ORIGINAL ARTICLE

Beyond the operating room: Comparing surgical outcomes of a public insurance programme in Khyber Pakhtunkhwa

Asma Altaf Hussain Merchant[1], Shifa Salman Habib[2], Kiran Sohail Azeemi[3], Waqas Hameed[4], Junaid Ur Rehman Siddiqui[5], Sameen Siddiqi[6], Adil Haider[7]

Abstract

Objective: To estimate the utilization of public insurance for surgical interventions in Khyber Pakhtunkhwa, Pakistan, and compare surgical outcomes between insured and uninsured patients.

Methods: We retrospectively extracted data from one public and three private tertiary hospitals of Khyber Pakhtunkhwa (KP) that are empanelled under the Sehat Card Plus (SCP) Programme. Secondary Data was collected for a period of 16 months, from 1st June 2021 to 30th September 2022 both electronically and manually. The data collection process took place from October 2022 to December 2022. Patients undergoing exploratory laparotomy, lower (uterine) segment caesarean section (LSCS), or open reduction internal fixation (ORIF) of fractures were included. Extracted data included demographic details, payment status (SCP user/non-user), and surgical outcomes [in-hospital mortality, length of stay (LOS), 14- and 30-day readmission]. Multivariable regression models were created to determine the association of SCP use with surgical outcomes.

Results: Records of 1,853 patients were analysed. The mean age was 28.74±12.75 years. A total of 582 (31.41%) patients utilized SCP for their treatment,429 (73.71%) of whom underwent LSCS. Overall mortality rate was 17 (0.92%). Compared with SCP non-users, SCP users had a significantly higher LOS (standardised β: 0.52, 95% CI: 0.08-0.97) and lower 14-day readmission rate (OR: 0.64, 95% CI: 0.41-1.00). However, no significant difference was observed for 30-day readmission.

Conclusion: Significantly prolonged LOS in SCP users can lead to over-utilisation of available assets. However, a lower 14-day readmission rate was also noted among the SCP users. To ensure optimal outcomes among patients and adequate use of resources, continuous monitoring and changes are required for such public insurance programmes in low-resource settings.

Keywords: Health insurance, National health programs, Universal health insurance, Treatment outcome

(JPMA 74: S-45 [Suppl. 11]; 2024) **DOI: https://doi.org/10.47391/JPMA.SCPP-07**

Introduction

Financial limitations are often a barrier for many patients in receiving the appropriate healthcare required during the course of a disease. To counter such inequitable access to healthcare, Universal Healthcare Coverage (UHC) was introduced as part of the Sustainable Development Goals (SDGs) in 2015.[1] UHC helps nations in curbing out-of-pocket expenditures by their patients and is specifically important for surgical interventions, where an estimated 3.7 billion people are prone to catastrophic expenditures (defined as 10% of overall expenses incurred within the house) if they require surgical care.[2]

The last decade saw UHC gaining momentum globally, where every country has been striving towards achieving it for improving the healthcare quality of its citizens.[3] High-income countries (HICs) such as Japan and France have been able to develop mature UHC systems, which have proven to be sustainable over a long time.[3,4] Meanwhile, low- and middle-income countries (LMICs) such as Ghana and Bangladesh are still in the process of setting up systems that can provide healthcare coverage to all.[3,4] A national health expenditure survey conducted from 2013 to 2014 in Pakistan, a South Asian LMIC, indicated 58% of the total health expenditure to be derived from out-of-pocket (OOP), with 85% being spent in private hospitals.[5] As a means to decrease these high incurred costs on the population, Pakistan initiated its first step towards UHC within Khyber Pakhtunkhwa (KP), a province of the country in 2015. This initiative was introduced as the Sehat Card Plus (SCP) Programme for the citizens of the province who could utilize it for pre-defined surgical and non-surgical healthcare services.[6]

While there were continuous modifications made to this first-of-its-kind programme, the evaluations were mostly limited to administrative domains, including population coverage, specialties where SCP was applicable, number of hospitals empanelled, etc.[6,7] with little focus on utilization of resources and treatment outcomes. Several studies from the United States have indicated higher utilization of

[1]The Clinical and Translational Research Centre, Medical College, Aga Khan University, Karachi, Pakistan; [2-6]Department of Community Health Sciences, Aga Khan University, Karachi, Pakistan; [7]Medical College, Aga Khan University, Karachi, Pakistan.

