

Fracture incidence and costs by province

Comprehensive, accurate fracture numbers and costs are very important data that could help with prioritization and allocation of health care resources. Unfortunately, in most jurisdictions in Canada, this data is not readily available.

In this appendix, we have utilized fragility fracture related data from Tarride et al¹, which is derived from five administrative databases maintained by the Canadian Institute for Health Information (CIHI). These authors have kindly shared with us the previously unpublished provincial break down for fragility fracture admissions data². We can therefore present the number and cost of fractures across Canada nationally and, to some degree, by province.

Per individual fracture, hip fractures are by far the most expensive, costing the health care system in excess of \$20,000 in acute care costs alone¹. Non-hip fractures are individually much less expensive, but because of their sheer numbers (as per Burge³, there are roughly 6.5 non-hip fractures for every hip fracture that occurs), their costs add up very significantly. In addition, non-hip fragility fractures are increasingly being treated operatively, with attendant higher per-case acute care costs and with more demand on operating room capacity⁴.

Tarride et al estimated that in Canada, acute care for hip fractures alone cost \$619,315,477 annually and that the cost was \$552,268,550 for all other fragility fractures combined¹. The total acute care cost for all fractures was therefore about \$1.2 billion¹. When outpatient care, prescription drugs, and indirect costs were added, the overall yearly cost of osteoporosis was over \$2.3 billion for the base case analysis, and as much as \$3.9 billion if a proportion of Canadians were assumed to be living in long-term care facilities due to osteoporosis¹. Costs associated with lost productivity of patients or family members, would add significantly to these figures.

Although many researchers have identified a decreasing secular trend for age adjusted hip fracture rates, this

does not mean that the number of hip fractures seen in any jurisdiction is decreasing. Quite the contrary, the ageing demographic more than offsets this secular trend. The absolute number of hip fractures has been increasing in all jurisdictions and is projected to continue to do so. This appendix gives a conservative estimate for projected numbers of hip fractures and their associated costs, nationally and by province, to 2035.

In this appendix, we have limited our estimation of provincial costs to those related to acute care of hip fractures. As a general rule of thumb, based on the findings of Tarride et al¹ described above, the acute hip fracture cost can be multiplied by a factor of 1.9 to obtain a rough estimate of the annual acute care costs for all fragility fractures for a jurisdiction and by a factor of 6.3 to obtain a rough estimate of the total annual societal costs of osteoporosis (including indirect costs, and incremental cost of long-term care). These enormous projected costs would be greatly mitigated by the implementation of FLS. Potential cost savings from FLS, by province, can be found in Appendix F.

For any jurisdiction with more recent/local hip fracture data, we also provide you with a generic Excel spreadsheet [\[click here for Excel\]](#). Simply insert your hip fracture number and the rest of the numbers will appear.

Methodology

Source of data:

1. Hip fracture data for 2007^{1,2} is the starting point for estimations and extrapolations .
2. Longitudinal hip fracture data from Quebec for the years 1997 through 2011⁵ was found to fit a linear regression with an R² of 0.9564.
3. The regression coefficient was scaled to other provinces as of the 2007 base year and used to project numbers of hip fractures for subsequent years.
4. Numbers of hospitalized fractures is as per Tarride et al^{1,2}. Total numbers of fractures (combined hospitalized and non-hospitalized fractures) were estimated on the basis of the relative frequency of fragility fracture types published in Burge et al³.
5. Costs of fractures in 2007 in each province were calculated for acute care services only, using cost factors as described in Tarride et al^{1,2}. Projected costs were calculated for hip fractures only.

Assumptions:

1. This method assumes that other provinces have similar current and future demographics to Quebec.
2. It further assumes that the linear increase in absolute fracture numbers (not to be confused with age-adjusted fracture rates) continues, in the absence of any intervention.
3. It assumes that the relative frequency of fragility fracture types continues to follow the ratios described in Burge et al³, at least during the period between 2015 and 2023.
4. This method has used Tarride's average national cost for hip fractures and consequently assumes that acute care costs for hip fractures are \$21,440 in all provinces¹.

Limitations:

1. Canadian fracture data is laborious to obtain, is of uncertain quality, and the time lag before it becomes available is significant.
2. The exclusion of non-hip fractures from the projection of costs in each province is unfortunate and results in a very conservative picture of the costs. It is significant to note that although hip fractures remain the most costly, other fragility fractures are increasingly being treated operatively, with attendant higher per-case acute care costs and with more demand on operating room capacity⁴.
3. The cost perspective of the provincial forecasts is

that of the acute care payer, and as such the cost estimates are very conservative. Long term care costs, and costs associated with lost productivity of patients or family members, would add significantly to the figures given.

