How Might Immunization Rates Change if Cost Sharing Is Eliminated?

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ABSTRACT

Objectives. There is a debate regarding the effect of cost sharing on immunization, particularly as the Affordable Care Act will eliminate cost sharing for recommended vaccines. This study estimates changes in immunization rates and spending associated with extending first-dollar coverage to privately insured children for four childhood vaccines.

Methods. We used the 2008 National Immunization Survey and peer-reviewed literature to generate estimates of immunization status for each vaccine by age group and insurance type. We used the Truven Health Analytics 2006 MarketScan Commercial Claims and Encounters Database of line-item medical claims to estimate changes in immunization rates that would result from eliminating cost sharing, and we used the Kaiser Family Foundation/Health Research and Educational Trust Employer Health Benefits Survey to determine the prevalence of coverage for patients with first-dollar coverage, patients who face office visit cost sharing, and patients who face cost sharing for all vaccine cost components. We assumed that once cost sharing is removed, coverage rates in plans that impose cost sharing will rise to the level of plans that do not.

Results. We estimate that immunization rates would increase modestly and result in additional direct spending of $26.0 million to insurers/employers. Further, these payers would have an additional $11.0 million in spending associated with eliminating cost sharing for children already receiving immunizations.

Conclusions. The effects of eliminating cost sharing for vaccines vary by vaccine. Overall, immunization rates will rise modestly given high insurance coverage for vaccinations, and these increases would be more substantial for those currently facing cost sharing. However, in addition to the removal of cost sharing for immunizations, these findings suggest other strategies to consider to further increase immunization rates.

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Immunization of children against potentially life-threatening illnesses has proved one of the greatest public health successes and one of the most cost-effective medical interventions of the 20th century.[1,2] One barrier to immunization is financial: enrollees seeking immunizations may be confronted with cost sharing (i.e., the contribution consumers make toward the cost of their health care as defined by their health insurance policy) that they are unable or unwilling to pay.[1–8] Approximately 7% of enrollees with private insurance face cost sharing for the administration of immunizations.[9]

This barrier will be lowered as part of the Patient Protection and Affordable Care Act (hereafter, ACA), also referred to as the Health Reform Act.[10] Subpart II Section 2713 of the Act, which was enacted in September 2010, requires first-dollar coverage for vaccines recommended by the Advisory Committee on Immunization Practices (ACIP).[11] First-dollar coverage means that cost sharing in the form of copays, co-insurance, or deductibles will not apply for ACIP-recommended vaccines. The policy intent was to provide financial relief to patients who were previously deterred by financial barriers, encouraging them to obtain vaccinations once these financial barriers were removed.

We examined immunization patterns among privately insured children and adolescents under different levels of cost sharing to estimate the effects of removing cost sharing for both the vaccine dose and administration. Children who are uninsured, underinsured for vaccines, or Medicaid eligible qualify for the Vaccines for Children (VFC) program, which offers vaccines at no cost, and were excluded from this analysis. With the passage of the ACA, children will primarily receive vaccines under private insurance or qualify through expanded Medicaid eligibility to receive vaccines through the VFC program. It is estimated that 89% of the population will have private health insurance coverage when health reform is fully implemented in 2022.[12,13] In 2010, 90% of children had health insurance coverage (public or private) at least some time during the year, of which 60% were covered by private insurance.[14]

Our analysis focused on four vaccines: (*1*) measles, mumps, and rubella (MMR); (*2*) heptavalent pneumococcal conjugate (PCV7); (*3*) human papillomavirus (HPV); and (*4*) meningococcal conjugate (MCV4). These vaccines present different challenges to uptake based on age recommendation, cost, and integration in the immunization delivery system (Table 1). Developed nearly 50 years ago, MMR is an older vaccine that was used under a traditional model of immunization

Table 1. Vaccine product characteristics in the U.S. by licensure, indication, school requirement, and recent coverage levels

Vaccine	*Year licensed*[a]	*Number of doses recommended*	*Age*	*Required for school attendance*	*Recent coverage level (2011)*[b]
MMR	1963 (measles) 1971 (MMR)	2	12–15 months 4–6 years	Yes	91.6%
PCV7	2000	4	2 months 4 months 6 months 12–15 months	35 states have child care requirements	93.6% (3 doses) and 84.4% (4 doses)[c]
MCV4	2005	1 dose + booster	11–12 years with a booster at 16 years	5 states have middle school requirements, 10 states have university requirements, and 5 states have middle school and university requirements	70.5%
HPV	2006 (Gardasil) 2009 (Cervarix)	3	11–12 years	Virginia	34.8%

[a]U.S. Food and Drug Administration licensure dates of selected vaccines

[b]Centers for Disease Control and Prevention (US). 2011 National Immunization Survey [cited 2013 Sep 19]. Available from: URL: http://www.cdc.gov/vaccines/stats-surv/nis/nis-2011-released.htm

[c]Coverage estimates are for PCV13 (surrogate for coverage, as PCV13 is a replacement product to PCV7 licensed in 2010).