Correspondence: Sameen Siddiqi. e-mail: sameen.siddiqi@aku.edu

ORICID: 0000-0001-8289-0964

resources and greater morbidity in Medicaid patients whose healthcare expenditure is covered by the state due to their low-income background.[8,9]

Since surgical interventions have incurred greater costs and higher utilization of resources as compared to non-surgical treatment in the context of SCP,[7] it is imperative to evaluate its associated outcomes such as length of stay and readmissions that can provide an insight to the utilization of resources. This can in turn identify the strengths and limitations of SCP, develop informed policies and expand this initiative to other parts of the country. Therefore, this study aimed to determine the utilization of SCP among citizens of Peshawar, the capital city of KP, for pre-defined surgical interventions and identify its association with length of stay (LOS), 14 and 30-day readmission within the same specialty post-discharge.

Patients and methods

Ethical approval for this study was received from the Aga Khan University Ethics Review Board (2022-7632-22601). This retrospective study used convenience sampling, with data extracted from four tertiary care hospitals in Peshawar. These comprised of three private and one public sector hospital, all of which are empanelled by the province to provide healthcare services using SCP. Since the public sector hospital has a bed capacity of approximately 1300 and the private sector hospitals can accommodate an estimated 1350 patients cumulatively, equal representation was achieved from both the sectors.

The data collection process took place from October 2022 to December 2022. Data was procured both electronically and manually for a period of 16 months, from 1st June 2021 to 30th September 2022. During this period, all patients who underwent exploratory laparotomy, lower (uterine) segment caesarean section (LSCS), or open reduction internal fixation (ORIF) of fractures, were included in the study. These procedures have been specified by the Lancet Commission on Global Surgery in 2015 as "Bellwether Procedures", the provision of which has been deemed a core indicator of global surgery.[10] As per the World Health Organization (WHO) database, the performance of these surgeries signified the completion of other less complicated procedures mentioned within WHO's primary surgery package.[10]

A proforma was developed to collect the data on demographics, admission details, and surgical outcomes. Extracted data for each patient included their age, gender, district of residence, whether SCP was used for treatment, type of Bellwether Procedure done, LOS (in days), outcome at discharge (alive/expired), and readmission within 14 and 30-days after discharge (in the same specialty). Three hospitals had well-developed electronic health record (EHR) systems that utilized the Current Procedural Terminology (CPT) system as a means to classify diagnosis and treatment accurately.[11] The CPT codes specified for exploratory laparotomy, LSCS, and ORIF of fractures were used to extract relevant data. Since one private hospital lacked an EHR system, data was collected manually through file reviews, where records were maintained according to the type of surgical intervention. Three data collectors reviewed each record that fulfilled the inclusion criteria and performed data entry on an Excel sheet stored on a password-protected computer. The data was extracted as per the variables in the proforma. The three hospitals with EHR systems did not have data related to the patient's comorbidities, disability status, and complications. Therefore, these variables could not be included in the analysis.

Estimating 8% of the patients using SCP to be readmitted after surgery, a total sample of 373 was calculated (with 223 SCP users and 150 non-users), to achieve 80% power at a two-sided 5% level of significance.[12] After retrieving datasets from all hospitals, patients having an emergent status for surgical intervention were excluded, with the inclusion of all other records, regardless of their age, gender, and SCP status. All data were anonymised using de-identified codes to ensure the confidentiality of the patients.

Data was analyzed using Stata software (StataCorp, College Station, TX), version 14.2. Categorical data were reported as frequencies and percentages (n/%), normally distributed continuous data were reported with means and standard deviations (SD), and continuous data with skewness was reported with median and interquartile range (IQR). Multivariable regression analysis was performed to determine the independent associations of SCP insurance usage with length of stay and readmission, after controlling for age, gender, type of hospital (public/private), and surgical intervention. Since severity of the disease was not available, it could not be adjusted. A *p*-value of <0.05 was considered significant.

Results

A total of 1891 records were obtained from all four hospitals. After excluding records with missing data, 1853 entries were used for analysis. The mean age of all patients was 28.74±12.75 years, with the majority of patients being females, n=1,379 (74.42%). This gender predominance was due to the extensive number of LSCS cases, n=1150 (62.06%). ORIF and exploratory laparotomy were performed on 547 (29.52%) and 156 (8.42%) patients respectively. The mortality rate for the overall cohort was

17 (0.92%). Table 1 demonstrates the demographic details of the cohort, as well as the readmission rate at 14- and 30-days post-discharge.

