

Factors Associated with Out-of-Pocket Expense for Shockwave Lithotripsy in the Philippines: Implications for Health Policy

Freddie Y. Sy, MD, FPUA¹ and Ma. Minerva P. Calimag, MD, PhD, FPSA^{1,2}

¹*The Graduate School, Thomas Aquinas Research Complex, University of Santo Tomas*

²*Faculty of Medicine and Surgery, University of Santo Tomas*

Introduction: Extracorporeal shockwave lithotripsy (ESWL) remains to be a cost-effective strategy for treating patients with urolithiasis. In the Philippines, Philhealth shoulders a portion of medical expenses to minimize out-of-pocket (OOP) payment by its members. However, since the establishment of the case-based payment scheme in 2012, no studies have yet assessed its impact on OOP in ESWL.

Objective: To determine the factors associated with out-of-pocket payment among Filipinos seeking treatment in ESWL centers located in the Philippines

Methods: The study utilized a mixed method sequential explanatory design. Twelve ESWL facilities were purposively selected to represent each facility type and location. A total of 2241 patients who underwent ESWL from January to December 2017 in twelve facilities were included in the quantitative study. For the qualitative portion of the research, focus group discussions and key informant interviews were done.

Results: It was found that 77% of the studied population had to pay OOP for ESWL with a median OOP expense to be Php37,769 (\$750) after deductions by PhilHealth, private insurance, and other funding agencies. Factors affecting OOP payment differ by facility location. In Metro Manila, factors associated with OOP payment include facility type and private insurance membership. In Luzon, factors associated are facility type, professional fee, Philhealth membership, and private insurance membership. OOP payment was found to be associated with private insurance membership in Visayas, and professional fee in Mindanao.

Conclusion: A high proportion of urolithiasis patients in the country require out-of-pocket (OOP) payment for ESWL despite the deductions from Philhealth, private insurance, and other supporting organizations. The large variation in ESWL charge by facility and location explains the high variability in OOP payment, especially in Visayas and Mindanao. Factors affecting OOP payment were also found to vary depending on the location of the facility.

Keywords: urolithiasis, lithotripsy, health expenditure, health policy, primary health care

Introduction

Worldwide, a rising trend of urolithiasis has been observed, especially in Asia.^{1,2} In 2016, urolithiasis accounted for 623,000 disability-

adjusted life years (DALYs).¹ This increasing burden is evident in the Philippines, wherein 362,000 new cases were diagnosed in 2016 alone corresponding to a 30% increase over a 10-year period.

Most patients with urolithiasis seek medical care due to the presence of flank pain, sometimes accompanied by nausea, vomiting, fever and even hematuria.^{3,4} Recent studies suggest the role of urolithiasis in the development of chronic kidney disease. Permanent damage to the kidneys may result if stones are left untreated.⁵

The cost-effective procedure for urolithiasis that is currently indicated for stones under 2 centimeters is the extracorporeal shockwave lithotripsy (ESWL), a minimally-invasive procedure which replaced open surgeries.⁶⁻⁹ It offers lower morbidity and equal stone-free rates compared to other treatment modalities.¹⁰⁻¹¹

In the Philippines, reimbursement for ESWL amounts to Php18,000 (\$360) Php8,400 (\$165) for professional fee and 9,600 (\$190) for the health facility.¹² However, out-of-pocket (OOP) expense remains a major source of funding for health spending in the country.¹³ With the exception of those qualified to avail of the “No Balance Billing” policy in government hospitals, patients are required to shoulder the remaining expenses no longer covered by the PhilHealth case rate.^{14,15} A better understanding of the source of OOP for ESWL could potentially break the barrier to providing care for those who need it. A well-designed health policy is warranted to reduce OOP expenses of patients especially among those with limited resources. To the best of the authors’ knowledge, there is no similar study done in the Philippines, which assessed the out-of-pocket payment of ESWL after implementation of the case-based payment scheme in the country.

The objectives of this study were 1) to estimate the OOP expense of ESWL patients in the Philippines; and 2) to determine the effect of factors associated with it including location and type of facility, type of lithotripter machine, cost of professional fee (PF), type of PhilHealth membership, and co-existing private insurance. The findings of this study could serve as a guide for PhilHealth decision makers in crafting future health policy related to the social health insurance coverage of medical procedures such as ESWL.

