# FFN Asia Pacific Congress 2024

ABSTRACTS

# Modifiable Factors on Osteoporosis Risk Among Postmenopausal Women in Malaysia: A Systematic Review and Meta-Analysis

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## INTRODUCTION:

Modifiable factors such as calcium intake, serum calcium and vitamin D levels, body mass index (BMI), physical activity, and functional capacity have been investigated in relation to osteoporosis among postmenopausal women (PMW) in Malaysia, yet a systematic review of these findings is lacking. This systematic review aimed to elucidate the association between various lifestyle factors and osteoporosis risk in this population.

## MATERIALS & METHODS:

PubMed, Scopus Medline, EBSCOhost and the WoS databases were searched up to June 2022. Case-control and cross-sectional studies reporting comparisons, correlations, or regression analyses between calcium intake, serum calcium and vitamin D levels, BMI, physical activity, functional capacity, and osteoporosis were included. Study quality was assessed using the Newcastle-Ottawa appraisal tool. Results were qualitatively and quantitatively synthesized, including meta-analysis when data allowed.

## RESULTS:

The review included one case-control study and eleven cross-sectional studies. Correlation between calcium intake and bone health across 774 PMW showed no significant association ($r = 0.165$, $p = 0.437$; random-effects model; heterogeneity $I^2 = 96.99\%$). Similarly, no association was found between serum vitamin D levels and bone health ($r = -0.0693$, $p = 0.204$; random-effects model; heterogeneity $I^2 = 39.51\%$). However, BMI exhibited a positive correlation with bone density across 1343 PMW ($r = 0.317$, $p < 0.001$; random-effects model; heterogeneity $I^2 = 75.39\%$), indicating a potential predictive role. The qualitative synthesis suggested inconclusive evidence regarding physical activity's association with bone health. Limited data prevented conclusive analysis of the relationship between serum calcium, functional capacity, and osteoporosis.

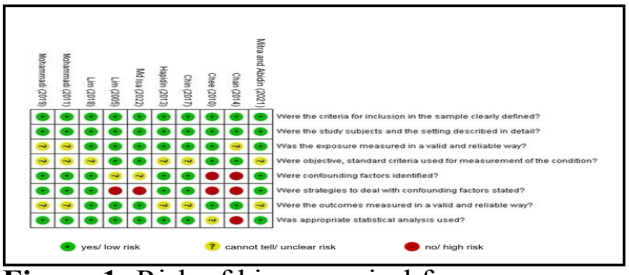



**Figure 1:** Risk of bias appraisal for cross-sectional studies

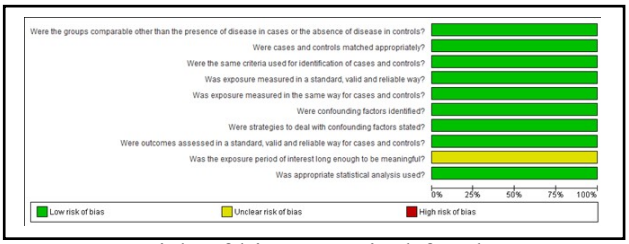



**Figure 2:** Risk of bias appraisal for the case-control study

## DISCUSSION:

Most studies conducted were cross-sectional, lacking diversity in study designs. The relationship between physical activity and functional capacity remains uncertain due to a lack of standardized studies conducted in Malaysia. A positive correlation between BMI and bone density was observed. These findings emphasize the necessity for more comprehensive studies and consideration of other potential confounding factors.

## CONCLUSION:

No significant associations were found between calcium intake, serum vitamin D levels, and physical activity with osteoporosis in Malaysian PMW. BMI emerged as a potential predictor of bone density. Further research is needed to confirm these findings and explore the relationship between these factors and osteoporosis in this population.

# Complication Profile Of Hip Fracture Patients Treated With Internal Fixation

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## INTRODUCTION:

In recent years, there has been a trend towards the use of cephalomedullary nail (CMN) over sliding hip screw (SHS) for the treatment of trochanteric fractures, despite the lack of good quality evidence supporting either implant, and higher costs of CMN. This study aims to describe and compare the complication risks between SHS and CMN fixation.

## MATERIALS & METHODS:

The World Hip Trauma Evaluation (WHiTE) study is a multi-centre, prospective cohort study that enrolled patients age ≥60 years who received operative treatment for their hip fracture. Patients were prospectively followed up for 120 days after surgery. We report the cumulative incidence of each complication and comparisons between the study groups.

## RESULTS:

A total of 8,187 patients who had a SHS ($n$ = 5,544) or CMN ($n$ = 2,643) were included in the analysis. For surgery-specific complications, CMN had higher risks of fixation failure (HR: 1.44); peri-implant fracture (HR: 4.73); revision surgery for fixation failure and peri-implant fracture (HR: 1.84); re-operation for infection (HR: 1.58); and surgical site infection (HR: 1.39) compared to SHS. For general complications, CMN had higher risks of blood transfusion (HR: 1.59); deep vein thrombosis (HR: 1.47); and pulmonary embolism (HR: 1.42); and similar risks of acute kidney injury (HR: 1.03); cerebrovascular accident (HR: 0.86); lower respiratory tract infection (HR: 0.96); myocardial infarction (HR: 0.67); and urinary tract infection (HR: 0.92) compared with SHS.

## DISCUSSIONS:

In our study, we observed higher risks of surgery-specific complications with CMN compared to SHS. Internal fixation with CMN caused one additional re-operation per 112 patients, one additional peri-implant fracture per 200 patients, and one additional deep SSI per 250 patients. It is important to consider that CMN are typically used for more complex trochanteric fractures in some hospitals in the United Kingdom, which may explain the higher rates of these complications.

## CONCLUSION:

CMN confers a higher risk of surgery-specific complications compared to SHS, which may be due to the use of CMN for more complex trochanteric fractures. For patients with stable fracture configurations, the SHS is likely to offer better value-based care.

## REFERENCES:

1. Goh EL et al. Complications following hip fracture: Results from the World Hip Trauma Evaluation cohort study. Injury. 2020.
2. Lewis SR et al. Cephalomedullary nails versus extramedullary implants for extracapsular hip fractures in older adults. Cochrane Database Syst Rev. 2022.
3. INSITE Investigators. Intramedullary Nailing vs Sliding Hip Screw in Trochanteric Fracture Management: The INSITE Randomized Clinical Trial. JAMA Netw Open. 2023.

