Appendix B: Mortality Following a Hip Fracture

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TABLE B–1: Mortality Following a Hip Fracture

Author, date	Time period of the study	Sample characteristics	In-hospital mortality	Cumulative post-hospital mortality (measured from the time of the fracture)	Comments
Jacobsen et al , 1992	1984-87	712,027 Medicare beneficiaries with a hip fracture. 79% female All subjects over age 65 3% black Persons who had a previous hip fracture, were being treated for complications of a hip fracture, or had cancer as a likely cause of their fracture were excluded from the sample.		*At 1 year:* 33.7% white males 33.5% black males 17,2% white females 22,9% black females For age 65-74: 18,9% white males 19.7% black males 94% white females 13,6% black females For ages 75-84: 32.4% white males 34.3% black males 14.3% white females 20,2% black females For age 85-94: 50.7% white males 56.2% black males *24.4'%.* white females 30.O% black females For age 95 t : 84.5% white males 72.6% black males *43.9%* white *females* 45 *6%* black females	
Marottoli et al., 1992	1982-88	118 persons with a hip fracture treated in 2 hospitals in New Haven, CT. 72% female All subjects over age 65: 31% age 65-74, 51% age 75-84, 19% age 85+ 19% admitted from a nursing home.		*At* 6 months: 18% (22 subjects)	All hip fractures were treated surgically.

Health Care Financing Administration, June 1990	1986	118,379 Medicare beneficiaries with a hip fracture who received open or closed reduction and internal fixation (procedure codes 79.05, 79.15, 79.25, and 79.35). All subjects over age 65 Persons with a diagnosis of cancer or aseptic necrosis were excluded from the sample.	*At 1 month:* 6% including: 9.7% white males 7.5% black males 5.0% white females 4.2% black females For age 65-74: 5.7% white males 2.8% black males 2.7% white females 3.4% black females For age 75-84: 9.4% white males 8.9% black males 4.2% white females 3.9% black females For age 85+: 14.5% white males 13.9% black males 7.2% white females 5.1% black females *At 1 year* for persons with pertrochanteric fractures only: 22.3% including: 31.8% white males 32.5% black males 19.9% white females 22.1% black females For age 65-74: 19.0% white males 21.2% black males 10.1% white females 13.3% black females For age 75-84: 30.4% white males 30.8% black males 16.5% white females 18.6% black females	1-year mortality data are for 75,101 persons with trochanteric fractures and 17,719 persons with cervical fractures who received reduction and internal fixation (procedure codes 79.15 or 79.35).

For age 85+:
43.2'%. white males
48.7% black males
26.5 white females
28.7% black females

At 1 year **for persons with transcervicai fractures only:**
19.5°A including:
30.7% white males
27.6% black males
16.4% white females
23.5'%. black females

For age 65-74:
16.2%. white males
18.6% black males
7.6°A white females
18.5% black females

For age 75-84:
31 .3% white males
28.2% black males
14.3%. white females
17.8% black females

For age 85+
44.9% white males
40.9% black males
25.8'%. white females
31.3% black female

Health Care Financing Administration, June 1990	1986	59,733 Medicare beneficiaries with a hip fracture who received a partial hip replacement (procedure code 81.6). All subjects over age 65 Persons with a diagnosis of cancer or aseptic necrosis were excluded from the sample.	*At 1 month:* 5.5% including: 9.0% white males 10.9% black males 4.5% white females 4.7% black females For age 65-74: 4.9% white males 2.7% black males 2.6% white females 3.2% black females For age 75-84: 9.4% white males 13.1% black males 3.7% white females 4.4% black females For age 85+: 15.2% white males 17.3% black males 6.9% white females 6.2% black females *At 1 year:* 21% including: 34.5% white males 35.8% black males 18.0% white females 24.5% black females For age 65-74: 21.0% white males 23.8% black males 9.6% white females 17.2% black females For age 75-84: 32.9% white males 30.6% black males 15.5% white females 22.2% black females For age 85+: 45.4% white males 51.9% black males 25.5% white females 30.5% black females	1-year mortality data are for 43,063 persons who received a partial hip replacement.

