

The International Costs and Utilities Related to Osteoporotic Fractures Study (ICUROS)—quality of life during the first 4 months after fracture

Osteoporosis International

March 2013, Volume 24, Issue 3, pp 811–823 | Cite as

- F. Borgström (1) Email author (fredrik.borgstrom@quantifyresearch.com)
- I. Lekander (1)
- M. Ivergård (2)
- O. Ström (1)
- A. Svedbom (2)
- V. Alekna (3) (4)
- M. L. Bianchi (5)
- P. Clark (6)
- M. D. Curiel (7) (8)
- H. P. Dimai (9)
- M. Jürisson (10)
- R. Kallikorm (10)
- O. Lesnyak (11)
- E. McCloskey (12)
- E. Nasonov (13)
- K. M. Sanders (14)
- S. Silverman (15)
- M. Tamulaitiene (3)
- T. Thomas (16)
- A. N. A. Tosteson (17)
- B. Jönsson (18)
- J. A. Kanis (19)

1. LIME/MMC, Karolinska Institutet, Stockholm, Sweden
2. OptumInsight, Stockholm, Sweden
3. Faculty of Medicine, Vilnius University, Vilnius, Lithuania
4. State Research Institute Center for Innovative Medicine, Vilnius, Lithuania
5. Bone Metabolism Unit, Istituto Auxologico Italiano IRCCS, Milan, Italy
6. Clinical Epidemiology Unit, Hospital Infantil Federico Gómez and Faculty of Medicine, UNAM, Mexico City, Mexico
7. Servicio de Medicina Interna/Enfermedades Metabólicas Óseas, Fundación Jiménez Díaz, Madrid, Spain
8. Cátedra de Enfermedades Metabólicas Óseas, Universidad Autónoma, Madrid, Spain
9. Medical University of Graz, Graz, Austria
10. Faculty of Medicine, Tartu University, Tartu, Estonia
11. Ural State Medical Academy, Yekaterinburg, Russia

11. Otar State Medical Academy, Tskaltubo, Russia
12. Academic Unit of Bone Metabolism, Metabolic Bone Centre, University of Sheffield, Sheffield, UK
13. FSBI Research Institute of Rheumatology, RAMS, Moscow, Russia
14. Department of Medicine, NorthWest Academic Centre, The University of Melbourne, Western Health, Melbourne, Australia
15. Cedars-Sinai Medical Center, Los Angeles, USA
16. INSERM U1059, CHU-St-Etienne, Saint Etienne, France
17. The Dartmouth Institute for Health Policy and Clinical Practice, Geisel School of Medicine at Dartmouth, Lebanon, USA
18. Stockholm School of Economics, Stockholm, Sweden
19. WHO Collaborating Centre for Metabolic Bone Diseases, University of Sheffield, Sheffield, UK

Original Article

First Online: 10 January 2013

Received: 28 June 2012

Accepted: 17 October 2012

- 49 Citations

Abstract

Summary

The quality of life during the first 4 months after fracture was estimated in 2,808 fractured patients from 11 countries. Analysis showed that there were significant differences in the quality of life (QoL) loss between countries. Other factors such as QoL prior fracture and hospitalisation also had a significant impact on the QoL loss.

Introduction

The International Costs and Utilities Related to Osteoporotic Fractures Study (ICUROS) was initiated in 2007 with the objective of estimating costs and quality of life related to fractures in several countries worldwide. The ICUROS is ongoing and enrolls patients in 11 countries (Australia, Austria, Estonia, France, Italy, Lithuania, Mexico, Russia, Spain, UK and the USA). The objective of this paper is to outline the study design of ICUROS and present results regarding the QoL (measured using the EQ-5D) during the first 4 months after fracture based on the patients that have been thus far enrolled ICUROS.

Methods

ICUROS uses a prospective study design where data (costs and quality of life) are collected in four phases over 18 months after fracture. All countries use the same core case report forms. Quality of life was collected using the EQ-5D instrument and a time trade-off questionnaire.

Results

The total sample for the analysis was 2,808 patients (1,273 hip, 987 distal forearm and 548 vertebral fracture). For all fracture types and countries, the QoL was reduced significantly after fracture compared to pre-fracture QoL. A regression analysis showed that there were significant differences in the QoL loss between countries. Also, a higher level of QoL prior to the fracture significantly increased the QoL loss and patients who were hospitalised for their fracture also had a significantly higher loss compared to those who were not.

Conclusions

The findings in this study indicate that there appear to be important variations in the QoL decrements related to fracture between countries.

