

Short-term Outcomes of Patients with Fragility Hip Fractures Infected with SARS-CoV-2 Managed in a COVID-19 Referral Hospital with an Orthogeriatric Team

Irewin A. Tabu, MD^{1,2} and Kiko A. Cortez, MD¹

¹Department of Orthopedics, Philippine General Hospital, University of the Philippines Manila

²Institute on Aging, National Institutes of Health, University of the Philippines Manila

ABSTRACT

Objectives. Presence of COVID-19 infection in patients with acute fragility hip fracture complicates the decision-making process in the management of these patients. This study aims to describe outcomes of patients with coexisting fragility hip fracture and COVID-19 infection who underwent surgery.

Methods. In this retrospective study, the patient database of a university hospital designated as a COVID-19 referral center with an orthogeriatric team was reviewed to determine the mortality and morbidity rates, and short-term functional outcomes of patients with coexisting COVID-19 and acute fragility hip fracture who underwent surgery.

Results. A total of 18 patients were admitted with COVID-19 infection and acute fragility hip fracture – 12 had surgery. Mean injury-to-admission and admission-to-surgery intervals were 6.5 and 4.8 days, respectively. Most patients (91.7%) had an incidental finding of SARS-CoV-2 infection. Mean ASA score was 2.9. Arthroplasty was done in all patients with a mean operative time of 155.8 minutes and an average blood loss of 366.7 mL. Thirty-day mortality and morbidity rates were 16.7% and 33.3%, respectively. Mean EuroQoL overall health score was 79.3.

Conclusion. A multidisciplinary team approach is recommended to expedite timely surgery prior to the onset of clinical deterioration. Asymptomatic and mildly symptomatic patients with acute fragility hip fracture are candidates for urgent surgical intervention even in the presence of COVID-19 infection.

Keywords: orthogeriatrics, COVID-19, fragility hip fracture

INTRODUCTION

Fragility hip fractures present as a significant cause of morbidity, mortality, and financial burden in the elderly population.¹⁻³ Delay in management has been associated with poorer outcomes⁴ and a higher economic impact^{5,6}. Hence, prompt admission and timely surgery is the gold standard in the treatment of fragility hip fractures.^{4,7,8}

However, barriers to access to healthcare are common in low- to middle-income countries due to poor healthcare-seeking behavior, suboptimal logistics, and problems with interfacility referrals.⁹ This was further aggravated by the COVID-19 pandemic as lockdowns were imposed and hospital resources were allocated for the treatment of patients infected with the virus.¹⁰⁻¹² Furthermore, patients are hesitant to seek admission due to fear of contracting the infection which led to deterioration of clinical status and development of secondary complications,¹³ In fact, Jarvis et al. documented

*Dr. Tabu and Dr. Cortez share primary authorship for this manuscript.

Corresponding author: Irewin A. Tabu, MD
Department of Orthopedics
Philippine General Hospital
University of the Philippines Manila
Taft Avenue, Ermita, Manila 1000, Philippines
Email: iatabu@up.edu.ph

a significant increase in the time from injury to hospital arrival of patients with traumatic hip fractures when compared to the pre-pandemic era.¹⁰ Even though there was a marked decrease in emergency room admissions during the pandemic, the influx of patients with fragility hip fractures remained unchanged.^{12,14,15}

Several authors have reported the negative effect of the COVID-19 pandemic to the overall outcomes of patients with fragility hip fractures attributed to medical complications and socioeconomic impact of both diseases.¹⁶⁻¹⁸ Kumar et al. coined this phenomenon as a “pandemic within a pandemic” to highlight the burden of the coexistence of the fragility hip fractures and COVID-19 infection.¹⁶

Given the challenges posed by the COVID-19 pandemic to the healthcare system globally, established pathways for patient care, such as the orthogeriatric team and fracture liaison service, played an important role in the continuity of health service delivery to elderly patients.^{12,19}

In the University of the Philippines - Philippine General Hospital (UP-PGH) – the first hospital designated as a COVID-19 referral center in the Philippines – the Orthogeriatric Multidisciplinary Fracture Management Model and Fracture Liaison Service (UPMOMMA-FLS) continued to function as a multi-specialty service to provide care for patients with fragility hip fractures. It was composed of orthopedic surgeons, anesthesiologists, geriatricians, internists, and physiatrists from the respective departments of the hospital.²⁰

Presently, decision making in surgical intervention in patients with co-existing acute fragility hip fracture and COVID-19 infection is compounded by the negative effect of SARS-CoV-2 infection in the overall outcomes of operative patients, with surgeons recommending completion of isolation prior to operative procedure. However, delay in the management of patients with acute fragility hip fracture also leads to deleterious results. This study aims to describe the outcomes of patients with fragility hip fractures and COVID-19 infection managed by a multidisciplinary team approach to aid in the decision making on surgical intervention for patients with co-existing diseases. To the authors’ knowledge, no local study has been published to document the short-term results of patients with co-existing diseases who underwent surgical intervention.