As shown in Table 2, the total sample was stratified as per the use of SCP to determine the demographics and outcomes based on their status of insurance. For the independent variables age, gender, and surgical intervention, a statistically significant difference was noted between the two groups (all $p<0.001$). However, no difference was seen for in-hospital mortality and readmission at both 14- and 30-days post-discharge. The mortality rate among SCP users was 07 (1.20%), while for SCP non-users, it was 10 (0.79%). Furthermore, the crude readmission rate at both 14- and 30-days after discharge was greater for SCP non-users as compared to SCP users (14-day readmission rate: 87 out of 1261 (6.90%) vs 31 out of 575 (5.39%); 30-day readmission rate: 36 (2.85%) vs 8 (1.39%).

Stratified by surgical intervention, the highest mortality rate was observed within exploratory laparotomy, n=12 (7.69%), while patients undergoing LSCS did not report any mortality. The longest median length of stay (LOS) was observed for patients undergoing ORIF (median: 6 days; IQR: 2-8 days), followed by exploratory laparotomy (median: 5.5 days; IQR: 3-11 days) and LSCS (median: 2 days; IQR: 2-3 days). To test the adjusted difference in LOS between the two groups, mean LOS was used to provide estimates. An increase was seen in mean LOS after adjusting for confounders (age, gender, type of hospital, and surgical intervention) within SCP users (4.55 to 4.62 days), while within SCP non-users, a decrease was observed (4.42 to 4.39 days). The highest readmission rates for both 14- and 30-days post-discharge were observed in patients who underwent exploratory laparotomy.

Multivariable regression models were constructed for primary outcomes after removing the records of expired patients and those with unknown readmission status. Table 3 illustrates the association between the use of SCP and surgical outcomes. Specifically, 3A shows its relationship with the length of stay for 1,836 cases; 3B highlights factors independently associated with 14-day readmission, drawn from 1,783 cases; and 3C presents a multivariable logistic regression model for 30-day readmission, also involving 1,783 cases. As shown in

Table-1: Demographic details and readmission rate of the included sample.

Variable	n (%) (n=1853)
Age (years)	
≤ 18	292 (15.76)
19-44	1389 (74.96)
45-64	125 (6.75)
≥ 65	47 (2.54)
Gender	
Male	474 (25.58)
Female	1379 (74.42)
Use of Sehat Card Insurance	
Yes	582 (31.41)
No	1271 (68.59)
Type of Hospital	
Public	697 (37.61)
Private	1156 (62.39)
Surgical Intervention	
Exploratory Laparotomy	156 (8.42)
Lower (uterine) Segment Caesarean Section (LSCS)	1150 (62.06)
Open Reduction Internal Fixation (ORIF)	547 (29.52)
Status at Discharge	
Alive	1836 (99.08)
Expired	17 (0.92)
	n (%) (n=1836)
14-Day Readmission (Discharge to 1st Readmission)	
Yes	118 (6.43)
No	1665 (90.69)
Unknown	53 (2.89)
30-Day Readmission (Discharge to 1st Readmission)	
Yes	44 (2.40)
No	1739 (94.72)
Unknown	53 (2.89)

Table-2: Distribution of Demographics and Readmission Rate as per Insurance Status.

Variable	Sehat Card Users (n=582) n (%)	Sehat Card Non-Users (n=1271) n (%)	*p*-value
Age (years)			<0.001
≤ 18	41 (7.04)	251 (19.75)	
19-44	493 (84.71)	896 (70.50)	
45-64	36 (6.19)	89 (7.00)	
≥ 65	12 (2.06)	35 (2.75)	
Gender			<0.001
Male	109 (18.73)	365 (28.72)	
Female	473 (81.27)	906 (71.28)	
Type of Hospital			0.413
Public	211 (36.25)	486 (38.24)	
Private	371 (63.75)	785 (61.76)	
Surgical Intervention			<0.001
Exploratory Laparotomy	62 (10.65)	94 (7.40)	
Lower (uterine) Segment Caesarean Section (LSCS)	429 (73.71)	721 (56.73)	
Open Reduction Internal Fixation (ORIF)	91 (15.64)	456 (35.88)	
Status at Discharge			0.383
Alive	575 (98.80)	1261 (99.21)	
Expired	7 (1.20)	10 (0.79)	
	n (%) (n=575)	**n (%) (n=1261)**	
14-Day Re-admission (Discharge to 1st Re-admission)			0.214
Yes	31 (5.39)	87 (6.90)	
No	529 (92.00)	1136 (90.09)	
Unknown	15 (2.61)	38 (3.01)	
30-Day Re-admission (Discharge to 1st Re-admission)			0.056
Yes	8 (1.39)	36 (2.85)	
No	552 (96.00)	1187 (94.13)	
Unknown	15 (2.61)	38 (3.01)	