Keywords

Costs Fracture Osteoporosis Quality of life

Reference

1. Johnell O, Kanis JA (2004) An estimate of the worldwide prevalence, mortality and disability associated with hip fracture. *Osteoporos Int* 15:897–902
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=15490120) (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=15490120)
[CrossRef](https://doi.org/10.1007/s00198-004-1627-0) (<https://doi.org/10.1007/s00198-004-1627-0>)
[Google Scholar](http://scholar.google.com/scholar_lookup?title=An%20estimate%20of%20the%20worldwide%20prevalence%2C%20mortality%20and%20disability%20associated%20with%20hip%20fracture&author=O.%20Johnell&author=JA.%20Kanis&journal=Osteoporos%20Int&volume=15&pages=897-902&publication_year=2004) (http://scholar.google.com/scholar_lookup?title=An%20estimate%20of%20the%20worldwide%20prevalence%2C%20mortality%20and%20disability%20associated%20with%20hip%20fracture&author=O.%20Johnell&author=JA.%20Kanis&journal=Osteoporos%20Int&volume=15&pages=897-902&publication_year=2004)
2. Doherty DA, Sanders KM, Kotowicz MA, Prince RL (2001) Lifetime and five-year age-specific risks of first and subsequent osteoporotic fractures in postmenopausal women. *Osteoporos Int* 12:16–23
[PubMed](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11305078) (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11305078)
[CrossRef](https://doi.org/10.1007/s001980170152) (<https://doi.org/10.1007/s001980170152>)
[Google Scholar](http://scholar.google.com/scholar_lookup?title=Lifetime%20and%20five-year%20age-) (http://scholar.google.com/scholar_lookup?title=Lifetime%20and%20five-year%20age-

specific%20risks%20of%20first%20and%20subsequent%20osteoporotic%20fractures%20in%20postmenopausal%20women&author=DA.%20Doherty&author=K M.%20Sanders&author=MA.%20Kotowicz&author=RL.%20Prince&journal=Osteoporos%20Int&volume=12&pages=16-23&publication_year=2001)

3. Johnell O, Kanis J (2005) Epidemiology of osteoporotic fractures. *Osteoporos Int* 16(Suppl 2):S3–S7
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=15365697)
CrossRef (<https://doi.org/10.1007/s00198-004-1702-6>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Epidemiology%20of%20osteoporotic%20fractures&author=O.%20Johnell&author=J.%20Kanis&journal=Osteoporos%20Int&volume=16&issue=Suppl%202&pages=S3-S7&publication_year=2005)
4. Kanis JA, Johnell O, Oden A, Sembo I, Redlund-Johnell I, Dawson A, de Laet C, Jonsson B (2000) Long-term risk of osteoporotic fracture in Malmo. *Osteoporos Int* 11:669–74
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11095169)
CrossRef (<https://doi.org/10.1007/s001980070064>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Long-term%20risk%20of%20osteoporotic%20fracture%20in%20Malmo&author=JA.%20Kanis&author=O.%20Johnell&author=A.%20Oden&author=I.%20Sembo&author=I.%20Redlund-Johnell&author=A.%20Dawson&author=C.%20Laet&author=B.%20Jonsson&journal=Osteoporos%20Int&volume=11&pages=669-74&publication_year=2000)
5. Melton LJ III, Chrischilles EA, Cooper C, Lane AW, Riggs BL (1992) Perspective. How many women have osteoporosis? *J Bone Miner Res* 7:1005–10
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=1414493)
CrossRef (<https://doi.org/10.1002/jbmr.5650070902>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Perspective.%20How%20many%20women%20have%20osteoporosis%3F&author=LJ.%20Melton&author=EA.%20Chrischilles&author=C.%20Cooper&author=AW.%20Lane&author=BL.%20Riggs&journal=J%20Bone%20Miner%20Res&volume=7&pages=1005-10&publication_year=1992)
6. van Staa TP, Dennison EM, Leufkens HG, Cooper C (2001) Epidemiology of fractures in England and Wales. *Bone* 29:517–22
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11728921)
CrossRef ([https://doi.org/10.1016/S8756-3282\(01\)00614-7](https://doi.org/10.1016/S8756-3282(01)00614-7))
Google Scholar (http://scholar.google.com/scholar_lookup?title=Epidemiology%20of%20fractures%20in%20England%20and%20Wales&author=TP.%20Staa&author=EM.%20Dennison&author=HG.%20Leufkens&author=C.%20Cooper&journal=Bone&volume=29&pages=517-22&publication_year=2001)
7. Ström O, Borgstrom F, Kanis J, Compston J, Cooper C, McCloskey EV, Jönsson B (2011) Osteoporosis: burden, health care provision and opportunities in the EU. *Arch Osteoporos* 6(1–2):59–155

