Effect of a Consignment Policy on Outcomes of Orthopedic Emergency Trauma Patients in a Tertiary Hospital

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ABSTRACT

Objectives. Implants for traumatic orthopedic injuries are costly, and usually borne by the patient. We determined whether a consignment policy decreases morbidity and mortality rates, decreases length of stay, and decreases total expenditure of our patients.

Methods. This is an ambispective cohort study comparing patients whose orthopedic implant surgeries were done before consignment policy and thus paid for out-of-pocket (Group A), and patients whose surgeries were done under the policy, and whose implants were paid for by hospital funding (Group B). Patient records and hospital bills were reviewed. A total of 206 patients were included in the study, and we gathered data from department and hospital records regarding the incidence of morbidity, mortality, length of stay, and total hospital expenditure.

Results. In this study, we demonstrate no difference in the incidence of morbidities and mortalities between the two groups. There was also no significant difference in the total hospital expenditure of both. There is a slightly shorter preoperative stay, and significantly longer postoperative and total hospital stays for Group B patients.

Conclusion. The consignment policy, in its first year of implementation, demonstrated no difference in the incidence of morbidity and mortality, or total hospital expenditures. Further long-term studies may be undertaken to improve accuracy of results.

Keywords: consignment policy, orthopedic trauma, health expenditure

INTRODUCTION

Orthopedic trauma emergency patients account for over 300 admissions per year in the Philippine General Hospital (PGH). The majority of these require internal fixation with orthopedic implants. Previously, all implants were paid for by patients as out-of-pocket expenses, often incurring catastrophic health expenditure, defined by WHO as health spending that causes families to reduce spending on other basic goods to pay for health care.[1]

Being uninsured drastically increases a patient's risk for mortality, especially for those that become acutely ill or seriously injured. Since the Institute of Medicine (IOM) report in 2002, recent studies show that insurance improves mortality, especially in acute trauma, and serious chronic illnesses such as end-stage renal disease and cancer.[2] This is an alarming fact, especially in the Philippines, where 54% of healthcare expenditure is shouldered by patients out-of-pocket[3] and only 9% is shouldered by social health insurance. And even with social insurance, there continues to be an

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increase in out-of-pocket spending through the years. There is also evidence that catastrophic health expenditure not only increases mortality of patients, but drives families into poverty, creating a significant social burden.[4,5] This fear of massive financial loss is what hinders or delays some families from consulting a hospital; however, in cases of acute injury such as fractures, this expenditure is unavoidable.[6]

Palm et al. performed a similar study design in determining the differences in outcomes before and after the implementation of the Hvidovre algorithm in the management of proximal femur fractures. Over 50 years, they studied 2,000 patients admitted for hip fractures; the data from the first group of 1,000 was prospectively included. After recording data for the first group, the Hvidovre algorithm was implemented (to determine choice of implant), and the data from the next 1,000 patients admitted under this policy was then recorded. Outcomes (reoperations, infection, etc.) were recorded and compared between the two groups.[7] We will use a similar study design, but with the population of all orthopedic trauma.

Consignment policy

The consignment policy was instituted in May 2019. Under this program, patients admitted to the emergency room are assessed by the medical and surgical team, and the Medical Social Service. They are classified according to ability to pay, as per Administrative Order No. 51-A (Table 1).

Those that fall under Class C and D thus may receive up to 100% coverage, and are the main beneficiaries of the policy. Class A and B are not eligible to avail of the policy, and thus are not included in this study.

Study groups

Group A consists of patients admitted from December 1, 2018 to April 30, 2019, at the emergency room for orthopedic trauma, for whom implant-requiring surgery was done. These patients were assessed and surgical options would be prepared by the surgeon and approved by consultants. These would be explained to the patient, including the cost of the implants. Implants would be chosen by the surgeon, dependent on the type of fracture and capacity of the patient to pay for the implant (Figure 1).

Group B consists of patients admitted from May 1, 2019 to September 30, 2019, at which point the Consignment policy had been implemented. Patients were assessed by the orthopedic team, and financial capability would be assessed by the Medical Social Service. The surgical options were prepared, and the most beneficial implant would be chosen, regardless of the cost, and papers would be submitted for approval by the hospital's Fiscal office. The operation would be done with the chosen implant, and once papers are completed, the patient may be discharged (Figure 2).

