

# Does Adopting a Multidisciplinary Approach in the Management of Acute Hip Fractures in Orthopedic Geriatric Patients Lead to Better Outcomes? A Preliminary Report of the University of the Philippines - Philippine General Hospital (UP-PGH) Orthogeriatric Multidisciplinary Fracture Management Model and Fracture Liaison Service

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## ABSTRACT

**Objectives.** This study is a retrospective cohort that aims to describe the profile of orthopedic geriatric patients aged 60 years old and above with acute hip fractures occurring within one month of admission in the Philippine General Hospital managed by a multidisciplinary team approach.

**Methods.** Data collection from the database was done to gather information regarding the patient profile, time to surgery, causes for delay in consultation, length of hospital stay, and follow-up rate, since this model was implemented.

**Results.** Overall, we saw a decrease in the time from admission to surgery and a decrease in the length of hospital stay, when compared to previous data. Follow-up rates and compliance to maintenance medication are at 96% and 72% respectively.

**Conclusion.** The implementation of a multidisciplinary approach and fracture liaison service presents us with favorable results in addressing hip fractures and osteoporosis.

**Key Words:** Orthopedics, Multidisciplinary Research, Osteoporosis, Osteoporotic Fractures, Geriatrics

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## INTRODUCTION

From 2007-2012, data from the Philippine national health insurance system database showed a total of 17,875 hip fractures and 4,610 vertebral fractures, with a higher prevalence in women than in men. The International Osteoporosis Foundation hip fracture incidence map showed in 2013 that the hip fracture incidence was at 93/100,000 Filipinos per year, with a higher incidence in women than in men. The cost per hip fracture was estimated at over 2,200 USD or over 110,000 Php, precipitating a high burden to health care cost.<sup>1</sup>

This new epidemic of osteoporosis and hip fractures gave rise to the practice of orthogeriatric, which the Australian and New Zealand Society for Geriatric Medicine defined as “medical care for older patients with orthopaedic disorders that is provided collaboratively by orthopaedic services and, aged care or rehabilitation services.”<sup>2</sup> The British Orthopedic Association (BOA) and the British Geriatric Society (BGS), in their collaboration on the care of patients with a fragility fracture, made known the importance of the geriatrician in managing geriatric orthopedic patients with hip fractures.

Several orthogeriatric care models have been implemented, with the joint care model being the most current one prescribed by the BGS. In this model of care, there is a collaboration between the geriatrician and orthopedic surgeon, as well as other members of a multidisciplinary team, including anesthesiologists and rehabilitation specialists, in the management of an elderly patient with acute hip fractures, starting from admission to a dedicated orthopedic ward up to discharge with secondary prevention of future osteoporotic fractures, with particular emphasis on fall intervention and prevention.<sup>3,4</sup> This approach to managing elderly patients with acute fragility hip fractures resulted in significant reductions in surgery and number of hospital days and the lowest in-patient mortality rate compared to other orthogeriatric models of care.<sup>3-5</sup> Currently, the gold standard for managing hip fractures in elderly patients is to have the surgery done within 48 hours of the injury. In this model, a fracture liaison service headed by a nurse specialist plays a vital role in the secondary prevention of fragility fractures, mainly addressing fracture risks by identifying, assessing, and treating these.<sup>4</sup>

In addition to specific approaches in managing elderly patients with fragility fractures, the BOA and BGS together established the National Hip Fracture Database (NHFD), principally with the intent of improving the quality and cost-effectiveness of hip fracture care. Having a constantly updated database with comparative data on patients with hip fractures allows for necessary feedback to guide health professionals in providing the best care for these patients. In a retrospective study by Patel et al. (2013), the NHFD brought about an improvement in hip fracture care quality, wherein an orthogeriatrician assessed more patients. This eventually translated to a shorter time to surgery and length of stay.<sup>6</sup> In Ireland, a similar study implemented the Irish Hip Fracture Database (IHFD) to monitor care standards against international criteria proposed by the BOA and BGS.

