Research Article

A Prospective Study on Direct Out-of-Pocket Expenses of Hospitalized Patients with Acute Exacerbation of Chronic Obstructive Pulmonary Disease in a Philippine tertiary care center

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Chronic obstructive pulmonary disease (COPD) is a frequent cause of morbidity and mortality in the Philippines and the majority of the economic burden lies in hospitalizations during an exacerbation. Despite coverage of hospitalization costs with the national health insurance system (PhilHealth) for COPD exacerbations, patients often pay out-of-pocket. This study aimed to determine the demographic characteristics of COPD admissions at a Philippine tertiary care center, Philippine General Hospital, assess the mean cost of hospitalization, and identify predictors of prolonged hospitalization and cost >20,000 Philippine pesos (Php). A prospective cross-sectional study was conducted for 6 months by chart review. Patients were categorized as charity service patients, that is, with no charged professional fees and free medications and private service patients who pay for their health care services. A total of 43 COPD admissions were included. The average daily cost of hospitalization (per 1,000 pesos) for service patients was 4.25, compared to 16 for private service patients. Demographic characteristics and type of accommodation were not significant predictors of prolonged hospital stay nor hospitalization cost of > Php 20,000. Accommodation costs and professional fees accounted for the majority of the overall cost for private patients, while medications and diagnostic tests were the major contributors to the overall cost for charity patients. Despite the existence of PhilHealth, in-patient coverage for COPD remain insufficient. Measures for maximizing COPD control in the outpatient setting could potentially reduce the total cost of this disease.

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Introduction

COPD is an increasing cause of morbidity and mortality in the Philippines. Estimates of the disease burden project COPD to be the 3rd leading cause of mortality worldwide.[1][2][3] Majority of the economic burden lies in the cost of hospitalizations during a COPD exacerbation.[4] With the new national health insurance structure, diseases are given specific case rates, and this allows for faster disbursement of claims.[5] This however may cause greater out-of-pocket expenses by the patients.

According to WHO, there are about 65 million people suffering from moderate to severe chronic obstructive pulmonary disease (COPD) out of the 328 million estimated globally.[1][2] Projected estimates report COPD to become the 3rd leading cause of death worldwide by 2030 with the majority of the reported deaths in COPD, unfortunately, occurring among low to middle-income countries.[2][3] Based on local studies of the disease in the Philippines, the incidence is reported to be at least 14%, whereas in other ASEAN countries the reported incidence is only 6%.[6][7] Smoking is one of the implicated risk factors for disease development, and smoking in the Philippines is noted to be higher at 28.3% than its ASEAN counterparts. This translates to at least 17 million smoking adult Filipinos.[8]

COPD presents with chronic cough, sputum production and dyspnea on exertion among patients with moderate to severe disease. The disease is characterized by airflow limitation that is not fully reversible.[9] Although multiple therapies are already available, the disease remains underdiagnosed and undertreated especially among primary care physicians.[10][11] Undertreated and uncontrolled COPD is marked by frequent exacerbations defined as an acute event of worsening respiratory symptoms requiring medications.[8] Markers for increased risk of exacerbations based on studies include old age, chronic mucus hypersecretion, and decreased FEV1. Moreover, COPD is progressive and end-stage disease is characterized by dyspnea even at rest with eventual respiratory failure. [12]

Important factors that influence the health care costs of COPD in general include disease severity, frequency of exacerbations, and the presence of comorbidities. [6][13] The predominant economic burden lies in the hospitalization costs for COPD exacerbations which are linked to higher mortality rates. [6] In the US, exacerbations account for $18 billion in direct costs annually.[14] This high cost of

therapy appears universal based on several studies conducted in Asia.[15][16] Treatment must therefore focus on the control of symptoms and prevention of future exacerbations – with emphasis on the use of maintenance inhaler therapies. This poses a problem among low-income countries like the Philippines, which utilize health care resources to respond mainly to acute illnesses, and are less adept at addressing chronic conditions such as COPD.[17]