Myers et al., 1991	1979-88	27 37° persons with a hip fracture treated in hospitals in Maryland. 80% females All subjects over age 65 6.3% black Subjects included: 18.1% white males (average age: 79) 1.9% black males (average age: 76) 75.5% white females (average age: 81) 4.4% black females (average age: 81)	4.9% (1,339 subjects) including: 7.9% white males 7.5% black males 4.1% white females 5.1% black females For age 65-69 (2,542 subjects): 5.2% white males 5.5% black males 1.5% white females 3.2% black females For age 70-74 (3,842 subjects): 6.0% white males 4.8% black males 2.8% white females 4.6% black females For age 75-79 (5,374 subjects): 6.7% white males 5.3% black males 3.3% white females 4.8% black females For age 80-84 (6,541 subjects): 8.2% white males 10.6% black males 3.6% white females 5.4% black females For age 85+ (9,071 subjects): 11.0% white males 13.2% black males 6.0% white females 6.0% black females	The adjusted relative odds of dying with each 1-year age increment were 1.04. The adjusted relative odds of dying for all males vs. all females were 1.6. Racial differences in death rates virtually disappeared in initial regression analyses. The adjusted relative odds of dying for white vs. black males were 0.9; the adjusted relative odds of dying for black vs. white females were 1.3. The adjusted relative odds for dying for whites vs. blacks were 1.1 Type of fracture (pertrochanteric vs. transcervical) was not a significant factor in mortality. Mortality differed for the 5 procedure categories: 1) no procedure of any type, 9.2%; 2) no surgical hip procedure but other procedures, 11.6% 3) reduction of the fracture without fixation, 5.3%; 4) internal fixation of the fracture, 4.2%; and 5) total hip replacement or other arthroplasty, 4.2%. The relative odds of dying were highest for subjects with serious infections, 12.3% for septicemia and 4.9% for pneumonia/influenza. As total number of medical diagnoses increased, the odds of dying increased.

Fisher et al., 1991	7/84-6/86	22,039 persons**with a hlp fracture in 6 New England states** **80% female** **All subjects over age 65** **21 %. admitted from a nursing home.** **Persons who had a previous hip fracture, were being treated for complications of a previous fracture, or had cancer as a likely cause of their fracture were excluded from the sample.**		*At 1 month:* ***6.3%*** ***At 3 months: 12.5%*** ***At 1 year: 24%*** **Including.** **For age 65-74:** **22% males** **12% females** **For age 75-84.** ***34%*** **males** **1770 females** **For age 85+:** **48%. males** **28% females** **Relative risk for blacks vs. whites 82**	
Magaziner et al,, 1989	**10/84-4/86**	**814 persons with a hip fracture treated in 7 hospitals in Baltimore, MD** **80%. female** **All subjects over age 65; average age: 80; 24.2% age: 65-74; 45.3°A age: 75-84; 30.6% age: 85+** **6.5% black** **All subjects living in the community prior to the fracture.**	*4.3% (37* subjects) **Average hospital length of stay. less than** *20* days	***At*** *3 months: 8.2%* ***At*** *6 months.* 12.6% *At 1 year:* 17. **4%** **Relative risk for males vs. females:** **1.4 at 3 months** **1.5 at 6 months** **1.9 at 1 year** **Compared with those age 65-74, relative risk for subjects age 75-84 was:** **1.1 at 3 months** **1.0** at **6 months** **0.9** at 1 year **Compared with those age 65-74, relative risk for subjects age 85+ was:** **2.6 at 3 months** **2.1 at 6 months** **1.8 at 1 year** **Relative risk for blacks vs. whites was:** **1.5 at 3 months** **1.9 at 6 months** **1.8 at 1 year**	Observed mortality approached expected mortality at 6 months **for females and subjects over age 85** and at 10 months for subjects age 75-84. Mortality for males and subjects age 65-74 was higher than expected beyond 1 year. For subjects with delirium, relative risk was: 3.2 at 3 months 3.5 at 6 months 3.1 at 1 year For subjects with serious coexisting medical conditions, relative risk was: **4.6 at 3 months** **3.6 at 6 months** **2.6 at 1 year** **Subjects with dementia did** not have **an increased risk of death.**