Data on hip fractures were collected from April 2012 to March 2013. A database was formed, including patient demographics, type of fracture, time to surgery, reasons for the delay, discharge destinations, and in-patient mortality. Implementation of the IHFD allowed for identifying factors in patient care that needed improvement, which in the future can be addressed to provide better quality care.<sup>7</sup>

In the Philippines, osteoporosis is primarily seen as part of natural aging and is not considered a national health

priority.<sup>1</sup> Further, there is a lack of accessible and essential data on this patient population that may eventually yield valuable information in improving the quality of care we can provide orthopedic geriatric patients. Historical data extracted from a compilation of the 2015 census of the UP-PGH Department of Orthopedics revealed that the average time from admission to surgery for elderly patients with hip fractures was 13 days. The average length of hospital stay was at 21 days. Continued efforts in providing the highest standard of care for our patients has led the department to officially launch the UP-PGH Orthogeriatric Multidisciplinary Fracture Management Model and Fracture Liaison Service on October 20, 2017, in partnership with the Department of Anesthesiology, Department of Family and Community Medicine, Department of Internal Medicine, and Department of Rehabilitation Medicine. A fracture liaison service (FLS) ensures that each patient is evaluated and managed for osteoporosis and focuses on secondary fracture prevention even after being discharged. It is part of the tasks of the FLS to make sure that each patient is compliant with all the necessary medications, exercises, and follow-up consultations.

The section implemented a data collection form to facilitate documentation, including demographics, details of the injury, information on menopause, comorbidities, osteoporosis, falls risk, screening for secondary osteoporosis, pertinent laboratory exams, details of the surgery, maintenance medication, and a follow-up checklist. All the information gathered using this form was inputted into the hip fracture database. All patients previously admitted to the hospital were followed up at the outpatient department, and their ambulation status, compliance to rehab, and compliance to anti-osteoporosis medications were reviewed.

Current recommendations from the National Institute for Health and Clinical Excellence (NICE) guidelines include calcium and vitamin D supplementation in elderly patients to decrease hip fracture risk.<sup>8</sup> The UK National Osteoporosis Guideline Group (NOGG) also produced a guideline on the prevention and treatment of osteoporosis, with updates on pharmacological interventions for treating individuals at high risk for fragility fractures. Standard treatments for osteoporosis include starting anti-osteoporosis medications with calcium and vitamin D. Bisphosphonates such as alendronate, risedronate, and zoledronic acid all have a grade A recommendation anti-fracture efficacy.<sup>9</sup>

This was a retrospective case series study profiling orthopedic geriatric patients with acute hip fractures admitted in the Philippine General Hospital being managed by a multidisciplinary team. Data was collected and analyzed from the Department of Orthopedics Hip Fracture Database. All patients managed by the multidisciplinary team and fracture liaison service (FLS) during their admission and follow-up from January 2018 to October 2018 were identified from the database, and data regarding time to surgery, the total length of hospital stay, causes for delay in admission,

perioperative morbidity, and mortality, and follow-up compliance were gathered. This study focused solely on collecting and analyzing data that can be taken from the Department of Orthopedics Hip Fracture Database.

## METHODS

### Study Population

From January 2018 to October 2018, patients who fulfilled the inclusion criteria comprised the study population. The inclusion criteria were as follows:

- Orthopedic patient aged 60 years old and above
- With acute hip fracture (occurring within one month of admission)
- Managed by the UP-PGH Orthogeriatric Multidisciplinary Fracture Management Model and Fracture Liaison Service

This included patients admitted during the period and patients initially seen at the outpatient clinic but not admitted. Excluded patients did not fall within the age group, with hip fractures that were more than one month old, those with pathologic fractures, and those without consent for participation in the study.

### Exposure

All orthopedic geriatric patients with acute hip fractures were managed by a multi-disciplinary team consisting of physicians from the following specializations: Orthopedics, Adult Medicine/Geriatrics, Family Medicine, Rehabilitation Medicine, and Anesthesia.

The clinical pathway for geriatric patients with acute hip fractures was activated (Figure 1). The patients were screened, and an orthopedics resident did an initial assessment. Necessary tests and radiographs were obtained from admission. Temporary stabilization in the form of skin traction was applied. Referrals to the respective departments previously mentioned were done either at the emergency room (ER) for patients received in the ER or at the ward for direct ward admissions. Each patient was seen by the FLS coordinator, who was in charge of collecting demographic data, documenting details regarding the patient's admission and follow-up using the data collection forms, and coordinating these follow-up consultations. The co-managing services actively provided necessary and valuable information for surgical and anesthetic planning and post-op care and discharge planning. Each patient was evaluated for pre-operative surgical clearance, and laboratory exams to diagnose osteoporosis and secondary causes for osteoporosis were done during the admission. Education regarding the importance of compliance to medication, home rehabilitation programs, and falls prevention was offered to each patient. Once discharged, all patients were advised to followed-up at the outpatient clinic. Information regarding ambulation status, compliance to anti-osteoporosis medications, and