National health coverage initially came into law through the Philippine Medical Care Act of 1969 which was signed by President Ferdinand E. Marcos, and eventually implemented in 1971. This act provided total coverage of medical services according to the needs of the patients. During the term of President Fidel V. Ramos, the development of House Bill 14225 and Senate Bill 01738 enabled the development of the National Health Insurance Act of 1995 (RA 7875). This created the Philippine Health Insurance Corporation (PhilHealth).[18] As of 2011, the case rate system has been introduced under the administration of President Benigno Aquino III. This payment mechanism set pre-determined coverage for select medical conditions and surgical procedures.[5] This significantly reduced the turnaround time or processing of claims since the amount of coverage is already identified. The new case rate system however may cause out-of-pocket expenses, with the present coverage for chronic obstructive pulmonary disease set at only Php 12,200.[18] This study aims to identify the amount of out-of-pocket expenses by patients admitted for COPD exacerbation at the Philippine General Hospital and predictors for prolonged stay and hospitalization costs.

This study aimed to determine the economic burden of COPD admissions at the Philippine General Hospital. This will provide financial estimates on the direct costs of treatment for COPD exacerbations in excess of the case rate provided by PhilHealth insurance. This was a pilot study that will lead to the performance of a national-scale research project.

The objectives of this study were to determine the out-of-pocket expenses of adult patients admitted for COPD in acute exacerbation using direct costing. The general demographics of the confined COPD patients were gathered, the mean costs of hospitalization due to COPD exacerbation among private and charity patients were compared, the relationship between baseline demographic characteristics and costs was evaluated and the predictors of hospitalization cost and a prolonged hospital stay of COPD in exacerbation were determined.

A prospective cross-sectional study was conducted for 6 months from the time of institutional ethics board approval by chart review. This study focused on out-of-pocket expenses of patients for

hospitalization utilizing direct costing. A total enumeration of cases was employed for the sample size.

The subjects included in the study were admissions from both charity and pay wards of adult patients ≥ 19 years old with the main diagnosis of COPD and/or PhilHealth enrollment claims using the ICD-10-CM Diagnosis Code J44.9. Patients who were ≤ 18 years old, not having COPD or ICD code J44.9 as being one of the primary assessments on admission and those who developed COPD exacerbation only during the hospital stay were excluded from the study.

All admissions fulfilling the inclusion criteria within the pre-set period were included in the study. Baseline characteristics, diagnostic and therapeutic sheets review was done. Recognizing the variability in terms of costs for medications that will be bought outside the institution, actual brand names used by each patient for their medicines have been recorded to allow for costs to be more accurately derived. For the diagnostic procedures, laboratory or imaging tests that were performed outside the institution were also recorded. Information was gathered directly from the nursing personnel/watchers caring for the patient. Direct costs for these medicines and procedures were inquired from patients/companies or the actual establishments where these tests were bought or performed. Medications and diagnostic tests not indicated in the chart or not implemented or carried out were excluded as part of the direct costing. Other sources of direct costs such as syringes, IV lines, fluids, etc. were not included in this study due to difficulty in accounting for their use. Chart reviews were done regularly at 1-3-day intervals during the course of the stay, noting daily changes in the medications, or new diagnostic procedures ordered. Records from the billing section were consequently reviewed upon discharge to account for the professional fees. A data extraction form was used during the chart review.

Data were encoded in Microsoft Word format for documentation and analysis was done in Microsoft Excel. Estimated total expenses were itemized as costs of accommodation, diagnostics, treatment, and professional fees as pre-specified. The total computed net expenditure incurred was compared to the actual case rate as follows:

Total net expenditure = Accommodation cost + Diagnostics cost + Therapeutics cost+ Professional fess (if applicable)

Out-of-pocket cost = Total net expenditure – PhilHealth case rate

Diagnostic and medication expenses for co-morbidities apart from COPD were included as direct costs of the hospitalization. Costing for charity patients under the No Balance Billing system was derived

similarly to other charity patients, and the same case rate will be implemented. External funding of charity patients from third-party financial sources inside PGH was considered as excess costs (hypothetical) for this study based on the formula expressed above.