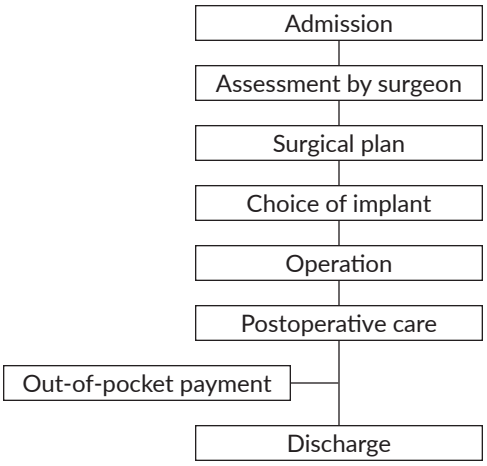

Figure 1. Flowchart of admission before Consignment policy.

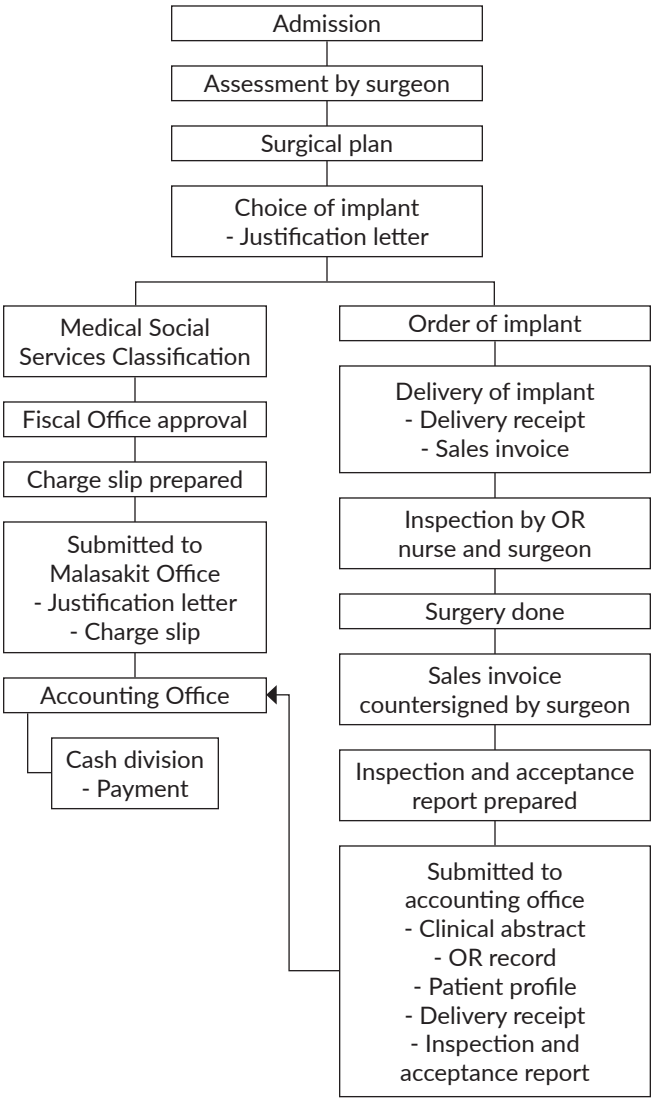

Figure 2. Flowchart of admission before Consignment policy.