MATERIALS AND METHODS

Objectives

This is a retrospective study designed to determine short-term outcomes in terms of morbidity and mortality rates and functional status of patients with coexisting acute fragility hip fractures and COVID-19 infection who underwent surgical intervention.

The secondary objectives of this study are as follows:

1. Describe the preoperative characteristics of patients; and

2. Describe the hospitalization details of patients in terms of timing of admission, surgery, and discharge

Study Population

Patients with coexisting acute fragility hip fracture and COVID-19 infection under the UPMOMMA-FLS who underwent surgical intervention were included in this study. Specifically, the inclusion criteria are as follows:

1. Age \geq 60 years old;
2. Diagnosed with acute fragility hip fracture;
3. Days-to-hospitalization interval \leq 28 days;
4. Preoperative COVID-19 infection confirmed with RT-PCR test during admission;
5. Underwent surgical intervention with either joint replacement or internal fixation; and
6. Has a 30-day follow-up data

The exclusion criteria are as follows:

1. Fragility fracture elsewhere in the body; and
2. Pathologic fractures.

Methods

All patients who satisfied the inclusion criteria were included in this study. Demographic details, preoperative parameters, and hospitalization information were obtained from the patient database of the UPMOMMA-FLS. Thirty-day morbidity and mortality rates were extracted from the monitoring sheet of the same patient database. Functional status at latest follow-up was recorded using the self-administered EuroQoL EQ-5D (see Appendix – Filipino version obtained from the authors of the questionnaire), which was also documented in the UPMOMMA-FLS patient database.

Statistical Analysis

Total population sampling was employed to include all patients who satisfied the inclusion criteria. Descriptive statistics such as mean, frequencies, and percentages were obtained for the various preoperative, intraoperative, and postoperative parameters measured in this study.

RESULTS

Patient Profile

A total of 18 patients with a mean age of 75.8 (\pm 8.8; range: 62-92) years old diagnosed with coexisting acute fragility hip fracture and preoperative COVID-19 infection were admitted in our institution. Twelve (12) patients underwent surgery. Mean injury-to-admission and admission-to-surgery intervals were 6.5 and 4.8 days, respectively. Mean injury-to-surgery interval was 11.3 days and mean length of hospitalization was 12.4 days. Patient population had a COVID-19 vaccination rate of 83.3%. Patient profile is summarized in Table 1.

Table 1. Patient Profile

	Value	
Demographic Information		
Mean age (SD; range)	75.8 (8.8; 62-92)	
Sex		
Male	1	
Female	11	
Mean (SD) / Range		
Hospitalization Information		
Injury-to-admission (days)	6.5 (3.8) / 1-12	
Admission-to-surgery (days)	4.8 (2.7) / 2-10	
Injury-to-surgery (days)	11.3 (5.0) / (4-21)	
Length of stay (days)	12.4 (2.9) / (9-17)	
	Frequency	Percentage (%)
Fracture Classification		
Transcervical	6	50
Pertrochanteric	6	50
Subcapital	0	—
Vaccination Status		
Complete	10	83.3
Incomplete	0	—
Unvaccinated	2	—

Preoperative Profile

Most patients (91.7%) were asymptomatic and had only incidental finding of COVID-19 infection on routine RT-PCR test. Only 1 patient required supplemental oxygen through a nasal cannula. Majority of patients (58.3%) had stable comorbidities while four patients had uncontrolled comorbidities and one patient with no comorbidity. Nine patients had normal chest radiographs and in three patients, pneumonia was considered. Non-specific changes in the electrocardiography were the most common finding (50%). Mean ASA score and preoperative hemoglobin was 2.9 and 111.3 g/L, respectively (Table 2).

