The Effect of Unexpected Bereavement on Mortality in Older Couples

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Objectives. We sought to determine whether unexpected bereavement has a greater impact on mortality in the surviving partner than death of a partner with preexisting chronic disease or disability.

Methods. In a UK primary care database (The Health Improvement Network), we identified 171 720 couples aged 60 years and older. We compared the rise in mortality in the first year after bereavement in those whose partner died without recorded chronic disease (unexpected bereavement) to those whose deceased partner had a diagnosis of chronic disease (known morbidity).

Results. For unexpected bereavement (13.4% of all bereavements), the adjusted hazard ratio for death in the first year after bereavement was 1.61 (95% confidence interval [CI] = 1.39, 1.86) compared with 1.21 (95% CI = 1.14, 1.30) where the partner had known morbidity. Differences between bereaved groups were significant ($P = .001$) and present for both men and women.

Conclusions. Unexpected bereavement has a greater relative mortality impact than bereavement preceded by chronic disease. Our findings highlight the potential value of preparing individuals for the death of a spouse with known morbidity and providing extra support after bereavement for those experiencing sudden unexpected bereavement. (*Am J Public Health.* 2013;103:1140–1145. doi: 10.2105/AJPH.2012.301050)

Death of a spouse is a major life event that is more common in older people. A rise in mortality after bereavement, most markedly in the first year, has been described in many populations, but individual risk factors for poor physical health after bereavement are not well understood.[1,2] This paucity of evidence limits the potential for clinical, social, and public health intervention to improve the well-being of older people after bereavement.

Preparedness for death of a partner is known to be protective against the adverse psychological effects of bereavement[3,4] and some studies have suggested that sudden, in particular traumatic, bereavement may increase vulnerability to poor mental health outcomes.[5,6] Few studies have examined how the expectation of bereavement influences subsequent physical health. A large US study investigated the relationship between cause of death and subsequent mortality in the surviving spouse.[7] The findings suggested that when the spouse died from a long-term disabling condition, such as dementia, the rise in mortality after bereavement was attenuated but results for other conditions, such as cancers, were less clear. Another US study has suggested that access to palliative care may be protective, in terms of mortality in the surviving spouse.[8] This finding suggests that preparedness and support before bereavement are determinants of physical health and amenable to intervention.

We tested the hypothesis that unexpected death has a greater impact on the surviving partner's risk of death than bereavement when the deceased partner has recognized preexisting morbidity. This is the first large study to examine this important question for medical care and services caring for families that experience unexpected bereavement.

METHODS

The Health Improvement Network (THIN; Cegedim Strategic Data Medical Research UK) database is an established primary care database that collects anonymized data from UK general practices and includes a full record of consultations, diagnoses, and prescribing.[9,10] In the United Kingdom, individuals register with a general practice, which holds their lifelong medical history until the patient moves to another practice (deregisters) or dies. A distinguishing feature of the THIN database is the family number, which allows practices to link patients who live in the same household or institution.[11]

Participants

We included 401 practices that were participating in the THIN scheme between 2005 and 2008 and used a historical patient file to identify household members registered on the practice index date. This allowed us to capture the household composition for a cohort of patients aged 60 years and older on an index date between 2005 and 2008 (n = 672 543).

We developed an algorithm, described in detail elsewhere, to identify couples with an age difference of 10 years or less.[12] The algorithm identified 316 569 patients aged 60 years or older (47% registered patients of this age) and 32 661 patients aged 50 to 59 years to form a total of 174 615 couples. From this group, we excluded any couple for whom (1) records indicated residence in a communal establishment before the index date, (2) registration details were inconsistent between current and historical registration files, or (3) both members were aged 95 years or older. This resulted in 171 720 couples for analysis.

We have confirmed the validity of our algorithm by comparison with contemporary national representative household surveys in England, which confirm that 99.4% of couples selected with our criteria identify themselves as married or cohabiting.[12]

We followed couples in the primary care record from the index date for their practice to their last practice data collection date up to September 2010. When 1 or both members of the couple deregistered from the participating general practice, we censored both members of the couple from the analysis. The average follow-up time was 208 weeks for women and 202 weeks for men.