Neu et al., 1989	**7/84-6185**	**31,504 Medicare beneficiaries discharged from a hospital in** DRG 209 209 and 23,944 Medicare beneficiaries discharged from a hospital in DRG 210.	**2% for persons in DRG** 4.2% for persons **in** DRG 210		
Bonar et al., 1990	10/83-1 2/86	1,292 **persons with a hip fracture** treated in 2 hospitals in New Haven, CT. All subjects over age 65	**4.6% (60 subjects)**	**At 6 months: 3% of the 151** subjects admitted from the community and discharged to a nursing **home had died.**	**This study focuses on the** 151 subjects who were admitted from the commu**nity and discharged to a nursing home,**
Kahn et al., 1990	**1/81 -1 2/82 and 7/85-6/86**	**1,358 persons with a hip fracture in the first time period and 1,404 persons with a hip fracture in the second time period.** **The subjects included persons with a hip fracture from a stratified random sample of Medicare-eligible persons treated in 297 hospitals in 5 states (CA, TX, IN, PA, and FL).** **79% female in the first time period; 77% female in the second time period.** **58% of the subjects were over age 80 in both time periods.** **14% nonwhite in the first time period; 13°A nonwhite in the second time period.** **24% were admitted from a nursing home in the first time period; 20% were admitted from a nursing home in the second time period.**	**5.7% in the first time peri-**od and 3.3% in the second time period **Average hospital length of stay: 20.1 days in the first time period and 14.5 days in the second time period,**	***At* 30** *days:* **5.3% in the first** time period and 4.6% in the second time period, ***At* 6 months: 17.9% in the first time period and 14.8% in the second time period.**	This study compares outcomes pre- and post-**PPS,** **Mortality is adjusted for severity of illness (sickness at the time of hospital admission), according to scales developed by the researchers.**

Gerety et al., 1989	9/82-9/84 and 9/84-1/86	180 persons with a hip fracture treated at Stanford University Hospital, including 65 subjects treated in the first time period and 115 subjects treated in the second time period. 85% female in the first time period and 78% female in the second time period. All subjects over age 69; average age 84 in the first time period and 83 in the second time period. 65% admitted from the community in the first time period and 66% in the second time period; 11% admitted from a nursing home in the first time period and 18% in the second time period; 25% admitted from a residential care facility in the first time period and 16% in the second time period. Persons who had a previous fracture, were terminally ill, or had cancer as a likely cause of their fracture were excluded from the sample.	2% in the first time period and 4% in the second time period. Average hospital length of stay: 12.3 days in the first time period and 11 days in the second time period.	*At 1 year:* 15% in the first time period and 23% in the second time period.	This study compares outcomes pre- and post-PPS. There was no significant difference in mortality between the two time periods.
Ray et al., 1990	10/81-9/83 and 10/84-9/86	4,368 Michigan residents with a Medicare-covered hip fracture, including 2,130 persons with a hip fracture in the first time period and 2,238 persons with a hip fracture in the second time period; the subjects constituted a 20% random sample of Michigan residents with a hip fracture. 78% female in the first time period and 77% female in the second time period. All subjects over age 65; average age: 81. 5% nonwhite	Average hospital length of stay: 18.7 days in the first time period and 14.4 days in the second time period.	*At 30 days:* 5.7% in the first time period and 6.8% in the second time period *At 3 months:* 12.8% in the first time period and 13.4% in the second time period. *At 1 year:* 23.2% in the first time period and 23.7% in the second time period	This study compares outcomes pre- and post PPS. There was no significant difference in mortality between the two time periods. The relative odds of dying by 1 year post-fracture were: age 65-70: 1 age 70-74: 1.7 age 75-79: 2.2 age 80-84: 2.8 age 85-89: 4.2 age 90-94: 6.1 age 95+: 11.2 females: 1 males: 2.3 whites: 1 nonwhites: 1.2

