

Insurance Type and Surgical-Patient Characteristics in the UPR-Affiliated Hospitals

Norma I. Cruz, MD; Elvis Santiago, MS; Beatriz C. Figueroa, MD

Objective: The characteristics of surgical patients were examined according to type of health insurance to determine whether differences existed between these groups.

Methods: We evaluated the characteristics of cases in the UPR General Surgery Department's database (entered from January 1, 2018 through December 31, 2018) by insurance type. The variables examined included age, gender, inpatient/outpatient status, wound classification, type of surgery, American Society of Anesthesiology (ASA) scores and whether a given patient had diabetes, was a smoker, or suffered from hypertension. This database had no trauma cases.

Results: Information was available for 5,097 cases during the study period. The mean age of the group was 51 (± 22) years. The gender distribution indicated that 56% were women and 44% were men. The insurance types were distributed as follows: government/no insurance, 40%; Medicare, 12%; and private insurance, 48%. The government-insured/uninsured patients were younger (mean age, 41 ± 24) and had had emergency surgery more frequently (18%) than had privately insured patients (10%). Medicare patients were significantly older (mean age, 72 ± 12), and had had higher incidences of diabetes (46%) and hypertension (81%), presenting with ASA scores greater than or equal to 3 in 73% of cases. More privately insured individuals than those in other groups had had elective surgery (90%); 48% had been outpatients when they had their surgery, 58% had had clean wounds, and 61% of the patients having elective surgery were women.

Conclusion: There were significant differences ($P < .05$) in the characteristics of patients with different types of health insurance. The frequency of emergency surgery was found to be significantly higher in the government-insured/uninsured group than in the privately insured group. [*PR Health Sci J* 2020;39:270-274]

Key words: Access to care, Insurance coverage, Surgery

It has been reported that insurance type may be linked to disparities in access to medical care (1–5). Uninsured and government-insured patients are reported to be at increased risk for impaired access to health care, delayed medical treatment, and the receipt of substandard care (6–10). These differences in care may result in disparities in outcomes in patients with different types of insurance. Both lack of insurance coverage and inadequate coverage have been associated with the lower use of preventive services (11,12) and are considered to be a barrier to the control of chronic conditions such as diabetes and hypertension (13,14). Often such patients use emergency departments for conditions that could be adequately treated in primary care setting if timely access were available (15).

In an effort to better understand this problem, we evaluated the characteristics of surgical patients according to the types of medical insurance they had so that we could determine whether insurance-related differences existed in the population served by the University of Puerto Rico (UPR)-affiliated hospitals.

Methods

We reviewed all the cases entered into the database of the UPR General Surgery Department from January 1, 2018, through December 31, 2018, to determine and analyze the associations between insurance type and patient characteristics, type of surgery and comorbidities. This database compiles (by case) the basic demographic information and clinical data of each patient recorded there. It collects information from the surgical services of the UPR-affiliated hospitals (6 participating hospitals: 2 in academic centers and 4 that are community hospitals). In this

Department of Surgery, School of Medicine, University of Puerto Rico Medical Sciences Campus, San Juan, Puerto Rico

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Address correspondence to: Norma I. Cruz, MD, Department of Surgery, School of Medicine, University of Puerto Rico, PO Box 365067, San Juan, PR 00936-5067. Email: normacruz001@gmail.com

database previously described in 2018 (16). “The information obtained comes from the weekly reports generated by the residents of the different participating surgical services at the aforementioned hospitals. The data from those reports are extracted and compiled, creating an aggregate of information that describes the general surgical procedures performed at the affiliated institutions as well as characterizing the patients on whom those procedures were performed. Personal identifiers are not included in the aggregated data. For each patient, the following information is collected into the database: age, gender, American Society of Anesthesiologists (ASA) physical status classification; the surgical procedure(s), the type of medical insurance, and if diabetic, smoker or hypertensive. Compliant with the Health Insurance Portability and Accountability Act (HIPAA), this database of surgical procedures is both secure and confidential”.

This database collects information on adult and pediatric surgical cases that receive surgical services at the participating institutions. Trauma cases are excluded, and the information from patients managed at the Trauma Hospital of the Medical Center in Río Piedras is collected in a different database, totally separated from that of the General Surgery Department.

For our study, we established 3 groups according to the following insurance types: government/ no insurance, Medicare, and private insurance. The study’s aim was to analyze the differences between the groups regarding patient characteristics, type of surgery (emergency vs. elective), type of admission and comorbidities.

Statistical analyses were performed with the software program SPSS (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, version 22.0. Armonk, NY: IBM Corp). Quantitative variables were expressed as means plus or minus standard deviations. Categorical variables were presented as frequencies and percentages. Analysis of variance (ANOVA) was used to compare quantitative variables among the groups. Differences among proportions were compared using the chi-squared test. Results were considered significant when the P-value was less than .05.