Descriptive statistics were used to summarize the demographic and clinical characteristics of the patients. Frequency and proportion were used for categorical variables, median and interquartile range for non-normally distributed continuous variables, and mean and SD for normally distributed continuous variables. Independent Sample T-test, Mann-Whitney U test and Fisher's Exact/Chi-square test were used to determine the difference of mean, rank and frequency, respectively, between charity and private patients. Odds ratio and corresponding 95% confidence intervals from binary logistic regression were computed to determine significant predictors for prolonged hospital stay and hospitalization cost of > P20,000. All statistical tests were two-tailed tests. Shapiro-Wilk was used to test the normality of the continuous variables. Missing variables were neither replaced nor estimated. Null hypotheses were rejected at 0.05α-level of significance. STATA 13.1 was used for data analysis.

Names of the research subjects were not indicated in the questionnaires and forms were safely stored in a secure location. The vulnerability of the elderly and socio-economically disadvantaged (charity) patients was considered in the study. The investigators ensured that the best level of care was given and social welfare assistance was provided irrespective of the patient's decision to participate. Informed consent was obtained from all the subjects.

There were no conflicts of interest identified among the investigators.

Results

There were a total of 43 admissions between June 2019 to November 2019 at the Philippine General Hospital with a diagnosis of COPD exacerbation. Table 1 shows the basic demographic characteristics of the patients admitted. All of the patients included in this study had Philippine Health Insurance support, and zero private health maintenance organization (HMO) coverage. The mean age was significantly younger among patients admitted to charity service at 60 years old, while the mean age of patients admitted to private service was 72 years old. Most of the admissions were predominantly males at 88%, with almost one half residing in a rural environment. The majority of the admissions between the two groups belonged to COPD Class D, and the most common comorbidities reported were hypertension, heart disease, diabetes, and cancer. The number of pack years was significantly higher among those patients admitted to private service at 47.5 years (mean) as compared to those under

charity service at only 22.5 years (mean). The average length of stay was 8 days for both groups. There was no statistical difference between the two groups in terms of sex distribution, type of residence, GOLD classification, comorbidities, smoking history, and length of hospital stay.

	Total (n=43)	Charity (n=28, 65.12%)	Private (n=15, 34.88%)	P-value
	Frequency (%); Mean + SD; Median (IQR)			
Age	64.49 + 12.68	60.43 + 10.99	72.07 + 12.47	
19 to 45 years old	3 (6.98)	3 (10.71)	0	**0.003**
45 to 64 years old	20 (46.51)	16 (57.14)	4 (28.57)	**0.042**
> 65 years old	20 (46.51)	9 (32.14)	10 (71.43)	
Sex				
Male	38 (88.37)	24 (85.71)	14 (93.33)	0.643
Female	5 (11.63)	4 (14.29)	1 (6.67)	
Type of Residence				
Urban	23 (53.49)	15 (53.57)	8 (53.33)	1.000
Rural	20 (46.51)	13 (46.43)	7 (46.67)	
Gold Classification				
Class A	0	0	0	
Class B	0	0	0	1.000
Class C	10 (29.41)	7 (30.43)	3 (27.27)	
Class D	24 (70.59)	16 (69.57)	8 (72.73)	
Comorbidities				
Hypertension	20 (46.51)	10 (35.71)	10 (66.67)	0.064
Diabetes	3 (6.98)	1 (3.57)	2 (13.33)	0.275
Heart disease	12 (27.91)	6 (21.43)	6 (40)	0.287
Cancer	2 (4.65)	2 (7.14)	0	0.535
Number of pack years	30 (20 to 50)	22.5 (20 to 30)	47.5 (30 to 100)	**0.005**
Smoking history				0.073
Current Smoker	37 (86.05)	26 (92.86)	11 (73.33)	
Previous smoker	3 (6.98)	0	3 (20)	

	Total (n=43)	Charity (n=28, 65.12%)	Private (n=15, 34.88%)	P-value
	Frequency (%); Mean + SD; Median (IQR)			
Non-smoker	3 (6.98)	2 (7.14)	1 (6.67)	
Length of hospital stay	8 (6 to 12)	8.5 (7 to 11.5)	8 (6 to 31)	0.759

Table 1. Demographic and clinical profile of the patients

Table 2 shows the type of room accommodation among all COPD exacerbation admissions. The majority were admitted to the non-ICU or regular ward/rooms, with only 2.33% and 13.95% of these patients requiring ICU-level care under charity and private service, respectively.