Fitzgerald et al., 1988	10/81 - 10/83 and 4/84-3/86	331 persons with a hip fracture treated in 1 Midwestern hospital; 149 were treated in the first time period; 189 were treated in the second time period, and 7 were lost to followup. 77% female in both time periods. All subjects over age 65: average age: 79 in the first time period and 80 in the second time period. 9%0 black in the first time period, and 11% black in the second time period. All subjects living in the community at the time of the fracture. Persons who had a previous hip fracture or had cancer as a likely cause of their fracture were excluded from the sample.	3% in the first time period and 4% in the second time period, Average hospital length of stay: 21.9 days in the first time period and 12.6 days in the second time period.	*At 1 year: 7%* in the first time period and 12% in the second time period.	This study compares outcomes pre- and post-PPS In the post-PPS period, the hospital became affiliated with an HMO, which may have affected patient outcomes: average hospital length of stay was 7.3 days for HMO enrollees compared with 14.0 days for other post-PPS subjects.
Palmer et al., 1989	1/81 -6/84 and 7184-12187	Random sample of 386 persons with a hip fracture discharged alive from 1 hospital in Indianapolis, IN. 76% of the 190 subjects treated in the first time period were female; 85% of the 196 subjects treated in the second time period were female. All subjects over age 65; average age: 80 All subjects were living in the community at the time of the fracture. Persons who had not had a previous hip fracture on the same side or had cancer as a likely cause of their fracture were excluded from the sample.	Potential subjects who died in the hospital were excluded from the sample. Average hospital length of stay 17 days in the first time period and 12.9 days in the second time period	*At 6 months:* 7.4% in the first time period and 5.6% in the second time period. Not *comparable to other studies because these figures are cumulative from the date of hospital discharge.*	This study compares outcomes pre- and post-PPS All subjects were treated surgically.

Fitzgerald et al. ,987	1/81-1/84 and 1/84-4/85	70 persons with a hip fracture treated in 1 hospital in Indianapolis, IN. 47 subjects in the first time period and 23 subjects in the second time period. 65% female in the first time period and 60% female in the second time period. All subjects over age 65; average age: 75 30% black in the first time period and 40% black in the second time period. All subjects admitted from the community. Persons with a previous hip fracture or cancer as a likely cause of their fracture were excluded from the sample.	2% in the first time period and 4% in the second time period. Average length of hospital stay: 16.6 days in the first time period and 10.3 days in the second time period.	*At 6 months:* 6% in the first time period and 9% in the second time period.	This study compares outcomes pre- and post-PPS. The two groups did not differ in the location of the fracture, the proportion or types of coexisting conditions, in-hospital complications, or prefracture function status. All subjects were treated surgically.
Petitti and Sidney, 1989	98o-85	2,048 females enrolled in a prepaid medical plan in California and treated for a hip fracture from 1/80 to 12/84. All subjects over age 5o 10% black	3.7% including: 1% age 50-59, 2% age 60-64, 4% age 65-69, 3% age 70-79, 4% age 80-84, 7% over age 85. Average hospital length of stay: 14.3 days	See table 12	
Campion et al., 1987 and Jette et al., 1987	6/83-7/84	79 persons with a hip fracture treated in 1 hospital in Boston, MA. 67% female All subjects over age 57: average age: 78; 9% under age 65; 23% age 65-74 48% age 75-84 21% over age 85 1% black 14% admitted from a nursing home. Persons with cancer as a likely cause of their fracture were excluded from the sample.	5.1% (4 subjects) Average hospital length of stay: 21.7 days; median hospital length of stay: 14.5 days	*At 3 months:* 16% *At 6 months:* 22% *At 1 year:* 29%	Study was conducted before DRGs went into effect in Massachusetts. All subjects were treated surgically.

Mossey et al., 1989	8/84-1/86	211 females treated for a hip fracture in 17 hospitals in Philadelphia, PA. All subjects over age 59; average age: 78.5 All subjects white. All subjects living in the community at the time of the fracture. All subjects able to walk across a room with a cane or less before the fracture and not too confused to answer questions after the fracture. Subjects did not have cancer or other health problems that were likely to result in death in the following year.	0.4% (1 subject)	*At* 6 months: 4% (8 subjects) *At 1 year: 8%* (15 subjects)	Higher mortality was associated with poor cognitive function, subjects' self-rated health as fair or poor, and length of hospital stay. Mortality was not associated with the subjects' age, pre-fracture physical functioning, number of preexisting health problems, number of medical diagnoses classified as serious, number of post-surgical medical complications, fracture site, type of treatment, or any the psychosocial variables measured in the study. These are the "healthier" hip fracture patients.
Cummings et al., 1988	Not reported	286 persons with a hip fracture treated in 3 hospitals in San Francisco, CA.	5.2% (15 subjects)		
Furstenberg and Mezey, 1987	1/80-7/83	119 persons with a hip fracture treated in 1 urban hospital. All subjects over age 60. 31% black All subjects living in the community prior to the fracture. Persons who had severe, multiple fractures or cancer as a likely cause of their fracture were excluded from the sample.	8% (10 subjects) including 7.3% of whites and 11% of blacks; this difference is not statistically significant. Average hospital length of stay: 30.4 days for whites and 41.2 days for blacks.		

