



Exploring the effects of the withdrawal of the capitation policy on Cesarean rates in public hospitals in Ghana: an interrupted time series analysis

Explorer les effets du retrait de la politique de capitation sur les taux de césariennes dans les hôpitaux publics au Ghana : une analyse interrompue des séries chronologiques

John Kanyiri Yambah¹; Naasegnibe Kuumibe², Kindness Laar³, Kofi Akohene Mensah³, Jones Apawu⁴, Abraham Babatiamo Titigah⁵, Aiden Suntaa Saanwie⁶, Edgar Lierdong Sopiimeh⁷

Corresponding Author

John Kanyiri Yambah

Courriel: yambahjohn@yahoo.com

University Health Services, University of Education, Winneba, Ghana

Résumé

Contexte et objectifs. Au Ghana, les taux de chirurgie césarienne (CC) ont augmenté de 2% depuis 2014, bien que l'Organisation Mondiale de la Santé ait demandé que la procédure ne soit pratiquée que pour les cas médicalement justifiables. Les mécanismes de paiement des fournisseurs, comme la capitation, ont été utilisés pour modérer les taux de CC dans certains contextes. La présente étude avait pour objectif d'explorer les effets du retrait de la politique de capitation sur le taux de CC dans les hôpitaux de soins primaires publics ainsi que les accouchements par voie vaginale (AVV) et les soins prénatals pour les femmes ayant des taux de 4 visites et plus (SP4+). *Méthodes.* Une conception analytique de séries chronologiques interrompues a été utilisée pour évaluer les effets du retrait de la capitation sur certaines variables du Système secondaire de Gestion de l'Information Sanitaire de District (SGISD 2) des hôpitaux publics au Ghana entre janvier 2015 et décembre 2019. *Résultats.* Les résultats montrent qu'après le retrait de la politique, la tendance et le niveau de fourniture de CC et d'AVV n'ont pas été modifiés de manière significative. Les tendances à la baisse significatives d'SP4+ se sont inversées avec des tendances positives significatives après le retrait de la politique. *Conclusion.* Nous concluons que le retrait de la politique de capitation n'a peut-être pas eu d'incidence significative sur le taux de CC dans les hôpitaux publics. Des mécanismes de paiement par capitation renforcés et des politiques spécifiques visant à limiter la CC sont nécessaires pour freiner la hausse au Ghana.

Mots-clés : Chirurgie césarienne, capitation, soins prénatals, soins maternels, hôpitaux
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1 University Health Services, University of Education, Winneba, Ghana.

2 Department of Economics, Faculty of Social

Summary

Context and objectives. In Ghana, CS rates have increased by 2% since 2014 even though the World Health Organization has called for the procedure only for medically justifiable cases. Provider payment mechanisms such as capitation have been used to moderate CS rates in some settings. We explored the effects of the withdrawal of the capitation policy on the Cesarean Surgery (CS) rate in public primary care hospitals together with vaginal delivery (VD) and antenatal care for women with 4+ visits (ANC4+) rates. *Methods.* An interrupted time-series analytical design was used to assess the effects of the withdrawal of capitation on selected variables from the secondary District Health Information Management System (DHIMS 2) of public hospitals between January 2015 and December 2019. *Results:* The results show that after the policy withdrawal, the trend and level of provision of CS and VD were not significantly altered. Significant declining trends of ANC4+ reversed with significant positive trends after the policy removal. *Conclusion.* We conclude that the withdrawal of the capitation policy may not have impacted the CS rate significantly in public hospitals. Enhanced capitation payment mechanisms and specific policies aimed at limiting CS are needed to curtail the rise in Ghana.

Keywords: Cesarean Surgery, capitation, antenatal care, maternal care, hospitals

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Introduction

Caesarean section (CS) delivery is essential for the provision of timely maternal care and for reducing maternal morbidity and mortality (1). This important medical procedure, which involves the delivery of a foetus through an abdominal incision before or during the labour process, however, has its drawbacks on maternal health, perinatal health and health expenditure when not appropriately indicated. CS audits have revealed that the procedure may not have been appropriate in one out of every 3 cases (1-2) and is associated with increased maternal morbidity and mortality when done by less skilled personnel (3). This procedure, the commonest surgery in health facilities in low and middle-income countries (4) has a mortality of 8 per 1000 surgeries in these countries with Sub-Saharan Africa having the highest risk (11 /1000 surgeries).

