

# Establishment of Fracture Liaison Service in Korea: Where Is It Stand and Where Is It Going?

Yong Han Cha<sup>1</sup>, Yong-Chan Ha<sup>2</sup>, Jae-Young Lim<sup>3</sup>

<sup>1</sup>Department of Orthopaedic Surgery, Eulji University Hospital, Daejeon;

<sup>2</sup>Department of Orthopaedic Surgery, Chung-Ang University College of Medicine, Seoul;

<sup>3</sup>Department of Rehabilitation, Seoul National University Bundang Hospital, Seoul National University College of Medicine, Seongnam, Korea

## Corresponding author

Yong-Chan Ha

Department of Orthopaedic Surgery, Chung-Ang University College of Medicine,  
102 Heukseok-ro, Dongjak-gu, Seoul 06973,  
Korea

Tel: +82-2-6299-1577

Fax: +82-2-822-1710

E-mail: hayongch@naver.com

Received: October 30, 2019

Revised: November 9, 2019

Accepted: November 10, 2019

The elderly population growth rate is extremely high in Korean society, and life expectancy is close to 85 years old for women and 80 for men as of people born in 2015. The future hip fracture prediction model of Korea shows that the elderly hip fracture rate will increase by 1.4 times by 2025, which will impose a serious socioeconomic burden on Korean society and become a key issue of public health management. The fracture liaison service (FLS) is defined adequate treatment and services for patients over 50 years old with fragility fractures, enabling systematic identification and decreasing the risk of subsequent osteoporotic fractures. In Korean society, the introduction of FLS, which is verified not only in the socioeconomic aspects but also in the treatment of patients, is thought to be essential. However, the challenges that need to be addressed in order to implement FLS include the lack of awareness regarding the necessity of this system, the lack of healthcare systems, and inadequate policies. In the future, further studies on the FLS and its clinical and socioeconomic effects for the Korean medical system will be necessary.

**Key Words:** Hip fractures · Osteoporotic fractures · Secondary prevention

## NECESSITY OF FRACTURE LIAISON SERVICE

The longer human lifespan arising from socioeconomic changes and advancements in the medical field has led to an explosive increase in the number of diseases affecting the geriatric population. Osteoporosis is one of the common bone metabolic diseases. Osteoporosis is associated with various comorbidities of the elderly and the medications used to treat these can affect one another and worsen the patient's condition; in some cases, it may result in osteoporotic fractures.[1-3] Compared to other fractures, hip fracture tends to have more severe consequences in the elderly hip fracture; it has high mortality and morbidity.[4] Although the risk varies depending on the characteristics of each study subject and the surgical method, one meta-analysis reports a 1-year cumulative mortality rate of hip fracture from 5.9% to 59%.[5] Many studies have reported increased hip fractures in the aging population and 50% of hip fractures are expected to occur in Asia by 2050.[6-8]

Copyright © 2019 The Korean Society for Bone and Mineral Research

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

This pattern is now commonly observed in Korean society.[8] Compared to other Organization for Economic Cooperation and Development (OECD) countries, the elderly population growth rate is extremely high, and life expectancy is close to 85 years old for women and 80 for men as of people born in 2015.[9] The first National Health Insurance Comprehensive Plan announced by the Ministry of Health and Welfare in 2018 also reports that the number of the elderly aged 65 or over was close to 7 million in 2017, and the medical expenses for the elderly amount to nearly 30 trillion won.[10] Accordingly, the growth of medical expenditure is also high compared to OECD countries. A study by Ha et al.[8] in 2016 reported using their future hip fracture prediction model, which takes into account the past incidence of elderly hip fracture, indicating that the elderly hip fracture rate will increase by 1.4 times by 2025, which will impose a serious socioeconomic burden on Korean society and become a key issue of public health management.