Kellie and Brody, 1990	9[illegible]80 82	19,070 persons with a Medicare reimbursed hip fracture in Illinois. 80% female 4% black All subjects over age 65	White males, 10.5% black males, 9.3% white females, 5.0% black females, 8.2% Average hospital length of stay: white males, 24.2 days; black males, 28.0 days; white females, 23.1 days; black females, 28.2 days.		The differences in in-hospital mortality are partially explained by differences in the age at which fractures occur in these different groups. After adjustment for age, the odds ratio for in-hospital death was twice as high for white men as for white women.
Crane and Kercek, 1983	11/71 12/80	159 persons with a hip fracture in 1 health care facility. 87% female Average age: 84.3; age range: 58-100 59% living in the geriatric hospital section of the facility and 41% living in the residential care section of the facility.	0.5% (16 subjects) Average hospital length of stay: 14.3 days for those who survived and 15.1 days for those who died. Average age of subjects who died in the hospital—88; age range: 70-94.	*By 2 months after hospital discharge:* 14% (22 subjects) *At 10 years:* 64.7% of females and 90% of males.	Subjects' pre- and post-fracture ambulatory status was correlated with mortality. Subjects who were more functionally impaired before the fracture were more likely to die after it. For subjects with femoral neck fracture: 8.3% died in the hospital, 13.7% by 2 months 30.8% by 6 months 39.3% by 1 year 69.2% by 10 years. For subjects with intertrochanteric fracture: 8% died in the hospital, 25.6% by 2 months 33.3% by 6 months 34.9% by 1 year; 67.8% by 10 years. For subjects with subtrochanteric fracture: 20% died in the hospital; 40% by 2 months 40% by 6 months 80% by 1 year 80% by 10 years.

Keene and Anderson, 1982	1/78-12/78	108 persons with a hip fracture treated at 1 hospital in Madison, WI. 75% female All subjects over age 50; average age 76; age range: 51-99	4%(4 subjects) 41% of the subjects were discharged to a nursing home, and 5 (11%) of these died in the next year; mortality for those discharged to home is not reported.	
Weiss et al., 1983	1976-79	168 females with a hip fracture in 1 county in Washington State. Average age: 64.1; age range: 50-74 All subjects white All subjects living in the community prior to the fracture. Subjects with cancer as a likely cause of their fracture were excluded from the sample.	At 1 year: 5.9% *At 2 years:* 10.5%	This study was intended to determine whether it is the hip fracture or factors that cause the person to fall that lead to increased mortality,

Matheny et al., 1980	1972-77	342 persons with a hip fracture treated in 1 hospital in Huntington, WV. 75% female Average age: 74 32.2% were confused on admission to the hospital, and 25% became confused in the hospital.	10% (34 subjects), including 7% of females and 18.6% of males Average age of those who died was 82, compared with 73 for those who did not die.	Mortality was 8.9% for persons with trochanteric fracture and 11.1% for persons with a femoral neck fracture. 17.3% of those who were confused on admission died, compared with 7.7% of those who were not confused on admission. 20.7% of those who developed confusion in the hospital died, compared with 1.1% of those who did not develop confusion in the hospital. For those treated surgically, 7.4% died; the average hospital say was 23 days for those who survived and 20 days for those who died; the timing of surgery did not affect mortality. For those not treated surgically, 27.3% died; the average hospital length of say was 15 days for those who survived and 6 days for those who died.