Aside, medical indications, it may also be done based on maternal request for reasons including fear of labour pain or concerns of labour complications such as pelvic

Science and Arts, SD-Dombo University of Business and Integrated Development Studies, Ghana.

3 Department of Health Policy, Management and Economics, School of Public Health, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

4 Department of Mathematics Education, Faculty of Science Education, University of Education, Winneba

5 Department of Obstetrics and Gynaecology, Tamale Teaching Hospital, Tamale Ghana.

6 Department of Obstetrics and Gynaecology, Bolgatanga Regional Hospital, Bolgatanga, Ghana.

7 Department of Obstetrics and Gynaecology, Holy Family Hospital, Techiman, Ghana.

floor damage, urinary incontinence, or reduced quality of sexual functioning and the perceived safety of the procedure (5). Also, a CS could be resorted to because physicians are less skilled in alternative delivery methods such as forceps and vacuum delivery when normal vaginal delivery is impossible. Despite worldwide calls for a reduction in the rates of CS, the rates of this surgical technique continue to be of concern for health systems. As a percentage of all deliveries, CS rates varies from 5% in Sub-Saharan Africa (SSA) to 42.8% in Latin America and the Caribbean (4).

While the WHO no longer recommends a target for CS, rates beyond 20% may not contribute to significant reductions in maternal mortality and morbidity or improved perinatal outcomes (6). Egypt's CS prevalence of 51.2%, the highest in Africa, is 37 times that of Chad, exemplifying country-to-country disparities (4). The CS rate in Ghana has increased over the last two decades. The most recent Ghana Maternal Health survey estimates the CS rate of 16 %, as at 2018 (7) represents a 2% rise from the preceding Demographic and Health Survey in 2014 and more than twice rate in 2012. The steep increase in CS may be due to a legitimate need; however, one cannot rule out the possibility that unjustifiable medical reasons may account for this trend. The low numbers of skilled professionals and inequitable health worker distribution in Ghana (8), exacerbated by financial and geographical barriers to accessing maternal health services (8), necessitate stakeholders to take a second look at the CS trend and any factors that may influence it. There are a number of measures aimed at reducing CS to only those that are medically justifiable. These include; promoting Vaginal Births After Cesarean section (VBAC), external cephalic version, promoting vaginal breech delivery, instituting protocols that require senior obstetrician review of decisions for CS and the Robson guidelines (4). Child birth training workshops, nurse-led relaxation programmes, psychoeducation, and financial interventions are

non-clinical interventions that have been deployed in other settings to stem the rise, leveraging on the social and behavioral model around the Robson guidelines (5). There are arguments that non-clinical interventions offer a greater prospect of substantial reductions in the CS rate (9). For instance supply-sided interventions such as financial incentives to encourage vaginal births reduced CS rates demonstrating the potential of purchasers to change maternal health service provision (3). Some of these interventions include demand or supply sided financial measures but other countries employ both. Supply sided interventions may work better because of their potential to influence systemic reform and change (10).

Several countries have reformed their payment systems in response to escalating healthcare costs by introducing supply-sided measures such as per diems, capitation, case-based systems, Fee for Service, or Global budgets (11). Accountability mechanisms have typically accompanied these to counter each payment system's deleterious effects, especially the provision of sub-optimal or unnecessary care. The evidence of these payment mechanisms on maternal healthcare has been mixed, both in high income countries (12) and in LMICS (13).

Renewed efforts towards realizing the maternal health related SDGs, require good scrutiny of purchaser payment reforms and their intended or unintended effects on key aspects of maternal care, especially antenatal care provision, facility delivery and provision of CS. Like many countries, Ghana has implemented a number of payment systems including Diagnosis Related Groups (DRGs), Fee for Service and capitation. These reforms, coupled with the need to achieve the SDG target 3.8 while concurrently tackling other maternal health concerns such as the rise in CS, warrant the need to monitor maternal provision changes associated with the policy changes.