Methods

The study utilized a mixed-method sequential explanatory design. Both quantitative and qualitative

data collection were performed from April to June 2019. Study sites included were purposively selected ESWL facilities in the Philippines to represent each type of facility (i.e., government hospital, private hospital, freestanding) as well as each location (i.e., Metro Manila, Luzon, Visayas, and Mindanao). A total of 12 facilities were invited to participate in the study. Three types of facilities were selected from each location. However, since no government hospital facilities offered ESWL in Luzon, two private hospitals and one freestanding facility were included for this location.

Quantitative Study

The quantitative method included the retrospective review of patient medical bills and charts. All patients underwent ESWL in the selected facilities from January 1, 2017 to December 31, 2017. Only PhilHealth patients with available billing data for one index session of ESWL were included. Inpatient ESWL cases and re-treatment cases were excluded.

Qualitative Study

The qualitative portion explored the policy implications of the findings of the quantitative part of the study. Data were collected from surveys of facility owners, focus group discussions (FGDs) involving ESWL patients, and interview with stakeholders including urologists, a former PhilHealth consultant and a former PhilHealth president.

Statistical Analysis

Quantitative data were encoded in MS Excel. Stata MP version 14 was used for data processing and analysis. Continuous variables were presented as mean/standard deviation or median/interquartile range depending on data distribution and were analyzed using an independent t-test or Mann Whitney U test. Categorical variables were presented as frequency/percentage and were analyzed using Chi-square test or Fisher’s exact test.

The identification of significant factors was performed by logistic regression using a penalized maximum likelihood estimation method (Firth’s method).¹⁶ Subgroup analysis by facility location

was conducted. P values ≤ 0.05 were considered statistically significant.

Ethical Considerations

The study was approved by the University of Santo Tomas Graduate School Ethics Review Committee last March 9, 2019 (Protocol number: GS-2019-PN024). A written informed consent form was sent to all study participants. A unique study ID number was assigned to each patient and ESWL facility. Only the corresponding positions of key informants in the qualitative portion of the study were reported in the results. Confidentiality and privacy were always kept and only the researcher, research assistant, and biostatistician had access to the gathered data.

Results

Quantitative Study Results

Profile of ESWL Patients

A total of 2,241 patients who underwent ESWL from January to December 2017 in 12 facilities were included in the study. The demographic and clinical characteristics of the patients are summarized in Table 1. Majority of the patients are non-indigent PhilHealth members. Only 683 (30%) have private insurance. Electromagnetic lithotriptors are the most common type used on ESWL patients. For both Metro Manila and Luzon, about half of the patients underwent ESWL in private hospitals. In contrast, most of the patients from Visayas and Mindanao underwent ESWL from freestanding facilities and government hospitals, respectively.

ESWL Actual Cost

The median charge for one session of ESWL is Php57,816 (\$1140). A summary of the differences in ESWL cost and charges by facility type is in Table 2. Operational cost greatly varies by facility type with freestanding facilities exhibiting the highest cost and highest charge for one ESWL session. Meanwhile, operational cost, the average charge for one ESWL

session, health facility charge, and PF rates were lowest in government hospitals.

OOP Expense

After the deductions by PhilHealth, private insurance, discounts, and other funding agencies, 77% of the patients incurred a median OOP expense of Php37,769 (\$750) as seen in Table 3. Median OOP expense varies by location with Luzon exhibiting the highest OOP. Median OOP in Metro Manila is significantly lower compared to Luzon, Visayas, and Mindanao. More than 90% of patients in Visayas and Mindanao required OOP expense for ESWL compared to 46% in Metro Manila.

Table 1. Demographic and clinical characteristics of ESWL patients (n=2241).

	n (%)
Age (in years), median	46 (IQR: 35 – 57)
Sex	
Male	1449 (65)
Female	792 (35)
PhilHealth membership	
Indigent	181 (8)
Non-indigent	2060 (92)
Private insurance	
With	683 (30)
Without	1558 (70)
Indication for ESWL	
Renal stone only	1374 (62)
Bladder stone only	55 (2)
Ureteral stone only	726 (32)
Renal and ureteral stones	60 (3)
Renal stone and others	9 (0.5)
Others only	7 (0.5)
Number of stones	
Single	2171 (97)
Multiple	70 (3)
Lithotripter type	
Electrohydraulic	512 (23)
Electromagnetic	1729 (77)

Table 2. Cost of ESWL procedure (in Philippine pesos and US dollars) by type of facility (n= 12).