This study was approved by the Institutional Review Board (IRB) of the UPR Medical Sciences Campus.

Results

During the 1-year period selected for evaluation, the database of the UPR General Surgery Department collected information on 5,097 surgical cases. The mean age of the patients in the group was 51 (±22) years. The gender distribution indicated that 56% were women and 44% were men.

The insurance types were distributed as shown in Figure 1.

The patient characteristics of the different groups are shown in Table 1.

Government-insured/uninsured patients were younger and had had emergency surgery more frequently than privately insured patients had (Table 1).

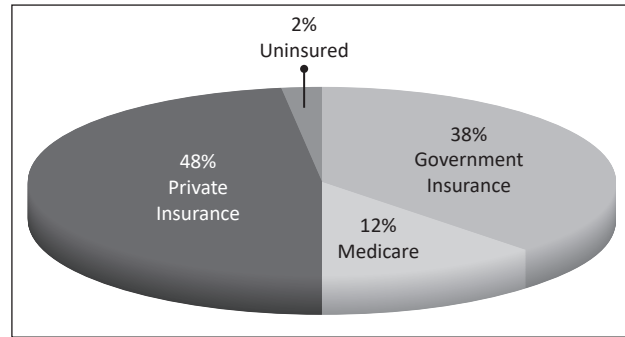


Figure 1. Percentage distribution of our cases per type of insurance.

Medicare patients were significantly older than were the patients in the other groups and had higher incidences of diabetes and hypertension than did the other patients. It was also noted that Medicare patients were sicker when they came to surgery, as indicated by ASA scores that were equal to or greater than 3 (severe systemic disease present) in a significantly high percentage of the cases (Table 1).

The patients in the private insurance group were more often females and had significantly (P≤.01) higher rates of elective surgery, being an outpatient (rather than inpatient), and having clean wounds which is shown in Table 1.

Table 1. Patient characteristics by insurance type. Differences between groups regarding mean age were compared using ANOVA and differences between proportions, for all other variables, were compared using the chi-squared test.

	Government/ Uninsured n = 2029	Medicare n = 627	Private n = 2441	P
Mean age	41±24	72±12	54±18	≤ 0.001
Males	962 (47.4%)	300 (47.9%)	959 (39.3%)	≤ 0.001
Females	1066 (52.6%)	326 (52.1%)	1480 (60.7%)	
Inpatients	1420 (70.3%)	462 (73.8%)	1268 (52.0%)	≤ 0.001
Outpatients	601 (29.7%)	164 (26.2%)	1171 (48.0%)	
Wound/Clean	893 (44.4%)	284 (46.0%)	1380 (58.0%)	≤ 0.001
Elective	1618 (79.8%)	544 (86.8%)	2198 (90.1%)	≤ 0.001
Emergency	410 (20.2%)	83 (13.2%)	242 (9.9%)	
*ASA ≤3	1303 (64.9%)	169 (27.2%)	1505 (62.3%)	≤ 0.001
*ASA ≥3	706 (35.1%)	453 (72.8%)	910 (37.7%)	
Diabetic	386 (19.0%)	286 (45.8%)	559 (22.9%)	≤ 0.001
Smoker	180 (8.9%)	74 (11.8%)	171 (7.0%)	≤ 0.001
Hypertensive	794 (39.1%)	506 (80.7%)	1272 (52.2%)	≤ 0.001

*American Society of Anesthesiology (ASA)

The distribution of diagnoses by International Classification of Diseases (ICD)-10 groups among the insurance types is described in Table 2. The ICD-10 codes were available for 5,062 patients in the database for the year studied. The 3 insurance groups were found to be significantly (P≤.001) different regarding ICD-10. The most commonly used ICD-10 code group was that which identified digestive system diseases; this was followed by the code group for neoplasms.

We used the Current Procedural Terminology (CPT) code groups to evaluate the surgical procedures performed, per type

Table 2. Distribution of diagnoses (ICD-10 codes) per insurance type. Differences among groups were compared using the chi-squared test.