The global drift towards capitation in these reforms, necessitates greater focus especially concerning the maternal health related SDGs. From literature, a change of payment method to capitation from a Fee For Service model was noted to improve prenatal care utilization, increase quality maternal services and improved perinatal outcomes in the USA (14). However, other authors found contradictory effects of Medicaid Capitation programmes in other states (15-16). Specifically, in the case of CS, the effects of Medicaid capitation-based payments have also been mixed. Two studies reported no impact on CS of per capita payment systems in California and the whole of the US respectively (14,17) after a review of natality data. The capitation Medicaid model in Ohio increased the odds of a primary CS rates (18) whereas other researchers found a lower likelihood of a CS following the Ohio programme (19). In Thailand and China, where capitation has been a prominent feature of their payment reforms, the effects on health utilization have not included CS rates (20-21). The changes noted in healthcare provision appear moderated when there is a blend of capitation with other payment methods (22). The magnitude and direction of any maternal provision indicator changes following the introduction or withdrawal of a policy also largely depend on the prior policy or the existing policy respectively (22). Apart from Ghana, studies of capitation in Africa have been limited to Kenya, Nigeria and Burkina (23–25).

Ghana's capitation is arguably the most researched in Africa. Evidence show the policy slowed down outpatient and inpatient care costs, improved quality of care and is favored by providers and clients even though health-seeking behaviour may have been hampered by poor knowledge of the policy (26–29). Capitation's impact on maternal service provision in Ghana is rare. This may be partly accounted for by the exclusion of delivery and postnatal care from the per capita basket of services. Details of the policy making process that led to the restriction of the maternal service package in Ghana's capitation programme are available elsewhere (30).

Despite the exclusion of delivery care (VD and CS) from the capitation policy in Ghana the policy can still impact VD and CS through prenatal care (ANC) and disparities in ANC4+ coverage of the population. For example, CS might be necessitated by a complicated delivery, which resulted from inadequate access to ANC services. Such cases will then affect the rates of delivery care (CS and VD) modes and indicate unanticipated maternal care outcomes of the capitation policy. We thus argue that an understanding of the hospital CS rate will help policy makers, regulators and providers understand the policy's intended and unintended consequences typical in health policy implementation (31). Other maternal care indices particularly ANC4+, vaginal delivery and the quality of maternal monitoring during labour, affect the decision for or the delivery mode as CS. Given the direct and indirect effects of the capitation policy on these, the CS rate may change following the withdrawal of capitation. We, therefore, analyzed the CS rates alongside two other maternal care indicators, facility VD and ANC4+ in hospitals during and after the policy withdrawal to better understand the maternal health care effects after the policy change.

Conceptual framework

Following the literature (10,12,32), we posit that capitation will affect CS rates through a number of channels. We expect capitation to improve

gatekeeping, adherence to guidelines and continuity of care ensured by the preferred primary provider (PPP) requirement. This expectation is consistent with the experience of capitation in Ghana and elsewhere, on the provision of care in general (33-34). Specifically, gatekeeping will increase facility-based VD directly (35) or indirectly via increased patronage of antenatal services (ANC4+). An improvement in facility VD could also arise from adherence to guidelines and improved focused antenatal care from policy congruence between the PPP arrangement and focused antenatal care. Independently, capitation, also incentivizes optimal team arrangements for effective output even if the per capita payment is insufficient (36). We expect capitation to impact similarly in maternal care settings. We therefore argue that adherence to guidelines will result in increased intrapartum labour monitoring. This will restrict the need for CS to mostly medically justifiable reasons consistent with expectations of capitation payments to primary care providers (36). Improved Focused Antenatal Care (FANC) will also reduce medically necessary CS through comprehensive pregnancy follow up and prompt care in cases where it is necessary. Per capita based payments are also known to improve quality through a favourable design of the healthcare system (32). This will then increase quality maternal health services and reduce unnecessary CS. These interrelationships are shown in Figure 1.

Methods

Study type and design

The study employed the interrupted time series analytical (ITSA) design to estimate the effects of the withdrawal of the capitation policy on CS. The ITSA design allowed us to analyze the change in level and trend of CS in hospitals alongside facility maternal care indices such as ANC4+ and VD following the withdrawal of the policy in 2017 (37).