Bereavement

We identified the timing of bereavement through the earliest record of death in the deceased partner's primary care record, based on either a specific Read code for death or a registration flag that indicated death. Read codes are a standardized coded thesaurus of clinical terms used in primary care information systems in the United Kingdom.

We modeled bereavement as a time-dependent variable and we focused on mortality in the first year after bereavement. We excluded 9 couples for whom both patients were recorded as dying on the same day.

Unexpected Bereavement

Our main approach to determining whether bereavement was unexpected was based on the recording of chronic diseases in the deceased partner's primary care record before death (Table A, available as a supplement to the online version of this article at http://www.ajph.org.). We identified a record for any condition included in the Charlson Index, and other common conditions that lead to significant disability. The Charlson Index is a validated score that weights 17 chronic physical conditions with a score of 1 to 6.[13] The score is highly predictive of 1-year mortality and has been validated in primary care databases.[14] We included additional conditions associated with significant disability before death based on identifying common chronic conditions, not included in the Charlson Index, classified as disability class III or above (disability weight > 0.24) in the World Health Organization 2004 Global Burden of Disease Project.[15] Specifically, we included Parkinson's disease, schizophrenia, and bipolar disorder.

We identified individuals who died without a record of any of these 20 chronic conditions more than 30 days before death as unexpected deaths and classified the remainder of deaths as deaths with known morbidity.

As alternate measures of unexpected bereavement, we utilized measures of health service utilization in the year before death: (1) number of clinical consultation days with primary care and (2) number of British National Formulary drug classes prescribed. This approach was based on our previous work, which has found these measures to be strong independent predictors of mortality.[16] A clinical consultation day was a day with a record of contact with the patients or their representatives, either in person or by telephone, by any practice clinical staff, but excluding administrative events such as repeat prescriptions or updating of records. We conservatively identified deaths of patients in approximately the bottom 10% of the distribution of these measures for all deceased patients as unexpected deaths (0 to 4 contact days and 0 to 5 drug classes), based on the distribution of deaths without recorded chronic disease.

Predictors of Mortality in the Bereaved Spouse

We adjusted analysis of mortality in the bereaved spouse for their personal characteristics including age, gender, region, area deprivation, time-dependent Charlson Index, smoking, whether living with a younger household member, and season. We updated the time-dependent Charlson score weekly throughout follow-up based on any new diagnoses in the primary care record. We have previously shown it to be more predictive than a fixed measure.[12]

Our measure of area deprivation was the Townsend Index, a composite small-area ecological measure of deprivation, which we assigned based on subject postcode at start of follow-up and summarized as quintiles based on national ranking.[17] We included season as a time-dependent predictor of mortality, with the period December to March defined as winter.[18] We included missing data for smoking status and Townsend score in the models as a separate category.

Analysis

We developed a fully adjusted Cox proportional hazards model for mortality for both genders together and men and women separately (PROC PHREG in SAS version 9.2, SAS Institute, Cary, NC). We entered bereavement status as a time-dependent variable with nonbereaved individuals as the baseline group. We adjusted all hazard ratios (HRs) for clustering at practice level by using the sandwich estimator to produce robust standard errors.

To investigate the effect of different circumstances of bereavement on mortality in the first year, we further parameterized the time-dependent bereavement variable as (1) 0 to 52 weeks after unexpected bereavement, (2) 0 to 52 weeks after bereavement with known partner morbidity, (3) more than 52 weeks after bereavement. Thus, we partitioned the bereavement effect between unexpected bereavement and bereavement with known morbidity in the first year.

RESULTS

Table 1 shows the baseline characteristics of bereaved partners by the circumstances of their partner's death. We identified 3575 (13.4%) bereavements as unexpected. Individuals whose partner died unexpectedly were slightly healthier than those whose partners died with known morbidity. Specifically, they were less likely to have at least 1 recorded Charlson morbidity at baseline (51% vs 55% for men, 38% vs 44% for women).