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=22886101)
CrossRef (<https://doi.org/10.1007/s11657-011-0060-1>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Osteoporosis%3A%20burden%2C%20health%20care%20provision%20and%20opportunities%20in%20the%20EU&author=O.%20Str%C3%B6m&author=F.%20Borgstrom&author=J.%20Kanis&author=J.%20Compston&author=C.%20Cooper&author=EV.%20McCloskey&author=B.%20J%C3%B6nsson&journal=Arch%20Osteoporos&volume=6&issue=1&E2%80%93&pages=59-155&publication_year=2011)

8. Ström O, Borgstrom F, Zethraeus N, Johnell O, Lidgren L, Ponzer S, Svensson O, Abdon P, Ornstein E, Ceder L, Thorngren KG, Sernbo I, Jonsson B (2008) Long-term cost and effect on quality of life of osteoporosis-related fractures in Sweden. *Acta Orthop* 79:269–80

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=18484255)
CrossRef (<https://doi.org/10.1080/17453670710015094>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Long-term%20cost%20and%20effect%20on%20quality%20of%20life%20of%20osteoporosis-related%20fractures%20in%20Sweden&author=O.%20Str%C3%B6m&author=F.%20Borgstrom&author=N.%20Zethraeus&author=O.%20Johnell&author=L.%20Lidgren&author=S.%20Ponzer&author=O.%20Svensson&author=P.%20Abdon&author=E.%20Ornstein&author=L.%20Ceder&author=KG.%20Thorngren&author=I.%20Sernbo&author=B.%20Jonsson&journal=Acta%20Orthop&volume=79&pages=269-80&publication_year=2008)

9. Borgstrom F, Zethraeus N, Johnell O, Lidgren L, Ponzer S, Svensson O, Abdon P, Ornstein E, Lunsjo K, Thorngren KG, Sernbo I, Rehnberg C, Jonsson B (2006) Costs and quality of life associated with osteoporosis-related fractures in Sweden. *Osteoporos Int* 17:637–50

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=16283064)
CrossRef (<https://doi.org/10.1007/s00198-005-0015-8>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Costs%20and%20quality%20of%20life%20associated%20with%20osteoporosis-related%20fractures%20in%20Sweden&author=F.%20Borgstrom&author=N.%20Zethraeus&author=O.%20Johnell&author=L.%20Lidgren&author=S.%20Ponzer&author=O.%20Svensson&author=P.%20Abdon&author=E.%20Ornstein&author=K.%20Lunsjo&author=KG.%20Thorngren&author=I.%20Sernbo&author=C.%20Rehnberg&author=B.%20Jonsson&journal=Osteoporos%20Int&volume=17&pages=637-50&publication_year=2006)

10. Dolan P (1997) Modeling valuations for EuroQol health states. *Med Care* 35:1095–108

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9366889)
CrossRef (<https://doi.org/10.1097/00005650-199711000-00002>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Modeling%20valuations%20for%20EuroQol%20health%20states&author=P)

.%20Dolan&journal=Med%20Care&volume=35&pages=1095-108&publication_year=1997)