# Bioelectrical Impedance Vector Analysis in Elderly Hip fracture Patients

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## INTRODUCTION:

Hip fracture patients commonly experience interconnected geriatric nutritional issues like undernutrition, sarcopenia, and frailty. Interventions targeting these factors are crucial for improving postoperative outcomes in hip fracture patients. Bioelectrical impedance vector analysis (BIVA) offers an assessment of body composition and hydration status, serving as a valuable tool to guide appropriate interventions. This study aims to assess body composition using BIVA in older adults with hip fractures and compare the findings with those of reference populations.

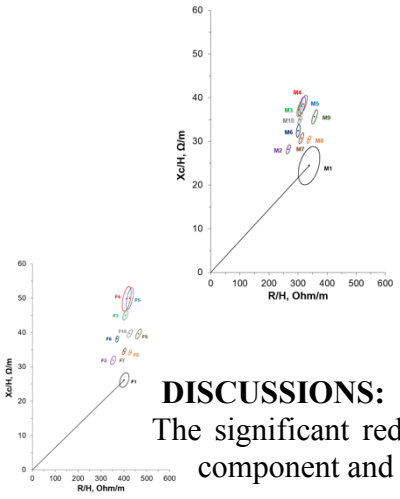
## MATERIALS & METHODS:

This cross-sectional study included 103 hip fracture surgery patients aged 65 years and older. Bioelectrical impedance assessment was conducted, and resistance (R) and reactance (Xc) data were analyzed based on height and plotted on RXc graphs. The data were compared with reference population groups, including age- and BMI-matched South Korean and foreign populations, as well as the South Korean young population.

## RESULTS:

The BIVA confidence ellipse indicated that the men and women were significantly different from reference population groups ($P < 0.001$), with a noticeable reduced Xc component. Only a small proportion of hip fracture men (n=2) and women (n=10) without sarcopenia located within the 75% tolerance ellipse compared to community-dwelling South Korean older adults without hip fracture. The majority of hip fracture men and women were positioned outside the 95% tolerance ellipse, notably in the right upper and lower quadrants, indicating low body cell mass or cachexia. Similar distribution patterns outside the 95% tolerance ellipse, particularly in the right lower quadrant, were observed when compared with other reference groups in both men and women.

**Figure 1:** Legend. <u>BIVA confidence ellipses</u>




## DISCUSSIONS:

The significant reduction in the Xc component and the BIVA pattern located outside the upper or lower right quadrants, indicating lower muscle composition or cachectic condition in older hip fracture patients, suggests a frail and malnourished state among this population.

## CONCLUSION:

Hip fracture patients exhibit a distinct BIVA pattern different from community-dwelling adults without hip fracture. BIVA is an effective method for screening and early identification of body composition alterations in older hip fracture patients. It can lead to appropriate multidisciplinary interventions, including rehabilitation and nutrition.

**REFERENCES:**
1. Slee A et al., Bioelectrical impedance vector analysis, phase-angle assessment and relationship with malnutrition risk in a cohort of frail older hospital patients in the United Kingdom. Nutrition. 2015 Jan;31(1):132-7.

## The Developing Of FFN Japan: Past, Present, And Future

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**INTRODUCTION:**
Despite the immense burden of fragility fractures, current estimate s suggest that almost one quart r of a million patients sustain a hip fracture due to osteoporosis in Japan each year. The purpose of this paper, we describe the history and current status of FFN -Japan an d demonstrate the project to establish the JNHFD, engage with government to develop an d launch the hi p fracture reimbursement scheme

**MATERIALS & METHODS:**
Fragility Fracture Network-Japan (FFN-Japan) launched the Japan National Hip Fracture Database (JNHFD) in 2017 started with only eight hospitals with establishing as a nonprofit organization in order to create the optimal fragility fracture care system in Japan. JNHFD increased 16 hospitals until the end of 2020, and registered 4271 patients in total. At the same time, FFN-Japan invited officials from the Japanese Ministry of Health, Labor and Welfare (MHLW) to participate in round table meetings to discuss the data collected in the JNHFD and to consider opportunities for nationwide improvement in hip fracture care.

**RESULTS:**
In April 2022, the Central Social Insurance Medical Council of the Japanese MHLW announced a new reimbursement scheme for hip fracture care including two key components: Early surgery (within 48 hours from injury) and secondary fracture prevention. Also Japanese health ministry required the hip fracture patients were registered to FFN-Japan NHFD. The new reimbursement scheme of hip fracture care in Japan provided major improvements on acute multidisciplinary care and post-fracture care with secondary fracture prevention. After a big policy change updated in April of 2022, FFN-Japan produced the big hospitals community and huge database with 550 hospitals which treat hip fracture patients.

**DISCUSSIONS:**
To overcoming fracture care gap, The Japanese FLS reimbursement scheme has been updated as of April 1st, 2022. This new scheme will provide major improvements to post-fracture care and the prevention of secondary fractures. It includes the following two key elements: emergency geriatric care and operation within 48 hours after fracture. New scheme of hip fracture care model may create and spread across Japan due to the policy changes from now on

**CONCLUSION:**
FFN-Japan played a key role on these policy changes to the health system by means the close collaboration and ongoing communication with the government

**REFERENCES:**
1. Yamamoto N et al., Fragility Fracture Network-Japan: The challenge of establishment of a national hip fracture database and successful achievement of nationwide health system change for hip fracture care in Japan. Injury 2024 in press

# Pre-Operative Anemia And Hyponatremia Increase The Risk Of Mortality In Elderly Hip Fractures

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## INTRODUCTION:

Pre-operative assessment is routinely performed for all hip fractures, and include a thorough clinical examination and multiple pre-operative tests. While abnormalities are often detected in many tests, they have varied effect on mortality. The purpose of the study was to assess the prevalence and impact of these abnormal tests and comorbidities.

## MATERIALS & METHODS:

This was a prospective study of 283 consecutive hip fracture patients aged above 50 years admitted in a major trauma hospital from February 2019 to December 2019. The prevalence of abnormalities in the following tests were assessed: chest x-ray, electrocardiogram, complete blood count, serum electrolytes, renal function test, prothrombin time/international normalized ratio, and serum bilirubin. Also, presence of comorbidities were recorded. Mortality within 90 days of admission was assessed.