	Government Hospital Median (Range)	Private Hospital Median (Range)	Freestanding Median (Range)
Operational cost of lithotripter	65,000 ^a (\$1,280)	1,000,000 (\$20,000) (506,431-3,200,875) (\$9,970-\$63,000)	1,990,000 (\$39,200) (1,500,000-2,431,408) (\$29,540-\$48,000)
Maintenance/ repair cost	1,000,000 ^a (\$20,000)	481,940 (\$9,500) (420,000-1,800,000) (\$8,300-\$35,400)	850,000 (\$17,000) (475,996-3,234,830) (\$9,375-\$63,705)
Average charge for 1 ESWL session	28,400 (\$560) (23,900-35,000) (\$471-\$690)	58,000 (\$1,140) (57,633-68,000) (\$1,135-\$1,340)	66,000 (\$1,300) (46,500-70,500) (\$916-\$1,388)
Health facility	15,500 (\$305) (8,400-25,000) (\$165-\$492)	27,600 (\$544) (18,207-38,000) (\$359-\$748)	27,000 (\$530) (10,000-37,600) (\$197-\$740)
PF: Urologist	15,000 (\$295) (5,040-20,000) (\$98-\$393)	23,600 (\$465) (18,000-32,393) (\$355-\$638)	16,500 (\$325) (13,000-32,000) (\$256-\$630)
PF: Anesthesiologist	4,000 (\$79) (3,360-5,000) (\$66-98)	5,000 (\$98) (4,000-6,800) (\$79-\$134)	5,000 (\$98) (4,000-5,000) (\$78-\$98)

^aRange not established since only one ESWL government facility owner answered

*Values presented are based on the survey of ESWL facility owners

Abbreviations: PF, Professional fee

Factors Associated with OOP for ESWL

Overall, the type of facility and the type of lithotripter, professional fee, PhilHealth membership, and private insurance membership are all significantly associated with OOP expense for ESWL as seen in Table 4. Compared to patients in private hospitals, patients from government hospitals (OR=2.43), and freestanding facilities (OR=1.83) are more likely to incur OOP expenses. Professional fee of $\geq 27,000$ pesos (~\$530) increases the odds of paying OOP for ESWL seven times. Non-indigent PhilHealth members and patients without private insurance are also more likely to pay OOP for ESWL. Lastly, patients who underwent ESWL using electromagnetic lithotriptors have 13 times higher odds of paying OOP for ESWL.

When the analysis is stratified by location, only facility type and private insurance membership were significantly related to OOP expense for ESWL in Metro Manila. Among patients who underwent ESWL in Luzon, treatment in private hospitals, increased professional fee, non-indigent PhilHealth membership, and no private insurance showed higher odds of incurring OOP expenses for ESWL. In Visayas, patients with no private insurance have 124 times higher odds of incurring OOP expenses for ESWL. Lastly, among patients who underwent ESWL in Mindanao, only professional fee was found to be associated with OOP expense for ESWL, i.e., patients who paid $\geq 27,000$ pesos (~\$530) for professional fees have 23 times higher odds of paying OOP for ESWL.

Table 3. Total charges and deduction by ESWL profile and patient characteristics (n=2241).

	Total Charges Median (IQR)	With OOP n (%)	OOP Expense Median (IQR)
Overall	57,790 (\$1,138) (45,000-72,500) (\$886-\$1,428)	77.20%	37,679 (\$742) (21,417-48,000) (\$422-\$945)
Location			
MM	51,400 ^a (\$1,010) (45,000-56,650) (\$886-\$1,115)	46.03%	27,320 ^a (\$538) (5,900-38,650) (\$116-\$761)
Luzon	57,776 ^b (\$1,138) (54,188-72,500) (\$1,067-\$1,428)	83.72%	39,776 ^b (\$783) (32,000-45,000) (\$630-\$886)
Visayas	72,162 ^c (\$1,421) (28,400-72,500) (\$560-1,428)	92.87%	35,000 ^c (\$690) (10,400-54,500) (\$205-\$1,073)
Mindanao	78,336 ^d (\$1,543) (53,000-78,336) (\$1,040-\$1,543)	90.97%	28,020 ^b (\$552) (26,816-60,336) (\$528-\$1,188)
Facility Type			
Government	35,000 ^a (\$690) (28,400-78,336) (\$560-\$1,543)	94.56%	17,000 ^a (\$335) (10,400-60,336) (\$205-\$1,189)
Private	57,734 ^b (\$1,133) (55,150-70,812) (\$1,086-\$1,395)	70.61%	30,000 ^a (\$590) (26,816-39,730) (\$528-\$782)
Freestanding	72,500 ^c (\$1,428) (45,000-72,500) (\$886-1,428)	73.59%	48,000 ^b (\$945) (32,000-54,300) (\$630-\$1,069)
Lithotripter Type			
Electrohydraulic	53,400 ^a (\$1,050) (45,000-56,650) (\$886-\$1,116)	34.96%	35,400 ^a (\$697) (26,720-38,650) (\$526-\$760)
Electromagnetic	66,000 ^b (\$1,300) (50,000-72,625) (\$985-\$1,430)	89.71%	39,532 ^b (\$779) (20,000-50,000) (\$394-\$985)
Philhealth Membership			
Indigent	28,400 ^a (\$560) (18,000-46,600) (\$355-\$918)	70.17%	10,400 ^a (\$205) (10,400-44,400) (\$205-\$874)
Non-indigent	60,000 ^b (\$1,182) (50,000-72,500) (\$985-\$1,428)	77.82%	38,650 ^b (\$761) (25,800-48,000) (\$510-\$945)
Private Insurance			
With	56,650 ^a (\$1,115) (51,150-73,000) (\$1,000-\$1,438)	41.14%	26,816 ^a (\$528) (13,800-26,816) (\$272-\$528)
Without	57,870 ^a (\$1,140) (45,000-72,500) (\$886-\$1,428)	93.00%	39,787 ^b (\$784) (23,500-50,000) (\$463-\$985)