The capitation policy in the Ashanti Region of Ghana

The Ashanti Region piloted capitation between 2012 and 2017 because the Ghana Diagnostic Related Groups G-DRGs were ineffective at cost reduction (26). The choice of the Ashanti region for the pilot was premised on the fact that the region became the source of the highest costs to the National health insurance scheme at that time (26). The region is the second most populous of Ghana's 16 administrative regions with an estimated population of 5.4 million inhabitants, had a women-in-fertile-age (WIFA) population of 46% of the total estimated population (38). The region's health insurance coverage of 72%, was above the national average of 70% (39). A total of 25 public primary hospitals, serve the 42 Administrative Districts in the region. These hospitals also act as referral centres for the many health centres, Community-based Health Planning and Services (CHPS), maternity homes and private clinics. The Ghana Health Service (GHS) is responsible for directly managing 47% of all health facilities. The GHS also has some oversight of private and mission facilities in the region. A tertiary level facility serves as a referral point for these hospitals and adjoining regions.

Data sources

The DHIMS 2, electronic database was the source of the secondary data used for the analysis in this study. Monthly inputs are validated by facility heads before submission to the Centre for Health Information Management Systems (CHIMS) that manages this database which serves to improve the collation and analysis of routine service data.

Sample size

The 25 public district hospitals in Ashanti served as the data extraction points of monthly ANC4+, VD and CS data relevant to the study. The considered period spanned 60 months (January 2015 to December 2019) with an interruption point at the 31st month of the series (July 2017) when the capitation policy was withdrawn. The time before the interruption point corresponded to the time of the capitation pilot.

Study variables

We evaluated three variables; ANC4+, VD and CS but with emphasis on CS. ANC4+ were the counts of women who received at least their fourth scheduled ANC visit in their current pregnancy the selected hospitals. VD was the count of vaginal delivery in all the participating hospitals and CS were also the count of the caesarean surgeries conducted.

Data access and extraction

Our Data were extracted between 1st October 2020 and 31st November 2020 with a data extraction sheet and entered into Stata 15.0 for data management and analyses.

Statistical analysis

We employed descriptive and inferential statistics to analyze our data. We calculated the mean, minimum and maximum provision of ANC4+, VD and CS using descriptive statistics. We then employed the segmented regression to analyze the levels and trends of service provision during and after the withdrawal of capitation. Specifically, the segmented regression model, as presented in equation (1) was used:

$$MC_t = \varphi_0 + \varphi_1 T_t + \varphi_2 \pi_t + \varphi_3 \pi_t T_t + \mu_t \quad (1)$$

where MC_t is the outcome variable (maternal care indicator), T_t is the capitation pre-withdrawal period; π_t measures the period

following the withdrawal of capitation and $\pi_t T_t$ is an interaction term for the two periods. The coefficient φ_0 represents starting level of the outcome variable; φ_1 is the slope of the outcome variable until the withdrawal of capitation; φ_2 represents the change in the outcome level that occurs in the period immediately following the withdrawal of capitation (compared to the counterfactual); φ_3 represents the difference between pre-and post-capitation withdrawal trends. Equation (1) was used in analyzing all three indicators and the significance level was set at 0.05. Autocorrelation errors were corrected, and the Durbin-Watson (DW) was reported.

Ethics approval

Ethical clearance was obtained from the Committee on Human Research Publications and Ethics of the Kwame Nkrumah University of Science and Technology (reference number CHRPE/AP/426/20).

Results

Our findings (see Table 1) show the mean ANC4+ decreased from 2553 +/- 778 (min: 1721, max: 4579) to 1954 +/- 273 (min: 1462, max: 2569) after the capitation policy withdrawal.

Table 1. Descriptive statistics of maternal care variables

	During capitation			After capitation withdrawal		
	Mean (SD)	Min	Max	Mean (SD)	Min	Max
ANC4+	2553 (778)	1721	4579	1954 (273)	1462	2569
VD	2103 (218)	1736	2484	2085 (196)	1745	2495
CS	488 (67)	359	689	694 (88)	530	906

Source: authors based on DHIMS 2, 2015-2019

The regression results also indicate the trend of ANC4+ provision declined significantly from a pre-existing level of 4912.57, at a rate of 63.611 ($p < 0.01$) per month but increased to 120 per month immediately after the withdrawal. Thereafter, the post-withdrawal trend increased significantly at 70.99 per month ($p < 0.01$) as shown in Table 2.