Bereavement Effect by Expectation of Bereavement

The HRs for mortality in the first year after bereavement for those experiencing an unexpected bereavement and those whose partner died with known morbidity are shown in Table 2. All HRs compared mortality to nonbereaved individuals. In both genders, there was a consistently greater impact of bereavement where the partner died unexpectedly with no evidence of differences between the men and women. For men and women combined, the HR for death after unexpected bereavement was 1.61 (95% confidence interval [CI] = 1.39, 1.86) compared with 1.21 (95% CI = 1.14, 1.30) when the partner had recorded comorbidities. In both genders, and overall, there was evidence of statistical heterogeneity in the effect of bereavement according to expectation of bereavement ($P = .005$ for men; $P = .024$ for women; and $P = .001$ for men and women combined).

Exclusion of conditions associated with significant disability (dementia, stroke, Parkinson's disease, schizophrenia, and bipolar disorder) from our known morbidity group did not change the findings. Likewise, adjustment for bereaved partner's baseline Charlson rather than time-dependent Charlson did not change our findings.

Bereavement Effect by Measures of Health Service Use

Table 3 shows mortality by expectation of bereavement based on the deceased partner's

TABLE 1—Baseline Characteristics of all Participants by Circumstances of Death of Partner: United Kingdom, 2005–2010

Circumstances of Partner Death	Men (n = 171 720)			Women (n = 171 720)		
	Unexpected Death of Female Partner, No. (%) or Mean ±SD	Known Morbidity Death of Female Partner, No. (%) or Mean ±SD	Not Bereaved, No. (%) or Mean ±SD	Unexpected Death of Male Partner, No. (%) or Mean ±SD	Known Morbidity Death of Male Partner, No. (%) or Mean ±SD	Not Bereaved, No. (%) or Mean ±SD
No. of subjects (% of bereavements)	1431 (16)	7701 (84)	162 588 (. . .)	2144 (12)	15 370 (88)	154 206 (. . .)
Age at baseline, y	74.8 ±8.8	74.6 ±8.1	69.2 ±7.5	72.0 ±8.9	72.9 ±8.0	66.6 ±7.5
No. of contact days for bereaved partner in 3 mo before bereavement[a]	1.6 ±2.0	1.8 ±2.3	. . .	1.5 ±2.2	1.8 ±2.3	. . .
No. of drug classes for bereaved partner in 3 mo before bereavement[b]	3.9 ±3.4	4.4 ±3.5	. . .	3.7 ±3.4	4.5 ±3.7	. . .
Charlson Index at baseline						
0	697 (49)	3468 (45)	87 072 (54)	1330 (62)	8553 (56)	98 194 (64)
1	380 (27)	2028 (26)	38 311 (24)	436 (20)	3662 (24)	31 004 (20)
2–3	289 (20)	1812 (24)	30 620 (19)	335 (16)	2717 (18)	22 077 (14)
≥ 4	65 (5)	393 (5)	6585 (4)	43 (2)	438 (3)	2931 (2)
Smoking status at baseline						
Nonsmoker	481 (34)	2336 (30)	57 759 (36)	1204 (56)	8364 (54)	88 278 (57)
Exsmoker	680 (48)	3977 (52)	77 935 (48)	588 (27)	4789 (31)	43 957 (29)
Current smoker	214 (15)	1168 (15)	22 031 (14)	259 (12)	1822 (12)	18 292 (12)
Missing	56 (4)	220 (3)	4863 (3)	93 (4)	395 (3)	3679 (2)

[a]A day with a record of contact with the patients or their representatives, either in person or by telephone, by any practice clinical staff, but excluding administrative events such as repeat prescriptions or updating of records.
[b]Number of British National Formulary drug classes prescribed.

contact with primary care in the year before death. In both genders, where the deceased partner had low contact with health services (4 or fewer days), the effect of bereavement was more marked (HR > 1.55) with a pattern similar to our comorbidity-based classification of expectation of bereavement. In a model for both genders, there was evidence of heterogeneity of the effect of bereavement between the low and higher contact groups ($P = .01$).

