

Table A1: Available physician billing codes relevant to musculoskeletal disorders: Ontario Health Insurance Plan\*

Diagnostic groups	Description	Billing codes	# of People <sup>a</sup>	# of Visits <sup>b</sup>
<b>Injury and related conditions</b>			<b>213,047</b>	<b>501,277</b>
Fractures/dislocations	<b>Dislocations:</b> shoulder, elbow, finger, other <b>Fractures and Dislocations:</b> vertebral column without spinal damage, vertebral column with spinal damage, ribs, pelvis, clavicle, humerus, radius/ulna, carpal bones, metacarpals, phalanges, femur, fibula/tibia, ankle, leg, other	831, 832, 834, 839 805, 806, 807, 808, 810, 812, 813, 814, 815, 816, 821, 823, 824, 827, 829	108,968	279,619
Strains/sprains of spine	Coccyx, neck, low back	847	3,647	5,286
Other Strains/sprains	shoulder/upper arm, elbow, wrist/hand and fingers, knee/leg, ankle/foot & toes, coccyx/neck, other	840, 841, 842, 843, 844, 845, 848	108,312	216,372
<b>Arthritis and related conditions</b>			<b>230,642</b>	<b>465,711</b>
Rheumatoid arthritis	Rheumatoid arthritis, still's disease	714	2,173	4,163
Ankylosing spondylitis	Ankylosing spondylitis	720	794	1,205
Connective tissue	Disseminated lupus erythematosus, scleroderma, polyarteritis nodosa, temporal arteritis	710, 446	41	79
Osteoarthritis	Osteoarthritis	715	123,371	241,751
Joint derangement	Joint derangement, recurrent dislocation, ankylosis, meniscus or cartilage tear, loose body in joint	717, 718	64,573	115,787
Synovitis	Synovitis, tenosynovitis, bursitis, bunion	727	35,147	59,904
Traumatic arthritis	Traumatic arthritis, Pyogenic arthritis	716,711	2,636	4,530
Gout	Gout	274, 712	153	224
Soft tissue disorders	Dupuytren's contracture, Fibrositis, myositis, muscular rheumatism	728, 729	1,539	2,467
Other arthritis		739	18,024	35,601
<b>Bone and spine conditions</b>			<b>37,806</b>	<b>65,315</b>
Spine	Spondylosis and allied disorders, intervertebral disc disorders, pain neck, lumbar strain, lumbago, coccydynia, sciatica, lumbar disc disease (degenerative), scoliosis	721, 722, 723, 724, 737	25,257	40,865
Bone	Osteomyelitis, osteochondritis, legg-perthes disease, osteoporosis, spontaneous fracture, other disorders of bone & cartilage, flat foot, pes planus, hallux valgus, hallux varus, hammer toe	730, 731, 732, 733, 734, 735	12,688	24,450
<b>Unspecified MSD</b>			<b>781</b>	<b>28,896</b>
<b>Musculoskeletal Disorders</b>			<b>477,003</b>	<b>1,082,726</b>

\* Available billing codes are a modified and abbreviated list based on ICD-9. <sup>a</sup> Number of people with at least one visit to an orthopaedic surgeon (Note that people can have visits for multiple conditions). <sup>b</sup> Number of visits to orthopaedic surgeons.

Table A2: Available diagnostic codes relevant to musculoskeletal disorders: Discharge Abstract Database\*

