Mortality after Bereavement: A Prospective Study of 95,647 Widowed Persons

JAAKKO KAPRIO, MD, MARKKU KOSKENVUO, MD, AND HELI RITA, MPOLSC

Abstract: The mortality of 95,647 persons, widowed during 1972–76 and identified by linking the Finnish Population Register and cause-of-death files, was followed up to the end of 1976. A total of 7,635 deaths during 225,251 person-years of experience were observed. Cause-specific standardized mortality ratios by time after bereavement were computed. The highest relative mortality risk was found immediately after bereavement. For all natural causes, mortality during the first week was over two-fold compared to expected rates. The relative risk was larger for ischemic heart disease (RR = 2.3 for men, and RR = 3.5 for women), an effect found in all age groups. Among men under age 65, excess mortality from IHD was also observed during later years of widowhood. For violent causes, exclusive of accidents simultaneously affecting both spouses, mortality was over two-fold during the first month. Mortality from suicides was greater than expected during the first years of widowhood. While the greatest excess mortality after bereavement seems to be due principally to the acute effects of becoming widowed, there also seems to be some excess mortality in younger persons widowed for a longer time. (Am J Public Health 1987; 77:283–287.)

Introduction

Widowhood is a common event that indicates and is related to changes in emotional condition, socioeconomic conditions, personal relations, and life-style.[1] Widowed persons have been found to have higher mortality rates than married persons in cross-sectional studies based on death certificates, census enumerations of the population, and longitudinal studies of recently widowed persons.[2–4]

The higher mortality of widowed persons has been ascribed to:

- a common environment with risks common to both spouses, e.g., dietary and social factors;
- the immediate effect of loss and grief reaction with its attendant psychosomatic disturbances;
- assortative mating on the basis of predisposition to illness, so that when one spouse dies, the other also dies soon afterwards.[5]

Earlier studies, on fairly small samples suggest that excess risk is greatest immediately after bereavement.[6–11] This has been confirmed by a large Swedish study[12] in which the distribution of cause-specific mortality in relation to time after bereavement was not examined. Helsing and Szklo,[13] however, found no excess mortality among 4,032 widowed persons immediately after bereavement when compared to their mortality in subsequent years.

By examining mortality in a large population of widowed persons, we sought to define both the period of greatest excess risk, and the associated causes of death.

Methods

Computer files of all death certificates for deaths occurring in 1972–76 in Finland were analyzed. These files are linked at the Central Statistical Office to the Central Population Registry records, and identification information on the spouse is added if the deceased person had been married. We then linked the personal identification data of the deceased's spouse to death certificate records to identify the deceased widows and widowers. Identification of spouse was missing

for only 0.2 per cent of deceased persons, whose marital status was recorded as married at the time of death.

A cohort of 95,647 widowed persons could be identified from the computer records, and their mortality was determined from January 1, 1972 to December 31, 1976. When the interval between the death of both spouses is short, miscoding of marital status could occur; this could cause either over- or undernumeration. We have no way of investigating these possibilities.

After the first week, among men but not among women, the proportion of deaths with the marital status coded as married increased with time of follow-up, presumably due to remarriage. This suggests that remarriage is not a major factor affecting overall mortality in the widowed cohort, even though remarriage rates for the entire widowed cohort are not known.

As the majority of cases dying 0–7 days after bereavement (Table 1) were due to traffic accidents killing both spouses, deaths from traffic accidents were excluded from many of our analyses. For other violent causes of death, death of both spouses can also be due to a shared cause. Therefore all deaths occurring within 30 days of the spouse's death were listed, and the causes of death of the spouses were jointly analyzed.

The number of person-years observed in the cohort was computed by following the cohort until death occurred, or until December 31, 1976. The person-years computed per five-year age group, sex, and calendar year were multiplied by the corresponding age, sex, and calendar year specific national mortality rate. When specific diagnoses or diagnosis groups were analyzed, the corresponding cause-specific reference mortality rates were used. The observed and expected figures were then summed over age groups and calendar years. Standardized mortality ratios (SMR) were computed by dividing the observed number of cases by the expected number. Confidence limits for the SMRs were computed assuming that the observed number of deaths were distributed according to the Poisson distribution.[14]

Results

The 95,647 widowed persons were observed for 225,251 person-years. As shown in Table 2, in the entire cohort, mortality from all causes was 6.5 per cent higher than expected. For natural causes, the comparable figure was 3.2 per cent, while for violent deaths as a whole, it was 93 per

TABLE 1—Proportion of Deaths during Follow-up Coded as Married among Bereaved Spouses during 1972-76 by Time after Bereavement and by Sex

Time after Bereavement	% Men	% Women
0–7 days	44.0	49.2
8–31 days	1.6	1.8
2–6 months	1.2	1.6
7–12 months	1.1	0.9
2nd year	3.1	1.1
3rd year	2.5	0.8
4th year	2.5	0.5
5th year	3.4	0.6

cent higher than expected (traffic accidents 153 per cent, suicides 242 per cent).