*Different superscript letters for each column indicate statistical significance (Kruskal Wallis and Dunn's test OR Mann Whitney U test, p<0.05)

Abbreviations: HF, Health Facility; IQR, Interquartile range; MM, Metro Manila; PF, Professional fee

Qualitative Study Results

Patient Perspective

According to the 19 patients included in the study, the actual charge for ESWL ranged from Php40,000 - Php68,000 (\$790 - \$1340). After deduction of PhilHealth benefits, private insurance, and other funding agencies, only three patients (16%) reported that they no longer have to pay anything. Among those who still had remaining balance, nine (47%) patients reported that their monthly family income is not enough to cover the expenses for ESWL treatment. Patients also reported additional expenses during treatment were incurred for food, transportation, medications, consultations, and unpaid leave. When both indirect cost and direct costs were considered, patients reported that they spent Php40,000 - Php75,000 (\$790 - \$1470) for ESWL treatment.

Urologist Perspective

Nine urologists participated in the interview—three from Metro Manila, three from Visayas, and three from Mindanao. Six out of the nine urologists (66%) utilized ESWL for the treatment of stones, especially if the size is small. According to four urologists (44%), they get a fixed rate of PF (Php15,000 to Php32,000 or \$300 - \$630) in addition to the PhilHealth reimbursement depending on whether the patient paid in cash or via private insurance. According to three urologists (33%), the PF given by PhilHealth is low or not enough. Only one urologist (11%) from a government hospital in Visayas believes that the case rate for ESWL is enough to cover both the urologist's PF and health facility expenses.

ESWL Facility Owners' Perspective

Among the twelve ESWL facility owners who participated in the survey, only six (50%) agreed with the NBB policy of PhilHealth. Among those who agreed with the policy, they expressed their support to NBB since it provides help to marginalized patients including indigents and sponsored members. Meanwhile, the six owners (50%) who disagreed with the NBB policy stated that the PhilHealth coverage is

not enough to cover the operational and maintenance cost of the lithotriptors.

Key Informant Perspective

According to key informants, the health facility fee and the professional fee are the cost drivers for lithotripsy. Evidence showing the high OOP expense by ESWL patients would serve as a basis for policy recommendations to PhilHealth. It was also discussed that support value may be subjective depending on the chosen hospital since charges may vary from one institution to another. It may be as low as 2% in private institutions and 100% in government hospitals.

Discussion

A high proportion of ESWL patients (77%) still paid OOP even after the deductions are made by PhilHealth and other supporting agencies. Since its implementation in 2012, the case rate for ESWL equivalent to Php18,000 (\$360) remained the same until today.¹² Based on the current price of ESWL in the country—with a median of Php57,790 (\$1140)—the case rate by PhilHealth is insufficient to cover all of the patients' expenses. In 97% of the patients included in the study, the PhilHealth case rate covered only about 34% of the total estimated cost of ESWL. Support value of PhilHealth case rate is 35% for health facility, and 30% for professional fee.