Operative Information

All patients underwent arthroplasty with cemented components. Partial hip arthroplasty was done in 11 patients and total hip arthroplasty was done in one patient. Methods of anesthesia used were regional (n=8), general (n=1), and combined regional with peripheral nerve block (n=3). Mean operative time was 155.8 minutes with a mean blood loss of 366.7 mL. Operative information is summarized in Table 3.

30-day Morbidity and Mortality Rates

Four patients developed complications. Thirty-day morbidity rate was 33.3%. This included surgical site infection (n=1), hospital-acquired pneumonia (n=3), unexpected ventilation (n=2), and myocardial infarction (n=1) (Table 4).

Two patients died within the 30 days from surgery due to septic shock from hospital-acquired pneumonia and cardiogenic shock from myocardial infarction. Mortality rate was 16.7% with a mean time-to-death of 20.5 days (Table 4).

Table 2. Preoperative Profile of Patients

Parameters	Frequency	Percentage (%)
Symptom on admission		
None	11	91.7
Mild	1	8.3
Moderate	0	—
Severe	0	—
Preoperative oxygen support		
Room air	11	91.7
Supplemental oxygen	1	8.3
Noninvasive ventilation	0	—
Mechanical ventilation	0	—
Comorbidities		
None	1	8.3
Stable	7	58.3
Uncontrolled	4	33.3
Preoperative chest radiograph		
Normal	9	75
Pneumonia considered	3	25
Electrocardiography		
Normal	5	41.7
Non-specific	6	50
Abnormal	1	8.3
ASA score		
I	0	0
II	3	25
III	7	58.3
IV	2	16.7
V	0	—
Mean preoperative hemoglobin	111.3 g/L	

Table 3. Operative Information

	Frequency	Percentage (%)
Surgery		
Partial hip arthroplasty	11	91.7
Total hip arthroplasty	1	8.3
Anesthesia		
General	1	8.3
Regional	8	66.7
Peripheral	0	—
Combined	3	25
Mean operative time (minutes)	155.8	
Mean blood loss (mL)	366.7	

Table 4. 30-day Morbidity and Mortality Rates

	Frequency	Percentage (%)
Complications		
Hospital-acquired pneumonia	3	25
Unexpected ventilation	2	16.7
Myocardial infarction	1	8.3
Surgical site infection	1	8.3
30-day morbidity	4	
Causes of death		
Septic shock	1	8.3
Cardiogenic shock	1	8.3
30-day mortality	2	

Table 5. Mean EuroQoL-EQ-5D

Patient	Mobility	Self-Care	Usual Activities	Pain	Anxiety / Depression	Overall Health
1	4	2	5	3	1	60
2	5	5	5	2	2	70
3	2	1	1	2	2	75
4	2	2	2	2	1	85
5	3	2	5	3	1	75
6	2	1	2	2	1	98
7	2	2	3	3	2	90
8	2	1	3	4	2	80
9	1	1	1	1	1	100
10	3	1	3	1	2	60
<i>Average</i>	2.6	1.8	3	2.3	1.5	79.3

Functional Outcomes

All alive patients (n=10) were able to follow-up at the outpatient clinic with a mean follow-up period of 3.4 months. Mean EuroQoL Overall Health score was 79.3. Each mean dimension score of the EuroQoL-EQ-5D is summarized in Table 5.

DISCUSSION

Elderly patients are at a higher risk for complications of COVID-19 pneumonia due to the susceptibility of this age group to various comorbidities.²¹ Furthermore, perioperative presence of COVID-19 infection in patients with acute fragility hip fractures is associated with higher morbidity and mortality rates.^{16,17} A systematic review was able to document a 30-day mortality rate of patients with co-existing COVID-19 and fragility hip fracture at 34.7%, which was significantly higher than their non-COVID counterparts, as well as when compared to the pre-pandemic era. The authors also reported higher rate of infection, acute renal failure, myocardial infarction, and acute respiratory failure in COVID-19 positive patients.²²

In this retrospective study, the 30-day morbidity and mortality rates of patients with coexisting acute fragility hip fracture and COVID-19 infection who underwent surgical intervention were 33.3% and 16.7%, respectively. Three patients developed hospital-acquired pneumonia with two of them subsequently put on mechanical ventilation and eventually expired. Septic shock was the cause of death in one patient and cardiogenic shock on the other patient. The first patient who expired had no known comorbidities but had an abnormal electrocardiography on admission. The second patient had uncontrolled diabetes mellitus and non-specific findings on ECG. Both patients had normal preoperative chest radiographs and unremarkable intraoperative course. Other complication reported in this study were surgical site infection treated with oral antibiotics and wound care.