11. Walters SJ (2009) Quality of life outcomes in clinical trials and health-care evaluation: a practical guide to analysis and interpretation. Wiley, Chichester
Google Scholar (http://scholar.google.com/scholar_lookup?title=Quality%20of%20life%20outcomes%20in%20clinical%20trials%20and%20health-care%20evaluation%3A%20a%20practical%20guide%20to%20analysis%20and%20interpretation&author=SJ.%20Walters&publication_year=2009)
12. Brazier JE, Green C, Kanis JA (2002) A systematic review of health state utility values for osteoporosis-related conditions. *Osteoporos Int* 13:768–76
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12378365)
CrossRef (<https://doi.org/10.1007/s001980200107>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=A%20systematic%20review%20of%20health%20state%20utility%20values%20for%20osteoporosis-related%20conditions&author=JE.%20Brazier&author=C.%20Green&author=JA.%20Kanis&journal=Osteoporos%20Int&volume=13&pages=768-76&publication_year=2002)
13. Brenneman SK, Barrett-Connor E, Sajjan S, Markson LE, Siris ES (2006) Impact of recent fracture on health-related quality of life in postmenopausal women. *J Bone Miner Res* 21:809–16
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=16753011)
CrossRef (<https://doi.org/10.1359/jbmr.060301>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Impact%20of%20recent%20fracture%20on%20health-related%20quality%20of%20life%20in%20postmenopausal%20women&author=SK.%20Brenneman&author=E.%20Barrett-Connor&author=S.%20Sajjan&author=LE.%20Markson&author=ES.%20Siris&journal=J%20Bone%20Miner%20Res&volume=21&pages=809-16&publication_year=2006)
14. Gabriel SE, Kneeland TS, Melton LJ III, Moncur MM, Ettinger B, Tosteson AN (1999) Health-related quality of life in economic evaluations for osteoporosis: whose values should we use? *Med Decis Making* 19:141–48
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=10231076)
CrossRef (<https://doi.org/10.1177/0272989X9901900204>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Health-related%20quality%20of%20life%20in%20economic%20evaluations%20for%20osteoporosis%3A%20whose%20values%20should%20owe%20use%3F&author=SE.%20Gabriel&author=TS.%20Kneeland&author=LJ.%20Melton&author=MM.%20Moncur&author=B.%20Ettinger&author=AN.%20Tosteson&journal=Med%20Decis%20Making&volume=19&pages=141-48&publication_year=1999)
15. Oleksik A, Lips P, Dawson A, Minshall ME, Shen W, Cooper C, Kanis J (2000) Health-related quality of life in postmenopausal women with low BMD with or without prevalent vertebral fractures. *J Bone Miner Res* 15:1384–92

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=10893688)
CrossRef (<https://doi.org/10.1359/jbmr.2000.15.7.1384>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Health-related%20quality%20of%20life%20in%20postmenopausal%20women%20with%20low%20BMD%20with%20or%20without%20prevalent%20vertebral%20fractures&author=A.%20Oleksik&author=P.%20Lips&author=A.%20Dawson&author=ME.%20Minshall&author=W.%20Shen&author=C.%20Cooper&author=J.%20Kanis&journal=J%20Bone%20Miner%20Res&volume=15&pages=1384-92&publication_year=2000)

16. Peasgood T, Herrmann K, Kanis JA, Brazier JE (2009) An updated systematic review of Health State Utility Values for osteoporosis related conditions. *Osteoporos Int* 20:853–68
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=19271098)
CrossRef (<https://doi.org/10.1007/s00198-009-0844-y>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=An%20updated%20systematic%20review%20of%20Health%20State%20Utility%20Values%20for%20osteoporosis%20related%20conditions&author=T.%20Peasgood&author=K.%20Herrmann&author=JA.%20Kanis&author=JE.%20Brazier&journal=Osteoporos%20Int&volume=20&pages=853-68&publication_year=2009)
17. Salaffi F, Cimmino MA, Malavolta N, Carotti M, Di ML, Scendoni P, Grassi W (2007) The burden of prevalent fractures on health-related quality of life in postmenopausal women with osteoporosis: the IMOF study. *J Rheumatol* 34:1551–60
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=17516618)
Google Scholar (http://scholar.google.com/scholar_lookup?title=The%20burden%20of%20prevalent%20fractures%20on%20health-related%20quality%20of%20life%20in%20postmenopausal%20women%20with%20osteoporosis%20the%20IMOF%20study&author=F.%20Salaffi&author=MA.%20Cimmino&author=N.%20Malavolta&author=M.%20Carotti&author=ML.%20Di&author=P.%20Scendoni&author=W.%20Grassi&journal=J%20Rheumatol&volume=34&pages=1551-60&publication_year=2007)
18. Tidermark J, Zethraeus N, Svensson O, Tornkvist H, Ponzer S (2002) Quality of life related to fracture displacement among elderly patients with femoral neck fractures treated with internal fixation. *J Orthop Trauma* 16:34–38
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11782631)
CrossRef (<https://doi.org/10.1097/00005131-200201000-00008>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Quality%20of%20life%20related%20to%20fracture%20displacement%20among%20elderly%20patients%20with%20femoral%20neck%20fractures%20treated%20with%20internal%20fixation&author=J.%20Tidermark&author=N.%20Zethraeus&author=O.%20Svensson&author=H.%20Tornkvist&author=S.%20Ponzer&journal=J%20Orthop%20Trauma&volume=16&pages=34-38&publication_year=2002)

