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Paper

Hip fracture in Northern Ireland, 1985-2010. Are age-specific fracture rates still rising?

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ABSTRACT:

BACKGROUND: The aims of this study were to review and update previous projections of the number of proximal femoral fractures in the Northern Ireland population and to ascertain if the trend of increasing age-specific fracture incidence was continuing.

METHODS: Data from 1985 to 1997 was obtained from hospital theatre records to ascertain the number of surgical procedures for proximal femoral fracture. Data for the years 2005 and 2010 was obtained from Northern Ireland's Fracture Outcomes Research Database (FORD) and locally held records in one region not then using FORD. Demographic details were obtained from data published by the Northern Ireland Statistics and Research Agency. Age-specific fracture rates were calculated for males and females in 5 year age brackets and for populations aged 50+ and 65+. Updated projections for the number of proximal femoral fractures by 2020 were made assuming the continuation of the same age-specific fracture rates observed in 2010.

RESULTS: From 1997 to 2010 the age-specific fracture incidence has fallen or plateaued across most observed age and sex sub-groups. Over the period 2010 to 2020, male and female fracture numbers are projected to increase by 23% and 21% respectively which equates to approximately 400 extra proximal femoral fractures.

CONCLUSION: Over the next decade there will be an increasing burden on Northern Irish healthcare resources attributed to a rise in the number of proximal femoral fractures. The age-specific fracture rates in this population are no longer rising and hence the expected increase in healthcare costs is primarily a consequence of the anticipated changing demographic trends.

INTRODUCTION

Hip fracture is a common injury with high morbidity and mortality. Fracture risk is multifactorial and reflects the patients' falls risk, frailty and underlying bone fragility. This frailty is reflected in poor outcomes with approximately 10% of sufferers dead within one month and one third dead within a year.[1] The clinical resources required for acute care are considerable with costs estimated at over £12000 for each individual inpatient stay.[2] With additional need for rehabilitation and longer term community support this rises to an estimate of over £25000 for the first year for the significant percentage of people requiring longer term residential care.[3]

Approximately 75000 proximal femoral fractures occur annually in the UK and with predicted demographic changes in the number of elderly people this is projected to increase to 91,500 by 2015 and 101,000 in 2020.[1] Previous studies within the Northern Ireland population demonstrated the number of proximal femoral fractures was increasing faster than that anticipated by demographic change alone.[4] The purpose of this study is to ascertain if age-specific fracture rates (the rate of fracture for specific age groups) have continued to rise within Northern Ireland or if they have levelled off or fallen as has been witnessed in other European[5-9] and North American populations.[9-12] Updated projections of proximal femoral fracture incidence are important in health care planning and provision of resources in Northern Ireland.

METHODS

Data was extracted from the Fracture Outcomes Research database (FORD) for the years, 2005 and 2010. For the year 2010, data was also collated from a separate database in Craigavon Area Hospital which opened a trauma and orthopaedic service in 2008 but was not then inputting data on FORD. Analysis of these data sources ensured capture of all proximal femoral fractures presenting for care throughout Northern Ireland. The incidence of proximal femoral fracture was recorded by sex and age in five year age bands for individuals aged 50-90+ years. A previous study collated similar information for the years 1985, 1991, 1994 and 1997 by surveying all theatre records in Northern Ireland hospitals undertaking operative management of proximal femoral fracture.[4]

The population of Northern Ireland at the different sampling times and future population projections were obtained from data published by the Northern Ireland Statistics and Research Agency.[13,14] This allowed the age and sex-specific hip fracture

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TABLE 1:

Annual incidence rates for fractures of the proximal femur by age group over the period 1985-2010 and total fracture numbers

Age group (years)	Males (rate/100,000)						Females (rate/100,000)					
	1985	1991	1994	1997	2005	2010	1985	1991	1994	1997	2005	2010
50-54	26	29	17	28	18	20	55	43	30	39	22	40
55-59	23	46	28	49	47	31	97	88	71	47	71	39
60-64	37	53	47	56	71	82	101	97	134	80	118	121
65-69	99	88	59	133	94	118	168	185	170	196	139	203
70-74	190	173	151	202	167	177	382	387	393	414	370	435
75-79	243	242	386	412	401	324	741	833	833	912	785	775
80-84	662	610	803	643	626	699	1247	1419	1666	1527	1539	1477
85-89	1207	1207	1386	1298	1344	985	2175	2278	2541	2607	2567	2363
90+	1930	1576	1878	2101	1630	2083	2623	3292	3381	4714	3209	3141
50+	128	137	147	169	168	170	374	432	479	500	474	476
65+	262	257	303	339	341	340	663	759	853	926	893	903
Total fracture No.	230	257	292	348	398	445	870	1037	1182	1275	1323	1438

rates in 5 year age bands to be calculated from age 50 to 90+ years.