## RESULTS:

91.5% (N= 259/283) of the patients had at least one abnormal investigation. The most common abnormal investigation was anemia (70.3%, N= 199/283), followed by deranged sodium (36.4%, N= 103/283). 17.7% (N= 50/283) of the patients had at least one new comorbidity diagnosed after admission. The most common newly diagnosed comorbidity was hypertension (10.6%, N= 30/283). Anemia (p=0.044), deranged sodium (p=0.002), raised urea (p=0.018), raised creatinine (p=0.002), renal disease (p=0.015), neurological diseases (p=0.024), and charlson comorbidity index (p=0.004) were associated with increased mortality in multivariate analysis.

| Investigation | Odds ratio (95% CI) | P-value | Adjusted odds ratio (95% CI) | P-value |
|---|---|---|---|---|
| Anemia | 5.95 (1.38-25.75) | 0.017 | 4.60 (1.04-20.38) | 0.044 |
| Severe anemia | 3.09 (1.04-9.17) | 0.042 | 2.67 (0.86-8.26) | 0.089 |
| Abnormal TLC | 0.36 (0.08-1.58) | 0.176 | 0.34(0.07-1.51) | 0.155 |
| Thrombocytopenia | 0.93(0.37-2.29) | 0.869 | 1.05 (0.41-2.66) | 0.922 |
| Abnormal INR | 1.26(0.51-3.13) | 0.623 | 1.27(0.50-3.25) | 0.613 |
| Deranged sodium | 4.72 (1.98-11.23) | <0.001 | 3.98 (1.64-9.68) | 0.002 |
| Deranged potassium | 1.22(0.39-3.76) | 0.732 | 1.13(0.35-3.63) | 0.841 |
| Raised Urea | 3.51 (1.54-8.01) | 0.003 | 2.90(1.20-7.00) | 0.018 |
| Raised Creatinine | 4.81 (2.00-11.57) | <0.001 | 4.94(1.84-13.27) | 0.002 |
| Raised Bilirubin | 0.25 (0.03-1.90) | 0.182 | 0.33 (0.04-2.60) | 0.294 |
| Abnormal ECG | 1.50(0.66-3.38) | 0.330 | 1.15(0.49-2.71) | 0.744 |
| Abnormal CXR | 2.40 (0.98-5.89) | 0.056 | 2.27(0.89-5.82) | 0.087 |

CI- Confidence Interval, TLC- Total Leukocyte Count, INR- International Normalized Ration, ECG-electrocardiogram, CXR- Chest X-ray

**Table 1:** Influence of abnormal investigations on 90-day mortality

| Comorbidity | Odds ratio (95% CI) | P-value | Adjusted odds ratio (95% CI) | P-value |
|---|---|---|---|---|
| Any comorbidity | 6.06 (1.40-26.22) | 0.016 | 5.45 (1.22-24.02) | 0.026 |
| CCI score | 1.50(1.13-2.01) | 0.006 | 1.61 (1.16-2.21) | 0.004 |
| Age-adjusted CCI* | 1.71(1.03-2.84) | 0.037 | 1.68 (1.02-2.78) | 0.043 |
| Number of comorbidities | | | | |
| 0 | Ref | | Ref | |
| 1 | 5.37 (1.15-24.97) | 0.032 | 4.86 (1.01-23-34) | 0.048 |
| 2 | 7.10 (1.50-33.66) | 0.013 | 6.41(1.31-31.33) | 0.022 |
| >2 | 5.99 (1.04-34.60) | 0.045 | 5.21 (0.87-31.14) | 0.070 |
| Hypertension | 1.49(0.67-3.32) | 0.325 | 1.27(0.55-2.93) | 0.575 |
| Uncomplicated diabetes | 1.19(0.45-3.11) | 0.722 | 1.25(0.46-3.39) | 0.667 |
| Chronic lung disease | 1.94 (0.68-5.55) | 0.217 | 1.87(0.63-5.57) | 0.263 |
| Cerebrovascular accident | 1.59 (0.44-5.81) | 0.478 | 1.37 (0.35-5.34) | 0.648 |
| Other neurological diseases | 4.30 (1.04-17.73) | 0.043 | 5.84(1.26-27.13) | 0.024 |
| Complicated Diabetes | 2.75 (0.54-13.98) | 0.222 | 3.14 (0.58-16.98) | 0.184 |
| Tumour | 1.15 (0.14-9.60) | 0.895 | 1.16 (0.13-10.28) | 0.893 |
| Dementia | 1.32 (0.16-11.19) | 0.796 | 1.02(0.11-9.21) | 0.984 |
| Moderate or severe renal disease | 6.08(1.37-26.99) | 0.018 | 7.74(1.48-40.39) | 0.015 |
| Cardiac arrythmia | 3.23(0.62-16.84) | 0.165 | 2.83(0.46-17.41) | 0.261 |
| Congestive Heart Failure | 1.87(0.21-16.61) | 0.575 | 2.58(0.27-24.82) | 0.411 |
| Hemiplegia | 3.14 (0.32-31.29) | 0.329 | 3.64(0.31-42.31) | 0.303 |
| Depression | 4.73(0.41-53.96) | 0.211 | 4.21(0.33-53.64) | 0.269 |
| Metastasis | 9.5 (0.57-156.39) | 0.115 | 13.82 (0.74-258.67) | 0.079 |

*For age-adjusted CCI, age was not included in the multivariate analysis reporting adjusted odds ratio. CI- Confidence Interval, CCI- Charlson Comorbidity Index

**Table 2:** Influence of comorbidities on 90-day mortality**.**

## CONCLUSION:

Pre-operative hemoglobin, sodium, urea, and creatinine were the most important tests influencing mortality, and derangements of these should therefore be carefully evaluated and managed. Hip fracture care pathways should focus on correction of these abnormalities.

# A Multidisciplinary Approach To Reduce Length Of Stay (LOS) In Older Adults With Hip Fracture: An Evidence-Based Implementation

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## INTRODUCTION:

Hip fracture incidence in Singapore of persons aged 50 years and above will increase 3.5 times between 2018 and 2050.[1] Prolonged hospital stay has a direct impact on poor outcomes and healthcare costs in older adults with hip fracture.[2,3] The mean length of stay (LOS) for such patients in Singapore ranges from 10 to 19 days.[4]Mean LOS within the National University Hospital, Singapore in 2022 was 11.7 days. This project aimed to implement a multidisciplinary approach including a fast-track transfer pathway in older adults with hip fractures.