compliance to the rehabilitation program (whether with our own Rehabilitation Medicine department or in a community rehabilitation center) were noted for each patient. Also, all patients were checked for any perioperative morbidity such as surgical site infection and implant failure, and any secondary fractures were documented. Follow-up dates were scheduled as follows: 2 weeks, 6 weeks, 3 months, 6 months, 9 months, and 1-year post-surgery (or post-admission, for those admitted but did not undergo any surgery). Patients who were lost to follow up were contacted by a member from the FLS (the FLS coordinator) through telephone. With the aid of a script, the patients were reminded of their check-ups and asked regarding their ambulation status, compliance to medications and exercises. All information from the data collection forms was encoded into the hip fracture database.

### Methods

Data from the hip fracture database was extracted and reviewed. Categorical variables were expressed in terms of frequency (percentages) and continuous variables as median (range) and average. The average time between the date of injury and surgery, and the average total length of hospital stay were computed. The incidence of delay to surgery was determined and patients who did not undergo surgery. The follow-up rate of all patients and the rate of compliance to medications were determined. Weight-bearing status was categorized as non-weight-bearing (wheelchair ambulation), partial weight-bearing, and full weight-bearing, and presented as percentages.

## RESULTS

From January 2018 to October 2018, there was a total of 28 patients aged 60 years old and above diagnosed with acute hip fractures (within one month of the injury) and managed by the multidisciplinary team. The average age of patients was 74 years: (range: 60 to 89 years old; median=74; mode=62); of the 28 patients, 23 were female (82%), while 5 (18%) were male; sixteen out of 28 patients (57%) had known comorbidities before the injury, but only 2 (7%) were aware of their osteoporosis (Table 1).

In terms of the mechanism of injury, low energy trauma was still the most common cause. Four patients (14%) already had previous falls within one year since the most recent one. The majority of the patients were diagnosed with extracapsular fractures, particularly intertrochanteric fractures (n=14; 50%) and subtrochanteric fractures (n=4; 14%). Others were diagnosed with intracapsular neck of femur fractures (n=10; 26%)(Table 1).

Seventeen patients (61%) presented with a delay in consultation, meaning they consulted with us more than 24 hours after the injury (Table 2). Among the reasons for the delay in consultation, four patients (14%) were initially seen in another hospital but were transferred to PGH for definitive management, three patients (11%) were delayed