However, the rate of drug treatment to prevent osteoporotic fractures in Korea is not high. At age 50 and older, the prevalence of osteoporosis amounts to 22.4%, but their use of medical institutions is only 60%, and osteoporosis drug use is only 34%.[11] In addition, 66% of patients discontinued medication after 1 year even if they started medication treatment. The reasons for the low rate of osteoporosis treatment to prevent osteoporotic fractures can be classified into 3 categories.[12] The first is a problem of the medical system itself, in which communication between primary care physicians and medical systems of each department is not executed smoothly. The second is a problem related to patients such as the lack of knowledge about osteoporosis drug treatment and prevention of osteoporotic fractures and the cost and side effects of osteoporosis drugs. Third, there are physician-related factors including overlooking the importance of osteoporosis drug use, lack of knowledge of effective drug use method, and lack of time to ensure their patients fully understand the main issues in osteoporotic fractures.

Various efforts have been reported to increase the number of osteoporosis drug prescriptions and patient use of the medications. Yuksel et al.[13] reported a community pharmacist-initiated screening program that checked whether patients received osteoporosis examinations and appropriate drug prescription when the patients visited a hospital. Bessette et al.[14] reported an almost doubled in-

crease in prescriptions after an educational intervention for the diagnosis and treatment of osteoporosis after fragility fractures.

Edwards et al.[15] performed an electronic medical record-based intervention to improve the treatment of osteoporosis. Kim et al.[16] reported that the osteoporosis-related knowledge and experience of orthopedic surgeons could increase the osteoporosis treatment rate after hip fracture. Although these interventions have good effects, they do not complement all of the previously mentioned patient education-related and healthcare system-related problems. We need a change to develop a more fundamental system, and the fracture liaison service (FLS) is expected to bring about such change.

## THE DEFINITION AND COMPOSITION OF FRACTURE LIAISON SERVICE

The FLS provides adequate treatment and services for patients over 50 years old with fragility fractures, enabling systematic identification and decreasing the risk of subsequent osteoporotic fractures.[17] In addition, for the secondary prevention of osteoporotic fractures, identifying fracture patients among in-patients and out-patients is necessary and multi-disciplinary services should be provided for performing diagnostic tests and providing treatments.

Of course, it is ideal to prevent all osteoporotic fractures in advance, but its cost effectiveness should be considered. Therefore, we should target hip fractures among the secondary fractures. Hip fractures have higher mortality and morbidity than other types of fractures, and the after-effect of the fractures persist.[4,17] According to the report by Kim et al.[18], the medical cost per capita of hip fractures in Korea is about twice that of vertebral fractures.

The annual social costs of hip fracture treatment are estimated to be \$12 billion in the United States and £1.7 billion in the United Kingdom.[19] Osteoporotic fractures tend to show a recurrence with increasing age.[17] In this regard, the osteoporotic fractures that occurred before this fracture can be called signal fractures and be considered as an opportunity to perform preventive evaluation and intervention for subsequent fractures.[20] Moreover, 50% of patients who have had hip fractures reported having other fractures before their hip fracture.[21,22] This means that if an intervention is performed to prevent the second frac-

ture after the first fracture, about half of all hip fracture patients would receive an intervention.

The FLS consists of 3 parts: primary treatment, secondary prevention, database construction and feedback.[17] Primary treatment is an evaluation of the fracture that occurred and evaluating any other underlying diseases and then performing early rehabilitation after surgical treatment. Secondary prevention refers to rehabilitation, nutritional management, and underlying disease management to prevent re-fracture by focusing on the evaluation of osteoporosis and medication treatment. These 2 interventions are performed consecutively or simultaneously, and setting a boundary between them is not straightforward. Primary treatment and secondary prevention are performed in accordance with various protocols, and to enhance the effect and compensate for the shortcomings of this protocol, the database construction and the result analysis through the database can be feedback to supplement and change this system. Depending on the size of the database and FLS, it can be divided into a local, regional, and national FLS.