## MATERIALS & METHODS:

The multidisciplinary evidence-based quality improvement (EBQI) project was implemented from July 2023 on patients aged ≥ 65 years with hip fractures admitted under orthopedic surgery. The Plan-Do-Study-Act (PDSA) method was utilized. This multidisciplinary EBQI comprises multiple interventions *(Figure 1*) and a fast-track workflow to a dedicated rehabilitation facility for suitable patients on top of the usual care delivered by the Orthogeriatric team. Outcome measures included mean LOS and cost.

## RESULTS:

A total of 143 patients (mean age 82 years) were admitted with hip fractures from July to November 2023 *(Figure2)*. The mean LOS of these patients was 10.2 days compared to the mean LOS of 11.7 days in year 2022. This resulted in a 1.5-day reduction in mean LOS and cost savings of SGD $404,761.50 over this study period (based on an average daily hospital bill of SGD $1,887 per day) as compared to usual orthogeriatric care only. Out of the 143 patients, 49 patients (34.3%) were deemed suitable and enrolled into the fast-track pathway. The mean LOS of the patients on the fast-track pathway was 7.2 days Whereas, the patients who were not on the pathway was 11.7 days.

| Root Cause | Intervention |
|---|---|
| No visibility of CH/ TCF beds | Community Hospital Beds Dashboard: indicating bed availability at community hospital twice per week |
| No one coordinating discharge planning | Orthogeriatric nurses explore Discharge planning from Day 1 of OrthoGeriatric Assessment |
| Scattered information regarding discharge planning | Utilise a discharge planning template to consolidate final discharge plans |
| Therapists taking time to commit to rehab plans/ goals | PTOT to document rehab goals and discharge destination by POD1 |
| Patient/Family Unaware of huge change in care needs after hip fracture | Provide patient/family education on potential change in functional status and need for longterm caregiver by using a standardise communication template. |
| No manpower (resulting in delay in facility's screening and long wait time for CH/TCF) | Develop a workflow and criteria for Fast track SLH transfer |

**Figure 1:** Interventions

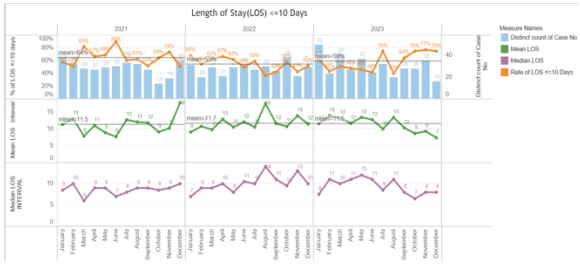



**Figure 2:** Length of stay in acute hospital.

## CONCLUSION:

Orthogeriatric care model enhanced with the integration of coordinated multidisciplinary interventions and fast-track pathway has resulted in shorter length of stay in an acute hospital and reduction in cost of hospital stay.

## REFERENCES:

1.Koh LK, Saw SM, Lee JJ, et al. Hip fracture incidence rates in Sinagpore 1991-1998.Osteoporos Int.2001; 12:311-318. 2. Burgers PT, Van Lieshout EM, Verhelst J, Dawson I, de Rijcke PA. Implementing a clinical pathway for hip fractures; effects on hospital length of stay and complication rates in five hundred and twenty six patients. Int Orthop. 2014 May;38(5):1045-50. doi: 10.1007/s00264-013-2218-Epub 2013 Dec 12. PMID: 24337751; PMCID: PMC3997766. 3.Lau TW, Fang C, Leung F. The effectiveness of a geriatric hip fracture clinical pathway in reducing hospital and rehabilitation length of stay and improving short-term mortality rates. Geriatr Orthop Surg Rehabil. 2013 Mar;4(1):3-9. doi: 10.1177/2151458513484759. PMID: 23936733; PMCID: PMC3739409.4.Tan ST, Tan WP, Jaipaul J, Chan SP, Sathappan SS. Clinical outcomes and hospital length of stay in 2,756 elderly patients with hip fractures: a comparison of surgical and non-surgical management. Singapore Med J. 2017 May;58(5):253-257. doi: 10.11622/smedj.2016045. Epub 2016 Feb 26. PMID: 26915390; PMCID: PMC5435843.

# Factors Associated with Recurrent Falls and Its Outcome 6 Months Post Intervention in Fall Clinic, Primary Care Clinic Kuala Lumpur (KKKL)

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## INTRODUCTION:

Malaysia is expected to become aging nation by 2030, where population aged 60 and above are projected to occupy 15.3% of total population [1]. Falls are common among elderly which leads to major morbidity and mortality [2]. Due to this Fall clinic KKKL was started since February 2021 with primary objective to identify risk factors and to prevent fall among elderly.

## MATERIALS & METHODS:

A retrospective Cohort study with universal sampling was done. All medical records of 86 patients under Fall clinic from February 2021 until June 2023 were reviewed. Independent factors for recurrent fall included in this study were: basic demographic data, concurrent comorbidity, home environment assessment, baseline Time Up and Go test (TUG) as well as current medication profile. $\chi 2$ test or Fisher's exact test was used to test the statistical significance, and factors with p-value of $< 0.05$ have been considered statistically significant. Odd ratios with 95% confidence interval were calculated with binary logistic regression. A post intervention analysis was then made to assess the improvement of identified risk factors after intervention.

## RESULTS AND DISCUSSION:

A total of 86 cases was included into this study and among these patients, 57(77.9%) of the patients were female and 23(26.7%) of them has recurrent fall. The analysis for risk factors for recurrent fall is detailed as below:

| Parameter | p-value | OR (95% CI) |
|---|---|---|
| History of CVA | 0.011 | 5.206 (1.136 – 20.598) |
| Probable Sarcopenia | 0.023 | 3.250 (1.147 – 9.212) |
| Abnormal TUG | 0.005 | 5.067 ( 1.545 – 16.616) |
| Usage of Insulin | 0.022 | 3.269 (1.159 – 9.220) |

Post intervention analysis showed that 22(25.6%) patients have improvement in TUG score 6 months later.

Table 1: Factor associated with recurrent fall

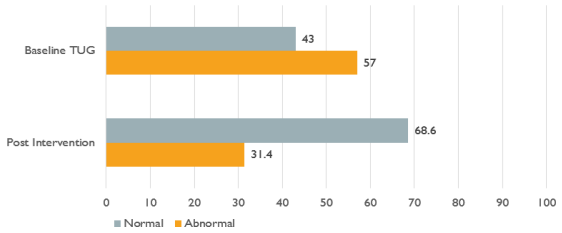



Figure 1: Change in TUG after 6 months (in %)

Besides that, 18(20.9%) of the patient were also found to have improvement in their DFIT (Dose, Frequency, Indication and Time) score and more patients were observed to achieve 100% DFIT score after intervention.