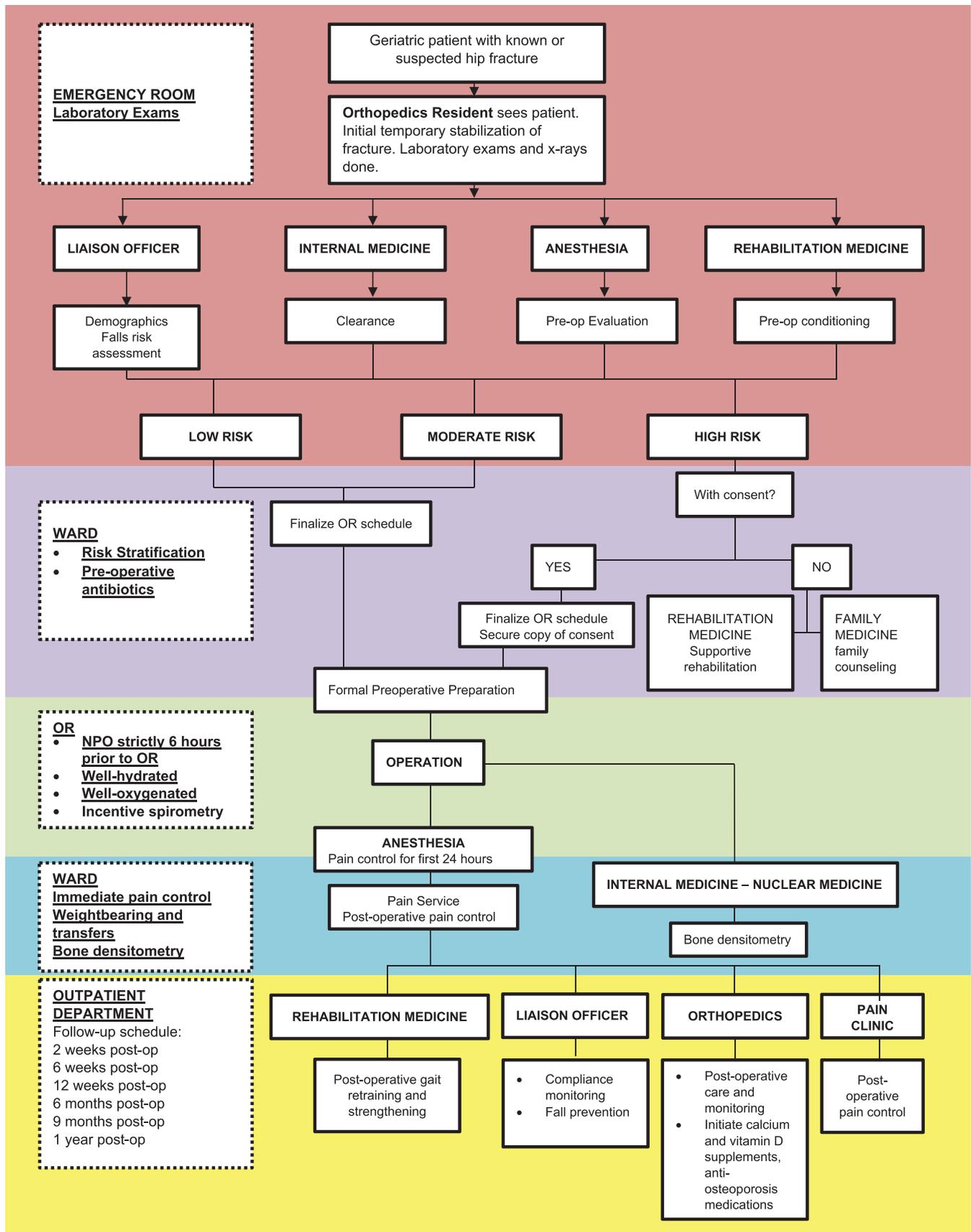


Figure 1. Clinical pathway for geriatric patients with acute hip fractures.

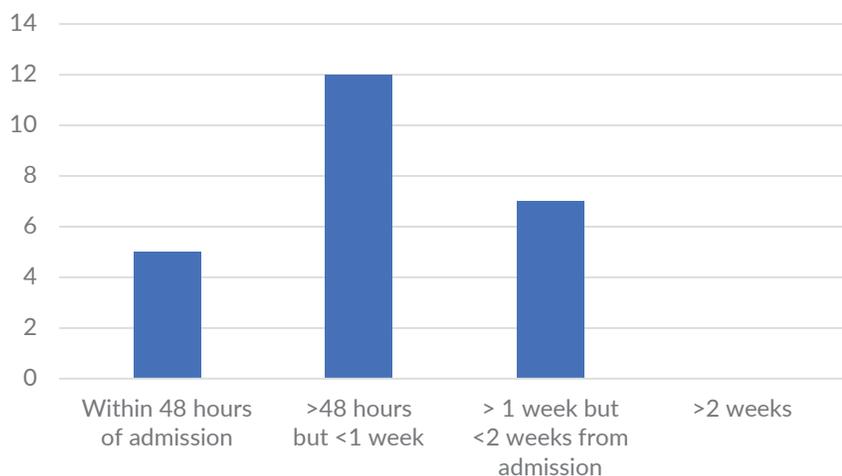


Figure 2. Time to surgery.

due to financial constraints, two patients (7%) initially refused consultation and surgery, one patient was allegedly delayed because there was no one available to bring the patient to the hospital. In contrast, another patient was allegedly difficult to transfer due to pain. The delay in 6 patients

Table 1. Baseline characteristics

	Number of Patients	Percentage
<b>Total</b>	28	100
<b>Age (range)</b>	60-89 (Average=74; Median=74; Mode=62)	N/A
<b>Sex</b>		
Male	5	18
Female	23	82
<b>Type of fracture</b>		
Intracapsular		
Neck of femur	10	36
Extracapsular		
Intertrochanteric	14	50
Subtrochanteric	4	14
<b>Known comorbidities</b>	16	57
<b>Known osteoporosis</b>	2	7
<b>Previous falls</b>	4	14