19. Tosteson AN, Gabriel SE, Grove MR, Moncur MM, Kneeland TS, Melton LJ III (2001) Impact of hip and vertebral fractures on quality-adjusted life years. *Osteoporos Int* 12:1042–49
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11846331)
CrossRef (<https://doi.org/10.1007/s001980170015>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Impact%20of%20hip%20and%20vertebral%20fractures%20on%20quality-adjusted%20life%20years&author=AN.%20Tosteson&author=SE.%20Gabriel&author=MR.%20Grove&author=MM.%20Moncur&author=TS.%20Kneeland&author=LJ.%20Melton&journal=Osteoporos%20Int&volume=12&pages=1042-49&publication_year=2001)
20. Zethraeus N, Borgström F, Johnell O, Kanis J, Jönsson B (2002) Costs and quality of life associated with osteoporosis related fractures—results from a Swedish survey. *Working Paper Series in Economics and Finance*, no. 512
Google Scholar (<https://scholar.google.com/scholar?q=Zethraeus%20N%2C%20Borgstr%C3%B6m%20F%2C%20Johnell%20O%2C%20Kanis%20J%2C%20J%C3%B6nsson%20B%20%282002%29%20Costs%20and%20quality%20of%20life%20associated%20with%20osteoporosis%20related%20fractures%20E2%80%94results%20from%20a%20Swedish%20survey.%20Working%20Paper%20Series%20in%20Economics%20and%20Finance%2C%20no.%20512>)
21. Hagino H, Nakamura T, Fujiwara S, Oeki M, Okano T, Teshima R (2009) Sequential change in quality of life for patients with incident clinical fractures: a prospective study. *Osteoporos Int* 20:695–702
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=18836672)
CrossRef (<https://doi.org/10.1007/s00198-008-0761-5>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Sequential%20change%20in%20quality%20of%20life%20for%20patients%20with%20incident%20clinical%20fractures%3A%20a%20prospective%20study&author=H.%20Hagino&author=T.%20Nakamura&author=S.%20Fujiwara&author=M.%20Oeki&author=T.%20Okano&author=R.%20Teshima&journal=Osteoporos%20Int&volume=20&pages=695-702&publication_year=2009)
22. Szende A, Oppe M, Devlin N (2007) EQ-5D value sets: inventory, comparative review and user guide. Springer, Dordrecht
CrossRef (<https://doi.org/10.1007/1-4020-5511-0>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=EQ-5D%20value%20sets%3A%20inventory%2C%20comparative%20review%20and%20user%20guide&author=A.%20Szende&author=M.%20Oppe&author=N.%20Devlin&publication_year=2007)
23. Fryback DG, Dunham NC, Palta M, Hanmer J, Buechner J, Cherepanov D, Herrington SA, Hays RD, Kaplan RM, Ganiats TG, Feeny D, Kind P (2007) US norms for six generic health-related quality-of-life indexes from the National Health Measurement study. *Med Care* 45:1162–70
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=18007166)
CrossRef (<https://doi.org/10.1097/MLR.0b013e31814848f1>)

Google Scholar (http://scholar.google.com/scholar_lookup?title=US%20norms%20for%20six%20generic%20health-related%20quality-of-life%20indexes%20from%20the%20National%20Health%20Measurement%20study&author=DG.%20Fryback&author=NC.%20Dunham&author=M.%20Palta&author=J.%20Hanmer&author=J.%20Buechner&author=D.%20Cherepanov&author=SA.%20Herrington&author=RD.%20Hays&author=RM.%20Kaplan&author=TG.%20Ganiats&author=D.%20Feeny&author=P.%20Kind&journal=Med%20Care&volume=45&pages=1162-70&publication_year=2007)

24. Knies S, Evers SM, Candel MJ, Severens JL, Ament AJ (2009) Utilities of the EQ-5D: transferable or not? *Pharmacoeconomics* 27:767–79
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=19757870)
CrossRef (<https://doi.org/10.2165/11314120-000000000-00000>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Utilities%20of%20the%20EQ-5D%3A%20transferable%20or%20not%3F&author=S.%20Knies&author=SM.%20Evers&author=MJ.%20Candel&author=JL.%20Severens&author=AJ.%20Ament&journal=Pharmacoeconomics&volume=27&pages=767-79&publication_year=2009)
25. Hiligsmann M, Ethgen O, Richy F, Reginster JY (2008) Utility values associated with osteoporotic fracture: a systematic review of the literature. *Calcif Tissue Int* 82:288–92
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=18404243)
CrossRef (<https://doi.org/10.1007/s00223-008-9117-6>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Utility%20values%20associated%20with%20osteoporotic%20fracture%3A%20a%20systematic%20review%20of%20the%20literature&author=M.%20Hiligsmann&author=O.%20Ethgen&author=F.%20Richy&author=JY.%20Reginster&journal=Calcif%20Tissue%20Int&volume=82&pages=288-92&publication_year=2008)
26. Boonen S, Singer AJ (2008) Osteoporosis management: impact of fracture type on cost and quality of life in patients at risk for fracture I. *Curr Med Res Opin* 24:1781–88
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=18489813)
CrossRef (<https://doi.org/10.1185/03007990802115796>)
Google Scholar (http://scholar.google.com/scholar_lookup?title=Osteoporosis%20management%3A%20impact%20of%20fracture%20type%20on%20cost%20and%20quality%20of%20life%20in%20patients%20at%20risk%20for%20fracture%20I&author=S.%20Boonen&author=AJ.%20Singer&journal=Curr%20Med%20Res%20Opin&volume=24&pages=1781-88&publication_year=2008)
27. Suzuki N, Ogikubo O, Hansson T (2010) Previous vertebral compression fractures add to the deterioration of the disability and quality of life after an acute compression fracture. *Eur Spine J* 19:567–74
PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=19760437)