Analysis based on prescribed drug use (Table 4) gives a similar pattern for women with the greater bereavement effect ($P = .001$) when their male partner (husband) had low use of prescribed medication in the year before death (HR = 1.83 for 5 or fewer drug groups). For men, however, there was little evidence of a relationship between their female partner's

TABLE 2—Effect of Unexpected Bereavement on Mortality in the First Year After Bereavement: United Kingdom, 2005–2010

Variable	Bereavements, No.(%)	Deaths Within 1 Year of Bereavement, No. (%)	Adjusted Effect,[a] HR (95% CI)	*P*
Bereaved men only	9132 (100)			.005[b]
Unexpected bereavement	1431 (15.7)	107 (7.5)	1.63 (1.34, 1.97)	
Known morbidity in deceased	7701 (84.3)	412 (5.4)	1.19 (1.08, 1.31)	
Bereaved women only	17 514 (100)			.024[b]
Unexpected bereavement	2144 (12.2)	72 (3.4)	1.62 (1.29, 2.03)	
Known morbidity in deceased	15 370 (87.8)	480 (3.1)	1.22 (1.11, 1.34)	
All bereavements	26 646 (100)			.001[b]
Unexpected bereavement	3575 (13.4)	179 (5.0)	1.61 (1.39, 1.86)	
Known morbidity in deceased	23 071 (86.6)	892 (3.9)	1.21 (1.14, 1.30)	

Note. CI = confidence interval; HR = hazard ratio. The sample size was n = 171 720 couples.
[a]Model adjusted for following personal factors: age, region, smoking, household composition, Townsend Index, Charlson Index (time dependent), and winter compared with mortality in nonbereaved couples.
[b]Test for heterogeneity.

TABLE 3—Effect of Deceased Partner's Primary Care Consultations in the Year Before Death on the Surviving Spouse's Mortality in the First Year After Bereavement: United Kingdom, 2005–2010

Deceased Partner's Consultations per Year	Bereavements, No. (%)	Deaths Within 1 Year of Bereavement, No. (%)	Adjusted Effect,[a] HR (95% CI)	*P*
Bereaved men only	9132 (100)			.059[b]
Low[c] (0–4)	1030 (11.3)	69 (6.7)	1.60 (1.23, 2.09)	
Higher[c] (≥ 5)	8102 (88.7)	450 (5.6)	1.22 (1.11, 1.34)	
Bereaved women only	17 514 (100)			.067[b]
Low[c] (0–4)	1915 (10.9)	68 (3.6)	1.57 (1.22, 2.00)	
Higher[c] (≥ 5)	15 599 (89.1)	484 (3.1)	1.22 (1.12, 1.34)	
All bereavements	26 646 (100)			.01[b]
Low[c] (0–4)	2945 (11.0)	137 (4.7)	1.59 (1.32, 1.91)	
Higher[c] (≥ 5)	23 701 (89.0)	934 (3.9)	1.23 (1.15, 1.31)	

Note. CI = confidence interval; HR = hazard ratio. The sample size was n = 171 720 couples.
[a]Model adjusted for following personal factors: age, region, smoking, household composition, Townsend Index, Charlson Index (time dependent), and winter compared with mortality in nonbereaved couples.
[b]Test for heterogeneity.
[c]Partner consultation days in 365 days before death.

(wife's) prescribed drug use before death and the effect of bereavement on mortality ($P = .76$). Use of different cut-offs for low prescribing did not alter our findings or modify the observed difference between men and women.

DISCUSSION

We examined the effect of unexpected loss of a partner on mortality. Unexpected bereavement led to a greater relative rise in mortality than when the deceased partner had known comorbidity or high health service use before death. Our findings demonstrate that the effect of bereavement on physical health is heterogeneous and greater when death is unexpected. Identification of this risk factor for poor outcomes after bereavement provides a potential target for intervention.