	Frequency (%)
Charity Non-ICU	22 (51.16)
Charity ICU	6 (13.95)
Private Non-ICU	14 (32.56)
Private ICU	1 (2.33)

Table 2. Type of room of the patients (n=43)

Table 3 shows the hospitalization cost per 1,000 pesos. The average price per day cost of hospital stay is significantly lower for the charity service at 4.25 compared to private service which is almost 4-fold at 16. There were no differences between the two groups in terms of costs for the medications, diagnostic tests, and procedures. The total cost for hospitalization was significantly lower in the charity group compared to the private service patients, with the majority of the cost difference likely driven by the absence of professional fees in the former.

	Total (n=43)	Charity (n=28, 65.12%)	Private (n=15, 34.88%)	P-value
	Median (IQR)			
Price per Day	6 (3.5 to 13.5)	4.25 (3.5 to 5.75)	16 (8 to 58.5)	**<0.001**
Professional fee	15 (8 to 17)	-	15 (8 to 17)	-
Medication cost	8.96 (6.86 to 11.71)	8.83 (6.98 to 10.42)	9.33 (6.65 to 24.56)	0.575
Diagnostic tests cost	8.33 (5.76 to 11.32)	8.28 (6.53 to 10.22)	8.33 (5.2 to 11.98)	0.919
Procedural cost	1.35 (0.32 to 4.08)	1.15 (0.31 to 3.11)	1.69 (0.57 to 5.07)	0.198
Total cost	28.2 (20.6 to 48.5)	22.87 (18.5 to 31.44)	51.32 (33.53 to 110.7)	**<0.001**

Table 3. Hospitalization cost (per P1000)

Table 4 shows that age, sex, type of residence, GOLD classification, comorbidities, pack years of smoking, and type of accommodation were not significant predictors of hospital stay of >9 days.

	Prolonged hospital stay		Odds ratio (95% CI)	P-value
	Yes (n=18, 41.86%)	No (n=25, 58.14%)		
	Frequency (%); Mean + SD; Median (IQR)			
Age	66.39 + 14.81	63.12 + 11.04	1.02 (0.97–1.07)	0.402
19 to 45 years old	1 (5.56)	2 (8)	(reference)	-
45 to 64 years old	8 (44.44)	12 (48)	1.33 (0.10–17.3)	0.826
> 65 years old	9 (50)	11 (44)	1.64 (0.13–21.1)	0.706
Sex				
Male	14 (77.78)	24 (96)	(reference)	-
Female	4 (22.22)	1 (4)	6.86 (0.70–67.6)	0.099
Type of Residence				
Urban	10 (55.56)	13 (52)	(reference)	-
Rural	8 (44.44)	12 (48)	0.87 (0.26–2.93)	0.818
Gold Classification				
Class A	0	0	-	-
Class B	0	0	-	-
Class C	4 (40)	6 (25)	(reference)	-
Class D	6 (60)	18 (75)	0.5 (0.10–2.40)	0.386
Comorbidities				
Hypertension	8 (44.44)	12 (48)	0.87 (0.26–2.93)	0.818
Diabetes	1 (5.56)	2 (8)	0.67 (0.06–8.09)	0.757
Heart disease	4 (22.22)	8 (32)	0.61 (0.15–2.45)	0.483
Cancer	0	2 (8)	-	-
Number of pack-years	30 (20 to 66)	30 (20 to 40)	1.01 (0.99–1.03)	0.255
Smoking history				

	Prolonged hospital stay		Odds ratio (95% CI)	P-value
	Yes (n=18, 41.86%)	No (n=25, 58.14%)		
	Frequency (%); Mean + SD; Median (IQR)			
Current Smoker	12 (66.67)	25 (100)	(reference)	-
Previous smoker	3 (16.67)	0	-	-
Non-smoker	3 (16.67)	0	-	-
Type of Accommodation				
Private	6 (33.33)	9 (36)	0.89 (0.25–3.18)	0.856
Charity	12 (66.67)	16 (64)	(reference)	-

Table 4. Predictors of prolonged hospital stay

Table 5 shows that age, sex, type of residence, GOLD classification, comorbidities, pack-years of smoking, and type of accommodation were not significant predictors of hospitalization cost of > 20,000 pesos.