RESULTS

The annual age specific rates of proximal femoral fracture for males and females are recorded for the years 1985, 1991, 1994, 1997, 2005 and 2010 (Table 1). Published data on this cohort based on figures up to 1997 demonstrated a 1.6% (95% CI 1.0-2.2) increase in incidence per annum with the rate increasing with age. The trend was noted in both males and females.[4]

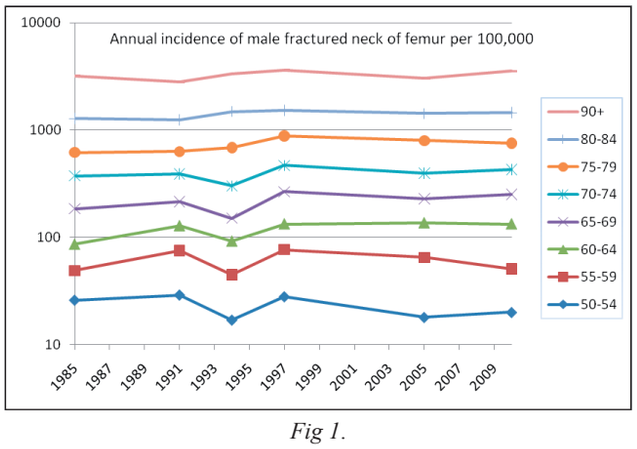

Fig 1.

Data obtained for the years 2005 and 2010 shows a continued increase in total fracture numbers which is in line with expectations from an ageing population. However, in most age groups a small reduction in the age-specific incidence of hip fracture is seen between 1997 and 2010. This trend can be observed in figures 1 and 2. Similarly, fracture incidence has been calculated and tabulated in table 1 for the age 50+ and 65+ cohorts. In males aged 50+ fracture incidence/100000 population has remained static with a rate of 169 in 1997 and 170 in 2010. Over the same period the female age 50+

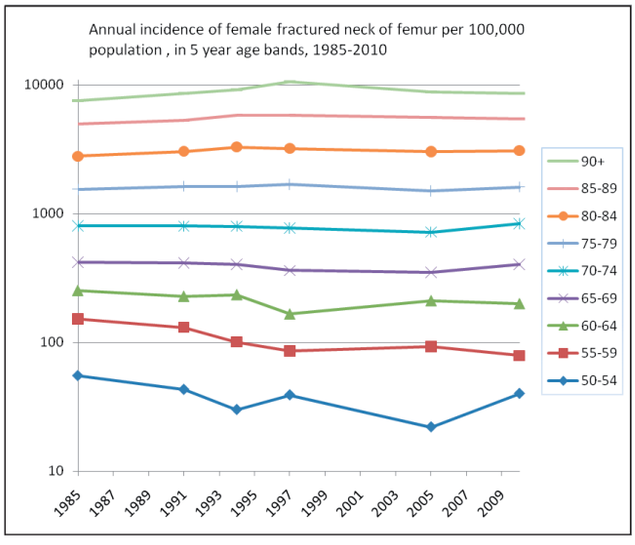

Fig 2.

fracture incidence rate/100000 has fallen from 500 to 476. In the age 65+ cohort the male fracture incidence/100000 has not changed being 339 in 1997 and 340 in 2010. In females the rate has fallen from 926 to 903 fractures/100000 population over the same time period.

From data obtained for 1985 to 1997, projections were made using three different assumptions. Firstly, that age standardised rates present in 1997 remained static. Secondly, that the secular increases in each age and sex sub-group would continue and thirdly, based on exponential growth (i.e. linear growth on a log scale or equivalently, a constant percentage increase per annum). These projections, previously published in 2000[4] have been plotted in figures 3 and 4 alongside the observed data from 2005 and 2010 and demonstrate that growth in fracture numbers has been slower than originally projected as a consequence of the levelling off in age-specific fracture rates.

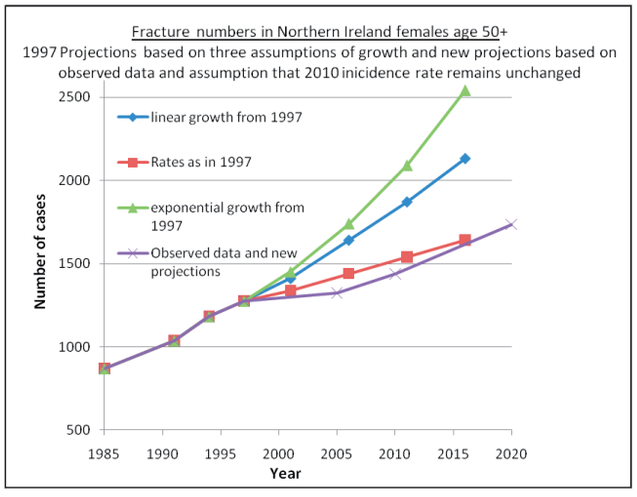

Fig 3.