Study Strengths and Weaknesses

This was the first large-scale study to examine directly the effect of unexpected bereavement on mortality. Our use of a primary care database allowed a large sample size and detailed characterization of the deceased partner's health on a number of parameters, including diagnosis and health service use. We have previously demonstrated the validity of our approach to identifying couples and bereavement in a primary care database and the robustness of the effect of bereavement on mortality to adjustment to individual characteristics including comorbidity.[12]

Our study does not include ethnicity as a potential confounder or effect modifier as

TABLE 4—Effect of Deceased Partner's Medication Use in the Year Before Death on the Surviving Spouse's Mortality in the First Year After Bereavement: United Kingdom, 2005–2010

Deceased Partner's Drug Classes per Year	Bereavements, No. (%)	Deaths Within 1 Year of Bereavement, No. (%)	Adjusted Effect,[a] HR (95% CI)	*P*
Bereaved men only	9132 (100)			.76[b]
Low[c] (0–5)	1015 (11.1)	51 (5.0)	1.31 (1.00, 1.72)	
Higher[c] (≥ 6)	8117 (88.9)	468 (5.8)	1.25 (1.14, 1.38)	
Bereaved women only	17 514 (100)			.001[b]
Low[c] (0–5)	2040 (11.7)	77 (3.8)	1.83 (1.44, 2.33)	
Higher[c] (≥ 6)	15 474 (88.4)	475 (3.1)	1.20 (1.09, 1.32)	
All bereavements	26 646 (100)			.019[b]
Low[c] (0–5)	3055 (11.5)	128 (4.2)	1.58 (1.30, 1.91)	
Higher[c] (≥ 6)	23 591 (88.5)	943 (4.0)	1.23 (1.15, 1.32)	

Note. CI = confidence interval; HR = hazard ratio. The sample size was n = 171 720 couples.
[a]Model adjusted for following personal factors: age, region, smoking, household composition, Townsend Index, Charlson index (time dependent), and winter compared with mortality in nonbereaved couples.
[b]Test for heterogeneity.
[c]Number of drug classes prescribed to partner in 365 days before death.

ethnicity is not well recorded in our data source. However, this is unlikely to change our conclusions as the size of the nonmajority ethnic population in the United Kingdom, especially among older people, is relatively small. As a sensitivity analysis, we restricted our analysis to couples who lived in areas that were of predominantly White ethnicity with less than 1.5% of the population from other ethnic groups. This analysis produced almost identical results to our main analysis and confirms that our findings are not importantly confounded by ethnicity. Similarly, our study relied on area-level measures of socioeconomic status. Studies in the United Kingdom have demonstrated the acceptability of such measures as surrogates for individual socioeconomic status, especially when, as in our study, attributed at sub–electoral ward level.[19,20] Furthermore, our area-level approach avoided the potential difficulty of measuring individual socioeconomic status meaningfully in older people.[21]

A potential weakness of our approach was the attribution of unexpected death based on morbidity or health service use before death. Our primary definition of an unexpected death encompasses any death for which there was no preexisting diagnosis of a chronic disease that predicts mortality or significant disability. Our unexpected death group included previously well individuals who died suddenly as a result of accidents or suicide or acute medical events. Expectation of death is a difficult concept, but it is unlikely, without a significant chronic diagnosis, that the individuals, their partners, or their clinicians would anticipate death. Our "known morbidity" comparison group was heterogeneous and included some individuals with stable chronic disease, whose death was not anticipated, as well as patients with a diagnosis of a life-limiting condition, such as cancer, and those with progressive disabling conditions, such as dementia. Such heterogeneity, and potential misclassification, would bias against finding a difference between our bereavement groups and does not invalidate our findings.

Furthermore, we replicated our findings with alternate measures of expectation of death based on health service use, as proxies for preexisting illness, and found similar findings. The use of these measures was based on empirical evidence of their ability to predict death and also their face validity as measures of preexisting disease requiring health care.

A potential bias in all studies of mortality after spousal bereavement is a marriage selection effect, which means that couples are likely to have similar health characteristics.[22] This cannot explain the results of this study because individuals experiencing unexpected death have healthier partners, on average, which would lead to a lower mortality relative to the comparison group in our main analysis. Furthermore, we adjusted our analysis for a range of health determinants including the Charlson index. Rarely, both members of a couple die in the same accident, which may introduce a bias into any examination of the effect of unexpected bereavement. We excluded couples who died on the same day to address this potential bias and also found that exclusion of deaths within 14 days of bereavement did not change our findings.