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TABLE 1: Total estimated fractures (hospitalized and non-hospitalized) by province, base year 2007. Hip fracture data from Tarride^{1,2} and others estimated based on Burge³.

	Alberta	British Columbia	Manitoba	New Brunswick	Nova Scotia	Newfoundland and Labrador	Ontario	Prince Edward Island	Quebec	Saskatchewan	Territories	CANADA
Hip	2,418	4,190	1,243	733	848	496	10,405	152	7,204	1,156	44	28,889
Vertebral	4,220	7,312	2,169	1,279	1,480	866	18,158	265	12,572	2,017	77	50,414
Wrist	2,851	6,134	1,820	1,073	1,242	726	15,233	223	10,547	1,692	64	41,606
Pelvic	1,122	1,944	577	340	394	230	4,828	71	3,343	536	20	13,406
Other	4,504	7,805	2,315	1,365	1,580	924	19,382	283	13,419	2,153	82	53,813
TOTAL	15,115	27,386	8,124	4,791	5,542	3,242	68,007	993	47,085	7,556	288	188,128

TABLE 2: Total estimated fractures (hospitalized and non-hospitalized) by province, 2015

	Alberta	British Columbia	Manitoba	New Brunswick	Nova Scotia	Newfoundland and Labrador	Ontario	Prince Edward Island	Quebec	Saskatchewan	Territories	CANADA
Hip	2,724	4,721	1,401	826	955	559	11,724	171	8,117	1,302	50	32,550
Vertebral	4,754	8,239	2,445	1,441	1,667	976	20,460	298	14,165	2,272	87	56,803
Wrist	3,211	6,912	2,051	1,209	1,398	818	17,165	250	11,884	1,906	73	46,878
Pelvic	1,264	2,191	650	383	443	259	5,441	79	3,767	604	23	15,105
Other	5,074	8,794	2,610	1,539	1,779	1,041	21,839	319	15,120	2,425	93	60,632
TOTAL	17,027	30,856	9,157	5,399	6,242	3,654	76,627	1,118	53,052	8,510	327	211,968

TABLE 3: Estimated annual costs arising from hospital-based care of fragility fracture patients, Canada^{1,2}. (Counts of occurrences from 2007; cost factors in 2010 dollars) (Does not include costs of those treated outside hospitals)

Absolute number	Hip	Humerus	Multiple Site	Other Site	Vertebral	Wrist	Total
Emergency Room visits	25,793	9,285	4,878	33,811	5,484	33,498	112,749
Hospitalizations	28,888	2,585	6,028	12,778	2,297	4,858	57,434
Same Day Surgery	68	131	73	328	58	2,775	3,433
Average unit cost	Hip	Humerus	Multiple Site	Other Site	Vertebral	Wrist	
Emergency Room visits	\$1,524.00	\$1,198.00	\$1,913.00	\$1,148.00	\$934.00	\$1,572.00	
Hospitalizations	\$20,068.00	\$12,432.00	\$23,289.00	\$13,871.00	\$13,789.00	\$8,731.00	
Same Day Surgery	\$4,147.00	\$3,335.00	\$4,283.00	\$3,664.00	\$4,026.00	\$3,307.00	
Total costs	Hip	Humerus	Multiple Site	Other Site	Vertebral	Wrist	Total
Emergency care	\$39,319,596.00	\$11,126,189.00	\$9,334,012.00	\$38,803,610.00	\$5,120,045.00	\$52,663,121.00	\$156,366,574.00
Acute Care	\$579,713,901.00	\$32,135,551.00	\$140,385,679.00	\$177,248,530.00	\$31,672,778.00	\$42,416,650.00	\$1,003,573,089.00
Same Day Surgery	\$281,981.00	\$436,848.00	\$312,633.00	\$1,201,935.00	\$233,507.00	\$9,177,460.00	\$11,644,363.00
Total Acute Care Costs	\$619,315,477.00	\$43,698,588.00	\$150,032,324.00	\$217,254,075.00	\$37,026,330.00	\$104,257,231.00	\$1,171,584,027.00

TABLE 4: ALBERTA: Projected numbers of hip fractures and associated costs to 2035

YEAR	2007	2010	2015	2016	2020	2023	2025	2030	2035
Number of hip fractures	2,418	2,533	2,724	2,763	2,916	3,031	3,107	3,299	3,490
Cost in 2010 dollars	\$51,841,920	\$54,305,448	\$58,411,328	\$59,232,504	\$62,517,208	\$64,980,736	\$66,623,088	\$70,728,968	\$74,834,848

TABLE 5: BRITISH COLUMBIA: Projected numbers of hip fractures and associated costs to 2035