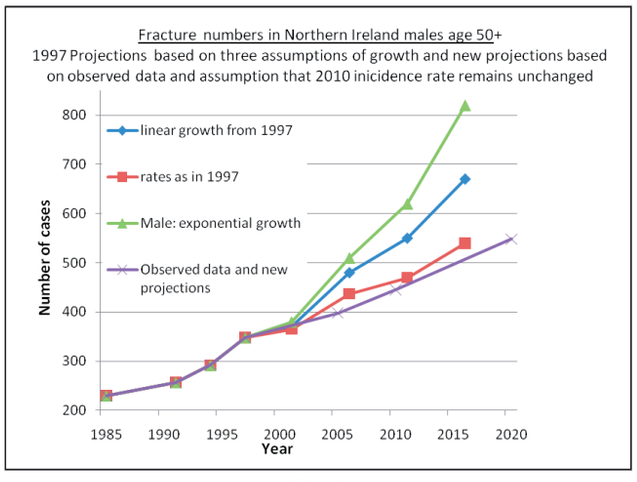

Fig 4.

New proximal femoral fracture projections have now been calculated based on the assumption that the 2010 age-specific incidences will remain unchanged in males and females. These suggest an increase in the number of male fractures from 445 to 548 (23% increase) and female fractures from 1438 to 1736 (21% increase) from the year 2010 to 2020.

DISCUSSION

This updated analysis of proximal femoral fracture incidence in Northern Ireland demonstrates that previous projections of total fracture numbers and age-specific rates have not been realised. Indeed age-specific fracture rates have levelled off or fallen in most age groups and consequently, projections of increased health care costs attributable to the rise in the number of proximal femoral fractures should be revised. Nevertheless, based on the assumption that the 2010 age-specific incidence remains unchanged and adopting population projections, in 2020 there will still be an extra 401 proximal femoral fractures in Northern Ireland (298 female and 103 male) representing a 21% increase from the number in 2010.

Similar levelling off or reductions of proximal femoral fracture rates have been observed across several European[5-9] and North American[9-12] populations. The potential explanations for this trend are numerous and varied. A study from Canada[16] observed a substantial increase in the number of bone mineral density scans and prescription rates for osteoporotic medication during the study period. This trend was followed by a true reduction in wrist and hip fracture rates despite the increasing age of the observed population. A study from Denmark[16] also observed a reduction in hip fracture rates between 1997 and 2006 alongside a significant increase in usage of anti-osteoporotic medications. This study however demonstrated that the decreased risk in men was nearly the same as in women despite a six times lower treatment prevalence and hence the authors could only attribute a small percentage of prevented hip fractures to this intervention. This study also reported reduction in smoking habits of the observed elderly population, increases in body mass index, and an increase in those reporting that they took regular exercise, all of which potentially had greater effects than the use of anti-osteoporotic medication. Nevertheless, development of fracture liaison services has been reported in West Glasgow[17] to significantly increase the proportion of patients with a fragility fracture receiving the required osteoporosis treatment, with resultant cost-effective prevention of fractures including hip fracture. A similar fracture liaison service was successfully established in Belfast in 2003[18] and remains in place to ensure uptake of appropriate treatment for osteoporosis in patients with fragility fracture.

A review of studies of hip and other fractures worldwide[9] reported that osteoporotic diagnosis and treatment does not fully explain the temporal reduction in hip fracture incidence. It postulated that as well as factors affecting risk late in an individual's life-course, additional risk factors encountered by differing birth cohorts contribute in later life to fracture rates. Such cohort effects have also been put forward to account for changing fracture rates in Finland where increased average body weight and functional ability was observed in an ageing population.[8] A study in the United states proposed that a cohort effect was likely to account for much of the observed change in fracture rates due to improved nutrition, the protective effect of raised BMI, a reduction in usage of psychoactive drugs and a reduction in falls risk.[10] The authors suggested further research to identify unknown factors which they thought may be present and contributing to the changing incidence.

SUMMARY

Proximal femoral fracture numbers continue to rise in Northern Ireland in line with the ageing population. Compared with the period 1985 to 1997 when the age-specific fracture rates were seen to be on the rise we now observe that between 1997 and 2010 the age-specific fracture rates have seen a plateau or slight reduction which is in keeping with findings in populations in North America and Europe. Reasons for the change are not identified by this study but are likely to embrace a range of influences including birth cohort, nutrition and falls risk as well as identification and treatment of low bone mineral density and other lifestyle factors.