We cannot distinguish the effect of violent (accident or suicide) death from sudden natural death, and some findings suggest that violent bereavement, rather than sudden natural bereavement, presents a risk to the health of the surviving partner.[6] However, violent deaths are uncommon in older people, accounting for 2% of deaths among those aged 60 years and older in the United Kingdom, whereas our unexpected death group constituted 13% of all deaths. For our results to be explained solely by bereavement because of violent deaths would require a very large effect for violent deaths, which is not plausible given the findings of other studies based on cause of death.[7]

Comparison With Existing Literature

A large US Medicare-based study has examined mortality after bereavement based on cause of death of the deceased partner, which gives an indirect insight into the effect of expectation of death.[7] They noted an attenuated bereavement effect among individuals whose deceased partners died from dementia or Parkinson's disease. However, for other causes of death, results were mixed, possibly reflecting the imprecise relationship between cause of death and expectation of death.

A number of smaller studies have examined mental health outcomes after bereavement and have attempted to compare the effect of expected and unexpected bereavement. Studies on self-perceived preparedness for death of a partner have found a protective effect but studies that have examined sudden and expected deaths based on investigator definitions have been less consistent.[3–6,23–25] This may reflect limitations of sample size, difficulty in defining unexpected death, or truly heterogeneous effects in different populations.

The effect of caregiving for a spouse with disability on the impact of bereavement has been examined. A US study of dementia caregivers with high strain before bereavement showed an improvement in both psychological health and physical health risk factors after bereavement in contrast to noncaregivers.[26] A further study by the same group identified a decrease in depressive symptoms after bereavement among dementia caregivers and high levels of expressed relief.[27] Overall, these findings are consistent with an attenuated health effect of bereavement when the deceased partners suffered from a disabling chronic condition.

Implications

The findings of our study give important insights into the health effects of bereavement and the importance of expectation of bereavement. The greater impact of unexpected bereavement may be mediated through a number of mechanisms. Unexpected death is believed to be a risk factor for complicated grief that is associated with poorer health outcomes and a potential mediator for the increased vulnerability described in this study.[28] As well as modification of the grief reaction, unexpected death will lead to a sudden loss of material, instrumental, and social support, which may have a more deleterious effect than expected loss.[29] The protective effect of an expected death may be explained by greater support and access to health care, including palliative care, both before and after bereavement.

A subset of deaths with known comorbidity will be from significant disabling conditions such as dementia, stroke, or severe mental illness. The evidence on improved health outcomes after bereavement in dementia caregivers is consistent with our findings.[26,27] Bereavement may allow caregivers the opportunity to reengage with normal activities and social participation as well as to address their own health needs. This effect will be

accentuated as the period before bereavement is likely to be particularly demanding.[7]

The impact of bereavement is determined by a range of factors including individual psychological characteristics, prebereavement quality of relationships, and coping skills.[30] Given these complex interactions, we caution against a single mechanism interpretation of our findings. It is plausible that all the proposed mechanisms contribute to the greater vulnerability after unexpected bereavement contingent on individual circumstances. There is a need for further work with bereaved individuals to understand the impact of different circumstances of bereavement including the concepts of expectation of death and preparedness for death.

Our findings highlight the need for intervention both before and after bereavement to improve health. Awareness and preparedness for the death of a spouse appears to be protective for health and there is a need to support carers in the period before the death of their spouse. Such support can be offered by palliative care services and appears to be effective.[8] Those experiencing unexpected bereavement will not access palliative care but our findings suggest a potential role for intervention after bereavement. Although our unexpected death group accounted for only 13% of all spousal bereavements, it is likely that a greater proportion could benefit from support after unexpected bereavement. Our definition of unexpected deaths excluded acute deaths in patients with stable chronic diseases, such as heart failure or chronic obstructive pulmonary disease, who are not traditionally offered palliative care. Physicians and other professionals in all settings who manage patients experiencing unexpected deaths need to address the psychological and physical health needs of surviving partners and family. The challenge is the development of effective social, clinical, and public health support to meet these needs while not medicalizing normal grief.[31] ■

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Contributors

S. M. Shah had the idea for the study and led the project. I. M. Carey undertook the analysis. All authors contributed to the interpretation of the findings and the writing of the article, and approved the final version.

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Human Participant Protection

This study was approved by the South-East National Health Service Research Ethics Committee (11/H1102/3).

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