In comparison to the pre-pandemic data based on the UPMOMMA-FLS database, the 30-day mortality rate of patients with coexisting COVID-19 infection showed a

higher trend (16.7% vs. 9.8%). However, the higher number reported in current study may be due to a smaller patient population.

In an unpublished multicenter data in the Philippines, the most common reasons for delay in hospital admission are fear of contracting the COVID-19 virus and logistical issues due to the imposed lockdowns.²³ This added to the preexisting problems in operating theater availability, staff shortage, and lack of funds for implants causing delay from admission to the actual surgery.^{5,10}

These factors, combined with the general perception of the public towards the pandemic, have caused delays in hospital consultation.¹⁰ It has been reported by several authors that delayed management of these patients led to development of secondary complications (e.g., pneumonia, ulcers, malnutrition, etc.) and death.^{4,7,8}

Based on our patient database, there was still a significant delay in admission of patients with acute fragility hip fractures with a documented mean injury-to-hospitalization and admission-to-surgery intervals of 6.5 and 4.8 days, respectively. Consequently, our mean injury-to-surgery interval was 11.3 days, which is almost six times the golden period recommended by the American College of Surgeons.⁷ Nonetheless, these numbers were greatly improved from the data prior to the adaptation of the Orthogeriatric Multi-disciplinary Fracture Management Model and Fracture Liaison Service in our institution.²⁰

Although some authors recommended that surgery in patients who contracted COVID-19 should be delayed for 7 weeks as they are at a higher risk of developing postoperative morbidity and mortality,²⁴ the American Academy of Orthopaedic Surgeons classified acute fragility hip fracture as an “urgent-only” case needing immediate surgery as the benefits of early mobilization outweighs the risks associated with surgery.²⁵ This is supported by various studies that early intervention prevents development of secondary complications and results to better overall outcomes^{4,7,8} and has been the gold standard in the management of patients with fragility fractures as recommended by various clinical practice guidelines adapted globally.²⁶