Table 1. Patient Categories based on Ability to Pay and Respective Pay Amounts

Patient category	Conditions for qualification	Payment by patient
Class A	Patient whose monthly per capita income is > 220% of latest PCPT for the region in which the hospital is located, using a private room	Patient pays 100% of the medical fee not covered by PhilHealth
Class B	Patient whose monthly per capita income is > 220% of latest PCPT for the region in which the hospital is located, using a shared room for 3 or more patients	Patient pays 100% of the medical fee not covered by PhilHealth
Class C	Patient whose monthly per capita income is 140-180% latest PCPT for the region where the hospital is located	The patient shares any affordable amount for medicines provided and ancillary services rendered
Class D	Patient whose monthly per capita income is < 140% of latest PCPT for the region in which the hospital is located, using a shared room for 3 or more patients	The patient shall not pay for incurred hospital charges

OBJECTIVES

Determine difference in outcomes of orthopedic trauma emergency patients admitted before and after institution of consignment policy

a. Morbidities (incidence)
b. Mortalities (incidence)
c. Preoperative stay (in days)
d. Postoperative stay (in days)
e. Length of hospital stay, total (in days)
f. Total hospital expenditure (excluding implant)

Research design

We performed an ambispective cohort study comparing group A, patients admitted prior to Consignment policy, to group B, patients admitted after institution of Consignment policy. The policy has been in place for five months (May 2019 to September 2019); thus, we compared a similar period of five months (December 2018 to May 2019).

Inclusion criteria

1. Patients admitted to the emergency room for orthopedic trauma
2. Patients who underwent surgery requiring an implant
3. Classified as Class C or D

Exclusion criteria

1. Patients admitted for elective procedures
2. Patients who underwent surgery not requiring an orthopedic implant
3. Classified as Class A or B

METHODS

Data recruitment

Data was taken from the department Management Information System database. The following data were collected: age, sex, bone fractured, type of implant, length of preoperative stay, length of postoperative stay, total hospital stay, and incidence of morbidities.

Handling of data; Privacy and Confidentiality

All records and documentation — i.e., documents, pictures, videos, recordings — made during data collection will be stored in a password-protected computer accessible only to the primary investigators and research assistants. These will be stored for up to 2 years from the publication of the paper, whereupon they will be wiped from the computer hard drive.

Outcomes

A morbidity is defined as a complication arising from poor surgical technique, poor surgical planning, failure or breakage of implants, or infection of an orthopedic implant. A mortality is a patient who meets their demise and is pronounced clinically dead during the current admission.

Length of stay is measured in days and is the number of days from admission to discharge. Preoperative stay is the number of days from admission to the first surgery, and postoperative stay is the number of days from the final surgery to discharge. This is because in some cases, such as open fractures and multiply injured patients, multiple surgeries are needed before the patient's injury is considered fully recovered.

Total hospital expenditure for the patients was obtained from the hospital's Fiscal office. This covers the total spent by the hospital for the bed stay for the admission/s, diagnostic tests done, operating room costs, and pharmacy costs (medications, IV fluids, etc.). Implant cost for both groups was not included in the calculations. Any out-of-pocket expenditures were also not recorded.

Statistical Technique

Data were checked for completeness, accuracy, and consistency prior to data analysis. We used XLSTAT (Addinsoft, Damremont, Paris, France) for data analysis. We used descriptive statistics for demographics such as age, sex, and type of fracture (upper arm, lower arm, hip, thigh, leg, foot, and ankle).

Incidence of morbidities and mortalities between the two groups was compared using Chi-square test. For continuous data (length of hospital stay, etc.), we found the data to be non-normally distributed (using Shapiro-Wilk test and

Table 2. Demographic Data

	Group A Pre-consignment (n=101)	Group B Post-consignment (n=105)	p-value
Sex			
Male	62 (61.39%)	65 (61.91%)	0.940
Female	39 (38.61%)	40 (38.10%)	
Age	43.02 (20.38)	40.09 (20.37)	0.268

Leven's test), hence we summarized them using medians. We did non-parametric comparison of medians between Group A and Group B using Mann-Whitney test, using a p-value of less than 0.05 as significant.

We then did subgroup analysis for chosen fracture types (namely, hip fractures), and likewise compared the incidences of morbidities and mortalities using Chi-square test, and the length of hospital stay using Mann-Whitney.

RESULTS

We recorded 101 patients in Group A, and 105 patients in Group B, fulfilling our planned sample size. There is no significant difference in age and sex distribution between the groups (Table 2).

Morbidities

There is 1 morbidity in Group A, and 5 morbidities in Group B, with no statistically significant difference in the incidence between the two groups. No patients sustained medical morbidities such as pulmonary embolism, deep venous thromboembolism, bedsores, etc., while admitted at PGH and awaiting surgery.