Table 2. Details on delayed consultation

	Number of patients	Percentage
Delayed consultation (more than 24 hours after injury)	17	61
Reason for delayed consultation		
Patient was seen in another hospital	4	23
There was no one to bring the patient to the hospital	1	6
Difficulty transferring patient	1	6
Patient refused consultation/surgery	2	12
Financial constraints	3	18
Unknown	6	35

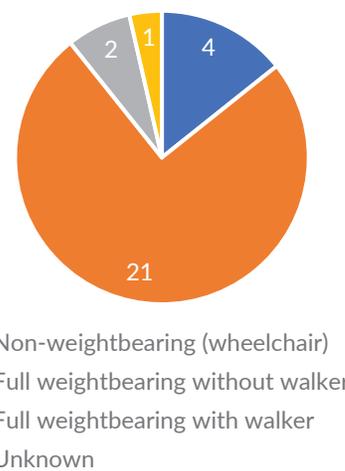


Figure 3. Weightbearing status.

(21%) was unknown, possibly due to a lack of information at the end of data collection. The person who supplied the information on the data collection form was not the patient or the same watcher present during the injury.

The average length of hospital stay was 13 days (range: 1-37 days; median: 12; mode: 11). Among the 28 patients seen by the multidisciplinary team, 24 underwent surgery, with the average time to surgery being five days (range: 1-11 days)(Table 3). Five patients (21%) had surgery done within 48 hours of admission, 12 patients at greater than 48 hours but less than one week (50%), and seven patients (29%) at greater than one week but less than two weeks from admission (Figure 2). All 24 surgeries were done within two weeks of admission.

Four patients were diagnosed with an acute hip fracture, but surgery was not done (Table 3). One patient was seen 26 days post-injury, was able to mobilize with a wheelchair and do transfers, with some inguinal tenderness but a negative heel-pound test. Surgery was offered, but he was deemed to be at high risk for cardiovascular complications given his prior stroke history. The patient was treated conservatively with rehabilitation exercises and physical therapy and ambulated with a walker five months post-injury. Another patient also opted to defer surgery due to a high risk for cardiovascular complications and was ambulatory with partial weight-bearing with the assistance of a walker at three months post-injury. The family declined another patient's surgery. One patient opted to go home against medical advice and has yet to be seen at the outpatient clinic.

Among the 28 patients managed by the team, a large portion is currently allowed full weight-bearing either with the assistance of a walker or a cane (n=21; 75%)(Table 4) (Figure 3). There are four patients (14%) who, at the time of the study, were non-weight-bearing in a wheelchair.

The Follow-up rate was 96%, with 24 out of 25 patients compliant to follow-up at the outpatient clinics. Compliance with calcium, vitamin D supplements, and anti-osteoporosis medications was checked at follow-ups and is currently

**Table 3.** Details on surgery

Surgery	Number of patients	Percentage
<i>Done</i>	24	86
Within 48 hours of admission	5	21
>48 hours but < 1 week	12	50
>1 week but <2 weeks from admission	7	29
> 2 weeks	0	0
<i>Not done</i>	4	14

**Table 4.** Weightbearing status

Weightbearing status	Number of patients	Percentage
Non-weight-bearing (wheelchair ambulation)	4	14
Full weight-bearing with assistance of a walker	21	75
Full weight-bearing without the walker	2	7
Unknown	1	4

at 72% (n=18). Six patients were not compliant with the maintenance medications, and three have yet to follow up at the clinics. There was one patient who lacked information on this aspect.

Perioperative complications such as surgical site infection, implant failure, deep vein thrombosis, and any secondary fractures were not noted in any of the patients.

## DISCUSSION

Fragility fractures continue to present challenges to our health care system and our aging society. In the UK alone, where orthogeriatric and the FLS have been widely accepted as the standard of care, there are about 300,000 fragility fractures every year. Recent projections estimate a double in the number of hip fractures by the year 2050. At present, the cost per hip fracture is estimated at over 2,200 USD or over 110,000 Php, precipitating a high burden to health care cost.

With the establishment of the UP-PGH Orthogeriatric Multidisciplinary Fracture Management Model and Fracture Liaison Service, we expect to address these issues and hopefully improve how we manage a nationwide problem of hip fractures and osteoporosis.