The members of the FLS are diverse, and include patients, orthopedic surgeons, radiologists, geriatricians, primary care physicians, and rehabilitation therapists. Although, the most important member would be the coordinators. [17] Previous studies called them various names such as case manager,[23,24] fracture nurse,[25] and nurse clinicians.[26] The key roles cover an extensive range and include the following: explanation for the need of osteoporosis evaluation and management, identification of patients, building casual links among patients, patients assessment, encouraging patients to follow-up with their primary physician, data collection, test arrangement, and discussions with health care providers regarding transfer information.

## THE EFFECTS OF FLS

FLS would improve the treatment course and outcome of patients with fracture and reduce socioeconomic costs. Chevalley et al.[27] reported that the osteoporosis clinical pathway involving coordinator nurse intervention in 385 patients with low trauma fracture resulted in a statistically significant increase in bone mineral density and an increase in the rate of osteoporosis drug treatment, and also increased the chance of evaluation intervention involving falls. Ruggiero et al.[28] reported a mortality reduction effect in

fracture prevention service for patients with hip fracture over 65 years old. Leal et al.[29] reported that cost-saving was achieved when the FLS service was provided in their Markov model analysis, which assumes the introduction of FLS in hip fracture patients. In a study that reported the cost effectiveness of FLS under the US health care system, it was predicted that a cost savings of \$16.7 million will be achieved if FLS is implemented for 2.5 million osteoporotic fracture patients in 1 year.[30] A study in Australia directly analyzed the past medical costs of groups with and without FLS. The risk of re-fracture was lowered by 29% in the group with FLS, and the cost of medical care per patient of 1,000 patients decreased by \$617,275.[31]

## CHALLENGES FOR THE ESTABLISHMENT OF FLS IN KOREA

It is thought that there are many obstacles to implementing FLS in Korea.

The first is the lack of awareness that a system like FLS is necessary. At present, Korean medical care is divided into areas of specialization. The scope of treatment of these specialists in each field is limited to their own area of treatment, making it difficult for them to know whether other areas of treatment are progressing well or how they affect the patient or the conditions these specialists treat. As for diseases such as stroke, chronic obstructive pulmonary disease, and diabetes, the diseases themselves and the medication to treat them can increase the risk of osteoporotic fracture, but the associated specialists such as orthopedic surgeons and neurologists and internists do not seem to pay sufficient attention to their relationship and consequences.

Second, changes in healthcare systems and facilities are needed. At the core of FLS lies the multidisciplinary management, which requires the relocation of facilities and personnel to facilitate communication between healthcare systems whose roles are divided, to enable such multidisciplinary management.

Third is the national policy support in terms of cost. The key member in the implementation of FLS is the coordinators. It requires a high cost to hire and train them and to build and manage the appropriate database. However, it is questionable whether the hospitals under the current low fee system are able to pay such a cost.

## THE CURRENT EFFORTS OF KOREAN SOCIETY FOR BONE AND MINERAL RESEARCH

In 2018, the Korean Society for Bone and Mineral Research (KSBMR) organized the FLS Committee and appointed FLS Committee members. The first meeting of this Committee was held on 15 May 2018. The first FLS guidebook was published in 2018 under the first goal of producing the Korean bluebook.[32] In addition, the committee members attended the 2018 Fragility Fracture Network Asia-Pacific regional expert meeting and the 8th Fragility Fracture Network Global Congress 2019 in Oxford, to introduce the current osteoporosis treatment, the status of osteoporotic fracture, and fracture integrated rehabilitation management rehabilitation program of Korea and reported the current efforts of the Committee to establish FLS in Korea. Currently, KSBMR has developed a coordinator training program and conducted 2 training sessions, and 2 additional training sessions will be held in November and December 2019. Also, 4 FLS educational symposium were held in 2018 and 2019. This is an effort to communicate the need for FLS to medical staff and to overcome obstacles through education. In addition, the FLS study is being conducted to verify the effect of patient education on osteoporosis and osteoporotic fracture treatment. The FLS study aims to improve patient awareness and objectively verify the effectiveness of FLS in the Korean medical system. It is not easy to make changes to medical systems and policies. However, KSBMR held 2 policy meetings in the National Assembly to establish the FLS system to induce changes in the interests and attitudes of health politicians.