ICD-10 Code (Group)	N = 5062	Government/ Uninsured n= 2029	Medicare n = 627	Private n = 2441	P
Neoplasms (C00-D49)	1478	410 (20.4%)	176 (28.1%)	892 (36.8%)	≤0.001
Endocrine diseases (E00-E89)	326	117 (5.8%)	9 (1.4%)	200 (8.2%)	≤0.001
Circulatory system diseases (I00-I99)	308	65 (3.2%)	88 (14.0%)	155 (6.4%)	≤0.001
Respiratory system diseases (J00-J99)	65	35 (1.7%)	16 (2.6%)	14 (0.6%)	≤0.001
Digestive system diseases (K00-K95)	1695	729 (36.3%)	193 (30.8%)	773 (31.9%)	≤0.001
Skin diseases (L00-L99)	163	99 (4.9%)	20 (3.2%)	44 (1.8%)	≤0.001
Genitourinary diseases (N00-N99)	171	71 (3.5%)	17 (2.7%)	83 (3.4%)	≤0.001
Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified (R00-R99)	287	168 (8.4%)	53 (8.5%)	66 (2.7%)	≤0.001
Injury, poisoning and certain other consequences of external causes (S00-T98)	173	96 (4.8%)	26 (4.1%)	51 (2.1%)	≤0.001
Factors influencing health status and contact with health services (Z00-Z99)	153	58 (2.9%)	17 (2.7%)	78 (3.2%)	≤0.001
Other codes	243	162 (8.1%)	12 (1.9%)	69 (2.8%)	≤0.001

of insurance, as seen in Table 3. The CPT codes were available for 5,059 patients in the database for the year studied. The 3 insurance groups were found to be significantly ($P \leq .001$) different regarding surgical procedures as indicated by the CPT codes. The most commonly used CPT code range was that identifying digestive system surgery; this was followed by the code range for cardiovascular system surgery.

The distribution of the type of insurance by the type of hospital (academic vs. community) is indicated in Table 4. The government-insured/uninsured patients had a slightly

Table 3. Distribution of type of surgery (CPT codes) per insurance type. Differences among groups were compared using the chi-squared test.

CPT Code (Group)	N = 5059	Government/ Uninsured n=2029	Medicare n=627	Private n=2441	P
Integumentary system (10004-10030)	710	246 (12.2%)	57 (9.2%)	407 (16.8%)	≤0.001
Musculoskeletal system (20100-20526)	312	178 (8.8%)	33 (5.3%)	101 (4.2%)	≤0.001
Respiratory system (30000-30320)	118	64 (3.2%)	29 (4.7%)	25 (1.0%)	≤0.001
Cardiovascular system (33016-33141)	759	207 (10.3%)	120 (19.4%)	432 (17.8%)	≤0.001
Digestive system (40490-40801)	2706	1123 (55.8%)	353 (57.0%)	1230 (50.7%)	≤0.001
Urinary system (50010-50200)	60	21 (1.0%)	6 (1.0%)	33 (1.4%)	≤0.001
Endocrine system (60000-60500)	243	103 (5.1%)	9 (1.5%)	131 (5.4%)	≤0.001
Others codes	151	70 (3.5%)	12 (1.9%)	69 (2.8%)	≤0.001

higher use of academic hospitals (55%) than they had of community hospitals (45%). The privately insured patients had a significantly ($P \leq .001$) higher use of community hospitals.

Discussion

Our study found that emergency surgery was most frequent in the government-insured/uninsured group. In the UPR-associated hospitals, elective surgery is only allowed with a pre-approval by the insurance carrier or with a direct payment from the patient. Therefore, the uninsured individual often accesses surgical care when his or her condition has become an emergency. In the case of the government-insured patients, they are required to provide referral and pre-approval documents, resulting in additional delays in their access to surgical care.

A study of the association of health insurance with the rate of emergency pediatric gastrointestinal procedures, reported that 79% of Medicaid patients required emergency procedures, while only 21% of the commercial insurance patients required such procedures (17). For the purpose of comparison, what we refer to in Puerto Rico as government health insurance, is roughly the equivalent of Medicaid in the United States.

These findings are in keeping with those of the current medical literature, which has noted an association of delays in surgery with insurance type (18–27). In a retrospective cohort study of 7,629 melanoma patients, it was reported that the risk of surgical delay was significantly increased ($P < .001$) in Medicaid patients compared to privately insured patients (18). In a study of the effect of insurance type on access to inguinal hernia repair it was found that individuals pretending to be Medicaid patients (for the purposes of a research study) were less successful at scheduling appointments for surgical consultation than authentic BlueCross and Medicare patients were (19). In a similar manner, a study of the access of patients with lumbar disc herniations to spine surgeons found that patients with Medicaid (compared to those who had private insurance) were significantly ($P < .001$) less successful at scheduling appointments and faced more barriers to care, such as the need for a referral (20).

Some reports have suggested that health reform laws have decreased the disparities faced

Table 4. Distribution of type of insurance by type of hospital (academic vs. community). Differences between groups were compared using the chi-squared test.