Previous projections of inpatient health care costs associated with proximal femoral fractures had predicted, assuming a cost of £12000 per fracture,[2] that costs would rise to £33.6 million by 2016 to treat the 2800 fractures anticipated in

Northern Ireland.[4] These projections have not been realised due to the described change in age-specific fracture incidence and current projections of 2284 fractures in the year 2020 at the same cost of £12000 per fracture would result in a revised annual inpatient cost of proximal femoral fractures of £27.4 million (An increase of 21% from 2010 to 2020). Though less than previous projections this still represents a £4.8 million per annum increase by 2020 which has significant implications for healthcare planning and resourcing. This highlights the need to adopt interventions which may prevent fracture and its associated morbidity and mortality as well as reducing healthcare costs.

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The Authors have no conflict of interest.

REFERENCES:

1. British Orthopaedic Association. The care of patients with fragility fractures. Guideline Ref ID: BOA2007. London: British Orthopaedic Association; 2007. Available online from: http://www.bgs.org.uk/pdf_cms/pubs/Blue%20Book%20on%20fragility%20fracture%20care.pdf. Last accessed May 2012.

2. Lawrence TM, White CT, Wenn R, Moran CG. The current hospital costs of treating hip fractures. *Injury*. 2005; **36(1)**: 88-91

3. Parrot S. Health Promotion England. United Kingdom Department of Trade and Industry. The economic cost of hip fracture in the UK. York: Office of Health Economics, University of York; 2000. Available online from: http://viewcare.co.uk/Publications/hipfracture.pdf. Last accessed May 2012.

4. Beringer TR, Wilson RA, Swain D, Patterson CC, Beverland D. Proximal femoral fracture in Northern Ireland between 1985-1997 – trends and future projections. *Ulster Med J*. 2000; **69(2)**:112-7

5. Nymark T, Lauritsen J, Ovesen O, Rock N, Jeune B. Decreasing incidence of hip fracture in the Funen County, Denmark. *Acta Orthop*. 2006; **77(1)**: 109-13

6. Lofthus CM, Osnes EK, Falch JA, Kaastad TS, Kristiansen IS, Nordsletten L, et al. Epidemiology of hip fractures in Oslo, Norway. *Bone*. 2001; **29(5)**: 413-8

7. Rogmark C, Sernbo I, Johnell O, Nilsson JA. Incidence of hip fractures in Malmo, Sweden, 1992-1995. Acta Orthop Scand. 1999; 70(1): 19-22

8. Kannus P, Niemi S, Parkkari J, Palvanen M, Vuori I, Jarvinen M. Nationwide decline in incidence of hip fracture. *J Bone Miner Res*.2006; **21(12)**: 1836-8

9. Cooper C, Cole A, Holroyd CR, Earl SC, Harvey NC, Dennison EM, et al. Secular trends in the incidence of hip and other osteoporotic fractures, *Osteoporos Int*. 2011; **22(9)**:1277-88

10. Stevens JA, Rudd RA. Declining hip fracture rates in the United States. *Age Ageing*. 2010; **39(4)**:500-3

11. Brauer C, Coca-Perraillon M, Cutler DM, Rosen AB. Incidence and mortality of hip fractures in the United States. *JAMA*. 2009; **302(14)**: 1573-9

12. Leslie WD, O'Donnell S, Jean S, Lagace C, Walsh P, Bancey C, et al. Trends in hip fracture rates in Canada. *JAMA*. 2009; **302(8)**: 883-9

13. Northern Ireland Statistics and Research Agency. NISRA. Mid year population estimates, 2010. Belfast: Northern Ireland Statistics and Research Agency; 2010. Available from: http://www.nisra.gov.uk/demography/default.asp17.htm Last accessed May 2012.

14. Northern Ireland Statistics and Research Agency. NISRA. Northern Ireland level projections, 2008. Northern Ireland Statistics and Research Agency; 2008. Available online from: http://www.nisra.gov.uk/demography/default.asp20.htm Last accessed May 2012.

15. Jaglal SB, Weller I, Mamdani M, Hawker G, Kreder H, Jaakkimainen L, et al. Population trends in BMD testing, treatment, and hip and wrist fracture rates: are the hip fractures projections wrong? *J Bone Miner Res*. 2005; **20(6)**:898-905

16. Abrahamsen B, Vestergaard P. Declining incidence of hip fractures and the extent of use of anti-osteoporotic therapy in Denmark 1997-2006. *Osteoporos Int*. 2010; **21(3)**:373-80

17. McLellan AR, Wolowacz SE, Zimovetz EA, Beard SM, Lock S, et al. Fracture liaison services for the evaluation and management of patients with osteoporotic fracture: a cost-effectiveness evaluation based on data collected over 8 years of service provision, *Osteoporos Int*. 2011; **22(7)**:2083-98.

18. Wright SA, McNally C, Beringer T, Marsh D, Finch MB. Osteoporosis fracture liaison experience: the Belfast experience. *Rheumatol Int*. 2005; **25(6)**:489-90