## CONCLUSIONS

In the rapidly aging Korean society, the introduction of FLS, which is verified not only in the socioeconomic aspects but also in the treatment of patients, is thought to be essential. However, the challenges that need to be addressed in order to implement FLS include the lack of awareness regarding the necessity of this system, the lack of healthcare systems, and inadequate policies. Nevertheless, KSBMR is trying to overcome this in various aspects. In the future, further studies on the FLS and its clinical and socioeconomic effects for the Korean medical system will be necessary.

## DECLARATIONS

### Acknowledgments

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

### Ethics approval and consent to participate

Not applicable.

### Conflict of interest

No potential conflict of interest relevant to this article was reported.

### ORCID

Yong-Han Cha <https://orcid.org/0000-0002-6164-6694>  
 Yong-Chan Ha <https://orcid.org/0000-0002-6249-0581>  
 Jae-Young Lim <https://orcid.org/0000-0002-9454-0344>

## REFERENCES

1. Cha YH, Ha YC, Park HJ, et al. Relationship of chronic obstructive pulmonary disease severity with early and late mortality in elderly patients with hip fracture. *Injury* 2019; 50:1529-33.
2. Yonekura H, Ide K, Onishi Y, et al. Preoperative echocardiography for patients with hip fractures undergoing surgery: A retrospective cohort study using a nationwide database. *Anesth Analg* 2019;128:213-20.
3. Omari A, Madsen CM, Lauritzen JB, et al. Comorbidity and mortality after hip fracture in nineteen thousand six hundred and eighty two patients aged eighteen to sixty five years in Denmark from 1996 to 2012. *Int Orthop* 2019;43: 2621-7.
4. Cha YH, Ha YC, Yoo JI, et al. Effect of causes of surgical delay on early and late mortality in patients with proximal hip fracture. *Arch Orthop Trauma Surg* 2017;137:625-30.
5. Abrahamsen B, van Staa T, Ariely R, et al. Excess mortality following hip fracture: a systematic epidemiological review. *Osteoporos Int* 2009;20:1633-50.
6. Cooper C, Campion G, Melton LJ 3rd. Hip fractures in the elderly: a world-wide projection. *Osteoporos Int* 1992;2: 285-9.
7. Gullberg B, Johnell O, Kanis JA. World-wide projections for hip fracture. *Osteoporos Int* 1997;7:407-13.