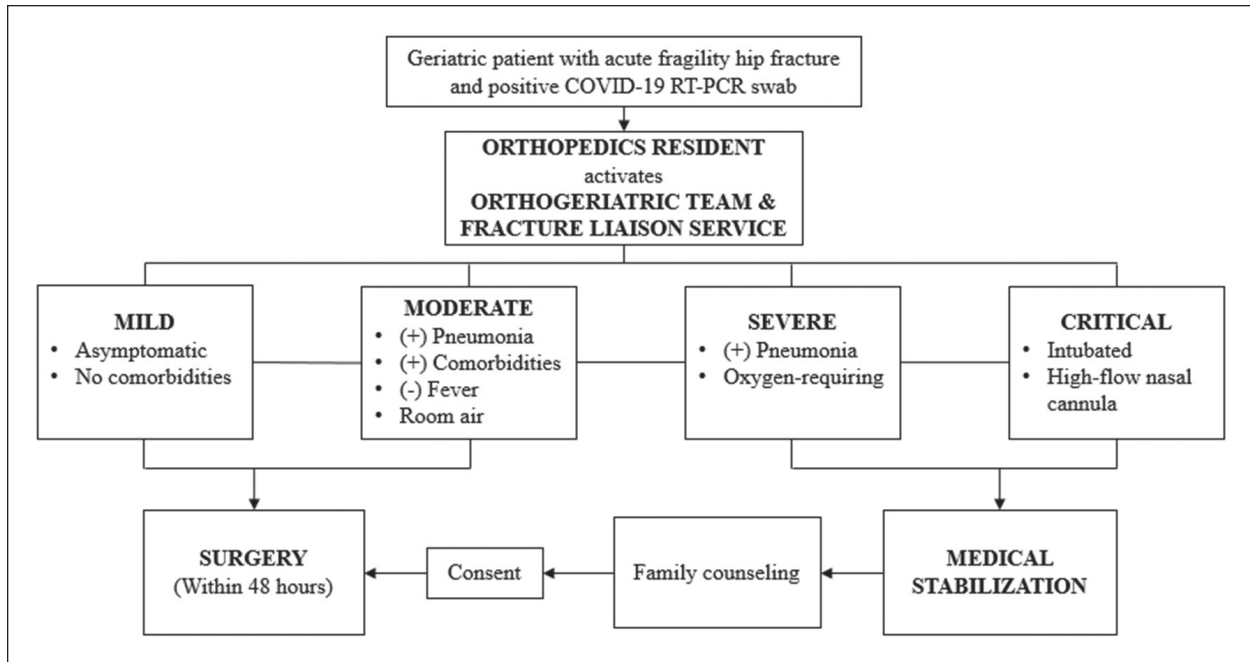


Figure 1. Clinical pathway for geriatric patients with acute hip fractures and COVID-19.

In this study, all patients who underwent surgery were only asymptomatic or mildly symptomatic patients. On the other hand, all patients who presented with severe symptoms on admission were not cleared for surgery. Five out of six patients with severe symptoms eventually expired within seven days from admission. Comparing the surgical versus the nonsurgical group, there was a significant difference in the mortality and morbidity rates between the two groups (morbidity rate: 33.3% vs. 100%, $p=0.0091$; mortality rate: 16.7% vs. 83.3%, $p=0.0079$). Although the difference in injury-to-admission between the surgical and nonsurgical groups was not significant (6.5 days vs. 8.7 days, $p=0.3610$), the former showed a relatively earlier hospitalization. This emphasized the importance of prompt admission and intervention prior to the onset of clinical deterioration.

Even though the time-motion statistics reported in our institution was subpar compared to western data, we were still able to report low morbidity and mortality rates and good functional outcomes. Nonetheless, overall awareness on fragility fractures and urgency to intervene should be promoted in the Philippines.

Joint replacement surgery was done in all patients due to the lack of intraoperative fluoroscopic imaging in the COVID-19 operating room complex. This limitation influenced surgeons to defer internal fixation even if the fracture configuration was amenable to an internal fixation device.

Majority of patients who underwent surgical intervention had full vaccination. On the other hand, all patients who were deemed unstable for surgery had no vaccination. In terms of survival of all patients with acute fragility

fracture and COVID-19 infection ($n=18$), fully vaccinated and unvaccinated patients had a mortality rate of 10% and 75%, respectively, which showed statistical significance ($p=0.00494$). This emphasized the importance of vaccination in the overall outcomes of COVID-19 patients. Unfortunately, the specific strain of COVID-19 was not known in all patients since this information was not readily available in our institution.

We modified the pathway reported by Reyes et al.²⁰ to accommodate the COVID-19 classification of patients based on the patients' clinical status, which was the main factor considered in determining suitability of patients to surgical intervention (Figure 1).

This study also highlighted the importance of a multi-disciplinary team approach to patients with coexisting acute fragility hip fracture and COVID-19 infection. The orthogeriatric pathway of care plays a significant role during the pandemic for patients with acute fragility hip fractures and afflicted with COVID-19 infection.^{27,28} The fracture liaison service (FLS) has been proven as a clinical- and cost-effective tool in the continued management of these patients post hospital discharge.²⁷ Prompt admission and surgical intervention should be carried out as soon as patients are physiologically optimized and prior to development of secondary complications which may complicate the contemplated surgical procedure.²³

In summary, our study documented low morbidity and mortality rates as compared to previously reported figures in the literature. Even with delays in hospital presentation and surgical intervention due to logistical factors, our patients showed improved functional outcomes at short-term follow-

up. Nonetheless, certain measures should be implemented to facilitate prompt admission and surgery in patients with acute fragility hip fractures and COVID-19 infection.

The decision making to perform surgery on patients with acute fragility hip fracture is compounded by the presence of COVID-19 infection, with some authors recommending delay in surgical intervention.²⁴ However, doing so may put patients at risk for developing secondary complications due to prolonged immobilization.^{4,7,8} Managing patients with coexisting acute fragility hip fracture and COVID-19 infection is challenging²⁸ and a shared decision making process should be employed between physicians and family members to manage expectations and select the appropriate treatment intervention.²⁹

CONCLUSION

Surgical intervention in patients with coexisting acute fragility hip fracture and COVID-19 infection should be carried out prior to onset of pulmonary symptoms and medical complications. Asymptomatic and mildly symptomatic patients are candidates for urgent surgical intervention even in the presence of COVID-19 infection. A multidisciplinary orthogeriatric team approach should be employed to expedite timely surgical intervention prior to the development of secondary complications and clinical deterioration, as well as to achieve the best outcomes in patients with coexisting asymptomatic and mild COVID-19 infection and acute fragility hip fracture.