In Group A, there is one case of a multiply injured 38-year-old man who had sustained a closed humerus fracture, closed segmental femur fracture, and open tibia fracture. The patient had been admitted and surgery was planned for his fractures. Since he did not yet have funds for the implants needed, temporizing external fixator was done for the tibia, and the femur placed on skeletal traction. Multiple debridement was then done for his open tibia fracture. A month after his admission, the consignment program was initiated, and funds were finally approved, but only for the humerus fracture. Due to the extensive shortening of the femur, at this point, it was deemed that the patient's segmental femur fracture and open tibia fracture would best be treated using a circular-frame external fixator to allow for correction via distraction osteogenesis. We retained this patient under Group A since the timing of his admission and initial lack of funds had the biggest factor on his delay to fixation.

In Group B, two of the patients have ankle fractures in whom the surgeries were performed uneventfully, and they were discharged well, but at two weeks postop, we noted draining sinus at the postop sites. Debridement and ankle fusion with Ilizarov fixator was then done for both patients. The three other cases are one of an infected open tibia fracture who underwent intramedullary nailing, one infected distal femur who underwent Ilizarov fixation, and a partial hip arthroplasty, who had undergone uneventful surgery and postoperative stay, but had draining sinuses on the postoperative sites on follow-up at 1-2 months. They were re-admitted, and infection control surgeries were likewise performed (debridement, application of cement spacer).

Mortalities

There was one mortality in Group A, and one in Group B, with no significant difference in incidence between the two groups. Both mortality cases were patients >60 years old with a fragility fracture of the hip, who presented at the emergency room more than a week after the fracture had occurred.

The mortality in Group A was a case of an 86-year-old woman, a home ambulator who came in on a Saturday for left hip pain secondary to a fall sustained two weeks prior. Her X-rays showed a previously fixed femoral shaft fracture on the right, and a complete displaced transcervical of the left femoral neck. We also noted narrowed cortices and osteopenia. We secured clearance and scheduled for a partial hip arthroplasty of the left. The surgery was done on the sixth day of admission. The patient started sitting up exercises on the first day postop and walker ambulation for five minutes at a time on the second day. She was not yet discharged at this time, since they were still securing funds to pay for the implant. On the seventh day postop, patient was found unresponsive with no pulse and blood pressure after eating breakfast. Advanced cardiac life support was initiated, and the patient was intubated, and food particles were noted in the airway upon laryngoscopy. After 24 minutes of resuscitation, the patient was not revived. The cause of death was determined to be respiratory failure due to food aspiration.

Group B's mortality is an 89-year-old woman who fell from standing height. The patient had been admitted at another hospital, where x-rays were taken showing a right hip fracture. She was advised surgical management but could not afford the estimated price of the implant. During her one-week admission at that hospital, she had also developed dysuria and bladder distention. She opted to leave against medical advice and was brought to our institution for second opinion. By this time, it was nine days post injury. She was admitted and workup was done, revealing a displaced intertrochanteric fracture of the right, as well as a grade II sacral decubitus ulcer, and sepsis from recurrent urinary tract infection. Proximal femoral nailing was done 20 days after injury (11 days after admission to our institution). Despite good surgical technique, the patient was unable to tolerate mobilization exercises due to poor nutritional status and muscle wasting, and weakness from her urinary infection. She was found unresponsive with no pulse or blood pressure, and was unresponsive to resuscitation. The cause of death was called as acute coronary syndrome due to cardiac decompensation.

The median post-op stay was significantly different between the two groups, with Group B having a longer post-

op stay by four days (p-value = 0.0001). The total hospital stay was also significantly longer by two days (p-value = 0.002). The pre-hospital stay was also shorter by around two days, though not statistically significant (Table 3).

Total hospital bill

There was no difference in the total hospital bill incurred by both groups of patients (p-value = 0.18). We did not include the implant cost in the analysis, as this data was not available for all the patients included (Table 4).