Overall, OOP expense was found to be associated with facility type, professional fee, PhilHealth membership, private insurance membership and type of lithotripter; however, the factors were found to vary depending on the facility location. ESWL charge is greater in locations outside Metro Manila resulting to a higher proportion of patients requiring OOP expense in Visayas (93%) and Mindanao (91%). Based on estimates by the Philippine Statistics Authority, the average monthly income in Visayas and Mindanao is significantly less than the median OOP of patients undergoing ESWL treatment in these two regions.¹⁷ The insufficient financial protection by PhilHealth especially in these locations could potentially push some families into poverty.¹⁴

Facility Type

Facility type was found to be associated with OOP expense in Metro Manila and other areas in Luzon. Overall, the odds of incurring OOP expense are two times higher in both government and freestanding facilities compared to private hospitals. One possible explanation is the support by private insurance membership. After the deduction of PhilHealth, the remaining balance is paid in full by some private insurance companies. Private insurance benefits, however, are only enjoyed by patients in private hospitals and freestanding facilities but not in government hospitals.

Furthermore, discrepancies in ESWL charges across facilities contributing to varied OOP expense could be explained by the higher median operating cost and maintenance cost of freestanding facilities which is almost twice the amount compared to private hospitals. In Luzon, the absence of government hospitals offering ESWL also causes the market power to be gained by both freestanding facilities and private hospitals leaving patients with no choice but to avail of their service regardless of the charged amount.

Professional Fee

In one study, physicians considered the PF rates set by PhilHealth unfair, owing to its low value relative to the skills and knowledge required in treating a patient.¹⁸ Except for Metro Manila and Visayas, the professional fee was found to be associated with OOP expense while controlling the effects of other variables. Patients charged with PF rate of $\geq$ Php27,000 (\$530) are more likely to pay OOP. The median cost of OOP is also higher among patients charged with PF $\geq$ Php27,000 pesos (\$530).

PhilHealth Membership

Philhealth had several categories for membership; however, the researcher decided to categorize this as indigent and non-indigent membership. Indigent members were identified by the Department of Social Welfare and Development as those with no visible means of income, or with income insufficient for their family needs. The premium

payment of these members were subsidized by the government, and they are the ones eligible to the No Balance Billing policy implemented in several institutions.

Only in Luzon was PHIC membership found to be associated with OOP. On the sub-analysis of data, 51 out of 69 (74%) of indigent members did not incur any additional expenses after PHIC deduction. Although PhilHealth indigent membership is not associated with incurring OOP expense in Metro Manila and Visayas, results showed that the cost patients shouldered is significantly lower among indigent members. It is, however, surprising that all indigent patients in Metro Manila and Visayas had to pay OOP even after undergoing ESWL in government hospitals, in spite of the “No Balance Billing” policy that is mandatory in government hospitals.¹⁹ Further examination revealed that the health facility charge resulted to the OOP expense incurred by indigent patients in these locations. As stated by most facility owners, the cost and maintenance of the machine are expensive, thus explaining the additional charge even to indigent patients.

Private Insurance Membership

Aside from Philhealth, some patients were also covered by private insurance companies (e.g. HMOs). The premium of these insurance was either paid by the patient or their respective companies. Except for Mindanao, patients without private insurance are more likely to incur OOP expenses after holding other variables constant. Nonetheless, some patients with private insurance still had to pay OOP—9% in Metro Manila, 11% in Luzon, 68% in Visayas, and 90% in Mindanao. In Mindanao, 250 out of the 331 (76%) privately-insured patients who still had to pay OOP underwent ESWL in government facilities. Since government hospitals are often not accredited by private insurance companies, no deduction was made from the billing records of privately-insured patients in Mindanao.

Lithotripter Type

When not stratified by location, lithotripter type was found to be a significant factor of OOP expense. Patients who underwent ESWL using electromagnetic lithotriptors have 13 times

higher odds of paying OOP compared to those who utilized electrohydraulic lithotripter. This finding, however, could be explained by the higher cost of ESWL in facilities located in Visayas and Mindanao, all of which use the electromagnetic type. Meanwhile, electrohydraulic lithotriptors were only found in Metro Manila—one private and one freestanding.

It should be noted that the study has several limitations. Due to time and financial constraints, random sampling of patients could not be implemented for the patient-level data. Only ESWL patients in the selected study sites were included, thereby, introducing a potential selection bias. Nonetheless, the researchers tried to obtain a national representative sample of patients who underwent ESWL in various centers by considering the various facility type and location.