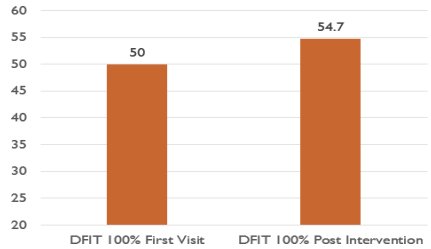



Figure 2: Change in DFIT after 6 months (in %)

## CONCLUSION:

History of CVA, probable sarcopenia, abnormal TUG and usage of insulin are associated with recurrent fall among elderly. Multi-disciplinary interventions offered by Fall Clinic is useful in optimizing those risk factors.

## REFERENCES:

1. Institute for Public Health (IPH) 2019. National Health and Morbidity Survey 2018 (NHMS 2018): Elderly Health. Vol. I: Methodology and General Findings, 2018. 132 pages
2. Frith J, Davison J. Falls. Reviews in Clinical Gerontology. 2013;23(2):101-117. doi:10.1017/S0959259813000026

# INITIATION OF ANTI-OSTEOPOROSIS MEDICATION, CALCIUM AND VITAMIN D SUPPLEMENTATION AND COMPLIANCE AFTER 6 MONTHS AMONG HIP FRACTURE PATIENTS

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## INTRODUCTION:

Osteoporosis, characterized by excessive bone loss, poses significant public health challenges for elderly individuals, both men and women. The long-term nature of medication required for osteoporosis management presents adherence challenges similar to those seen in chronic conditions like hypertension and diabetes. Suboptimal medication adherence in osteoporosis has been linked to increased risks of fractures and elevated all-cause mortality among the elderly population.

## MATERIALS & METHODS:

This prospective study conducted from January to December 2023, focusing on elderly patients aged 55 years and above who presented with fragility hip fractures at our hospital. Identification of these patients was conducted by our Fracture Liaison Service Coordinators, excluding those with severe trauma, malignancy, or steroid-induced fractures. Comprehensive demographic data, medication prescriptions, and surgical information were meticulously recorded. Patients were initiated on osteoporosis-related treatment and systematically followed up for a duration of six months. Compliance with calcium, vitamin D, and anti-osteoporotic medication was assessed after six months among patients enrolled from January to July 2023.

## RESULTS:

A total of 150 patients were identified and consulted by the Fracture Liaison Service (FLS). Remarkably, 96% of these patients received calcium and vitamin D supplementation either upon discharge or during follow-up. Among the patients with hip fragility fractures, 119 (80%) patients agreed to initiate anti-osteoporotic medications, with the majority opting for anti-resorptive treatment (93%) over anabolic therapy (7%).

Interestingly, 70% of patients commenced anti-osteoporotic medications during their hospital stay, while the remaining 30% began treatment as outpatients during follow-up, often necessitating time to discuss treatment costs with family members.

After six months, compliance rates were noted to be 100% for calcium and vitamin D supplementation, and an impressive 95% for anti-osteoporotic medications. However, a reduction of 5% in compliance was observed. Various factors were identified contributing to this decline, including financial constraints, transportation difficulties to hospital visits, and unspecified reasons leading patients to default or discontinue treatment.

## CONCLUSION:

Improving compliance with anti-osteoporosis treatment hinges on the deployment of effective pharmacological management strategies. Collaborative efforts among healthcare team members, coupled with multidisciplinary approaches, can greatly enhance outcomes for individuals managing osteoporosis. The integration of Fracture Liaison Services (FLS) serves as a cornerstone in this realm, pivotal for facilitating early intervention and nurturing patient commitment to treatment protocols.

# Expansion of Fracture Liaison Services for the Patients with "Unrecognizable Vertebral Fractures" on Chest/abdominal CT Sagittal Images

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The presenter is a rehabilitation doctor covering all wards of a regional central hospital. Most of the elderly inpatients suffer from lifestyle-related diseases and/or cancer. These are risk factors for osteoporosis. Here is an easy way to find patients eligible for osteoporosis treatment.

## MATERIALS & METHODS:

Of about 5,000 patients that the presenter was involved directly in rehabilitation from September 2017 to January 2024, the subjects of this study were those who SQ grade 1 or higher fractures were found on CT sagittal images. Standard medication and guidance of exercise and nutrition were provided by the presenter.

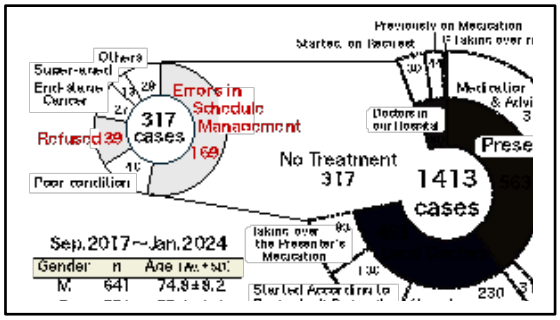
## RESULTS:

Of the 1413 eligible patients, 467 gastro-entero-logical surgery, 346 thoracic surgery, and 195 cardiovascular surgery and cardiology patients were included.

At 6 months after the first contact, one-third of patients are treated by their local doctors, 169 patients had no treatment due to errors in schedule management, and only 39 patients refused the recommendation to take measures against osteoporosis (Fig.1).

Secondary fragility fractures occurred only in patients with multiple or high-grade pre-existing vertebral fractures.

**Figure 1:** Treatment status 6 months after the first contact




## INTRODUCTION:

BMD in patients with low initial BMD increased with treatment, and BMD in patients with enough initial BMD could be raised by changing the drugs when it went down (Fig 2).

## DISCUSSIONS:

The UK's clinical standard has been focusing on "newly identified vertebral fracture" since 2017.

Japan has the most CTs per capita in the world. About 80% of hospitalized patients undergo a CT scan as a basic examination, and patients with diseases at risk of recurrence are followed up for 5 years using CT scan.

In addition, diagnostic imaging support using artificial intelligence is also advancing.

It was easy to find patients with multiple risk factors of osteoporosis by this method, and the patients accepted well the recommendations for osteoporosis control. The attending doctors and family doctors had also become supportive.

However, it was a solo attempt, and sometimes scheduling errors occurred.

## CONCLUSION:

Use of Chest/abdominal CT images is beneficial to detect osteoporosis patients. It is hoped that FLS will be deployed in each department of the regional central hospitals collaborating with regional medical network in consideration of comorbidities of the elderly patient.