Table 2. Regression results of maternal care variables

	Capitation		Post withdrawal		Durbin-Watson statistic	
	Level	Trend	Level change	Trend change	Original	Transformed
ANC4+	4912.57***	-63.61***	119.61	70.99***	1.49	1.90
VD	3168.03***	3.75	-226.26	6.11	1.27	1.68
CS	733.02***	7.26***	-12.61	4.80	1.4	1.94

***p<0.001, **p<0.05, *p<0.10

Source: Authors based on DHIMS 2, 2015-2019

With regards to VD, there was a decrease of the mean monthly VD to 2085+/- 196 (min: 1795, max: 2495) from 2103 +/- 218 (min: 1736, max: 2484) following the withdrawal of the policy as indicated in Table 1. The regression results in Table 2 also suggest that the month-to-month VD rates increased from a level of 3168.03 during capitation, albeit not at statistically significant rates but decreased by 226 less VD per month following the withdrawal of the policy. However, the predicted increase in trend (compared to the counterfactual) was not statistically significant.

Considering CS, the mean monthly CS rate increased after the policy withdrawal to 694+/- 88 from 488+/-67. The regression results in Table 2 show that CS rates increased significantly in the months before the capitation withdrawal as shown in figure 1.



Figure 1. pathway showing the potential influence of capitation on Cesarean rates

After capitation was suspended there were 12 fewer surgeries done in the immediate month (August 2017). Thereafter there was an increase in the trend of CS (coefficient: 4.8, p>0.10) as seen in Table 2 and illustrated in Figure 2.

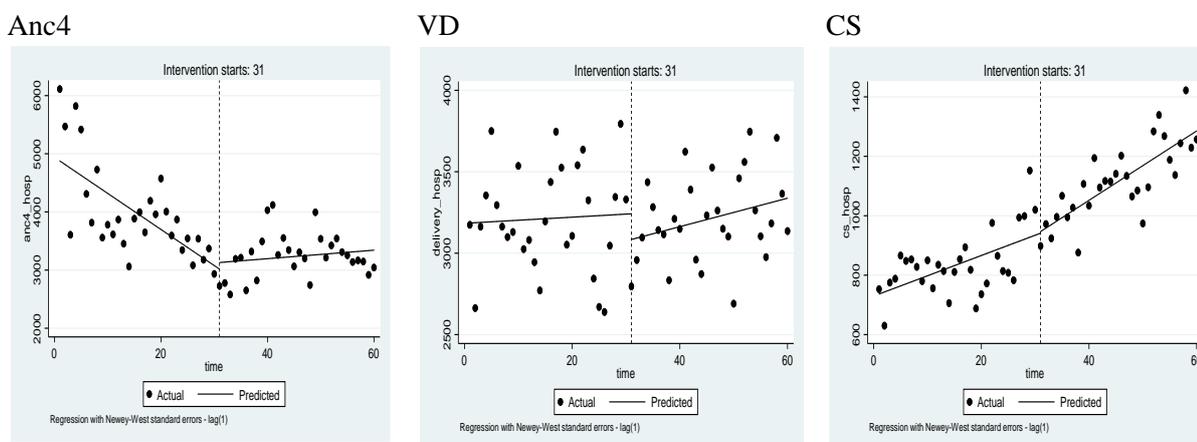


Figure 2. ITSA graphs of ANC4+, VD and CS Source: Authors based on DHIMS 2, 2015-2019