Statement of Authorship

Both authors contributed in the conceptualization of work, acquisition and analysis of data, drafting and revising, and final approval of the version to be published.

Author Disclosure

Both authors declared no conflicts of interest.

Funding Source

The study was self-funded.

REFERENCES

- Rizkallah M, Bachour F, El Khoury M, Sebaaly A, Finianos B, El Hage R, et al. Comparison of morbidity and mortality of hip and vertebral fragility fractures: Which one has the highest burden? *Osteoporos Sarcopenia*. 2020 Sep;6(3):146–50. doi: 10.1016/j.afos.2020.07.002.
- Braithwaite RS, Col NF, Wong JB. Estimating hip fracture morbidity, mortality, and costs. *J Am Geriatr Soc*. 2003 Mar;51(3):364–70. doi: 10.1046/j.1532-5415.2003.51110.x.
- Mithal A, Ebeling PR, Kyer CS. The Asia-Pacific regional audit. Singapore; 2013. pp. 86–90.
- Klestil T, Röder C, Stotter C, Winkler B, Nehrer S, Lutz M, et al. Impact of timing of surgery in elderly hip fracture patients: a systematic review and meta-analysis. *Sci Rep*. 2018 Sep;8(1):13933. doi: 10.1038/s41598-018-32098-7.
- Cortez KA, Lai JGL, Tabu IA. Economic burden and the effects of early versus delayed hospitalization on the treatment cost of patients with acute fragility hip fractures under the UPM-PGH Orthogeriatric Multidisciplinary Fracture Management Model and Fracture Liaison Service. *Osteoporos Sarcopenia*. 2021 Jun;7(2):63–8. doi: 10.1016/j.afos.2021.05.004.
- Loures FB, Chaoubah A, de Oliveira VM, Almeida AM, de Saraiva Campos EM, de Paiva EP. Economic analysis of surgical treatment of hip fracture in older adults. *Rev Saude Publica*. 2015;49:12. doi: 10.1590/s0034-8910.2015049005172.
- Lee DJ, Elfar JC. Timing of hip fracture surgery in the elderly. *Geriatr Orthop Surg Rehabil*. 2014 Sep; 5(3):138–40. doi: 10.1177/2151458514537273.
- Leung F, Lau TW, Kwan K, Chow SP, Kung AWC. Does timing of surgery matter in fragility hip fractures? *Osteoporos Int*. 2010 Dec; 21(Suppl 4):S529–34. doi: 10.1007/s00198-010-1391-2.
- Pouramin P, Li CS, Busse JW, Sprague S, Devereaux P, Jagnor J, et al. Delays in hospital admissions in patients with fractures across 18 low-income and middle-income countries (INORMUS): a prospective observational study. *Lancet Glob Health*. 2020 May;8(5):e711–20. doi: 10.1016/S2214-109X(20)30067-X.
- Jarvis S, Salottolo K, Madayag R, Pekarek J, Nwafo N, Wessel A, et al. Delayed hospital admission for traumatic hip fractures during the COVID-19 pandemic. *J Orthop Surg Res*. 2021 Apr;16(1):237 doi: 10.1186/s13018-021-02382-w.
- Shadmi E, Chen Y, Dourado I, Faran-perach I, Furler J, Hangoma P, et al. Health equity and COVID-19: Global perspectives. *Int J Equity Health*. 2020 Jun;19(1):104. doi: 10.1186/s12939-020-01218-z.
- Upadhyaya GK, Iyengar K, Jain VK, Vaishya R. Challenges and strategies in management of osteoporosis and fragility fracture care during COVID-19 pandemic. *J Orthop*. 2020 Jun;21:287–90. doi: 10.1016/j.jor.2020.06.001.
- Lai AY, Sit SM, Wu SY, Wang M, Wong BY, Ho S, et al. Associations of delay in doctor consultation with COVID-19 related fear, attention to information, and fact-checking. *Front Public Health*. 2021 Dec;9:797814.. doi: 10.3389/fpubh.2021.797814.
- Minarro JC, Zamorano-Moyano C, Urbano-Luque ML, Arenas-de Larriva A, Izquierdo-Fernández A, Quevedo-Reinoso R. Is COVID-19 affecting the incidence of hip fractures? *Injury*. 2020; 51(10): 2329.
- Walters S, Raja H, Ahmad R, Tsitskaris K. *Surg J*. 2022 Jan;8(1):e8–13. doi: 10.1055/s-0041-1741511.
- Kumar P, Jindal K, Aggarwal S, Kumar V, Rajnish RK. 30-day mortality rate in hip fractures among the elderly with coexistent COVID-19 infection: a systematic review. *Indian J Orthop*. 2021 Mar;55(3):571–81. doi: 10.1007/s43465-021-00386-6.
- Fadulelmola A, Gregory R, Gordon G, Smith F, Jennings A. The impact of COVID-19 infection on hip fractures 30-day mortality. *Trauma*. 2021 Oct;23(4):295–300. doi: 10.1177/1460408620951352
- Dallari D, Zagra L, Cimatti P, Guindani N, D'Apolito R, Bove F, et al. Early mortality in hip fracture patients admitted during first wave of the COVID-19 pandemic in Northern Italy: a multicentre study. *J Orthop Traumatol*. 2021 Apr;22(1):4–11. doi: 10.1186/s10195-021-00577-9.
- Hampson G, Stone M, Lindsay JR, Crowley RK, Ralston SH. Diagnosis and management of osteoporosis during COVID-19: Systematic review and practical guidance. *Calcif Tissue Int*. 2021 Oct;109(4): 351–62. doi: 10.1007/s00223-021-00858-9.
- Reyes PVSJ, Tabu IA, Sandoval MAS, Mangubat AAS, Bing-Agsaoy DDC. 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. *Acta Med Philipp*. 2021;55(3):308–14. doi:10.47895/amp.v55i3.1759
- Du R, Liang L, Yang C, Wang W, Cao T, Li M, et al. Predictors of mortality for patients with COVID-19 pneumonia caused by SARS-CoV-2: A prospective cohort study. *Eur Respir J*. 2020 May;55(5):2000524. doi: 10.1183/13993003.00524-2020.
- Kumar P, Sen R, Aggarwal S, Agarwal S, Rajnish RK. Reliability of modified Harris hip score as a tool for outcome evaluation of total hip