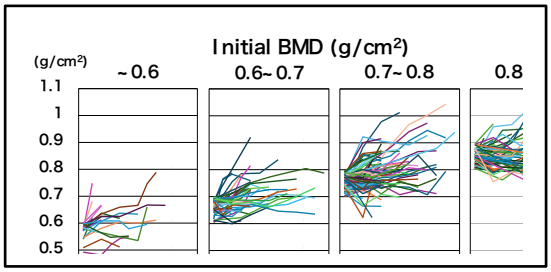



**Figure 2:** BMD changes of lumber spine in female patients

# Cost-Utility Analysis Of Fracture Liaison Service In Osteoporotic Hip Fracture Patients At Tertiary Care Hospital In Thailand

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## INTRODUCTION:

Osteoporotic hip fracture is associated with high morbidity, mortality, and contributed to a huge socioeconomic burden (1). In Thailand, Fracture Liaison Services (FLS) have been established as a comprehensive multidisciplinary care and offer secondary fracture prevention (2). However, its cost-effectiveness in Thailand remains unknown. Hence, this research aimed to assess the cost-utility analysis (CUA) of FLS in osteoporotic hip fracture patients.

## MATERIALS & METHODS:

A prospective cohort study was performed between September 2021 and April 2023 at Police General Hospital. All patients presenting with low-energy hip fractures participated in the institution's FLS and were recruited into the study. One-year direct medical, direct non-medical, and indirect costs were collected. EQ-5D-5L was used to assess the health utility state. Subsequently, cost per quality-adjusted life years (QALY) was estimated at 12-month follow-up and compared to previous cost per QALY studies.

## RESULTS:

The cohort consisted of 71 patients. The average age was 78.13 years old. The majority (73.2%) of the participants were female. Median total direct cost was $6,096.99(range 5,506.03-6,566.53) and total cost was $7,503.16(range 7,123.85-8,309.49). At 12-month follow-up, median QALY was 0.872(range 0.872-0.957) and cost per QALY was $8,604.50.

## DISCUSSIONS:

Hip fracture has a high impact on patients' quality of life and on society. In 2022, Thai National GDP per capita was $7,650.88 and Bangkok GPP was $16,954.04. The total cost of osteoporotic hip fracture from present study was > 50% of Bangkok GPP and 112% of the Thai National GDP per capita. From a previous Thai study in 2004, the median total cost was $3,157.00 per patient per year. And another study in 2008, cost per QALY was 6,620.52 (3). Compared with previous studies with traditional care, FLS confers higher total cost. However, the number was much lower than other studies from developed countries (4).

## CONCLUSION:

The FLS in Thailand is still considered cost-effective, offering patients not only comprehensive secondary fracture prevention, but also improved quality of life at a reasonable cost.

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3. Wajanavisit W et al. Cost-utility analysis of osteoporotic hip fractures in Thais. J Med Assoc Thai 2015;98: 65-69
4. C.-H. Wu et al. Economic impact and cost-effectiveness of fracture liaison services: a systematic review of the literature. Osteoporos Int 2018;29(6):1227-1242

# From Awareness to Action: Unveiling Knowledge, Attitude and Practices in Fragility Fractures and Secondary Prevention

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## INTRODUCTION:

Primary fragility fracture is expected to occur in one in two women and one in five males over the age of fifty. To raise the awareness among the nurse and allied health group working in one of the tertiary care hospitals, the core team including subject experts was formed to focus on altering and spreading knowledge; modifying perceptions of the issue; and developing practical policies for successful execution.

## MATERIALS & METHODS:

The study was a cross-sectional questionnaire-based study involving nurses and allied health care professionals working in a tertiary care hospital in Pakistan. A structured questionnaire (15 questions) was prepared based on the literature reviews to assess knowledge, Attitude, and practice (KAP) regarding fragility fractures, prevention for secondary fractures and rehabilitation.

The Pre and Post assessment was conducted in the last session of the series of the workshop which is Strengthening Bones health: Nurses Contribution. The session was attended by 46 participants. The study participants were asked to fill KAP pretest questionnaire followed by interactive educational intervention and post-test questionnaire.

## RESULTS:

Participants' knowledge, attitudes, and practices related to fragility fractures, secondary prevention, and rehabilitation had significantly improved, according to pre- and post-workshop assessments. The graphical representation of the pre and post tests are as follow:

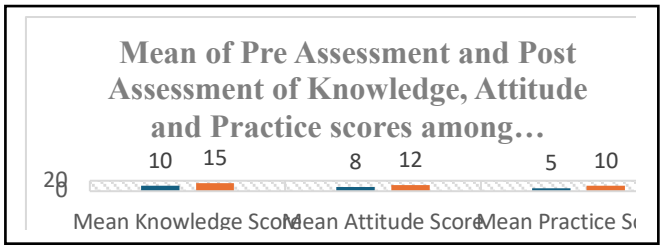



**Figure 2:** Difference between pre and post-test

Figure 1: Number of Participants and workshops conducted

| Workshops | # of Participant |
|---|---|
| Falls and secondary prevention. | 40 |
| Comprehensive geriatric assessment: Nursing practice | 24 |
| Orthogeriatric nursing in emergency and perioperative inpatient settings | 45 |
| Strengthening Bones health: | |

## DISCUSSIONS:

The improvement in pre and post KAP scores highlights how beneficial educational interventions are for improving comprehension and practice readiness. Workshops encouraged active participation, fostering collaboration and knowledge sharing among healthcare professionals for comprehensive care.

## CONCLUSION:

The study's conclusions highlight the value of educational initiatives in improving healthcare providers' ability to properly treat fragility fractures. Through focused training, nurses and other health professionals showed considerable gains in their comprehension of interdisciplinary teamwork, rehabilitation, and the prevention of fragility fractures.

## REFERENCES:

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# FLS Effectiveness In Patients With Hip Fracture Surgery: Home Based Interactive Telecommunication

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## INTRODUCTION:

Rehabilitation and management following hip fracture surgery play a critical role in promoting patient recovery and restoring functional abilities. However, with the majority of patients spending their recovery period at home, self-management can pose challenges, potentially increasing the risk of functional decline and complications. In response, our objective is to offer Fracture Liaison Service (FLS) to patients discharged home after hip fracture surgery and conduct periodic monitoring using home-based interactive telecommunication to evaluate effectiveness.