CrossRef (<https://doi.org/10.1007/s00586-009-1162-y>)

Google Scholar ([http://scholar.google.com/scholar_lookup?](http://scholar.google.com/scholar_lookup?title=Previous%20vertebral%20compression%20fractures%20add%20to%20the%20deterioration%20of%20the%20disability%20and%20quality%20of%20life%20after%20an%20acute%20compression%20fracture&author=N.%20Suzuki&author=O.%20Ogikubo&author=T.%20Hansson&journal=Eur%20Spine%20J&volume=19&pages=567-74&publication_year=2010)

[title=Previous%20vertebral%20compression%20fractures%20add%20to%20the%20deterioration%20of%20the%20disability%20and%20quality%20of%20life%20after%20an%20acute%20compression%20fracture&author=N.%20Suzuki&author=O.%20Ogikubo&author=T.%20Hansson&journal=Eur%20Spine%20J&volume=19&pages=567-74&publication_year=2010](http://scholar.google.com/scholar_lookup?title=Previous%20vertebral%20compression%20fractures%20add%20to%20the%20deterioration%20of%20the%20disability%20and%20quality%20of%20life%20after%20an%20acute%20compression%20fracture&author=N.%20Suzuki&author=O.%20Ogikubo&author=T.%20Hansson&journal=Eur%20Spine%20J&volume=19&pages=567-74&publication_year=2010))

28. Cockerill W, Lunt M, Silman AJ, Cooper C, Lips P, Bhalla AK, Cannata JB, Eastell R, Felsenberg D, Gennari C, Johnell O, Kanis JA, Kiss C, Masaryk P, Naves M, Poor G, Raspe H, Reid DM, Reeve J, Stepan J, Todd C, Woolf AD, O'Neill TW (2004) Health-related quality of life and radiographic vertebral fracture.

Osteoporos Int 15:113–19

PubMed ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=14618303)

[cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=14618303](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=14618303))

CrossRef (<https://doi.org/10.1007/s00198-003-1547-4>)

Google Scholar (http://scholar.google.com/scholar_lookup?title=Health-related%20quality%20of%20life%20and%20radiographic%20vertebral%20fracture&author=W.%20Cockerill&author=M.%20Lunt&author=AJ.%20Silman&author=C.%20Cooper&author=P.%20Lips&author=AK.%20Bhalla&author=JB.%20Cannata&author=R.%20Eastell&author=D.%20Felsenberg&author=C.%20Gennari&author=O.%20Johnell&author=JA.%20Kanis&author=C.%20Kiss&author=P.%20Masaryk&author=M.%20Naves&author=G.%20Poor&author=H.%20Raspe&author=DM.%20Reid&author=J.%20Reeve&author=J.%20Stepan&author=C.%20Todd&author=AD.%20Woolf&author=TW.%20O'Neill&journal=Osteoporos%20Int&volume=15&pages=113-19&publication_year=2004)

29. Zethraeus N, Stromberg L, Jonsson B, Svensson O, Ohlen G (1997) The cost of a hip fracture. Estimates for 1,709 patients in Sweden. *Acta Orthop Scand* 68:13–17

PubMed ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9057561)

[cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9057561](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9057561))

CrossRef (<https://doi.org/10.3109/17453679709003968>)

Google Scholar ([http://scholar.google.com/scholar_lookup?](http://scholar.google.com/scholar_lookup?title=The%20cost%20of%20a%20hip%20fracture.%20Estimates%20for%201%20709%20patients%20in%20Sweden&author=N.%20Zethraeus&author=L.%20Stromberg&author=B.%20Jonsson&author=O.%20Svensson&author=G.%20Ohlen&journal=Acta%20Orthop%20Scand&volume=68&pages=13-17&publication_year=1997)