Kenzora et al., 1984 1/71 -12/77	**406 persons with a hip fracture treated at 1 hospital in Boston, MA.** **75% female** **12% had bilateral fractures**	**3% (13 subjects)** **399 treated surgically and 7 were treated with bed rest; average length of hospital stay was 20.8 to 25.4 days, depending on the type of treatment.**	*At 1 year:* 14.3% (58 subjects), including 14% of females and 16% of males; this difference is not significant,	Authors say the anticipated mortality was 9% Mortality was 13.4% for subjects with subcapital fracture and 15% for subjects with intertrochanteric fracture (no significant difference). **Age was a significant factor for subjects with intertrochanteric fracture but not subcapital fracture** **The timing of surgery affected mortality:** **• Of the 96 subjects who had surgery on day 1, 8.3% died within 3 weeks, 22.9% died within 6 months, and 34% died within 1 year;** **• Of the 1988 subjects who had surgery on day 2, 1.6% died with in 3 weeks, 4.3% died within 6 months, and 6% died within 1 year;** **• Of the 62 subjects who had surgery on day 3,0 died within 3 weeks, 4.8% died within 6 months, and 4.8% died within 1 year;** **• Of the 18 subjects who had surgery on day 4, 5.5% died within 3 weeks, 5.5% died within 6 months, and 5.5% died within 1 year;** **• Of the 9 subjects who had surgery on day 5, 0 died with in 3 weeks, 11% died within 6 weeks, and 11% died within 1 year;**

					• **Of the 26 subjects who had surgery after day 5, 3.8% died within 3 weeks, 26% died** within 6 months, and 35% died within 1 year. ▪ Mortality was 110/0 for subjects with O to 3 coexisting medical conditions and 25%. for those with 4 to 6 coexisting medical conditions. • **Of the** subjects who had O to 3 coexisting medical conditions, mortality at 1 year was significantly higher for those who had **surgery on day 1 compared with days 2 to 5 (28% VS. *4%).***
Owen et al., 1980	**1976**	**36 persons with a hip fracture in** Rochester, MN. 72% female Average age: 84; age range: 50 to 90	14% (5 subjects) Average hospital length of stay. 21 days		
Miller, 1978	1972-74	360 to 403 persons with hip fracture **treated in 2 hospitals in Charlottesville, VA.** **71 % female** **Average age 73** **90% white** **13% admitted from a nursing home.**	8% (30 subjects)	***At 1 year:* 27%. Including 23% of females and 37% of males.** **Mortality at 1 year increased with age:** **9% under age 60;** **13% age 60-69;** **27% age 70-79,** **33% age 80-89,** 70% **age 90+**	**Mortality was elevated in the first 4 months and returned to normal by [8] months,**

Gallagher et al., 1980	**1965-74**	**415 persons with a hip fracture in Rochester, MN.** **79% female** **Of female subjects:** 1% **were** under 50, 5% were 50-59, **15% were 60-69, 30% were 70-79, 49%. were 80+.** **Of male subjects:** **14°A were under 50, 8% were 50-59, 14% were 60-69, 17% were 70-79, 47% were 80+** **All subjects white** **Persons with a second fracture, cancer as a likely cause of their fracture, or a fracture following an accident were excluded from the sample.**		***At* 18** *months:* ***27%*** **At 4 years: 50%.** **At 6** *years:* **65%** *At* **8** *years:* **81%** *At 10 years:* **93%**	**The authors say that the survival curves show a 12% difference between expected and observed survival for** 4 months post-fracture and that after 4 months, the curves are approximately parallel **for the duration of the study.**
FOREIGN STUDIES					
Nydegger et al, 1991	**1987**	**329 persons with a hip fracture treated in 1 hospital in Geneva, Switzerland.** **83% female** **Average age for females: 82; age range: 49 to 98** **Average age for males 75.7; age range: 34 to 97** **Persons with cancer as a likely cause of their fracture were excluded from the sample.**	**8%** (27 subjects) including **7.3% of females and 12.7% of males**		
Baudoin et al., 1991	1987	142 **persons randomly selected from 1,178 persons with** a hip fracture in Pi-cardy, France. 72% of the 1178 **persons were female** **All subjects over age 20** **Persons with cancer as a likely cause of their fracture were excluded from the sample.**	**7.6% for females and 9%** for males	***At* 2** *years:* **25% including** 28% for females and 21% for males	**Subjects' age did not have** a statistically significant effect on mortality.