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	Hospitalization cost of > P20,000		Odds ratio (95% CI)	P-value
	Yes (n=33, 76.74%)	No (n=10, 23.26%)		
	Frequency (%); Mean + SD; Median (IQR)			
Age	63.3 + 13.34	68.4 + 9.83	0.97 (0.91–1.03)	0.267
19 to 45 years old	3 (9.09)	0	-	-
45 to 64 years old	15 (45.45)	5 (50)	1.0 (0.24–4.18)	1.000
> 65 years old	15 (45.45)	5 (50)	(reference)	-
Sex				
Male	28 (84.95)	10 (100)	(reference)	-
Female	5 (15.15)	0	-	-
Type of Residence				
Urban	18 (54.55)	5 (50)	(reference)	-
Rural	15 (45.45)	5 (50)	0.83 (0.20–3.44)	0.801
Gold Classification				
Class A	0	0	-	-
Class B	0	0	-	-
Class C	8 (30.77)	2 (25)	(reference)	-
Class D	18 (69.23)	6 (75)	0.75 (0.12–4.56)	0.755
Comorbidities				
Hypertension	17 (51.52)	3 (30)	2.48 (0.54–11.3)	0.240
Diabetes	3 (9.09)	0	-	-
Heart disease	8 (24.24)	4 (40)	0.48 (0.11–2.14)	0.336
Cancer	1 (3.03)	1 (10)	0.28 (0.02–4.95)	0.386
Number of pack years	30 (20 to 50)	30 (25 to 45)	1.002 (0.98–1.0)	0.842
Smoking history				

	Hospitalization cost of > P20,000		Odds ratio (95% CI)	P-value
	Yes (n=33, 76.74%)	No (n=10, 23.26%)		
	Frequency (%); Mean + SD; Median (IQR)			
Current Smoker	28 (84.85)	9 (90)	(reference)	-
Previous smoker	2 (6.06)	1 (10)	0.64 (0.05–7.95)	0.731
Non-smoker	3 (9.09)	0	-	-
Type of Accommodation				
Private	14 (42.42)	1 (10)	6.63 (0.75–58.6)	0.089
Charity	19 (57.58)	9 (90)	(reference)	-

Table 5. Predictors of hospitalization cost of > P20,000

Figure 1 shows the groups admitted under charity service and private service and their breakdown of hospitalization costs itemized under accommodation, medications, procedures, professional fees, diagnosis/diagnostics, procedures, and grand total cost.

