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Title: Burden of disease and treatment gap in patients with an osteoporotic hip fracture between 2015 and 2019 in Italy

Short title: Treatment gap and economic burden of osteoporotic hip fractures in Italy

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Table S1 – ICD9CM codes for excluded fractures (in the 12 months prior to index hip fracture)

ICD9CM Code	Fracture site	Description
805	Vertebral column, without	Cervical, closed
805,2		Dorsal [thoracic], closed
805,4		Lumbar, closed
805,8		Unspecified, closed
812	Fracture of humerus	Upper end, closed
812,2		Shaft or unspecified part, closed
812,4		Lower end, closed
813	Fracture of radius and ulna	Upper end, closed
813,2		Shaft, closed
813,4		Lower end of forearm, unspecified
813,41		Colles' fracture
813,42		Other fractures of distal end of radius (alone)
813,43		Distal end of ulna (alone)
813,44		Radius with ulna, lower end
813,8		Unspecified part, closed

Table S2 – ICD9CM codes for excluded bone related diseases

ICD9CM Code	Disease	Description
731	Osteitis deformans	Osteitis deformans without mention of bone tumor
731,1		Osteitis deformans in diseases classified elsewhere
730,7	Osteopathy	Osteopathy resulting from poliomyelitis
731,2		Hypertrophic pulmonary osteoarthropathy
731,3		Major osseous defects
731,8		Other bone involvement in diseases classified elsewhere
268,2	Osteomalacia	Osteomalacia, unspecified
252	Hyperparathyroidism	Hyperparathyroidism
588,81		Secondary hyperparathyroidism (of renal origin)
756,51	Osteogenesis imperfecta	Osteogenesis imperfecta

Table S3 – ATC codes for anti-osteoporotic drugs

Anti-osteoporotic drug	
Bisphosphonates (M05BA)	
Oral	
<i>etidronic acid</i>	M05BA01
<i>clodronic acid</i>	M05BA02
<i>pamidronic acid</i>	M05BA03
<i>alendronic acid</i>	M05BA04
<i>tiludronic acid</i>	M05BA05
<i>ibandronic acid</i>	M05BA06
<i>risedronic acid</i>	M05BA07
Intravenous	
<i>ibandronic acid</i>	M05BA06
<i>zoledronic acid</i>	M05BA08
Bisphosphonates, combinations (M05BB)	
<i>etidronic acid and calcium, sequential</i>	M05BB01
<i>risedronic acid and calcium, sequential</i>	M05BB02
<i>alendronic acid and colecalciferol</i>	M05BB03
<i>risedronic acid, calcium and colecalciferol, sequential</i>	M05BB04
<i>alendronic acid, calcium and colecalciferol, sequential</i>	M05BB05
<i>alendronic acid and alfacalcidol, sequential</i>	M05BB06
<i>risedronic acid and colecalciferol</i>	M05BB07
<i>zoledronic acid, calcium and colecalciferol, sequential</i>	M05BB08
<i>ibandronic acid and colecalciferol</i>	M05BB09
Bone morphogenetic proteins (M05BC)	
<i>dibotermín alfa</i>	M05BC01
<i>eptotermín alfa</i>	M05BC02
Other drugs affecting bone structure and mineralization (M05BX)	
<i>ipriflavone</i>	M05BX01
<i>aluminium chlorohydrate</i>	M05BX02
<i>strontium ranelate</i>	M05BX03
<i>denosumab</i>	M05BX04
<i>burosumab</i>	M05BX05
<i>romosozumab</i>	M05BX06
<i>strontium ranelate and colecalciferol</i>	M05BX53
Selective estrogen receptor modulators (G03XC)	
<i>raloxifene</i>	G03XC01
<i>bazedoxifene</i>	G03XC02
<i>lasofoxifene</i>	G03CC03
Systemic Hormonal Preparations. Calcium Homeostasis (H05)	
<i>teriparatide</i>	H05AA02
<i>calcitonins</i>	H05BA

Table S4 – ICD9CM codes for comorbidities

ICD9CM code	Disease
737,1	Kyphosis
715.x	Osteoarthritis
491.2, 496	Chronic obstructive pulmonary disease
571.2, 571.5, 571.6, 571.9	Liver cirrhosis
710	Lupus
340	Multiple sclerosis
714.x	Rheumatoid arthritis
720	Ankylosing spondylitis
555.x	Crohn's disease
556.0-556.4, 556.8, 558.x	Inflammatory bowel disease
696.0, 696.1, 696.9	Psoriasis
585.1, 585.2	Chronic kidney disease stage I-II
585.3, 585.4	Chronic kidney disease stage III-IV
585.5, 585.6	End stage renal disease
556.5, 556.6, 556.9	Ulcerative colitis
278	Obesity/overweight
277	Cystic fibrosis
390.x, 391.x	Rheumatic fever
574.x	Gallstones (cholelithiasis and choledolithiasis)
272.0, 272.2, 272.3, 272.4	Hyperlipidemia
250.x	Diabetes
272,1	Hypertroglyceridemia
493.x	Asthma
692.x	Eczema
477.x, 372.1, 691.x, 693.0, 708.0, 995.0, 995.2, 995.3, 782.1, 698.8, 698.9, 288.3, 708.9, E930–949	Allergic rhinitis, allergic conjunctivitis, allergic rash/skin eruption (atopic dermatitis), drug allergies
680–709	Dermatologic issues
268.x	Vitamin D deficiency
275,41	Hypocalcemia
252,1	Hypoparathyroidism
288	Neutropenia
256,4	Polycystic ovarian syndrome
211.3, 211.4	Colorectal polyps
990	Exposure to radium
06.2, 06.3, 06.5	Thyroidectomy
783.0, 307.1	Anorexia
303.x, 304.x, 305.x, 291.x, 968.5, 292.x, 648.30–648.34	Substance abuse
260, 261, 262, 263.x, 783.2, V85.0	Malnutrition / hypoalbuminemia