[title=The%20cost%20of%20a%20hip%20fracture.%20Estimates%20for%201%20709%20patients%20in%20Sweden&author=N.%20Zethraeus&author=L.%20Stromberg&author=B.%20Jonsson&author=O.%20Svensson&author=G.%20Ohlen&journal=Acta%20Orthop%20Scand&volume=68&pages=13-17&publication_year=1997](http://scholar.google.com/scholar_lookup?title=The%20cost%20of%20a%20hip%20fracture.%20Estimates%20for%201%20709%20patients%20in%20Sweden&author=N.%20Zethraeus&author=L.%20Stromberg&author=B.%20Jonsson&author=O.%20Svensson&author=G.%20Ohlen&journal=Acta%20Orthop%20Scand&volume=68&pages=13-17&publication_year=1997))

30. Zethraeus N, Gerdtham UG (1998) Estimating the costs of hip fracture and potential savings. *Int J Technol Assess Health Care* 14:255–67

PubMed ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9611901)

[cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9611901](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=9611901))

CrossRef (<https://doi.org/10.1017/S026646230001223X>)

Google Scholar ([http://scholar.google.com/scholar_lookup?](http://scholar.google.com/scholar_lookup?title=Estimating%20the%20costs%20of%20hip%20fracture%20and%20potential%20savings&author=N.%20Zethraeus&author=UG.%20Gerdtham&journal=Int%20J%20Technol%20Assess%20Health%20Care&volume=14&pages=255-67&publication_year=1998)

[title=Estimating%20the%20costs%20of%20hip%20fracture%20and%20potential%20savings&author=N.%20Zethraeus&author=UG.%20Gerdtham&journal=Int%20J%20Technol%20Assess%20Health%20Care&volume=14&pages=255-67&publication_year=1998](http://scholar.google.com/scholar_lookup?title=Estimating%20the%20costs%20of%20hip%20fracture%20and%20potential%20savings&author=N.%20Zethraeus&author=UG.%20Gerdtham&journal=Int%20J%20Technol%20Assess%20Health%20Care&volume=14&pages=255-67&publication_year=1998))

31. Gruber-Baldini AL, Zimmerman S, Morrison RS, Grattan LM, Hebel JR, Dolan MM, Hawkes W, Magaziner J (2003) Cognitive impairment in hip fracture

patients: timing of detection and longitudinal follow-up. *J Am Geriatr Soc* 51:1227–36

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12919234)

CrossRef (<https://doi.org/10.1046/j.1532-5415.2003.51406.x>)

Google Scholar ([http://scholar.google.com/scholar_lookup?title=Cognitive%20impairment%20in%20hip%20fracture%20patients%3A%20timing%20of%20detection%20and%20longitudinal%20follow-up&author=AL.%20Gruber-](http://scholar.google.com/scholar_lookup?title=Cognitive%20impairment%20in%20hip%20fracture%20patients%3A%20timing%20of%20detection%20and%20longitudinal%20follow-up&author=AL.%20Gruber-Baldini&author=S.%20Zimmerman&author=RS.%20Morrison&author=LM.%20Grattan&author=JR.%20Hebel&author=MM.%20Dolan&author=W.%20Hawkes&author=J.%20Magaziner&journal=J%20Am%20Geriatr%20Soc&volume=51&pages=1227-36&publication_year=2003)

[Baldini&author=S.%20Zimmerman&author=RS.%20Morrison&author=LM.%20Grattan&author=JR.%20Hebel&author=MM.%20Dolan&author=W.%20Hawkes&author=J.%20Magaziner&journal=J%20Am%20Geriatr%20Soc&volume=51&pages=1227-36&publication_year=2003](http://scholar.google.com/scholar_lookup?title=Cognitive%20impairment%20in%20hip%20fracture%20patients%3A%20timing%20of%20detection%20and%20longitudinal%20follow-up&author=AL.%20Gruber-Baldini&author=S.%20Zimmerman&author=RS.%20Morrison&author=LM.%20Grattan&author=JR.%20Hebel&author=MM.%20Dolan&author=W.%20Hawkes&author=J.%20Magaziner&journal=J%20Am%20Geriatr%20Soc&volume=51&pages=1227-36&publication_year=2003))

32. Givens JL, Sanft TB, Marcantonio ER (2008) Functional recovery after hip fracture: the combined effects of depressive symptoms, cognitive impairment, and delirium. *J Am Geriatr Soc* 56:1075–79

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=18422945)

CrossRef (<https://doi.org/10.1111/j.1532-5415.2008.01711.x>)