replacements in Indian population. *J Clin Orthop Trauma*. 2019 Jan-Feb;10(1):128–30. doi: 10.1016/j.jcot.2017.11.019.

23. Tabu IA, Alpuerto BB, Araneta KTS, Delgado GD, Lai J, San Juan J, et al. Fragility hip fracture management during the COVID-19 pandemic: a multicenter experience from a country with an emerging economy. 2021. (In-house report).

24. El-Boghdadly K, Cook TM, Goodacre T, Kua J, Blake L, Denmark S, et al. SARS-CoV-2 infection, COVID-19 and timing of elective surgery: A multidisciplinary consensus statement on behalf of the Association of Anaesthetists, the Centre for Peri-operative Care, the Federation of Surgical Specialty Associations, the Royal College of Anaesthetists and the Royal College of Surgeons of England. *Anaesthesia*. 2021 Jul;76(7):940–6. doi: 10.1111/anae.15464.

25. Guy DK, Bosco JA III, Savoie FH III, AAOS Guidelines for Elective Surgery During the COVID-19 Pandemic [Internet]. 2020 [cited 2022 May]. Available from: <https://www.aaos.org/about/covid-19-information-for-our-members/aaos-guidelines-for-elective-surgery/>

26. Chan DD, Chang L, Akesson KE, Mitchell P, Chen C, Michael Lewiecki E, et al. Consensus on best practice standards for Fracture Liaison Service in the Asia-Pacific region. *Arch Osteoporos*. 2018 May;13(1):59. doi: 10.1007/s11657-018-0463-3.

27. Tarantino U, Cariati I, Tancredi V, Casamassima D, Piccirilli E, Iundusi R, et al. State of fragility fractures management during the COVID-19 pandemic. *Int J Environ Res Public Health*. 2020 Oct;17(21):7732. doi: 10.3390/ijerph17217732.

