the other Nordic countries in spite of the Danish inclusion of more benign conditions in bladder cancer. The survival differences for both sites were notable within the first year of diagnosis. The possible factors in operation for the lower Danish survival include later diagnosis, higher co-morbidity from smoking-related diseases, or possibly, less adequate treatment and management.

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