Diagnostic groups	Description	ICD code	# of People <sup>a</sup>	# of Surgeries <sup>b</sup>
<b>Injury and related conditions</b>			<b>30,076</b>	<b>30,948</b>
Fractures/dislocations	<b>Dislocations:</b> neck, spine & pelvis, shoulder, elbow, hand & wrist, hip, knee & patella, ankle & foot <b>Fractures:</b> neck, spine & pelvis, shoulder, elbow, hand & wrist, hip, knee & patella, ankle & foot	S13.0-S13.3, S33.0-S33.3, S43.0-S43.3, S53.0-S53.1, S63.0-S63.2, S73.0, S83.0-S83.1, S93.0-S93.3 T08, S12, S32, S42, S52, S62, S72, S82, S92	27,750	28,570
Other Strains/sprains	neck and lumbar spine, shoulder, elbow, hand & wrist, hip, knee & patella, ankle & foot	S13.4, S13.5, S33.5-S33.7, S43.4-S43.7, S53.2-S53.4, S63.3-S63.7, S73.1, S83.2-S83.7, S93.4-S93.6	2,346	2,378
<b>Arthritis and related conditions</b>			<b>84,904</b>	<b>89,280</b>
Rheumatoid arthritis	Rheumatoid arthritis, still's disease	M05 - M09	820	875
Ankylosing spondylitis	Ankylosing spondylitis	M45, M46	118	125
Connective tissue	Disseminated lupus erythematosus, scleroderma, polyarteritis nodosa, temporal arteritis	M30-M36	640	751
Osteoarthritis	Osteoarthritis	M15-M19	37,261	38,779
Joint derangement	Joint derangement, recurrent dislocation, ankylosis, meniscus or cartilage tear, loose body in joint	M22-M24	25,459	26,112
Synovitis	Synovitis, tenosynovitis, bursitis, bunion	M65-M71	7,612	7,871
Traumatic arthritis	Traumatic arthritis, pyogenic arthritis	M00-M03, M12	527	563
Gout	Gout	M10, M11, M14	238	242
Soft tissue disorders	Disorders of muscle Fibroblastic disorders, Soft tissue disorders in diseases classified elsewhere Shoulder lesions, enthesopathies lower limb	M60-M63 M72-M73 M75-M77	11,723	12,590
Other arthritis	Fibrositis, myositis, muscular rheumatism Other arthritis, other MSK disorders	M79 M13, M96, M99	1,349	1,372
<b>Bone and spine conditions</b>			<b>20,551</b>	<b>29,492</b>
Spine	Deforming dorsopathies, spondylosis, other dorsopathies Spinal stenosis, ankylosing hyperostosis, other spondylopathies	M40-M43, M47, M49-M54 M48.0-M48.3, M48.8-M48.9	8,906	15,323
Bone	Osteopathies and chondropathies, traumatic spondilopathy Acquired deformities of fingers and toes, hallux valgus	M80-M90, M91-M94, M48.4, M48.5 M20, M21.4, L60.0, L60.2, L84	11,700	14,169
<b>Unspecified MSD</b>	other acquired deformities, other joint disorders	M21 excluding. M21.4, M25	<b>3,322</b>	<b>3,478</b>
<b>Musculoskeletal Disorders</b>			<b>132,630</b>	<b>153,198</b>

\* ICD-10 diagnostic codes. <sup>a</sup> Number of people with at least one hospital encounter with an orthopaedic surgeon as the main healthcare provider (Note that people can have visits for multiple conditions). <sup>b</sup> Number of orthopaedic surgeries.

Table A3: Multilevel Poisson regression models of office visits to orthopaedic surgeons for arthritis and injury: results for the effects of age and sex, Ontario: 2007-08

	MSD			Arthritis			Injury		
	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value
<b>Intercept</b>	-3.561	0.028	<.0001	-4.852	0.036	<.0001	-3.940	0.039	<.0001
<b>Sex</b> (Ref: Men)	-0.524	0.025	<.0001	-0.379	0.034	<.0001	-0.701	0.030	<.0001
<b>Age groups</b> (Ref: 18-24)									
25-34	-0.044	0.023	0.057	0.145	0.031	<.0001	-0.192	0.028	<.0001
35-44	0.166	0.022	<.0001	0.561	0.029	<.0001	-0.146	0.028	<.0001
45-54	0.544	0.022	<.0001	1.098	0.029	<.0001	0.100	0.027	0.000
55-64	0.824	0.022	<.0001	1.525	0.028	<.0001	0.248	0.027	<.0001
65-74	1.022	0.022	<.0001	1.806	0.029	<.0001	0.334	0.028	<.0001
75+	1.067	0.023	<.0001	1.800	0.029	<.0001	0.486	0.028	<.0001
<b>Age by sex</b>									
25-34	0.146	0.034	<.0001	-0.001	0.046	0.978	0.241	0.042	<.0001
35-44	0.325	0.033	<.0001	0.151	0.043	0.001	0.456	0.041	<.0001
45-54	0.571	0.032	<.0001	0.410	0.042	<.0001	0.736	0.040	<.0001
55-64	0.759	0.032	<.0001	0.560	0.041	<.0001	0.979	0.040	<.0001
65-74	0.788	0.032	<.0001	0.586	0.042	<.0001	1.061	0.041	<.0001
75+	0.759	0.032	<.0001	0.462	0.042	<.0001	1.165	0.041	<.0001