28. Olarte CM, López AM, Feldman JT, Zabala AL, Morales DC, Patino AF, et al. Hip fracture management in an orthogeriatric clinical care center during the COVID-19 pandemic in Bogotá, Colombia. *J Gerontol Geriatr Med*. 2021;7:117. doi: 10.24966/GGM-8662/100117

29. Greensmith TSW, Faulkner AC, Davies PSE, Sinnerton RJH, Cherry JV, Supparamaniam S, et al. Hip fracture care during the 2020 COVID-19 firstwave: a review of the outcomes of hip fracture patients at a Scottish Major Trauma Centre. *Surgeon*. 2021 Oct;19(5):e318–24. doi: 10.1016/j.surge.2021.01.012.

APPENDIX

Palatanungan Tungkol sa Kalusugan / Tagalog na bersyon para sa Pilipinas (Tagalog version for the Philippines)

Sa ilalim ng bawat paksa, paki-tsek ang ISANG kahon na pinakamagandang maglalarawan sa iyong kalusugan sa ARAW NA ITO.

PAGGALAW O PAGKILOS	
Wala akong problema sa paglalakad-lakad	<input type="checkbox"/>
May bahagya akong mga problema sa paglalakad-lakad	<input type="checkbox"/>
Medyo may mga problema ako sa paglalakad-lakad	<input type="checkbox"/>
May mga matindi akong problema sa paglalakad-lakad	<input type="checkbox"/>
Hindi ako nakakapaglalakad-lakad	<input type="checkbox"/>
PANGANGALAGA SA SARILI	
Wala akong problema sa palilig o pagsusuot ng damit	<input type="checkbox"/>
May mga bahagya akong problema sa palilig o pagsusuot ng damit	<input type="checkbox"/>
Medyo may mga problema ako sa palilig o pagsusuot ng damit	<input type="checkbox"/>
May mga matitindi akong problema sa palilig o pagsusuot ng damit	<input type="checkbox"/>
Hindi ko kaya ang palilig o pagsusuot ng damit	<input type="checkbox"/>
MGA KARANIWANG GAWAIN (halimbawa: mga aktibidad sa trabaho, pag-aaral, gawain sa bahay, pamilya o libangan)	
Wala akong problema sa paggawa ng aking mga karaniwang gawain	<input type="checkbox"/>
May mga bahagya akong problema sa paggawa ng aking mga karaniwang gawain	<input type="checkbox"/>
Medyo may mga problema ako sa paggawa ng aking mga karaniwang gawain	<input type="checkbox"/>
May matitindi akong mga problema sa paggawa ng aking mga karaniwang gawain	<input type="checkbox"/>
Hindi ko kayang gawain ang aking mga karaniwang gawain	<input type="checkbox"/>
PISIKAL NA SAKIT O KIROT / PAGIGING DI-KOMPORTABLE	
Wala akong nararamdamang pisikal na sakit o kirot o pagiging di-komportable	<input type="checkbox"/>
May nararamdaman akong bahagyang pisikal na sakit o kirot o pagiging di-komportable	<input type="checkbox"/>
Medyo may nararamdaman akong sakit o kirot o pagiging di-komportable	<input type="checkbox"/>
May nararamdaman akong matinding sakit o kirot o pagiging di-komportable	<input type="checkbox"/>
May nararamdaman akong labis na sakit o kirot o pagiging di-komportable	<input type="checkbox"/>
PAGKABAHALA / PAGKALUMBAY	
Hindi ako nababahala o nalulumbay	<input type="checkbox"/>
Ako ay bahagyang nababahala o nalulumbay	<input type="checkbox"/>
Ako ay medyo nababahala o nalulumbay	<input type="checkbox"/>
Ako ay masyadong nababahala o nalulumbay	<input type="checkbox"/>
Ako ay labis na nababahala o nalulumbay	<input type="checkbox"/>

ANG IYONG KALUSUGAN SA ARAW NA ITO =

- Gusto naming malaman kung gaano kabuti o kasama ang iyong kalusugan sa ARAW NA ITO.
- Ang iskalang ito ay nalagyan ng numero simula 0 hanggang 100.
- Ang 100 ay nangangahulugan ng pinakamabuting kalusugan na iyong maiisip. Ang 0 ay nangangahulugan ng pinakamasamang kalusugan na iyong maiisip.
- Markahan ng X ang iskala upang ipakita ang katayuan ng iyong kalusugan sa ARAW NA ITO.
- Ngayon, pakisulat sa kahon sa ibaba ang numerong iyong minarkahan sa iskala.