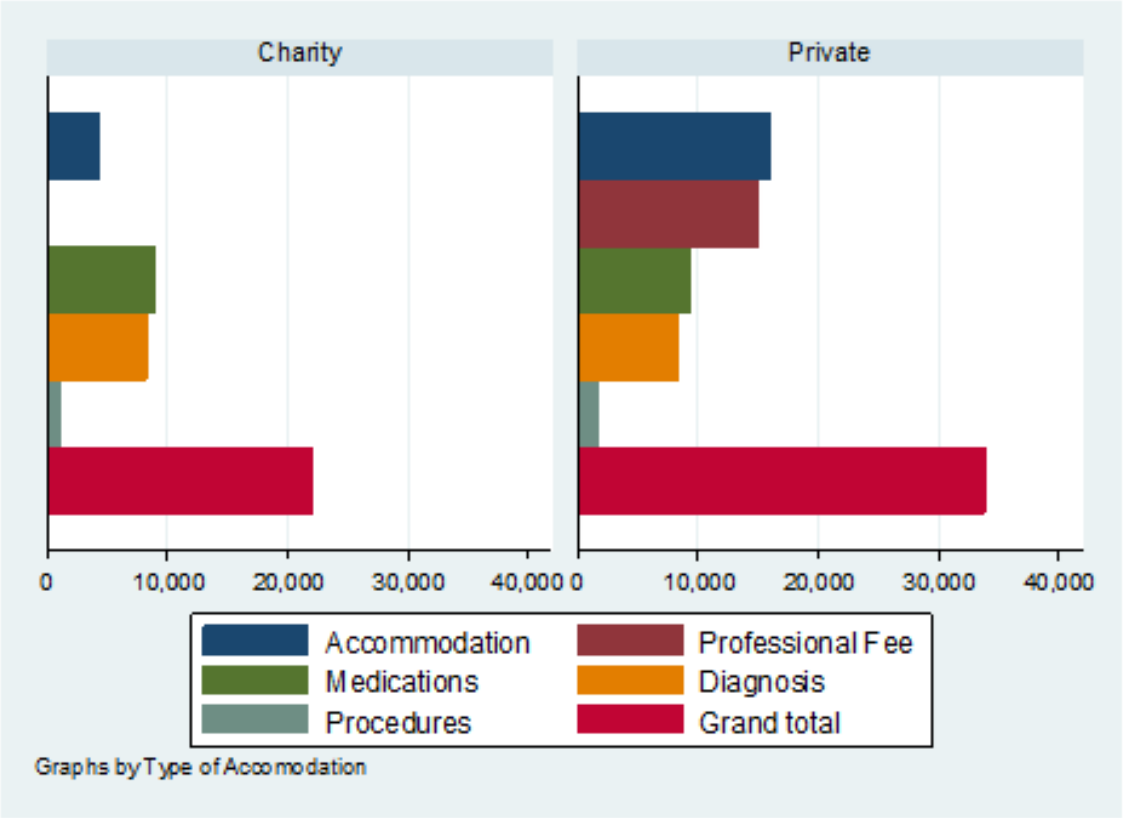

Figure 1. Median value of the hospitalization cost between Charity and Private patients

Discussion

This study aimed to prospectively evaluate the overall cost of admissions for COPD exacerbation in a tertiary government hospital over a 6-month period. Despite the existence of PhilHealth insurance, the provision of Php 12,200 pesos as the case rate for this diagnosis is inadequate based on this study. With a total mean cost of 22,000 to 51,000 pesos per hospitalization, out-of-pocket expenditure is unavoidable.

A study in the US on the cost of COPD in terms of medical care and loss of productivity/absenteeism amounted to $36 billion, with costs projected to even increase in 2020.[19] As much as 70% of the cost of illness is attributed to COPD admissions.[20] A study by Pfuntner et al. in the US showed that COPD cost per stay was at $6,400 in 1997 which subsequently increased to $7,400 in 2010 with an accounted inflation of 15.6% after 13 years. COPD was among the 3 diagnoses with the highest aggregate cost in the US mainly due to its frequency.There are variations in costs for different countries. Economic

analysis on COPD from different countries reflected varied costs: $522 in France, $1258 in Canada, $3196 in Spain, and $4119 in the USA, with the majority of these costs being derived from hospital admissions. Other main sources of direct cost include long-term oxygen therapy and maintenance medications after discharge.[21]

For our study, the mean age was 64.49 + 12.68, with a high prevalence of comorbid conditions. The mean duration of hospital stay was 8 days. There were no significant predictors for cost and duration of stay identified in the present study, and this may be due to the small sample size. According to a study by Torabipour, 2 major drivers for the cost of COPD were derived from hospitalizations and medications. Among hospitalized patients, major determinants of costs were history of hypertension, duration of hospital stay, and the number of clinical consultations. [13] Therefore, limiting unnecessary clinical consultations, adequate management of comorbidities, and shortening hospitalization stay may potentially equate to lower hospitalization costs for COPD. This study did not measure the following, and therefore represents potential limitations, including indirect costs and productivity losses, discharge medication costs and procedures (rehabilitation, long-term oxygen therapy).

Conclusion

Our study indicates that the mean hospitalization cost for COPD exacerbation is 28,200 with a significantly lower cost for charity admissions at 22,870 pesos (mean) vs. private admissions at 51,320 pesos (mean). Despite the existence of PhilHealth, in-patient coverage for this disease is still insufficient. The majority of the patients were in the elderly age group, with a high prevalence of comorbidities. The present study was not able to identify major drivers for cost or prolonged hospitalization stay. However, measures such as maximizing COPD control in the outpatient setting, avoiding unnecessary tests/procedures, and reducing hospital stay could potentially reduce the total cost of this disease. We recommend similar studies that will employ a larger sample size, include indirect costs, and recruit patients from different institutions to account for variations in healthcare delivery systems and financial sources.

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