Table-3: Adjusted Beta Coefficients for Association between Use of Sehat Card and Surgical Outcomes: (A) Length of Stay (LOS); (B) 14-Day Readmission; (C) 30-Day Readmission

Table 3A: Multivariable Linear Regression Model for Association between Length of Stay and Use of Sehat Card

Variable	Adjusted Beta Coefficients (95% CI)	*p*-value
Use of Sehat Card Insurance		
No	Reference	-
Yes	0.52 (0.08,0.97)	0.022
Surgical Intervention		
Lower (uterine) Segment Caesarean Section (LSCS)	Reference	-
Exploratory Laparotomy	6.11 (5.16,7.05)	<0.001
Open Reduction Internal Fixation (ORIF)	3.59 (2.79,4.40)	<0.001
Gender		
Female	Reference	-
Male	-0.18 (-0.90,0.55)	0.634
Age (years)		
≤18	Reference	-
19-44	0.31 (-0.36,0.99)	0.360
45-64	0.22 (-0.73,1.17)	0.651
≥ 65	0.47 (-0.98,1.92)	0.522

Table 3B: Multivariable Logistic Regression Model for Association between 14-Day Readmission and Use of Sehat Card

Use of Sehat Card Insurance		
No	Reference	-
Yes	0.64 (0.41,1.00)	0.048
Type of Hospital		
Private	Reference	-
Public	2.85 (1.79,4.54)	<0.001
Surgical Intervention		
Lower (uterine) Segment Caesarean Section (LSCS)	Reference	-
Exploratory Laparotomy	1.87 (0.87,4.03)	0.109
Open Reduction Internal Fixation (ORIF)	0.73 (0.33,1.59)	0.423
Age (years)		
≤ 18	Reference	-
19-44	2.42 (1.27,4.64)	0.008
45-64	2.17 (0.95,4.97)	0.068
≥ 65	1.76 (0.46,6.70)	0.406
Gender		
Female	Reference	-
Male	1.52 (0.81,2.87)	0.192

Table 3C: Multivariable Logistic Regression Model for Association between 30-Day Readmission and Use of Sehat Card

Use of Sehat Card Insurance		
No	Reference	-
Yes	0.61 (0.27,1.36)	0.225
Surgical Intervention		
Lower (uterine) Segment Caesarean Section (LSCS)	Reference	-
Exploratory Laparotomy	4.13 (1.40,12.20)	0.010
Open Reduction Internal Fixation (ORIF)	3.03 (1.15,7.97)	0.024
Gender		
Female	Reference	-
Male	1.52 (0.66,3.48)	0.322

Table 3A, after adjusting for surgical intervention, age, and gender, multivariable linear regression indicated that compared to SCP non-users, SCP users had a significantly prolonged LOS (standardized β = 0.52, *p*=0.022).

Tables 3B and 3C show multivariable logistic regression models used to highlight associations between the use of SCP and readmission at 14- and 30-days post-discharge respectively. The odds of 14-day readmission amongst those using SCP lowered by 36% (95% CI: 0.41-1.00), as shown in Table 3B. Additionally, the odds of readmission among patients undergoing surgery at a public hospital were 2.58 times more than those getting a surgical intervention at a private hospital.

While 30-day readmission was significantly higher in patients undergoing exploratory laparotomy (OR: 4.12, 95% CI: 1.40-12.20) and ORIF (OR: 3.03, 95% CI: 1.15-7.97), the status of SCP use did not indicate any significant association with it (*p*<0.225). Table 3C further depicts the association between independent variables to 30-day post-discharge readmission.