Subgroup analysis

After grouping the patients by fracture type, we noted that the subgroup for hip fractures had non-significantly shorter preoperative and hospital stays, and no difference in incidence of morbidity and mortality (Table 5).

DISCUSSION

Our main objective was to determine any difference in incidence of morbidities and mortalities, our chosen indicator for success of treatment. In this study, we demonstrated no difference in morbidities and mortalities between patients in Groups A and B. We also showed that the consignment policy was at least non-inferior to out-of-pocket expenditure in terms of morbidities and mortalities.

We were surprised to find a significantly longer postoperative and total hospital stay when analyzing Group B patients, despite a non-significantly shorter preoperative stay. Upon review, a common cause of delay in discharge is the delay in filing paperwork. Discharge clearance is only given after completion of all requirements, which includes clinical abstract which must be requested from the medical records (average of one half to one working day), and the delivery receipts from the implant companies. Another confounder for postoperative stay is the need for prolonged IV antibiotics in cases who come in with a pre-existing or hospital-acquired infection (pneumonia, urinary tract infection, candidemia, etc.), and need for prolonged postoperative rehabilitation.

The slightly shorter preoperative stay may be since the patients' capability to pay for the implants upfront is no longer a factor in choosing which patients to schedule. However, there remain other delays to surgery, such as lack of operating room slots and delay in procurement of needed implant.

We noted that there was also no difference in the total hospital bill of both groups of patients (excluding implant costs).

The subgroup that appears to be most benefited by this policy is the patients with hip fractures, who is the only subgroup with shorter total hospital stays. This is interesting to note because of our concurrent Fracture Liaison Service, a multidisciplinary team which aims for elderly patients who suffer hip fracture to be operated on within two to three days of admission, to prevent the mortality associated with prolonged immobility. This is backed up by several studies that elucidate the importance of holistic and prompt care for elderly hip fracture patients because of their higher rates of mortality.[8]

In a study of 80 cases of long bone fractures, Sada ranked the top causes of delay in surgery: first being medical reasons (55%), financial (31.7%), infrastructure (8.3%), and plan of surgery (5%),[9] showing that lack of financing is indeed a major cause of delay in surgery.

Despite several studies that attempt to show the effect of coverage on health outcomes, the direct causal relationship of health insurance and patient outcomes remains elusive. Randomly assigning participants to coverage or no-coverage would be considered unethical, adequate control for baseline health status is difficult in cohort studies, and short-term studies fail to account for the long-term outcomes.[2,10]

Limitations

Despite attaining the planned sample size, the period included in this study is limited, with the following implications: 1) we are not able to follow-up long term morbidities

Table 3. Inferential Statistics for all Fractures

	Group A Pre-consignment (n=101)	Group B Post-consignment (n=105)	p-value
***Pre-op stay** (days)*	9.64 (15.82)	7.60 (5.95)	0.55
***Post-op stay** (days)*	8.18 (10.98)	12.33 (15.90)	<0.0001
Hospital stay	20.51 (20.08)	23.13 (16.96)	0.002
Morbidity	1 (0.99%)	5 (4.7%)	0.21
Mortality	1 (0.99%)	1 (0.95%)	1.00

Table 4. Inferential Statistics for Total Billing

	Group A	Group B	
R	12240	12736	
n	115	108	223
R2/n	1302761.739	1501904.593	2804666.332
H			1.76673568
df			1
p			0.183786581
a			0.05
sig			no

Table 5. Inferential Statistics for Hip Fractures

	Group A Pre-consignment (n=29)	Group B Post-consignment (n=27)	p-value
***Pre-op stay** (days)*	7.14 (5.24)	6.15 (4.23)	0.448
***Post-op stay** (days)*	10.21 (10.37)	10.48 (5.42)	0.074
Hospital stay	19.10 (18.61)	17.60 (7.81)	0.247
Morbidity	1 (3.45%)	1 (3.7%)	1.000
Mortality	1 (3.45%)	1 (3.7%)	1.000

(e.g., post-traumatic arthritis, malunion and non-union, etc.), 2) we are not able to include later re-admissions, and 3) we have a limited number of observations.