For all natural causes, SMRs are twofold higher during the first week for both men and women (Table 3). They decrease, but continue high for men under age 65 through the third year; for older men they approach expected levels after the sixth month, and for women they do so after the first month.

For men, a 2.3-fold increase in mortality for ischemic heart disease (ICD 8th revision, rubrics 410-414) was observed during the first week (Table 4); for women, the increase was 3.5-fold. After the first month, mortality was at population levels or less except for an excess mortality among widowers under age 65 during the second and perhaps subsequent years.

For deaths from cerebrovascular disease (ICD 430-438) a 1.9-fold increase in mortality was observed for men during the first month, with a four-fold increase in those under age 65 (data not shown). For women, only a slight increase in mortality was observed during the first six months.

For deaths from malignant disease (ICD 140-239) among men, 1.25-fold increase in mortality was observed during the first month. After the first month no excess mortality was observed. For women, a 1.6-fold increase in mortality was observed during the first week (data not shown).

For all non-cardiovascular causes considered together, there was some slight excess mortality immediately after bereavement. Among men under age 65, excess mortality (relative risks about 1.5) occurred in the first and third years after bereavement (Table 5).

When deaths within 30 days of the death of the spouse

TABLE 2—Overall Mortality during Follow-up by Cause among Widowed Spouses 1972-76

Cause of Death	SMR	95% Confidence Limits	Observed Deaths
All Causes	106.5	(104.2,109.0)	7635
Natural Causes	103.2	(100.8,105.6)	7122
Infections	101.1	(92.5,110.3)	505
Cancer	103.2	(97.8,108.6)	1432
Cardiovascular Disease	102.6	(99.5,105.7)	4269
IHD	103.9	(99.5,108.4)	2124
CVD	103.8	(97.6,110.4)	1024
Other	99.1	(93.4,105.1)	1121
Other	107.7	(100.8,114.9)	916
Violent Causes	193.0	(176.7,210.5)	513
Traffic Accidents	253.3	(217.1,293.7)	175
Suicides	242.4	(204.4,293.7)	144
Other Causes	141.3	(122.1,162.6)	194

were analyzed with respect to the cause of death of the spouse, there were two cases in which both spouses committed suicide, and 19 violent deaths of the widowed spouse during the first month following death from natural causes in the spouse (SMR = 204, 95% CL 123, 319): six traffic accident deaths, seven suicides, and six deaths from other violent causes. Exclusive of traffic accidents, male widowers had 10 deaths (five suicides).

After the first month, substantial excess mortality from violent causes (non-traffic) was found among all men and women, especially those under 65 years of age (Table 6). For suicides, men had a greater (17.2-fold) mortality than women (4.5-fold) during the first month of widowhood; however, in many cases this was subsequent to homicide of the spouse. After this period, the excess mortality was of the same order in both sexes. During the second to twelfth months after bereavement, there were 37 suicides (SMR = 312, 95% CL 219,430) among men and 19 among women (SMR = 216, 95% CL 130,337). The excess risk decreased slightly during subsequent years, but remained higher than expected from the entire follow-up period. Excess mortality due to suicides occurred in all age groups.

Discussion

Prospective studies of mortality after bereavement[2,3,15] have found widowed persons to have higher mortality than married persons. Data from a large population sample reflecting both time periods after bereavement and their associated causes of death have not been previously available, however. Mellström, et al,[12] analyzed the mortality of about 360,000 Swedish persons widowed between 1968 and 1978 and found an increased risk of death during the first three months of widowhood, which lessened with time. They did not analyze the time trends with respect to specific causes of death, however. Jones, Goldblatt, and Leon[16] analyzed cancer and other mortality in a longitudinal study of 4,016 widowers and 8,563 widows bereaved during 1971-75. No excess cancer mortality was observed. For other causes of death, excess mortality was observed only for women during the first two months after bereavement (SMR 223).[16] The causes of death were not analyzed in enough detail to distinguish between deaths due to a common event affecting both spouses and deaths from independent causes to which bereavement may have contributed, but a substantial excess of deaths (16 actual as opposed to 7.2 expected) occurred in women whose spouses died of violent causes;[16] a similar pattern was found in men.