Discussion

The findings from this retrospective study highlight the surgical outcomes associated with the use of public insurance in a resource-limited setting. The results indicate limited use of public insurance for inpatient surgical procedures among the included hospitals, where approximately only 30% of patients utilized it. Furthermore, SCP users had a significantly higher LOS as compared to the patients who did not receive services under SCP for the same procedures. While the SCP users had significantly lower odds of having 14-day readmission as compared to SCP non-users, there was no significant difference between these groups for 30-day readmission rates.

The SCP was introduced as a means to provide increased access to healthcare delivery in terms of both availability and affordability to all residents of KP.[6] There has been a continuous expansion within the services of this publicly funded programme since its inception in 2015.[13] Currently, approximately 7.2 million families are utilizing the SCP services.[14] Our results indicate only 582 (31.4%) patients used SCP for major surgical procedures, specifically exploratory laparotomy, LSCS, and ORIF. The limited use of SCP is majorly due to the residents being ineligible for the programme due to their citizenship, lack of proper documentation required for registration in the programme, and not being aware of the SCP services.[15] However, the number of enrolled families within the programme has continued to increase, with 35,866,110 families registered for it as of 1st July 2022.[7] Continuous primary, secondary, and third-party evaluations further identify barriers

associated with the usage of insurance and provide potential solutions for equitable expansion of the programme.[7,15]

A major finding of this study is the significantly prolonged LOS for SCP users undergoing Bellwether procedures as compared to SCP non-users. Multiple studies from HICs demonstrate a prolonged hospital stay for insured patients. Studies from the United States using data from the National Trauma Data Bank (NTDB) and the American College of Surgeons-National Surgical Quality Improvement Programme (ACS-NSQIP) concluded that insured patients have a longer LOS than uninsured patients post-trauma and post-pancreatoduodenectomy, respectively.[16,17] While limited, literature from LMICs also indicates similar findings for various other treatments[18] While the public-funded SCP aims to increase accessibility to healthcare services within Pakistan, there is a possibility of overuse of medical services owing to no expenses incurred to the patient, often referred to as moral hazard.[19] Furthermore, insured patients are also shown to have more surgical complications as compared to patients paying out-of-pocket.[20] It is imperative to ascertain the causes of prolonged LOS in our study to prevent excessive use of medical services which can increase the stakeholders' expenditure and decrease the rate of complications as a means of providing quality care, irrespective of the payer status.

The rate of 14-day readmission is used consistently in Taiwan as a monitoring indicator of healthcare quality.[21] Due to a similar short- and long-term healthcare goals of Pakistan and China, and a similar Asian population, we used the 14-day readmission parameter to identify its potential association with patients' insurance status. After adjusting for confounders, our results indicate 36% lower odds of 14-day readmission for insured patients as compared to their uninsured counterparts. Contrary to our findings, Lin et al. concluded a higher 14-day readmission rate in publicly insured children as compared to those who are privately insured.[22]

Concerning the association of 30-day readmission rates with insurance status, there is wide variability within the literature. Our results showed no statistical difference in 30-day readmission rate among SCP users and non-users ($p< 0.225$). Similarly, a study from Philadelphia reported no statistical difference for 30-day readmission rate in gastric bypass patients among users and non-users of Medicare/Medicare.[23] In contrast, Jacobs et al. analysed inpatient NSQIP data and concluded Medicaid and uninsured patients to have significantly increased 30-day readmission as compared to privately insured patients (adjusted OR: 1.35, 95% CI: 1.11–1.65, p-value: 0.004).[24] There is a possibility that self-paying/uninsured patients delay seeking care and take early discharges/leave against medical advice due to the costly healthcare,[25] leading to increased readmission rates. However, this was not seen in our study, encouraging the need for similar research to be conducted with a higher number of SCP-empanelled hospitals.

Since the surgical outcomes of SCP users have not been determined after the inception of the programme in 2015, this study is the first-of-its-kind to compare vital quality indicators such as LOS and readmission rates of insured with uninsured patients. Furthermore, using Bellwether procedures to ascertain these outcomes allowed for a broader perspective on the quality of healthcare services provided under the SCP.