## MATERIALS & METHODS:

Twenty-two patients were evaluated and treated under FLS led by the coordinator. The FLS includes patients' identification, investigation, education, coordinating, and monitoring. Education of post-operative physical activity, fall prevention, osteoporosis prevention, or nutrition were scheduled by corresponding specialist. Functional ambulation category (FAC) was assessed at admission, discharge, and follow-up. Repeated-Measure Analysis of Variance (RM-ANOVA) was conducted to study a program effect and the effect of education completion.

## RESULTS:

Twenty patients completed follow-up. Average FAC at admission, discharge, follow-up was 0.93, 2.02, and 2.85, respectively. RM-ANOVA reported a significant time effect of telecommunication program on functional ambulation levels ($F(1, 18) = 43.624$ ($p < 0.0001$). The interaction effect between time and group was insignificant ($F(1, 18) = 0.036$ ($p = 0.852$). The group effect was insignificant ($F(1, 18) = 2.885$ ($p = 0.107$). However, we found a trend that higher FAC scores in patients with complete education than that of patients with incomplete education (Figure 1).

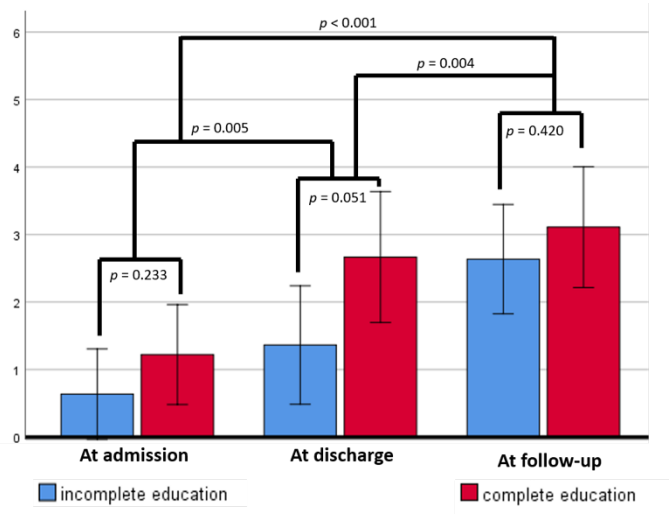



**Figure 1:** Summary of follow-up

## DISCUSSIONS & CONCLUSION:

The FLS service demonstrates improvement in patients' perception of physical activity leading to enhanced Functional Ambulation Category (FAC). Continuous home-based interactive telecommunication by the FLS coordinator may contribute to this improvement.

## REFERENCES:

1. The effectiveness of fracture liaison services in patients with hip fractures: A systematic review and meta-analysis of randomized controlled trials. Heliyon. 2023 Oct; 9(10): e20838.

# Vitamin D [25(OH)D] Serum Concentration Level among Filipino Postmenopausal Women with Proximal Femur Fractures: A Single-Center Study from the Philippine Orthopedic Center

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## INTRODUCTION:

Fragility fractures commonly occur among patients with osteoporosis, and they are considered an important public health issue. Low serum 25(OH)D levels are a risk factor for hip fracture.

## MATERIALS & METHODS:

This is a cross-sectional analytical research study conducted at the Philippine Orthopedic Center from March 2022 to March 2023. This study determined the Serum concentration of 25(OH)D level in a 60 – 100-year-old Postmenopausal Women in a Philippine Orthopedic Center with proximal femur fracture.

## RESULTS:

Serum concentrations of Vitamin D 25(OH)D with an overall mean and standard deviation of 26.7±8.7 ng/mL, with a median of 25.1 ng/mL and an interquartile range (IQR) of 21-32.1 ng/mL. The frequency distribution of 25(OH)D levels in the entire sample showed that 69.6% of women had concentrations below 30 ng/ml, 26.4% of women 30-40 ng/ml and 4.0% of women above 40 ng/ml. These results suggest that as the serum concentration of Vitamin 25(OH)D decreases, the risk of hip fractures and OSTA scores increase.

| | Mean ± SD | Median (IQR) | <30 | 30-40 | >40 |
|---|---|---|---|---|---|
| | | | Frequency (%) | | |
| Overall | 26.7±8.7 | 25.1 (21-32.1) | 174 (69.6) | 66 (26.4) | 10 (4.0) |
| By age | | | | | |
| 60 – 64 (30) | 26.4±7.6 | 26.7 (21-32.1) | 21 (70) | 8 (26.7) | 1 (33.3) |
| 65 – 69 (48) | 28.3±10.2 | 27.5 (21-34.4) | 28 (58.3) | 17 (35.4) | 3 (6.3) |
| 70 – 74 (60) | 25.9±7.6 | 24.6 (20.8-30.5) | 44 (73.33) | 14 (23.3) | 2 (3.33) |
| 75 – 79 (45) | 25.5±8.2 | 24.7 (20-29.7) | 36 (80) | 8 (17.8) | 1 (2.22) |
| 80 – 84 (40) | 28.7±9.3 | 27.1 (23.9-33.5) | 25 (62.5) | 14 (35.0) | 1 (2.5) |
| 85 – 89 (25) | 25.1±9.1 | 23.9 (19.8-30.0) | 18 (72.0) | 5 (20.0) | 2 (8.0) |
| ≥90 (2) | 20.5±2.1 | 20.5 (19-21.9) | 2 (100) | 0 | 0 |

**Figure 1:** Serum concentration of Vitamin 25(OH)D among postmenopausal women, in ng/mL (n=250)

## DISCUSSIONS:

This study highlights the fact that most of the patients who sustain fractures are caused by a fall from standing height (96.4%) or a slip in the bathroom or wet floor. This conclusion merits special attention since it should be the focus of efforts designed to avoid fragility fractures in the senior population. To reduce the risk of falls in the home, family members and caregivers should pay particular attention to the older population.

## CONCLUSION:

Overall, the results suggest that a large proportion of postmenopausal women in this sample had insufficient levels of Vitamin D, which may have implications for bone health and other health outcomes.

# Osteoporosis Liaison Service (OLS) Improved Clinical Outcomes: A 3-Year Report

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[2] Department of Geriatrics and Gerontology, National Taiwan University Hospital, Taipei, Taiwan

## INTRODUCTION:

There exists a significant care gap for those suffering from fragility fracture and osteoporosis. In this study, we present the three-year outcomes of an osteoporosis liaison service (OLS) program comprising a fracture liaison service (FLS) program and a medication management service (MMS) program.