Google Scholar (http://scholar.google.com/scholar_lookup?title=Functional%20recovery%20after%20hip%20fracture%3A%20the%20combined%20effects%20of%20depressive%20symptoms%2C%20cognitive%20impairment%2C%20and%20delirium&author=JL.%20Givens&author=TB.%20Sanft&author=ER.%20Marcantonio&journal=J%20Am%20Geriatr%20Soc&volume=56&pages=1075-79&publication_year=2008)

33. Adunsky A, Levy R, Heim M, Mizrahi E, Arad M (2003) The unfavorable nature of preoperative delirium in elderly hip fractured patients. *Arch Gerontol Geriatr* 36:67–74

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=12849100)

CrossRef ([https://doi.org/10.1016/S0167-4943\(02\)00058-4](https://doi.org/10.1016/S0167-4943(02)00058-4))

Google Scholar (http://scholar.google.com/scholar_lookup?title=The%20unfavorable%20nature%20of%20preoperative%20delirium%20in%20elderly%20hip%20fractured%20patients&author=A.%20Adunsky&author=R.%20Levy&author=M.%20Heim&author=E.%20Mizrahi&author=M.%20Arad&journal=Arch%20Gerontol%20Geriatr&volume=36&pages=67-74&publication_year=2003)

34. Holmes J, House A (2000) Psychiatric illness in hip fracture. *Age Ageing* 29:537–46

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=11191247)

CrossRef (<https://doi.org/10.1093/ageing/29.6.537>)

Google Scholar (http://scholar.google.com/scholar_lookup?title=Psychiatric%20illness%20in%20hip%20fracture&author=J.%20Holmes&author=A.%20House&journal=Age%20Ageing&volume=29&pages=537-46&publication_year=2000)

35. Formiga F, Lopez-Soto A, Duaso E, Ruiz D, Chivite D, Perez-Castejon JM, Navarro M, Pujol R (2007) Differences in the characteristics of elderly patients suffering

from hip fracture due to falls according to place of residence. J Am Med Dir Assoc 8:533–37

PubMed (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Abstract&list_uids=17931578)

CrossRef (<https://doi.org/10.1016/j.jamda.2007.06.007>)

Google Scholar (http://scholar.google.com/scholar_lookup?title=Differences%20in%20the%20characteristics%20of%20elderly%20patients%20suffering%20from%20hip%20fracture%20due%20to%20falls%20according%20to%20place%20of%20residence&author=F.%20Formiga&author=A.%20Lopez-Soto&author=E.%20Duaso&author=D.%20Ruiz&author=D.%20Chivite&author=JM.%20Perez-Castejon&author=M.%20Navarro&author=R.%20Pujol&journal=J%20Am%20Med%20Dir%20Assoc&volume=8&pages=533-37&publication_year=2007)

Copyright information

© International Osteoporosis Foundation and National Osteoporosis Foundation 2013

About this article

Cite this article as:

Borgström, F., Lekander, I., Ivergård, M. et al. Osteoporos Int (2013) 24: 811. <https://doi.org/10.1007/s00198-012-2240-2>

- DOI (Digital Object Identifier) <https://doi.org/10.1007/s00198-012-2240-2>
- Publisher Name Springer-Verlag
- Print ISSN 0937-941X
- Online ISSN 1433-2965
- About this journal
- Reprints and Permissions



- Published in cooperation with

The International Osteoporosis Foundation



- Published in cooperation with

The National Osteoporosis Foundation

Personalised recommendations

1. [Beyond bone mineral density, FRAX-based tailor-made intervention thresholds for therapeutic decision in subjects on glucocorticoid](#)
Yu, Shan-Fu... Cheng, Tien-Tsai
Medicine (2017)
2. [Cost-Effectiveness of Intervention Thresholds for the Treatment of Osteoporosis Based on FRAX® in Portugal](#)
Marques, Andréa... da Silva, José António P.
Calcified Tissue International (2016)
3. [The impact of comorbidities on costs, utilities and health-related quality of life among HIV patients in a clinical setting in Bogotá](#)
Van Duin, Mark JM... Hiligsmann, Mickaël
Expert Review of Pharmacoeconomics & Outcomes Research (2016)

Want recommendations via email? [Sign up now](#)

Powered by: **Recommended** 

SPRINGER NATURE

© 2017 Springer International Publishing AG. Part of [Springer Nature](#).

Not logged in Servicios de Atencion Psiquiatrica (3001211942) - Comision Nacional de Bioetica (3001395162) - CONRICYT Trial (3002001097) 187.210.186.200