Table A4: Multilevel Poisson regression models of orthopaedic surgery for arthritis and injury: results for the effects of age and sex, Ontario: 2007-08

	MSD			Arthritis			Injury		
	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value
<b>Intercept</b>	-4.896	0.034	<.0001	-5.816	0.042	<.0001	-5.767	0.041	<.0001
<b>Sex</b> (Ref: Men)	-0.669	0.036	<.0001	-0.459	0.047	<.0001	-1.082	0.058	<.0001
<b>Age groups</b> (Ref: 18-24)									
25-34	-0.002	0.032	0.947	0.194	0.040	<.0001	-0.211	0.047	<.0001
35-44	0.235	0.030	<.0001	0.653	0.037	<.0001	-0.389	0.046	<.0001
45-54	0.682	0.029	<.0001	1.250	0.036	<.0001	-0.270	0.045	<.0001
55-64	0.971	0.029	<.0001	1.625	0.035	<.0001	-0.298	0.047	<.0001
65-74	1.121	0.030	<.0001	1.792	0.036	<.0001	-0.227	0.051	<.0001
75+	1.142	0.031	<.0001	1.550	0.037	<.0001	0.811	0.045	<.0001
<b>Age by sex</b>									
25-34	0.115	0.049	0.020	-0.069	0.062	0.261	0.146	0.080	0.067
35-44	0.341	0.047	<.0001	0.035	0.057	0.541	0.576	0.076	<.0001
45-54	0.590	0.045	<.0001	0.284	0.054	<.0001	0.918	0.073	<.0001
55-64	0.834	0.044	<.0001	0.488	0.053	<.0001	1.487	0.074	<.0001
65-74	0.912	0.045	<.0001	0.571	0.054	<.0001	1.759	0.076	<.0001
75+	0.972	0.045	<.0001	0.471	0.056	<.0001	1.803	0.070	<.0001

Table A5: Multilevel Poisson regression models of office visits to orthopaedic surgeons for arthritis and injury: results for the main and adjusted effects of access to primary care physicians (PCP), geographic availability of orthopaedic surgeons, and need indicators, Ontario: 2007-08