While this study used patient cohorts from both public and private hospitals, the overall sample was small. This limited determination of factors associated with mortality, owing to its lower rate. Data were extracted from four hospitals that received patients from diverse settings and backgrounds. However, since these hospitals were within the same city of the province, it can limit the generalisability of the results. Since the dataset received only included the individual hospital's record number and not the reference number allocated to the patients as part of SCP, they could not be tracked for post-discharge mortality and readmission in cases where they might have gone to a different hospital. Furthermore, the severity of the disease was not available. Maintenance of EHRs within other SCP-empanelled hospitals would have allowed for increased variables and more robust analysis.

Conclusion

Our results show that compared to SCP non-users, SCP users have a significantly higher LOS and lower 14-day readmission rate, with no statistical difference for 30-day readmission rate. Higher LOS can lead to over-utilisation of resources in the public insurance programme, however lower readmission rates show optimal recovery of surgical patients. Continuous scrutiny and evaluation of such programmes is required, both within administrative and treatment domains, to ensure appropriate use of resources and positive outcomes for patients. This could pave avenues for further improvement in SCP, establishing it as a model of public insurance programme for other low-resource settings.

Disclaimer: Limited findings from this study have previously been discussed in a report titled "Third Party Evaluation of Sehat Card Plus Khyber Pakhtunkhwa" which was conducted by the Department of Community Health Science at the Aga Khan University, Karachi, Pakistan.

Conflict of interest: None.

Funding disclosure: This study constituted a pivotal component of the comprehensive Third-Party Evaluation of the Sehat Card Plus Programme in the Khyber Pakhtunkhwa Province. The research initiative was financially supported by the German Agency for International Cooperation (GIZ).