	Government/ Uninsured n = 2029	Medicare n = 627	Private n = 2441	P
Academic hospital	1125 (55.4%)	211 (33.7%)	389 (15.9%)	≤ 0.001
Community hospital	904 (44.6%)	416 (66.3%)	2052 (84.1%)	≤ 0.001

by government-insured patients (28). In a study of 141,344 patients hospitalized with acute cholecystitis, it was found that prior to the 2006 Massachusetts health reform, patients had a 6.6% to 9.9% lower ($P < .001$) probability of immediate cholecystectomy (28). Immediate cholecystectomy is the optimal surgical treatment for uncomplicated acute cholecystitis, and, compared to delayed cholecystectomy, it is associated with improved medical and economic outcomes (29, 30).

It has been reported that 8% to 10% of the population of the United States is uninsured (31, 32), while in Puerto Rico, approximately 6% of the population is uninsured (33). In our study we found that 2% of the surgical patients were uninsured. As previously stated, members of this group (i.e., uninsured patients) often gain access to medical/surgical care when they present to an emergency department with an acute problem.

In our study, the privately insured patients were mostly females (61%) who had undergone elective surgery (90%) as outpatients. This group also represented the majority (48%) of the workload of the surgical services. It is the privately insured group that most frequently receives pre-approval for surgical procedures and therefore can be admitted to the hospital for service.

It is estimated that 7% of all hospitalizations in the United States result from emergency general surgery (34). It can be seen, then, that at 20.2%, the rate of emergency surgery in the government-insured/uninsured population is higher than the expected norm. The members of this group tend to receive their care in over-crowded emergency departments resulting in delayed diagnosis, worse overall health, and presentation at more advanced stages of disease (35).

The Medicare group, as expected, was significantly older, with a mean age of 72 (± 12) years. As it is frequently seen in these older patients, the frequency of comorbidities, such as diabetes (46%) and hypertension (81%), was higher (13, 14). These patients, when presenting for surgery, had severe systemic disease ($ASA \geq 3$) 73% of the time.

The 3 insurance groups evaluated in our study were significantly different regarding ICD-10, CPT and the type of hospital (academic vs. community) visited. The government-insured/uninsured group was younger, and as expected, required fewer cardiovascular surgeries as a group and used academic hospitals more frequently (36–38). The privately insured group used community hospitals 84% of the time.

Among the limitations of our study is that the database accessed obtained information only from the UPR-affiliated hospitals (2 academic centers and 4 community hospitals). These data do not, however, comprehensively encompass the population of Puerto Rico. In addition, the uninsured group was small (76 cases) and represented 2% of the total surgical patients, while in Puerto Rico, the uninsured represent about 6% of the total population (33). We opted to merge the government insured with the very small group of uninsured, so as to prevent affecting the statistics based only on the size of the group.

Nonetheless, this study suggests that there are significant differences in the characteristics of patients, which differences have to do with the type of health insurance they have. Uninsured and government-insured patients have higher frequencies of emergency surgery, suggesting delays in early diagnosis and surgical care. Future efforts need to be made to improve healthcare delivery to these vulnerable populations.

Conclusion

This study found significant differences in the characteristics of patients with different types of health insurance. Government-insured/uninsured patients had a higher frequency of emergency surgery than did the patients in the other 2 groups. Privately insured patients, in addition, receive timely elective surgery 90% of the time.

Resumen

Objetivo: Examinamos las características de pacientes quirúrgicos por tipo de seguro de salud para determinar si existen diferencias entre los grupos. Métodos: Evaluamos las características de los casos en la base de datos del Departamento de Cirugía de la UPR (entrados del 1 de enero del 2018 al 31 de diciembre del 2018) por tipo de seguro. Las variables examinadas incluyeron edad, género, admitido/ambulatorio, clasificación de herida, tipo de cirugía, ASA y si era diabético, fumador o hipertenso. Resultados: La información de 5,097 casos estaba disponible. La edad media fue 51 ± 22 años, con una distribución por género de 56% mujeres y 44% hombres. La distribución por seguros fue: asegurado por el gobierno o no asegurado 40%, asegurado por Medicare 12% y asegurado por una compañía privada 48%. Los asegurados por el gobierno o no asegurados eran más jóvenes (edad media 41 ± 24) y tuvieron cirugía de emergencia (18%) con más frecuencia que los de seguros privados (10%). Los de Medicare eran mayores (edad media 72 ± 12) y más frecuentemente diabéticos (46%) e hipertensos (81%) y presentaban con una clasificación de ASA ≥ 3 en 73% de los casos. En los de seguros privados, la cirugía electiva (90%), ambulatoria (48%), en heridas limpias (58%) y en mujeres (61%) fueron significativamente más frecuentes. Conclusión: Hay diferencias significativas ($p < 0.05$) en las características de los pacientes por tipo de seguro de salud. Los

asegurados por el gobierno y no asegurados tuvieron una mayor frecuencia de cirugía de emergencia en comparación con los que estaban cubiertos por seguros privados.

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