Discussion

The study found that the capitation policy withdrawal did not result in a significant change in the provision of CS in hospitals in the Ashanti region. This is the first research in Ghana, to the best of our knowledge, to suggest that the capitation policy withdrawal may not have had any effects CS rates. First, the neutral effect finding on CS is consistent with findings from studies elsewhere (15,40), even though the capitation payments in those settings were risk adjusted. Differently, while our study indicated a decline in the prenatal quality care indicator, ANC4+, prenatal quality of care was not different after the capitation program in the USA (15). The results of our study are however in conflict with findings from another study (19) which found that implementation of per capita based payment policy in three counties in Ohio, USA, was associated with a decreased likelihood of a CS. The Findings of our study suggests that, although Ghana's capitation led to improved quality care (34), this improvement did not reflect in maternal health services to significantly change CS. If that were the case, a significant increase in CS trend or level would be expected after the capitation withdrawal. This emphasizes that policy effects are not necessarily linear (31). Regarding the quality of care in general and quality of maternal care in particular, ANC4+ which is a proxy for quality maternal care for the SDG-3 witnessed a decline during capitation in Ashanti Region. The withdrawal of the policy, increased ANC4+, suggesting the capitation policy hindered hospitals from delivering expected standard ANC services. This probably confirms the low perceptions of quality in the Ashanti region during capitation (34). The expectations were that, these low-quality services would have resulted in higher CS rates compared to the period after the withdrawal. Specific health system design factors including payment mechanism for other facilities (CHPS, Health Centres, and Private Facilities) could explain the differences between our findings and theirs.

Second, the no statistically significant trend increase in CS after the capitation withdrawal could also be attributable to the re-introduction of the Ghana Diagnosis Related Groups (G-DRG). Ghana's primary care capitation was replaced with the G-DRG which was introduced in 2008. The non-significant trend increase in CS may have reflected possible tendencies for the DRG payment system to curb overtreatment in hospitals (41). The increased trend of ANC4+ post capitation withdrawal confirms the increased provision of services attributable to any DRG payment system

(42) although this did not translate into an expected decrease in CS rates. This could be due to Ghana's imprecise G-DRGs that were used for maternal care reimbursement.

Finally, to account for the non-significant increase trend change in CS, we posit that the decline in ANC4+ during capitation and the increased trends of ANC4+ after the policy suspension, are indicative of poor provider adherence and increased provider adherence to clinical guidelines during capitation and after the policy withdrawal respectively (43). The increased ANC4+ trend change after the policy withdrawal indicated more pregnant women getting better monitoring as a result of the increased adherence to guidelines which translated into more successful VD and less need for unnecessary CS. This reasoning is further affirmed by an increase in trends in VD after the withdrawal of capitation, even though this was not significant statistically. This line of argument is supported by similar findings involving guideline adherence but in non-maternity care settings (44).

Limitations

We need to acknowledge some limitations of our study. First, we relied on DHIMS 2 data, a secondary data source which is often suspect regarding completeness and accuracy. However, DHIMS 2 is known for its completeness and accuracy (45), raising little doubts about its reliability. All the same, we still compared for any differences between the same data extracted by two different health information officers. We relied on data validation routinely done by the heads of the various hospitals to apply to our results. Notwithstanding, to strengthen future research results even though relatively more expensive, primary collation of facility data may further increase the internal validity of studies of a similar type.

Second, in the ideal situation, we should obtain all data points before the introduction of capitation, during the capitation and after the removal of the policy to allow for more causal attribution of the capitation policy effects on our study variables. However, the withdrawal of the policy after 31 months of the 60 months we considered is consistent with the single interruption requirement and above the minimum of 9 data points needed for an interrupted time series analysis. Further, our results may serve as bases for further research.

Finally, our study could benefit from introducing a control group, which would allow for estimating a difference in difference technique to control for confounders. We could not do this because of the bureaucracy of obtaining the data set from control regions. We recommend using a control region and

a difference-in-difference research analytical design for future research.

The study relied on aggregated data in the Ashanti Region. We therefore urge caution extrapolating the findings to other regions that piloted capitation because of differing sociodemographic and economic characteristics.

Conclusion

The withdrawal of the capitation policy did not alter the CS significantly and may have reversed the provision of lower quality pre-delivery maternal care services. The policy withdrawal appears to have incentivized hospitals to provide care that align with the attainment of the maternal health goals of the SDGs. The NHIA, healthcare providers, governments and other stakeholders need to work closely together before and during the implementation of per capita based payment mechanisms in health systems.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be considered as a potential conflict of interest.

Author contributions

JKY contributed to the concept and design of the study, development of the data collection instrument, data analysis, interpretation of the data, and drafting of the manuscript. NK contributed to the concept and design of the study, development of the data collection instrument the acquisition of data, data analysis, interpretation of the data, and drafting of the manuscript. LK, JA and KAM contributed to data analysis, interpretation of the data. All co-authors reviewed and approved the final version.

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