Many earlier studies based on small samples have found an increased risk of death during the first six months after bereavement[6,8,9] which, in some studies seemed to be due mainly to coronary deaths.[7] Koskenvuo found an excess mortality after widowhood during the first two months,[17] which seemed to be mainly due to ischemic heart disease. Niemi found an increased mortality risk after bereavement during the first six months in a study of 939 men, of whom 174 lost their spouse after retirement.[11] Circulatory disorders and tumors were overrepresented as causes of death among those retired men, who died within six months after their spouses death.

Helsing and Szklo,[13] however, found no increased risk immediately after bereavement in a study of 4,032 widowed persons followed for 11 years. Compared to married controls and adjusted for some demographic, socioeconomic, and behavioral variables, the mortality rates of male but not female widowed were increased over the entire follow-up

TABLE 3—Standardized Motrality Ratios (SMR), 95% Confidence Limits (CL), and Observed Deaths (Obs) for Deaths from All Natural Causes by Sex, Age Group, and Time after Bereavement

Age Group		Time after Death of Spouse							
		0–7 days	8–31 days	2–6 mths	7–12 mths	2nd year	3rd year	4th year	5th year
Men									
Less than 65	SMR	194	180	137	144	139	131	103	113
	95% CL	71,421	107,284	110,170	116,177	116,164	104,163	72,143	58,198
	Obs	6	18	85	92	135	82	36	12
65 and over	SMR	196	132	109	102	102	94	111	96
	95% CL	143,261	108,161	100,119	94,111	96,110	86,102	100,123	78,116
	Obs	46	101	525	519	852	519	350	102
Total Men	SMR	196	138	113	107	107	98	110	97
	95% CL	146,256	114,165	104,122	99,116	100,114	90,106	100,122	80,117
	Obs	52	119	610	611	987	601	386	114
Women									
Less than 65	SMR	259	120	97	108	95	108	85	113
	95% CL	135,456	71,190	78,119	88,131	80,111	90,130	63,112	70,173
	Obs	12	18	91	106	148	113	50	21
65 and over	SMR	191	123	97	104	98	94	95	93
	95% CL	138,257	99,151	89,107	96,113	92,105	87,102	86,106	78,111
	Obs	43	90	456	533	855	602	375	129
Total Women	SMR	203	122	97	105	98	96	94	95
	95% CL	153,264	100,148	89,106	97,113	92,104	89,104	86,103	81,112
	Obs	55	108	547	639	1003	715	425	150

period. Analysis by cause of death[18] revealed an excess of accidents and suicides during the first six months of widowhood. These violent deaths were not due to a common cause affecting both spouses. Support by other persons living with the bereaved person during the grief reaction was an important determinant of mortality.[19] Berkman and Syme's nine-year follow-up study in Alameda County, California[20] found that adults lacking social and community ties had a 2.3 to 2.8-fold risk of death, independent of physical health status, socioeconomic status, smoking, use of alcohol, obesity, physical activity, and use of preventive health services.

The principal excess mortality observed in our study was found during the first week, month, and half-year after bereavement, particularly for IHD among the natural causes of death. Excess mortality from IHD may be related to grief and emotional distress which induce disturbances of sleep, and predispose to arrhythmias leading to cardiac mortality.[21] Sleeplessness after bereavement may also be a precipitating factor in a reactive psychosis which may then predispose to suicide, the risk of which was increased during the entire follow-up period. Guilt feelings may be induced by loss of the spouse, leading to depression and self-neglect, i.e., non-observance of regular meal times and failure to comply with medical treatment. Resistance to infections may decrease because of the increased stress.

The greater effect of bereavement on mortality for men

TABLE 4—Standardized Motrality Ratios (SMR), 95% Confidence Limits (CL), and Observed Deaths (Obs) for Deaths from Ischemic Heart Disease by Sex, Age Group, and Time after Bereavement

Age Group		Time after Death of Spouse							
		0–7 days	8–31 days	2–6 mths	7–12 mths	2nd year	3rd year	4th year	5th year
Men									
Less than 65	SMR	216	89	104	125	152	116	112	143
	95% CL	44,626	24,228	69,149	88,173	118,193	80,163	67,178	57,294
	Obs	3	4	29	36	67	33	18	7
65 and over	SMR	233	122	116	106	109	107	112	95
	95% CL	136,373	82,176	100,135	91,123	97,123	93,124	92,135	65,134
	Obs	17	29	173	167	282	185	111	32
Total Men	SMR	230	117	114	109	116	108	112	101
	95% CL	140,355	81,164	99,131	95,125	104,128	95,124	94,133	72,138
	Obs	20	33	202	203	349	218	129	39
Women									
Less than 65	SMR	457	112	85	98	78	124	77	109
	95% CL	148,1061	30,284	51,133	60,147	52,112	84,175	38,138	35,254
	Obs	5	4	19	23	29	31	11	5
65 and over	SMR	329	157	79	103	97	79	97	90
	95% CL	200,506	106,222	64,96	87,121	85,110	66,93	79,117	62,124
	Obs	20	31	100	143	230	139	106	35
Total Women	SMR	349	150	80	102	94	84	94	92
	95% CL	225,513	104,208	66,96	87,119	83,106	73,98	78,113	65,125
	Obs	25	35	119	166	259	170	117	40