While we have limited the cases to those requiring implants, there are still several confounding factors that we presume to influence our data on lengths of stay. Besides our subgroup analysis on hip fractures in the elderly, we analyzed the dataset as a whole and did not control for age, trauma velocity, or fracture type and location because of the wide variety in our small number of cases. More precise data may be generated with analysis of a larger data set and/or a single fracture type.

We also would have liked to include the implant cost in the analysis of the overall hospitalization cost – we plan to do this in a future study, when all the data is available.

CONCLUSION

We conclude that currently, the consignment policy - in which the government shoulders the cost of orthopedic implants - is non-inferior to out-of-pocket spending in terms of incidence of morbidities and mortalities, as well as total hospital cost, among orthopedic trauma patients requiring implants. We note a slightly shorter preoperative stay and longer postoperative stay that may be confounded by the variables we have stated.

Financial support remains only one of many factors that can improve outcomes of orthopedic trauma patients. However, it remains a topic worth investigating. Future studies may investigate cost analysis, especially in terms of lost productivity, and social burden.

Recommendations

The authors recommend continuing to recruit patients to this study in the coming years, for a better statistical comparison. This would help eliminate factors stemming from the novelty of the Consignment policy (i.e., inexperience with the system, non-streamlined documentation requirements, etc.). The authors recommend pursuing a cost analysis investigation for out-of-pocket spending and use of consignment policy for orthopedic implants. In a resource-limited setting, this would help guide policies to select the most cost-effective options that would best benefit the health sector and its constituents. The authors would consider gathering qualitative data as well, possibly in the form of interviews or focused group discussions with the patients, and other stakeholders in the policy. This would give a better all-around evaluation of the people's experience with the policy.

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

The investigators declared no conflicts of interest, or any relations or funding with pharmaceutical, or orthopedic implant companies. They have not received benefits from any commercial parties.

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REFERENCES

1. Ulep VGT, Dela Cruz NAO. Analysis of out-of-pocket expenditures in the Philippines. Philipp J Dev. 2013;XL(72):93-123.
2. Woolhandler S, Himmelstein DU. The relationship of health insurance and mortality: Is lack of insurance deadly? Ann Intern Med. 2017 Sep;167(6):424-431. doi:10.7326/M17-1403
3. Obermann K, Jowett M, Kwon S. The role of national health insurance for achieving UHC in the Philippines: a mixed methods analysis. Glob Health Action. 2018;11(1):1483638.. doi:10.1080/16549716.2018.1483638
4. Gupta DK, Sharma S. Management of empyema - Role of a surgeon. J Indian Assoc Pediatr Surg. 2005 Jul-Sep;10(3):142-146. doi:10.4103/0971-9261.16963
5. Gupta I. Out-of-pocket expenditures and poverty: estimates from NSS 61st round. Paper presented for consideration of the Expert Group on Poverty , Planning Commission. 2009.
6. Xu K, Evans DB, Kawabata K, Zeramdini R, Klavus J, Murray CJL. Household catastrophic health expenditure: a multicountry analysis. Lancet. 2003 Jul;362(9378):111-117. doi:10.1016/S0140-6736(03)13861-5
7. Palm H, Krasheninnikoff M, Holck K, Lemser T, Foss NB, Jacobsen S, et al. A new algorithm for hip fracture surgery. Reoperation rate reduced from 18 % to 12 % in 2,000 consecutive patients followed for 1 year. Acta Orthop. 2012 Feb;83(1):26-30. doi:10.3109/17453674.2011.652887
8. Lisk R, Yeong K. Reducing mortality from hip fractures : a systematic quality improvement programme. BMJ Qual Improv Rep. 2014 Sep;3(1): u205006.w2103. doi:10.1136/bmjquality.u205006.w2103
9. Sada EC, Bhot F, Kanishetty R. Study of incidence and cause of delay for treatment of long bone fractures of the lower limb in tertiary care hospital. Int Surg J. 2019 Sep;6(9):3170-3173. doi:10.18203/2349-2902.isj20194046
10. Kronick R. Health insurance coverage and mortality revisited. Health Serv Res. 2009 Aug;44(4):1211-1231. doi:10.1111/j.1475-6773.2009.00973.x