The current hip fracture database implemented with this program reveals several essential facts that must be addressed. First, the results highlight that females are at greater risk of developing osteoporosis and fragility fractures given their post-menopausal state. Knowing that most of the elderly have multiple medical co-morbidities should prompt us to coordinate with other subspecialties from Internal and Family Medicine and be wary of the problem of polypharmacy. With only a 7% awareness rate for osteoporosis, we should proactively educate our patients on this critical condition, and at the same time, treat all patients with the necessary supplements and anti-osteoporosis medications.

Second, knowing that the most common injury mechanism is still low energy mechanical falls, an integral part of our treatment should be modifying the patient's environment and conditioning the patient for better balance to avoid future falls. Therefore collaboration with the Department of Rehabilitation Medicine is vital in fracture prevention, addressing issues regarding fall prevention through lifestyle and environmental modifications and rehabilitation programs to prepare the patient physically.

Despite these realizations, this current program's figures show a lot of promise in improving how we manage hip fractures in the elderly. In the 2015 census of the UP-PGH Department of Orthopedics, the average time from admission to surgery for elderly patients with hip fractures was 13 days. The average length of hospital stay was at 21 days. Since the implementation of the Orthogeriatric Multidisciplinary Fracture Management Model and Fracture Liaison Service, we have seen a decrease in both the time to surgery and length of hospital stay, from 13 days to 5 days, and 21 days to 13 days. That is equivalent to a 62% and 38% decrease, respectively.

Further studies are needed to demonstrate significant and correlations, but the absolute numbers are promising. A multidisciplinary approach can address the delays to surgery under the attending physicians' control, such as the delays in clearance and unnecessary laboratory exams before surgery. Although not part of the study and the existing database, implant availability may also contribute to surgery delays and should be considered in early hip fracture management. Early return to ambulation post-operatively allows for a shorter hospital stay as well, with patients being discharged a few days after the surgery. A faster time to surgery and a shorter hospital stay can eventually translate to more efficient use of hospital beds and facilities. Consequently, less hospital expenses arising from prolonged hospital stays. A faster time to surgery and hospital stay can also lower morbidity and mortality that prolonged hospitalization and immobilization can bring about.

Also, early risk stratification can provide us with alternative plans for managing fractures non-surgically. Despite being managed conservatively, collaboration with rehabilitation medicine and family medicine still provides each patient with goals to prevent prolonged immobilization complications. Two out of the four patients who did not undergo surgery were eventually able to ambulate with partial weight-bearing with the proper rehabilitation. Collaborating with physicians from rehabilitation medicine and anesthesia allows our patients to return to ambulation as early as possible, with the appropriate exercises and pain control. As seen in the current data, most post-operative patients are classified as either partial or full weight-bearing, which coincides with our goals of bringing back our patients to ambulation as early as possible.

This program also presents us with more consistent follow-ups and constant reminders on medication compli-

ance. A follow-up rate of 96% and a compliance rate of 72% give us a baseline to compare future improvements and give us a framework to properly monitor our patients. Part and parcel of osteoporosis treatment is calcium and vitamin D supplementation together with bisphosphonate therapy. With a dedicated fracture liaison service, we can hope to maintain follow-up schedules and medication compliance and encourage patients lost to follow up to come back.

Though limited by its descriptive nature, this study provided us with multiple opportunities to tackle our persistent problem with osteoporosis. Documenting and increasing awareness of the possible advantages of adopting a multidisciplinary approach can lead to standardizing hip fracture care in the Philippines, decreasing hospital expenses, and providing evidence that earlier surgery leads to better outcomes. The persistent problems of inadequate facilities and having to shoulder the costs for implants can be addressed knowing that we can save more by doing early surgery. Hip fractures are just one aspect of this global concern, but measures can be done one step at a time.

## CONCLUSION

The implementation of a multidisciplinary approach and fracture liaison service presents us with favorable results in addressing hip fractures and osteoporosis, ultimately contributing to a decrease in the time from admission to surgery, a decrease in the length of hospital stay, as well as improvements in follow-up rates and compliance to maintenance medications for osteoporosis.

## Statement of Authorship

All authors participated in the data collection and analysis and approved the final version submitted.

## Author Disclosure

All authors declared no conflicts of interest.

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