	Arthritis		Injury	
	Main effect models	Adjusted model	Main effect models	Adjusted model
<i>Access to PCP</i>				
Quintile V (highest)	0.93(0.81 - 1.05)	<b>1.16(1.03 - 1.21)</b>	1.10(0.95 - 1.27)	<b>1.13(1.00 - 1.31)</b>
Quintile IV	0.90(0.80 - 1.02)	1.00(0.88 - 1.14)	1.03(0.90 - 1.17)	1.02(0.90 - 1.17)
Quintile III	0.94(0.84 - 1.07)	0.98(0.87 - 1.11)	0.95(0.83 - 1.08)	0.94(0.82 - 1.07)
Quintile II	1.01(0.89 - 1.13)	1.05(0.94 - 1.17)	0.98(0.87 - 1.10)	0.98(0.87 - 1.09)
Quintile I (lowest)	1.00	1.00	1.00	1.00
<i>Geographic availability of orthopaedic surgeons</i>				
Quintile V (highest)	1.18(0.98 - 1.39)	<b>1.34(1.10 - 1.63)</b>	1.11(0.90 - 1.36)	<b>1.18(1.01 - 1.51)</b>
Quintile IV	0.90(0.76 - 1.07)	0.97(0.81 - 1.17)	0.96(0.78 - 1.19)	1.01(0.80 - 1.28)
Quintile III	1.06(0.89 - 1.25)	1.16(0.97 - 1.38)	0.93(0.76 - 1.15)	0.97(0.77 - 1.20)
Quintile II	1.19(0.97 - 1.41)	1.24(0.99 - 1.47)	0.90(0.73 - 1.10)	0.94(0.76 - 1.16)
Quintile I (lowest)	1.00	1.00	1.00	1.00
<i>SES</i>				
Quintile V (highest)	0.93(0.78 - 1.11)	0.95(0.79 - 1.14)	1.09(0.88 - 1.34)	<b>1.34(1.06 - 1.69)</b>
Quintile IV	0.98(0.83 - 1.17)	0.97(0.81 - 1.15)	0.98(0.80 - 1.20)	1.13(0.91 - 1.41)
Quintile III	1.16(0.97 - 1.38)	1.05(0.89 - 1.25)	1.09(0.89 - 1.34)	1.10(0.89 - 1.36)
Quintile II	0.99(0.83 - 1.17)	0.89(0.75 - 1.06)	1.20(0.98 - 1.47)	1.16(0.93 - 1.44)
Quintile I (lowest)	1.00	1.00	1.00	1.00
<i>Proportion of population ≥65 years</i>				
Quintile V (highest)	<b>1.19(1.00 - 1.42)</b>	1.13(0.95 - 1.35)	<b>1.33(1.09 - 1.63)</b>	<b>1.37(1.10 - 1.70)</b>
Quintile IV	1.12(0.99 - 1.34)	1.09(0.92 - 1.29)	<b>1.33(1.09 - 1.63)</b>	<b>1.39(1.12 - 1.71)</b>
Quintile III	<b>1.22(1.02 - 1.45)</b>	1.23(0.99 - 1.45)	<b>1.26(1.03 - 1.53)</b>	<b>1.33(1.09 - 1.64)</b>
Quintile II	1.05(0.88 - 1.25)	1.01(0.86 - 1.19)	1.05(0.86 - 1.28)	1.10(0.89 - 1.34)
Quintile I (lowest)	1.00	1.00	1.00	1.00
<i>Proportion of rural population</i>				
<15%	<b>0.84(0.74 - 0.96)</b>	0.86(0.72 - 1.02)	0.96(0.82 - 1.12)	0.84(0.67 - 1.04)
Intermediate (15-50% )	0.96(0.84 - 1.11)	0.97(0.83 - 1.12)	1.04(0.87 - 1.23)	0.98(0.81 - 1.17)
Rural (≥50%)	1.00	1.00	1.00	1.00

Table A6: Multilevel Poisson regression models of orthopaedic surgery for arthritis and injury: results for the main and adjusted effects of access to primary care physicians (PCP), geographic availability of orthopaedic surgeons, and need indicators, Ontario: 2007-08