Simonen and Mikkola, 1991	1982-83	A random sample of 383 persons with a hip fracture in Finland. 77% female All subjects over age 70		*At 1 year:* 26% including 22.9% of females and 35.2% of males *At 5 years:* 59% including 55.7% of females and 71.9% of males	
Davidson and Bodey, 1986	1981-82	155 persons with a hip fracture treated in 1 hospital in Middlesex, England. 84% female Average age: 80.8; age range: 53-102 8% had a previous hip fracture 7% (11 subjects) had cancer, and in 9 of these 11 subjects, the cancer had metastasized.	28.4% (44 subjects), including 27% of females and 36% of males; 0% of those under age 70, 23% of those age 70-79, 35% of those age 80-89, and 53% of those age 90+. Average hospital length of stay: 51 days	*At 1 year:* 43% (67 subjects) (7 subjects were lost to followup)	In-hospital mortality was correlated with gender, age, coexisting illness, and dementia. Mortality was higher in males, even though they were younger on average. There was no significant difference in mortality between subjects with subcapital vs. trochanteric fractures. All subjects were treated surgically. Delay of surgery was not correlated with mortality. 80% of the diabetic subjects and 54% of the subjects with dementia died ir the hospital.
Beringer, T.R.O. et al., 1984	1981-82	150 females with a hip fracture treated in 1 hospital in Belfast, Ireland. All subjects over age 65; mean age 81.2 87 persons with cervical fracture and 63 with trochanteric fracture.	21% (31 subjects) Average hospital length of say: 37 days		Subjects with a cervical fracture were younger on average than subjects with a trochanteric fracture, but there was no significant difference in mortality between subjects with a cervical vs. a trochanteric fracture within age groups.

Young and Gibbs, 1984	198[illegible]	125 persons with a hip fracture treated in 1 hospital in Glasgow, Scotland. 88% female All subjects over age 65; median age: 89; age range: 66-95 25% admitted from a nursing home or old age home	20.8% (26 subjects) Average hospital length of say: 43 days; median hospital length of stay for survivors: 31 days.	*At 1 year:* 26%	Predictors of mortality in the order of their significance were: 1) post-operative complications, 2) prefracture mental status, 3) co-existing illness, 4) prefracture mobility, and 5) age. Source of admission did not predict mortality. 32.5% of subjects with post-operative complications and 2.2% of subjects without post-operative complications died. 10% of the 81 subjects who were mentally alert on admission and 41% of the 34 subjects who were confused on admission died. 32% of the 72 subjects with 1 or more coexisting illnesses and 6% of the 53 subjects without coexisting illnesses died.
Holmber and Thorngren, 1985	1975-83	3,053 persons with a hip fracture in Stockholm, Sweden. 79% admitted from home; 5% admitted from old people's homes; 16% admitted from long stay hospitals. Subjects' age and gender were not reported.		*At 4 months:* 16% including 9% for persons admitted from home *At 1 year:* 22% including 16% for persons admitted from home *At 2 years:* 30% including 22% for persons admitted from home	

El Banna et al.,1984	**1976-82**	**224 persons with a hip fracture treated m 1 hospital in Belgium, 78% female Average age, 77**	**36%(82 subjects) 16% in the first 30 days post-fracture**		**Greater patient age, greater number of preexisting medical conditions, preexisting mental impairment, and postoperative complications were associated with higher mortality Type of fracture and type of treatment did not influence mortality.**
Kreutzfeldt, et al., **1984**	1978	117 persons with a hip fracture in 1 **county in Denmark. All subjects over age 60**	Average hospital length **of stay: 66 days.**	***At 1 year:* 26% (31 subjects)**	**Mortality was highest in the first 3 months post-fracture, but** only for subjects with coexisting diseases.
Lawton et al., 1983		**128 persons with hip fracture in 1 hospital in Leeds, England. All subjects over age 55**	**In 1 retrospective pilot study, mortality was 40% including 29% for the 24 subjects with a cervical fracture and 50% for the 26 subjects with a trochanteric fracture. In a prospective study, mortality was** 14% including **15% for the 39 subjects with a cervical fracture and 13% for the 30 subjects with a trochanteric or basal cervical fracture.**		**Study concludes that subjects with a trochanteric fracture are more likely than subjects with a cervical fracture to die.**
Lund et al., 1981	Not reported	145 subjects with a hip fracture treated in 1 hospital **in Aarhus, Denmark.**		***At 1 year:* 21% (31 subjects)**	