TABLE 5—Standardized Motrality Ratios (SMR), 95% Confidence Limits (CL), and Observed Deaths (Obs) for Deaths from Non-Cardiovascular Natural Causes by Sex, Age Group, and Time after Bereavement

Age Group		Time after Death of Spouse							
		0–7 days	8–31 days	2–6 mths	7–12 mths	2nd year	3rd year	4th year	5th year
Men									
Less than 65	SMR	166	179	166	157	116	156	96	74
	95% CL	20,602	72,370	119,226	111,214	84,155	110,214	51,165	15,214
	Obs	2	7	40	39	44	38	13	3
65 and over	SMR	139	116	114	105	100	90	113	95
	95% CL	72,232	81,161	100,130	92,120	90,111	78,103	95,132	69,129
	Obs	13	36	222	217	337	204	147	42
Total Men	SMR	139	123	119	110	102	96	111	93
	95% CL	78,229	89,166	106,135	98,125	92,112	85,109	95,130	68,125
	Obs	15	43	262	256	381	242	160	45
Women									
Less than 65	SMR	166	115	102	115	110	110	84	83
	95% CL	45,427	53,219	76,135	86,148	88,135	84,141	55,124	36,163
	Obs	4	9	50	59	90	61	26	8
65 and over	SMR	171	109	94	115	97	104	86	101
	95% CL	93,286	73,156	81,110	100,131	87,109	92,118	71,102	75,133
	Obs	14	29	161	214	308	242	123	51
Total Women	SMR	170	110	96	115	100	105	85	98
	95% CL	100,268	78,151	84,110	102,129	91,110	94,118	72,100	75,127
	Obs	18	38	211	273	398	303	149	59

TABLE 6—Standardized Motrality Ratios (SMR), 95% Confidence Limits (CL), and Observed Deaths (Obs) for Deaths from Violent Causes (non-traffic) by Sex, Age Group, and Time after Bereavement

Age Group		Time after Death of Spouse							
		0–7 days	8–31 days	2–6 mths	7–12 mths	2nd year	3rd year	4th year	5th year
Men									
Less than 65	SMR	7984	214	277	152	222	172	155	0
	95% CL	486,11500	27,803	158,448	70,290	136,343	83,317	51,365	—
	Obs	23	2	16	9	20	10	5	0
65 and over	SMR	2015	155	215	197	131	157	98	39
	95% CL	1033,3494	33,461	140,315	127,291	86,190	98,238	36,185	1,214
	Obs	12	3	26	25	27	22	7	1
Total Men	SMR	3961	174	235	183	158	162	109	28
	95% CL	2710,5409	56,402	169,317	127,255	116,210	111,228	56,191	1,155
	Obs	35	5	42	34	47	32	12	1
Women									
Less than 65	SMR	5437	239	190	198	181	155	94	0
	95% CL	2551,7830	30,903	90,347	100,358	104,295	71,295	19,274	—
	Obs	14	2	10	11	16	9	3	0
65 and over	SMR	1335	68	161	128	98	39	78	74
	95% CL	550,3265	2,371	90,266	69,220	57,157	13,92	29,170	1,268
	Obs	6	1	15	13	17	5	6	2
Total Women	SMR	2829	130	171	153	126	76	83	54
	95% CL	1745,4413	27,381	111,253	98,227	87,178	41,127	38,157	1,195
	Obs	20	3	25	24	33	14	9	2

supports the evidence reviewed by Stroebe and Stroebe[22] on the sex difference in health risks of the widowed. Changes in health behavior patterns (nutrition, alcohol use, smoking and physical activity) may be contributing factors in the excess longterm mortality among male widowers under age 65 found both for ischemic heart disease and non-cardiovascular causes of death.