	Arthritis		Injury	
	Main effect models	Adjusted model	Main effect models	Adjusted model
<i>Access to PCP</i>				
Quintile V (highest)	0.93(0.80 - 1.09)	0.99(0.87 - 1.12)	0.90(0.78 - 1.05)	0.98(0.85 - 1.13)
Quintile IV	1.01(0.87 - 1.17)	1.02(0.90 - 1.15)	0.87(0.74 - 1.02)	1.04(0.91 - 1.20)
Quintile III	0.99(0.85 - 1.14)	1.02(0.91 - 1.15)	0.92(0.78 - 1.08)	1.04(0.91 - 1.19)
Quintile II	1.01(0.88 - 1.17)	0.93(0.83 - 1.03)	0.98(0.84 - 1.16)	1.01(0.89 - 1.14)
Quintile I (lowest)	1.00	1.00	1.00	1.00
<i>Geographic availability of orthopaedic surgeons</i>				
Quintile V (highest)	0.85(0.71 - 1.01)	0.86(0.73 - 1.00)	1.01(0.86 - 1.19)	1.15(0.98 - 1.35)
Quintile IV	<b>0.77(0.65 - 0.92)</b>	0.91(0.79 - 1.05)	0.85(0.72 - 1.00)	1.03(0.88 - 1.20)
Quintile III	<b>0.81(0.67 - 0.96)</b>	0.83(0.72 - 0.95)	0.87(0.74 - 1.02)	0.99(0.86 - 1.15)
Quintile II	0.89(0.74 - 1.07)	0.77(0.67 - 0.89)	0.97(0.82 - 1.15)	1.05(0.90 - 1.21)
Quintile I (lowest)	1.00	1.00	1.00	1.00
<i>Office visits to orthopaedic surgeons</i>				
Quintile V (highest)	<b>1.73(1.51 - 1.99)</b>	<b>1.73(1.51 - 1.99)</b>	<b>1.51(1.31 - 1.73)</b>	<b>1.38(1.20 - 1.59)</b>
Quintile IV	<b>1.58(1.37 - 1.81)</b>	<b>1.46(1.26 - 1.69)</b>	<b>1.37(1.20 - 1.57)</b>	<b>1.24(1.08 - 1.41)</b>
Quintile III	<b>1.44(1.25 - 1.66)</b>	<b>1.39(1.22 - 1.59)</b>	<b>1.24(1.09 - 1.42)</b>	<b>1.19(1.05 - 1.36)</b>
Quintile II	<b>1.25(1.09 - 1.44)</b>	<b>1.14(1.00 - 1.29)</b>	1.16(1.01 - 1.34)	1.12(0.97 - 1.29)
Quintile I (lowest)	1.00	1.00	1.00	1.00
<i>SES</i>				
Quintile V (highest)	<b>0.83(0.69 - 0.99)</b>	1.02(0.96 - 1.29)	0.87(0.74 - 1.02)	0.98(0.84 - 1.14)
Quintile IV	0.88(0.73 - 1.05)	1.04(0.99 - 1.32)	0.92(0.78 - 1.08)	1.01(0.88 - 1.17)
Quintile III	0.90(0.75 - 1.08)	0.93(0.81 - 1.06)	0.98(0.84 - 1.16)	0.98(0.85 - 1.12)
Quintile II	0.91(0.76 - 1.09)	1.05(0.92 - 1.20)	1.04(0.89 - 1.22)	1.02(0.89 - 1.18)
Quintile I (lowest)	1.00	1.00	1.00	1.00
<i>Proportion of population ≥65 years</i>				
Quintile V (highest)	<b>1.31(1.10 - 1.56)</b>	1.04(0.90 - 1.20)	<b>1.28(1.10 - 1.50)</b>	1.02(0.88 - 1.19)
Quintile IV	<b>1.20(1.01 - 1.43)</b>	1.02(0.89 - 1.16)	<b>1.27(1.09 - 1.48)</b>	1.05(0.90 - 1.22)
Quintile III	1.18(0.99 - 1.40)	1.05(0.92 - 1.20)	<b>1.18(1.01 - 1.37)</b>	1.02(0.89 - 1.18)
Quintile II	1.00(0.84 - 1.19)	0.99(0.87 - 1.13)	<b>1.06(0.91 - 1.24)</b>	1.00(0.87 - 1.14)
Quintile I (lowest)	1.00	1.00	1.00	1.00
<i>Proportion of rural population</i>				
Urban (<15%)	<b>0.75(0.67 - 0.85)</b>	<b>0.84(0.73 - 0.97)</b>	<b>0.81(0.72 - 0.90)</b>	<b>0.80(0.69 - 0.93)</b>
Intermediate (15-50%)	1.05(0.93 - 1.20)	1.11(0.99 - 1.25)	0.98(0.87 - 1.11)	0.94(0.83 - 1.06)
Rural (≥50%)	1.00	1.00	1.00	1.00