## MATERIALS & METHODS:

The OLS program enrolled patients with new hip fractures or untreated vertebral fractures for the FLS program (n = 600), and those with osteoporosis medication treatment but not necessarily fragility fractures for the MMS program (n = 499) from National Taiwan University Hospital and its Bei-Hu branch. Baseline assessments were conducted by care coordinators using items adapted from the 13 Best Practices Framework (BPF) standards of the International Osteoporosis Foundation. Follow-up assessments were performed via telephone at 4 months, 8 months, 1 year, 18 months, 2 years, and 3 years.

## RESULTS:

The mean age of the cohort was 76.2 ± 10.2 years, with 78.8% being female. Over the first three years, the mortality rates were 6.28%, 5.34%, and 4.31%, respectively. Incident fracture rates were 4.09%, 3.11%, and 1.85%, while fall rates were 23.2%, 19.32%, and 12.1%, respectively. Cox proportional hazard models identified chronic kidney disease (CKD) and cancer, body mass index (BMI) under 18.5 kg/m$^2$, lower albumin levels, and higher age as significant risk factors for mortality. Lower T-scores were significant risk factors for incident fracture rates. The detailed content is provided in the following table.

| | 1st year | | 2nd year | | 3rd year | |
|---|---|---|---|---|---|---|
| | OR | P value | OR | P value | OR | P value |
| T-score | 0.28 | **0.04** | 0.58 | **0.04** | 0.71 | 0.07 |
| Fall | 7.27 | **<0.001** | 6.24 | **<0.001** | 5.00 | **<0.001** |

**Table 1:** Risk factors of incident fracture rate

| | | 1st year | | 2nd year | | 3rd year | |
|---|---|---|---|---|---|---|---|
| | | OR | P value | OR | P value | OR | P value |
| CKD | | 2.77 | **0.04** | 2.82 | **0.04** | 1.80 | 0.27 |
| Cancer | | 3.59 | **0.01** | 1.51 | 0.14 | 1.79 | 0.18 |
| BMI (reference:<18.5kg/m$^2$) | 18.5~24 | 0.17 | **<0.001** | 0.23 | **0.01** | 0.37 | 0.06 |
| | >24 | 0.34 | **0.02** | 0.45 | **0.03** | 0.53 | 0.07 |
| Albumin | | 0.27 | **<0.001** | 0.36 | **0.01** | 0.20 | **<0.001** |
| Creatinine | | 1.07 | 0.16 | 1.12 | 0.14 | 1.51 | **<0.001** |
| Age | | 1.03 | 0.20 | 1.03 | 0.25 | 1.09 | **0.003** |

**Table 2:** Risk factors of mortality

| | 1st year (N=1099) | 2nd year (N=1030) | 3rd year (N=975) |
|---|---|---|---|
| Dead | 69 (6.28%) | 55 (5.34% ) | 42 (4.31%) |
| Fall | 255 (23.20%) | 199 (19.32%) | 118 (12.1%) |
| Incident fracture | 45 (4.09%) | 32 (3.11%) | 18 (1.85%) |

**Table 3:** Three-year outcomes of the OLS program

## DISCUSSIONS:

In the present study, we implemented a comprehensive and coordinated program aimed at identifying, assessing, and treating patients with fragility fractures. Our participation of the OLS program decreased mortality and incident fracture rate year by year. Other FLS programs implemented in Taiwan have reported similar high BMD testing rates and medication initiation rates. The OLS programs definitely improved outcomes.

## CONCLUSION:

Our OLS program provided a better quality of fracture care, and we identified CKD, cancer, BMI, albumin, creatinine and age as the risk factors for mortality. T-score, fall event in the past year were the risk factors for incident fracture rate among these patients.

## REFERENCES:

1. Chang CB, Yang RS, Chan DC et al., Osteoporosis International (2021) 32:2163–2172

# Safety Outcomes In Patients Treated With Denosumab In Outpatient Setting, Hospital Kuala Lumpur

[1]Abdul Halim H; [1,3]Tiew WP; [1]Mohd Jeffri NS; [1]Makpol FI; [2]Chong EGM
[1]Department of Pharmacy, Hospital Kuala Lumpur; [2]Geriatric Unit, Hospital Kuala Lumpur; [3]Faculty of Pharmacy, University Kebangsaan Malaysia

## INTRODUCTION:

Denosumab has been an alternative antiosteoporosis in osteoporotic patients with contraindications to bisphosphonates in Malaysia. Worldwide data indicate that denosumab was better tolerated compared to bisphosphonates. Our study aimed to explore on the reported safety outcomes among geriatric patients prescribed with denosumab, and its implications on the treatment outcomes.

## MATERIALS & METHODS:

This is a retrospective cohort study on medical record review, on geriatric patients prescribed with denosumab. All patients aged 60 years and above, prescribed with at least two doses of denosumab and followed up under Medical and Orthopedic Clinics in Hospital Kuala Lumpur between January 2022 till December 2023 were recruited. Any cases with incomplete history or untraceable record were excluded from the study. Sample size calculation of 206 patients were estimated to achieve a power of 80% with 95% confidence interval (CI). Demographic, clinical data and safety outcomes were presented descriptively, while factors associated with adverse events were assessed using Logistic Regression in RStudio version 2023.12.1+402. P-value less than 0.05 is considered significant.

## RESULTS:

Out of 439 patients screened, only 200 patients were recruited into this study. The mean age ± standard deviation (SD) of the recruited patients is 77.3±8.3 years old with 84.7% of them were female. Most of the patients were able to ambulate independently (75.7%) and 43% of the patients had clinical frailty scale (CFS) of 5. Almost 80% of the patients had diagnoses of cognitive impairments and 92% had more than five comorbidities. The mean treatment duration with denosumab is 29.7±20.8 months. Approximately 23% of the patients experienced adverse events while on treatment and 81.2% had injection delay. Underlying pulmonary disease (OR: 3.1, CI: 1.1-9.7) and CFS > 5 (OR: 2.6, CI: 1.3-10.6) were significantly associated with adverse events risk.

## DISCUSSIONS:

Frail patients (CSF 6 & 7) experienced more side effects with denosumab (infection: 12.4%). Any delays in denosumab need to be investigated to rule out adverse events related.

## CONCLUSION:

There is a need for thorough screening and monitoring of safety outcomes with denosumab since the current data might be under reported.

## REFERENCES:

1. Chen Y et al. Efficacy and safety of denosumab in osteoporosis or low bone mineral density postmenopausal women. Front. Pharmacol., 14 April 2021.12:588095.
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