Table S5 – ATC codes for bone altering drugs other than OP treatment

Drug name	ATC code
Glucocorticoids	H02
<i>betamethasone</i>	H02AB01
<i>dexamethasone</i>	H02AB02
<i>fluocortolone</i>	H02AB03
<i>methylprednisolone</i>	H02AB04
<i>paramethasone</i>	H02AB05
<i>prednisolone</i>	H02AB06
<i>prednisone</i>	H02AB07
<i>triamcinolone</i>	H02AB08
<i>hydrocortisone</i>	H02AB09
<i>cortisone</i>	H02AB10
<i>prednylidene</i>	H02AB11
<i>rimexolone</i>	H02AB12
<i>deflazacort</i>	H02AB13
<i>cloprednol</i>	H02AB14
<i>meprednisone</i>	H02AB15
<i>cortivazol</i>	H02AB17
<i>combinations of glucocorticoids</i>	QH02AB30
<i>prednisolone, combinations</i>	QH02AB56
<i>prednisone, combinations</i>	QH02AB57
Proton pump inhibitors	A02BC
Anti-epileptic drugs	N03A
<i>barbiturate and derivatives</i>	N03AA
<i>hydantoin derivatives</i>	N03AB
<i>benzodiazepine derivatives</i>	N03AE
<i>carboxamide derivatives</i>	N03AF
<i>fatty acid derivatives</i>	N03AG
Loop diuretics	C03C
<i>Sulfonamides, plain</i>	C03CA
<i>Sulfonamides and potassium in combination</i>	C03CB
Anti-depressants	N06A
<i>non-selective monoamine reuptake inhibitors</i>	N06AA
<i>selective serotonin reuptake inhibitors</i>	N06AB
Thiazolidinediones	A10BG
Antiviral treatment for HIV infection	J05A
<i>protease inhibitors</i>	J05AE
<i>nucleoside and nucleotide reverse transcriptase inhibitors</i>	J05AF
<i>non-nucleoside reverse transcriptase inhibitors</i>	J05AG
<i>antivirals for treatment of hiv infections, combinations</i>	J05AR
Cyclosporin	L04AD01

Table S6 – Osteoporosis treatments prescribed in the 6 months following index OP hip fracture

Anti-osteoporotic drug	ATC code	Patients	
		n	%
Bisphosphonates (M05BA)			
Oral			
alendronic acid	M05BA04	1,688	57.6%
risedronic acid	M05BA07	397	13.5%
ibandronic acid	M05BA06	77	2.6%
clodronic acid	M05BA02	23	0.8%
etidronic acid	M05BA01	0	0.0%
pamidronic acid	M05BA03	0	0.0%
tiludronic acid	M05BA05	0	0.0%
Intravenous			
ibandronic acid	M05BA06	0	0.0%
zoledronic acid	M05BA08	0	0.0%
Bisphosphonates, combinations (M05BB)			
alendronic acid and colecalciferol	M05BB03	589	20.1%
alendronic acid and alfacalcidol, sequential	M05BB06	0	0.0%
alendronic acid, calcium and colecalciferol, sequential	M05BB05	0	0.0%
etidronic acid and calcium, sequential	M05BB01	0	0.0%
ibandronic acid and colecalciferol	M05BB09	0	0.0%
risedronic acid and calcium, sequential	M05BB02	0	0.0%
risedronic acid and colecalciferol	M05BB07	0	0.0%
risedronic acid, calcium and colecalciferol, sequential	M05BB04	0	0.0%
zoledronic acid, calcium and colecalciferol, sequential	M05BB08	0	0.0%
Bone morphogenetic proteins (M05BC)			
dibotermis alfa	M05BC01	0	0.0%
eptotermis alfa	M05BC02	0	0.0%
Other drugs affecting bone structure and mineralization (M05BX)			
denosumab	M05BX04	27	0.9%
strontium ranelate	M05BX03	3	0.1%
aluminium chlorohydrate	M05BX02	0	0.0%
burosumab	M05BX05	0	0.0%
ipriflavone	M05BX01	0	0.0%
romosozumab	M05BX06	0	0.0%
strontium ranelate and colecalciferol	M05BX53	0	0.0%
Selective estrogen receptor modulators (G03XC)			
bazedoxifene	G03XC02	0	0.0%
lasofoxifene	G03CC03	0	0.0%
raloxifene	G03XC01	0	0.0%
Systemic Hormonal Preparations. Calcium Homeostasis (H05)			
teriparatide	H05AA02	129	4.4%
calcitonins	H05BA	0	0.0%