REFERENCES
1. Parkes CM: Bereavement. Br J Psychiatry 1985; 146:11–17.
2. Jacobs S: An epidemiological review of the mortality of bereavement. Psychosom Med 1977; 39:344–357.
3. Susser M: Widowhood: A situational life stress or a stressful life event. Am J Public Health 1981; 71:793–795.
4. Stroebe W, Stroebe MS, Gergen KJ, Gergen M: The effects of bereavement on mortality: a social psychological analysis. In: Eiser JR (ed): Social Psychology and Behavioral Medicine. New York: John Wiley, 1982; 527–560.
5. Kraus AS, Lilienfeld AM: Some epidemiological aspects of the high mortality rate in the young widowed group. J Chronic Dis 1959; 10:207–217.
6. Young M, Benjamin B, Wallis C: The mortality of widowers. Lancet 1963; 1:454–456.
7. Cox PR, Ford JR: The mortality of widows shortly after widowhood. Lancet 1964; 1:163–164.
8. Rees WD, Lutkins SG: Mortality of bereavement. Br Med J 1967; 4:13–16.
9. Parkes CM, Benjamin B, Fitzgerald RG: Broken heart: a statistical study of increased mortality among widowers. Br Med J 1969; 1:740–743.

10. Clayton J: Mortality and morbidity in the first year of widowhood. Arch Gen Psychiatry 1974; 30:747–750.
11. Niemi T: The mortality of male old-age pensioners following spouse's death. Scand J Soc Med 1979; 7:115–117.
12. Mellström D, Nilsson HÅ, Odén A, Rudgren Å, Svanborg A: Mortality among the widowed in Sweden. Scand J Soc Med 1982; 10:33–41.
13. Helsing KJ, Szklo M: Mortality after bereavement. Am J Epidemiol 1981; 114:41–52.
14. Rothman KJ, Boice JD Jr: Epidemiologic Analysis with a Programmable Calculator. NIH Pub. No. 79-1649. Washington DC: Govt Printing Office, 1979.
15. Berkson J: Mortality and marital status. Am J Public Health 1962; 52:1318–1329.
16. Jones DR, Goldblatt PO, Leon DA: Bereavement and cancer: some data on deaths of spouses from the longitudinal study of Office of Population Censuses and Surveys. Br Med J 1984; 289:461–464.
17. Koskenvuo M: Mortality and causes of death among spouses (in Finnish with English summary). Pub. of the Dept. of Public Health Science, University of Helsinki M30, 1978, Dissertation.
18. Helsing KJ, Comstock GW, Szklo M: Causes of death in a widowed population. Am J Epidemiol 1982; 116:524–32.
19. Helsing KJ, Szklo M, Comstock GW: Factors associated with mortality after widowhood. Am J Public Health 1981; 71:802–809.
20. Berkman LF, Syme L: Social networks, host resistance, and mortality: a nine-year follow-up study of Alameda county residents. Am J Epidemiol 1979; 109:186–204.
21. Partinen M, Putkonen PTS, Kaprio J, Koskenvuo M, Hilakivi I: Sleep disorders in relation to coronary heart disease. Acta Med Scand 1982; (suppl)660:69–83.
22. Stroebe MS, Stroebe W: Who suffers more? Sex differences in health risks of the widowed. Psychol Bull 1983; 92:279–301.

Call for Abstracts, Public Health Dentistry 50th Annual Meeting

The American Association of Public Health Dentistry is inviting papers on a broad range of dental public health subjects for presentation at its 50th annual meeting in Las Vegas, October 8–10, 1987. The theme for the AAPHD meeting is "1937–1987: Fifty Years of Service; Preparing for the Second Fifty."

Participation by all health professionals concerned about the public's oral health is welcome. Papers are requested on a wide variety of topics including: dental care delivery systems; oral epidemiology; infection control; occupational health; dental education; access to care; quality assurance; cost containment; program evaluation; dental disease prevention programs; dental insurance; dental practice acts; computers; fluoridation; cardiology; federal, state, and local dental programs; auxiliary utilization; geriatric dentistry; hospital and institutional dental services; health education; dental health personnel; health promotion; community organization; health policy; health litigation; and related topics.

Abstracts will be selected by a review process and rated on the following criteria: originality, significance, and quality of supporting data. Abstracts should be 200 words or less, on one-half of an 8½" × 11" sheet of paper, single spaced, and should be submitted with the understanding that the same paper will not be presented at another meeting. Acceptance of the abstract requires that the author present the paper at the AAPHD Annual Meeting. Authors who fail to present the paper after acceptance may forfeit their privilege to present at future meetings. Abstracts must be identified by name, address, and phone number of author-contact. Three copies of the abstract and a self-addressed, stamped envelope must be received by April 1, 1987. Authors will be notified by July 1, 1987 of acceptance. Abstracts should be submitted to:

Linda C. Niessen, DMD, MPH
AAPHD Vice President and Program Chair
P.O. Box 124
Perry Point, MD 21902