Jensen et al., 1979; Jensen and Bagger, 1982; Jensen, 1984	1/77- 12/77	518 persons with a hip fracture treated in 1 hospital in Denmark, 80.5% female Median age: 78; age range: 26 to 96 26% admitted from a nursing home	6% (30 subjects) Average hospital length of stay: 23 days. For subjects admitted from a nursing home, m-hospital mortality was 5.1 % and their average length of hospital stay was 7 days,	*At* 6 *months:* 15.6%, ranging from 2.7% in the group that was least dependent before the fracture to 27,9% in the group that was most dependent before the fracture. *At* 2.5 *years:* 35%, ranging from 12% in the group that was least dependent before the fracture to 58% in the group that was most dependent before the fracture. *At* 2.5 *years:* 26% for those admitted from home	Subjects were divided into 4 groups: 1) independent, 2) slightly dependent, 3) moderately dependent, and 4) totally dependent The factors most predictive of long-term mortality were prefracture independence/dependence and age. Subjects in group 1 had a survival probability identical to the general population, The factor most predictive of in-hospital mortality was postoperative complications,
Ceder et al., 1980	9/76-4/77	103 persons with a hip fracture treated in 1 hospital in Lund, Sweden. 73% female All subjects over age 50; average age: 75	2% (2 subjects)	*At* 4 *months:* 4% *At 1 year:* 12%	
Holmberg et al., 1986	1/75- 12/77	3,002 persons with a hip fracture in Stockholm, Sweden. 75% female All subjects over age 50 21 % admitted from a long-term care institution	4.4% in the first 3 weeks post-fracture.	*At* 3 months: 12%, including 8% for subjects admitted from home and 27% for subjects admitted from an institution, *At 1 year:* 16% for subjects admitted from home and 46% for subjects admitted from an restitution. *At* 3 *years:* 35% *At* 6 *years:* 54%	For all subjects, mortality paralleled mortality for the population at 1 year. For subjects over age 80, mortality was higher for the general population than for hip fracture patients from 1 to 6 Years post-fracture.

Jensen and Tondevold, 1979	4/71 -3/77	1,592 persons with a **hip fracture** in Denmark, 77'%, female All subjects over age 50, average age for females. 78; average age **for mal**-es: 74	**86% (137 subjects)** Average hospital length of stay. 24 days	***At* 3 months: 17% including** 152% **for** females and 21 .5% for males ***A? 6*** months: 21.5% including Post-fracture, with a *20%* for females and 25% for males ***At 1 year:* 26.8%** ***At* 3** *years:* **43%** ***At* 5** *years:* **56%**	For males, the actual and expected mortality be-came parallel at 1 8 years For females, the actual **and expected mortality became parallel at 1.6 years with a 16.5% decre-ment.** **Age, sex, and complica-tions, but not fracture type, affected mortality,**
Thomas and Stevens, 1974	**Not reported**	**205 persons with a hip fracture in Eng-land.** **All subjects over age 57**	**12,2% (25 subjects)**	***At 1 year:* 31%**	
Dahl, 1980	**1960-71**	**675 persons with a hip fracture treated in 1 hospital in Norway.** **74% female** **Average age: 73,9, including 71.5 for females and 74.7 for males; age range: 17-99,**	**13.9% (94 subjects)** **Average hospital length of stay: 34.6 days,**	***At 1 month:* (most subjects were still in the hospital at this time): 9.8% (79 subjects) including 9.8% of females and 17,17.** of males; **2% of all females and males under age 65 died; 2170 of females over age 84, and 38% of mal-es over age 84 died,** ***In the second month:*** no **sub-jects under age 65 died, but 10% of females over age 84 and 1770 of males over age 84 died.** ***At* 6 *months:* 21%** ***At* 4** *years:* **61 % of females over age 75 and 78% of mal-es over age 75**	Mortality was higher than expected for 2 months post-fracture. Subjects with severe coex-isting diseases had higher mortality: 2% of subjects with O coexisting illnesses, 23% of subjects with 1 coexisting illness, 40% of subjects with 2 coexisting illnesses, and 63% of all subjects with 3 coexisting illnesses died. 65% of subjects with 1 or more *severe* coexisting Ill-nesses died in the first 6 months. There was no significant difference in mortality for subjects with trochanteric vs femoral neck fractures.

SOURCE Off Ice of Technology Assessment, 1993