YEAR	2007	2010	2015	2016	2020	2023	2025	2030	2035
Number of hip fractures	4,190	4,389	4,721	4,787	5,053	5,252	5,385	5,717	6,048
Cost in 2010 dollars	\$89,833,600	\$94,102,493	\$101,217,314	\$102,640,278	\$108,332,135	\$112,601,028	\$115,446,956	\$122,561,777	\$129,676,598

TABLE 6: MANITOBA: Projected numbers of hip fractures and associated costs to 2035

YEAR	2007	2010	2015	2016	2020	2023	2025	2030	2035
Number of hip fractures	1,243	1,302	1,401	1,420	1,499	1,558	1,597	1,696	1,794
Cost in 2010 dollars	\$26,649,920	\$27,916,324	\$30,026,998	\$30,449,133	\$32,137,672	\$33,404,076	\$34,248,345	\$36,359,019	\$38,469,693



TABLE 7: NEW BRUNSWICK: Projected numbers of hip fractures and associated costs to 2035

YEAR	2007	2010	2015	2016	2020	2023	2025	2030	2035
Number of hip fractures	733	768	826	837	884	919	942	1,000	1,058
Cost in 2010 dollars	\$15,715,520	\$16,462,322	\$17,706,991	\$17,955,925	\$18,951,660	\$19,698,461	\$20,196,329	\$21,440,998	\$22,685,667

TABLE 8: NEWFOUNDLAND AND LABRADOR: Projected numbers of hip fractures and associated costs to 2035

YEAR	2007	2010	2015	2016	2020	2023	2025	2030	2035
Number of hip fractures	496	520	559	567	598	622	637	677	716
Cost in 2010 dollars	\$10,634,240	\$11,139,579	\$11,981,811	\$12,150,257	\$12,824,043	\$13,329,382	\$13,666,275	\$14,508,506	\$15,350,738

TABLE 9: NOVA SCOTIA: Projected numbers of hip fractures and associated costs to 2035

YEAR	2007	2010	2015	2016	2020	2023	2025	2030	2035
Number of hip fractures	848	888	955	969	1,023	1,063	1,090	1,157	1,224
Cost in 2010 dollars	\$18,181,120	\$19,045,087	\$20,485,032	\$20,773,020	\$21,924,976	\$22,788,943	\$23,364,921	\$24,804,866	\$26,244,810

TABLE 10: ONTARIO: Projected numbers of hip fractures and associated costs to 2035

YEAR	2007	2010	2015	2016	2020	2023	2025	2030	2035
Number of hip fractures	10,405	10,899	11,724	11,888	12,548	13,042	13,372	14,196	15,020
Cost in 2010 dollars	\$223,083,200	\$233,684,114	\$251,352,303	\$254,885,941	\$269,020,493	\$279,621,406	\$286,688,682	\$304,356,871	\$322,025,061

TABLE 11: PRINCE EDWARD ISLAND: Projected numbers of hip fractures and associated costs to 2035

YEAR	2007	2010	2015	2016	2020	2023	2025	2030	2035
Number of hip fractures	152	159	171	174	183	191	195	207	219
Cost in 2010 dollars	\$3,258,880	\$3,413,742	\$3,671,845	\$3,723,466	\$3,929,949	\$4,084,811	\$4,188,052	\$4,446,155	\$4,704,258

TABLE 12: QUÉBEC: Projected numbers of hip fractures and associated costs to 2035

YEAR	2007	2010	2015	2016	2020	2023	2025	2030	2035
Number of hip fractures	7,204	7,546	8,117	8,231	8,687	9,030	9,258	9,829	10,399
Cost in 2010 dollars	\$154,453,760	\$161,793,403	\$174,026,140	\$176,472,688	\$186,258,878	\$193,598,521	\$198,491,616	\$210,724,354	\$222,957,092

TABLE 13: SASKATCHEWAN: Projected numbers of hip fractures and associated costs to 2035

YEAR	2007	2010	2015	2016	2020	2023	2025	2030	2035
Number of hip fractures	1,156	1,211	1,302	1,321	1,394	1,449	1,486	1,577	1,669
Cost in 2010 dollars	\$24,784,640	\$25,962,406	\$27,925,350	\$28,317,938	\$29,888,293	\$31,066,059	\$31,851,237	\$33,814,180	\$35,777,124

TABLE 14: TERRITORIES: Projected numbers of hip fractures and associated costs to 2035

YEAR	2007	2010	2015	2016	2020	2023	2025	2030	2035
Number of hip fractures	44	46	50	50	53	55	57	60	64
Cost in 2010 dollars	\$943,360	\$988,188	\$1,062,903	\$1,077,845	\$1,137,617	\$1,182,445	\$1,212,331	\$1,287,045	\$1,361,759

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