8. Ha YC, Kim TY, Lee A, et al. Current trends and future projections of hip fracture in South Korea using nationwide claims data. *Osteoporos Int* 2016;27:2603-9.
9. Organisation for Economic Co-operation and Development. Education at a glance 2017: OECD indicators. Paris, FR: OECD Publishing; 2017.
10. Ministry of Health and Welfare. The first comprehensive plan of national health insurance : 2019-2023. 2019 [cited by 2019 Aug 1]. Available from: [http://medicare1.nhis.or.kr/hongbo/static/html/minisite/file/bojangnews82\\_1.pdf](http://medicare1.nhis.or.kr/hongbo/static/html/minisite/file/bojangnews82_1.pdf)
11. Yu TY, Cho H, Kim TY, et al. Utilization of osteoporosis-related health services: Use of data from the Korean national health insurance database 2008-2012. *J Korean Med Sci* 2018;33:e20.
12. Cranney A, Lam M, Ruhland L, et al. A multifaceted intervention to improve treatment of osteoporosis in postmenopausal women with wrist fractures: a cluster randomized trial. *Osteoporos Int* 2008;19:1733-40.
13. Yuksel N, Majumdar SR, Biggs C, et al. Community pharmacist-initiated screening program for osteoporosis: randomized controlled trial. *Osteoporos Int* 2010;21:391-8.
14. Bessette L, Davison KS, Jean S, et al. The impact of two educational interventions on osteoporosis diagnosis and treatment after fragility fracture: a population-based randomized controlled trial. *Osteoporos Int* 2011;22:2963-72.
15. Edwards BJ, Bunta AD, Anderson J, et al. Development of an electronic medical record based intervention to improve medical care of osteoporosis. *Osteoporos Int* 2012;23:2489-98.
16. Kim SR, Ha YC, Park YG, et al. Orthopedic surgeon's awareness can improve osteoporosis treatment following hip fracture: a prospective cohort study. *J Korean Med Sci* 2011; 26:1501-7.
17. British Geriatrics Society. The care of patients with fragility fracture. London, UK: British Geriatrics Society; 2007.
18. Kim HY, Ha YC, Kim TY, et al. Healthcare costs of osteoporotic fracture in Korea: Information from the national health insurance claims database, 2008-2011. *J Bone Metab* 2017; 24:125-33.
19. Neuburger J, Currie C, Wakeman R, et al. The impact of a national clinician-led audit initiative on care and mortality after hip fracture in England: an external evaluation using time trends in non-audit data. *Med Care* 2015;53:686-91.
20. Port L, Center J, Briffa NK, et al. Osteoporotic fracture: missed opportunity for intervention. *Osteoporos Int* 2003;14:780-4.
21. Gallagher JC, Melton LJ, Riggs BL, et al. Epidemiology of fractures of the proximal femur in Rochester, Minnesota. *Clin Orthop Relat Res* 1980:163-71.
22. Edwards BJ, Bunta AD, Simonelli C, et al. Prior fractures are common in patients with subsequent hip fractures. *Clin Orthop Relat Res* 2007;461:226-30.
23. Majumdar SR, Johnson JA, Lier DA, et al. Persistence, reproducibility, and cost-effectiveness of an intervention to improve the quality of osteoporosis care after a fracture of the wrist: results of a controlled trial. *Osteoporos Int* 2007; 18:261-70.
24. Morrish DW, Beaupre LA, Bell NR, et al. Facilitated bone mineral density testing versus hospital-based case management to improve osteoporosis treatment for hip fracture patients: additional results from a randomized trial. *Arthritis Rheum* 2009;61:209-15.
25. Huntjens KM, van Geel TA, van den Bergh JP, et al. Fracture liaison service: impact on subsequent nonvertebral fracture incidence and mortality. *J Bone Joint Surg Am* 2014; 96:e29.
26. Collinge C, LeBus G, Gardner MJ, et al. Osteoporosis in orthopaedic trauma patients: a diagnosis and treatment protocol. *J Orthop Trauma* 2008;22:541-7; discussion 8-9.
27. Chevalley T, Hoffmeyer P, Bonjour JP, et al. An osteoporosis clinical pathway for the medical management of patients with low-trauma fracture. *Osteoporos Int* 2002;13:450-5.
28. Ruggiero C, Zampi E, Rinonapoli G, et al. Fracture prevention service to bridge the osteoporosis care gap. *Clin Interv Aging* 2015;10:1035-42.
29. Leal J, Gray AM, Hawley S, et al. Cost-effectiveness of orthogeriatric and fracture liaison service models of care for hip fracture patients: A population-based study. *J Bone Miner Res* 2017;32:203-11.
30. Solomon DH, Patrick AR, Schousboe J, et al. The potential economic benefits of improved postfracture care: a cost-effectiveness analysis of a fracture liaison service in the US health-care system. *J Bone Miner Res* 2014;29:1667-74.
31. Major G, Ling R, Searles A, et al. The costs of confronting osteoporosis: Cost study of an Australian fracture liaison service. *JBMR Plus* 2019;3:56-63.
32. Korean Society for Bone and Mineral Research. Fracture liaison services guidebook. Seoul: Korean Society for Bone and Mineral Research; 2018.