References

1. World Health Organization (WHO). SDG Target 3.8 | Achieve universal health coverage (UHC). [Online] 2023 [Cited 2023 October 30]. Available from URL: https://www.who.int/data/gho/data/themes/theme-details/GHO/universal-health-coverage
2. Shrime MG, Dare AJ, Alkire BC, O'Neill K, Meara JG. Catastrophic expenditure to pay for surgery worldwide: a modelling study. Lancet Glob Health 2015;3(Suppl 2):s38-44. doi: 10.1016/S2214-109X(15)70085-9
3. Reich MR, Harris J, Ikegami N, Maeda A, Cashin C, Araujo EC, et al. Moving towards universal health coverage: lessons from 11 country studies. Lancet 2016;387:811-6. doi: 10.1016/S0140-6736(15)60002-2
4. Maeda A, Araujo E, Cashin C, Harris J, Ikegami N, Reich MR. Universal Health Coverage for Inclusive and Sustainable Development: A Synthesis of 11 Country Case Studies. Washington, DC: The World Bank; 2014. Doi: 10.1596/978-1-4648-0297-3.
5. Khalid F, Raza W, Hotchkiss DR, Soelaeman RH. Health services utilization and out-of-pocket (OOP) expenditures in public and private facilities in Pakistan: an empirical analysis of the 2013-14 OOP health expenditure survey. BMC Health Serv Res 2021;21:178. doi: 10.1186/s12913-021-06170-4
6. Hasan SS, Mustafa ZU, Kow CS, Merchant HA. "Sehat Sahulat Program": A Leap into the Universal Health Coverage in Pakistan. Int J Environ Res Public Health 2022;19:6998. doi: 10.3390/ijerph19126998
7. Forman R, Ambreen F, Shah SSA, Mossialos E, Nasir K. Sehat sahulat: A social health justice policy leaving no one behind. Lancet Reg Health Southeast Asia 2022;7:100079. doi: 10.1016/j.lansea.2022.100079
8. Stone ML, LaPar DJ, Mulloy DP, Rasmussen SK, Kane BJ, McGahren ED, et al. Primary payer status is significantly associated with postoperative mortality, morbidity, and hospital resource utilization in pediatric surgical patients within the United States. J Pediatr Surg 2013;48:81-7. doi: 10.1016/j.jpedsurg.2012.10.021
9. Peluso H, Abougergi MS, Caffrey J. Impact of primary payer status on outcomes among patients with burn injury: A nationwide analysis. Burns 2018;44:1973-81. doi: 10.1016/j.burns.2018.06.009
10. Meara JG, Leather AJ, Hagander L, Alkire BC, Alonso N, Ameh EA, et al. Global Surgery 2030: Evidence and solutions for achieving health, welfare, and economic development. Surgery 2015;158:3-6. doi: 10.1016/j.surg.2015.04.011
11. Dotson P. CPT® Codes: What Are They, Why Are They Necessary, and How Are They Developed? Adv Wound Care (New Rochelle) 2013;2:583-7. doi: 10.1089/wound.2013.0483
12. Brown CS, Montgomery JR, Neiman PU, Wakam GK, Tsai TC, Dimick JB, et al. Assessment of Potentially Preventable Hospital Readmissions After Major Surgery and Association With Public vs Private Health Insurance and Comorbidities. JAMA Netw Open 2021;4:e215503. doi: 10.1001/jamanetworkopen.2021.5503
13. Khan SA, Cresswell K, Sheikh A. Contextualising sehat sahulat programme in the drive towards universal health coverage in Khyber Pakhtunkhwa, Pakistan. Khyber Med Univ J 2022;14:63-70. Doi: 10.35845/kmuj.2022.21481.
14. Health Department of Khyber Pakhtunkhwa. Sehat Card Plus – We Care About Patient. [Online] 2023 [Cited 2023 October 30]. Available from URL: https://sehatcardplus.gov.pk/
15. Health Department of Khyber Pakhtunkhwa. Third Party Evaluation of Sehat Card Plus, Khyber Pakhtunkhwa By Agha Khan University. News Release. Health Department of Khyber Pakhtunkhwa. [Online] 2023 [Cited 2023 October 30]. Available from URL: https://www.healthkp.gov.pk/news/view/692
16. Englum BR, Hui X, Zogg CK, Chaudhary MA, Villegas C, Bolorunduro OB, et al. Association Between Insurance Status and Hospital Length of Stay Following Trauma. Am Surg 2016;82:281-8. doi: 10.1177/000313481608200324
17. Flick KF, Sublette CM, Yip-Schneider MT, Maatman TK, Colgate CL, Soufi M, et al. Insurance Type and Marital Status Impact Hospital Length of Stay After Pancreatoduodenectomy. J Surg Res 2021;257:587-92. doi: 10.1016/j.jss.2020.07.071
18. Docrat S, Besada D, Cleary S, Lund C. The impact of social, national and community-based health insurance on health care utilization for mental, neurological and substance-use disorders in low- and middle-income countries: a systematic review. Health Econ Rev 2020;10:11. doi: 10.1186/s13561-020-00268-x
19. Sohn M, Jung M. Effects of public and private health insurance on medical service utilization in the National Health Insurance System: National panel study in the Republic of Korea. BMC Health Serv Res 2016;16:503. doi: 10.1186/s12913-016-1746-2
20. LaPar DJ, Bhamidipati CM, Mery CM, Stukenborg GJ, Jones DR, Schirmer BD, et al. Primary payer status affects mortality for major surgical operations. Ann Surg 2010;252:544-50. doi: 10.1097/SLA.0b013e3181e8fd75
21. Chiu WT, Yang CM, Lin HW, Chu TB. Development and implementation of a nationwide health care quality indicator system in Taiwan. Int J Qual Health Care 2007;19:21-8. doi: 10.1093/intqhc/mzl063
22. Lin C, Hsu S, Yan YH. The LACE index and risk factors of 14-day versus 30-day readmissions in children. Int J Qual Health Care 2023;35:mzad032. doi: 10.1093/intqhc/mzad032
23. Dallal RM, Trang A. Analysis of perioperative outcomes, length of hospital stay, and readmission rate after gastric bypass. Surg Endosc 2012;26:754-8. doi: 10.1007/s00464-011-1947-z
24. Jacobs MA, Kim J, Tetley JC, Schmidt S, Brimhall BB, Mika V, et al. Association of Insurance Type with Inpatient Surgical 30-day Readmissions, Emergency Department Visits/Observation Stays, and Costs. Ann Surg Open 2023;4:e235. doi: 10.1097/as9.0000000000000235
25. Hasan O, Samad MA, Khan H, Sarfraz M, Noordin S, Ahmad T, et al. Leaving Against Medical Advice From In-patients Departments Rate, Reasons and Predicting Risk Factors for Re-visiting Hospital Retrospective Cohort From a Tertiary Care Hospital. Int J Health Policy Manag 2019;8:474-9. doi: 10.15171/ijhpm.2019.26