Since only the statement of accounts and actual hospital facility charges incurred by ESWL patients were reviewed, indirect costs incurred such as transportation and productivity losses were not assessed. Furthermore, other charges not reflected in the official receipt by the facility such as additional professional fees could likewise not be assessed, potentially underestimating the professional fee charges, and consequently, the OOP expense.

Conclusion

PhilHealth case rate for ESWL is insufficient to cover the total cost of the procedure due to a high proportion of urolithiasis patients requiring OOP expense in the country. The large variation in ESWL charge by facility and location explains the high variability in OOP expense, especially in Visayas and Mindanao. Factors affecting OOP expense were found to vary depending on the location of the facility. Strict implementation of the “No Balance Billing” policy for indigents in government hospitals and an updated review of the current ESWL case rate is recommended to PhilHealth to reduce OOP expense of patients especially those with limited resources. A major access barrier to needed health care thus are unregulated direct charges that often constitute and contribute to high out-of-pocket expense that can generate problems in financial protection.

Acknowledgements

The authors would like to thank Ms. Marla Vina A. Briones, MSc. for the statistical analysis and support provided in the interpretation of data.

Declaration of Conflicting Interest

The authors do not have any potential conflict of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors do not have any financial support to declare.

References

1. IHME. GBD Results Tool - Urolithiasis.
2. Liu Y, Chen Y, Liao B, et al. Epidemiology of urolithiasis in Asia. *Asian J Urol* 2018; 1-10. doi:10.1016/j.ajur.2018.08.007
3. Ludwig WW, Matlaga BR. Urinary stone disease: Diagnosis, medical therapy, and surgical management. *Med Clin North Am* 2018; 102(2): 265-77.
4. He L, Yang H, Fan L, et al. Comparison of symptomatic versus asymptomatic urolithiasis: Surgical outcomes and medium-term follow-up. *Int J Clin Exp Med* 2016; 9(2): 4300-7.
5. Mehmet NM. Effect of urinary stone disease and its treatment on renal function. *World J Nephrol* 2015; 4(2): 271.
6. Torricelli F, Danilovic A, Vicentini F, Marchini G, Srougi M, Mazzuchi E. Extracorporeal shock wave lithotripsy in the treatment of renal and ureteral stones. *Rev Assoc Med Bras* 2015; 61(1): 65-71.
7. Iqbal N, Assad S, Rahat Aleman Bhatti J, Hasan A, Shabbir MU, Akhter S. Comparison of extracorporeal shock wave lithotripsy for urolithiasis between children and adults: A single centre study. *Cureus* 2016; 8(9): e810.
8. Koo V, Young M, Thompson T, Duggan B. Cost-effectiveness and efficiency of shockwave lithotripsy vs flexible ureteroscopic holmium:yttrium-aluminium-garnet laser lithotripsy in the treatment of lower pole renal calculi. *BJU Int* 2011; 108(11): 19136.
9. Jagtap J, Mishra S, Bhattu A, Ganpule A, Sabnis R, Desai M. Evolution of shockwave lithotripsy (SWL) technique: A 25-year single centre experience of >5000 patients. *BJU Int* 2014; 114(5): 748-53.
10. Raheem OA, Khandwala YS, Sur RL, Ghani KR, Denstedt JD. Burden of urolithiasis: Trends in prevalence, treatments, and costs. *Eur Urol Focus* 2017; 3(1): 18-26.

11. Geraghty RM, Jones P, Somani BK. Worldwide trends of urinary stone disease treatment over the last two decades: A systematic review. *J Endourol* 2017; 31(6): 547-56.
12. Philhealth. Philhealth Circular No. 2013; 35, s.2013.
13. Ulep V, Dela Cruz N. Analysis of out-of-pocket expenditures in the Philippines. *Philipp J Dev* 2013; 40 (1-2).
14. Bredenkamp C, Buisman LR. Financial protection from health spending in the Philippines: Policies and progress. *Health Policy Plan* 2016; 31(7): 919-27.
15. 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): 14836-38.
16. Devika S, Jeyaseelan L, Sebastian G. Analysis of sparse data in logistic regression in medical research: A newer approach. *J Postgrad Med* 2016; 62(1): 26-31.
17. Philippine Statistics Authority. Ave. Income, Ave. Expenditure and Ave. Savings of Families, by Region, Philippines: 2012 and 2015.; 2015.
18. Dalmacion G, Juban N, Zordilla Z. Reconnaissance Study on the Implementation of Case-Based Payments.; 2014.
19. PhilHealth. Strengthening the Implementation of the No Balance Billing Policy (Revision 1) PhilHealth Circular 2017-0006.; 2017.