MMR = measles, mumps, and rubella

PCV7 = heptavalent pneumococcal conjugate

MCV4 = meningococcal conjugate

HPV = human papillomavirus

PCV13 = 13-valent pneumococcal conjugate

delivery at well-child visits. Rates of MMR immunization for children are uniformly high and likely attributable, in part, to provider support of vaccinations, especially through a medical home and eventual school entry requirements.[15–19] MMR is also less expensive than newer vaccines. PCV7, which was recommended by ACIP in 2000, is an example of a vaccine that signaled a new era of more expensive vaccines, though it is also integrated into well-child visits. In 2010, a next-generation PCV13 vaccine replaced PCV7, adding six serotypes to the vaccine. Finally, HPV vaccine, recommended for use in 2006, and MCV4, recommended by ACIP in 2005, highlight the challenges of vaccinating adolescents who sporadically access preventive health care.[20] HPV vaccine also highlights the challenges of introducing new vaccines that are not only more expensive but also raise questions about social norms and stigma.[21]

To understand the role of cost sharing and its impact on vaccine coverage, we modeled the effects of eliminating cost sharing for select immunizations routinely recommended for children and adolescents and discuss other factors that may be important impediments to immunization.

METHODS

In 2010, we employed two data sources and the literature to generate our estimates. First, we used the 2008 National Immunization Survey (NIS) for children aged 19–35 months and the 2008 NIS-Teen for adolescents aged 13–17 years to develop estimates of immunization status for each vaccine by age group and type of insurance coverage.[22,23] NIS insurance categories include private insurance, Medicaid, military health (including TRICARE, CHAMPUS, and CHAMP-VA), Indian Health Services, other (including Medicare, Medigap, and single-service plans), and uninsured. The NIS is a random-digit-dial telephone survey of parents collecting data on children's and adolescents' immunization status and household demographics. Immunization status is verified by the child's or adolescent's healthcare provider. The 2008 NIS sample of 18,430 children and the 2008 NIS-Teen sample of 17,835 adolescents are random samples of the U.S. population.[4,24] While the surveys provide estimates of immunization status by age, type of insurance, and type of vaccine covered, they do not indicate whether the insurance coverage requires member cost sharing.

Second, for estimates of the behavioral effect of first-dollar coverage, we used the Truven Health Analytics 2006 MarketScan Commercial Claims and Encounters Database for the period of January 1 to December 31, 2006, which includes 16.1 million plan members. This database consists of line-item medical claims for individuals enrolled in health plans from large employers. We based our analyses on nearly 3.5 million members who were enrolled in plans that could be identified. The plan identifiers allowed us to determine the cost-sharing characteristics of each plan and calculate the immunization rates at the plan level. By using the insurance claims, we could see actual payments and identify the percentage of the total payment made by the insurer and the enrollee. These data are available at the vaccine level. We then estimated the changes in immunization rates that would result from eliminating the member's cost sharing.

We created proxy estimates from the Kaiser Family Foundation/Health Research and Educational Trust Employer Health Benefits Survey results to determine the percentage of privately insured children and adolescents who currently have first-dollar coverage, only pay for office visits, or face cost sharing on all vaccine cost components.[9] We assumed that beneficiaries with either no deductible or with preventive care coverage that does not apply against the deductible had first-dollar coverage for immunizations. The 2009 survey included 2,054 randomly selected private firms and government entities with three or more employees.

Using the findings from the NIS and the MarketScan datasets for each vaccine, we estimated the number of people in the population with employer-sponsored insurance, the behavioral impact of eliminating member cost sharing for childhood immunizations, and the size of the populations affected by the change. In this subgroup, we identified the prevalence of coverage for those with first-dollar coverage, those who faced office visit cost sharing, and those who faced cost sharing on all vaccine cost components. We assumed that, once cost sharing was removed, coverage rates in plans that impose cost sharing would rise to the level of plans that do not. Further, we assumed that some proportion of children would not be immunized regardless of cost sharing, either because of philosophical objection or other barriers to immunization.

We used the MarketScan database to determine the average cost of dose and administration for beneficiaries who received that immunization. We were then able to sum across vaccines to get an overall cost of the benefit change. The claims show both the total plan payments and the beneficiary payments.

Eliminating cost sharing has two cost components for payers. First, there is the increased cost to insurers for enrollees who would have been immunized without any change in cost sharing. For example, for MMR, the vaccination rate is currently about 93%. Payers will

now have the additional costs of any cost sharing this subpopulation would have paid in the past. Second, there are the additional costs of the newly vaccinated. Reducing cost sharing will encourage increased vaccinations, and payers will face the full costs of those additional vaccinations (Figure).

RESULTS

Table 2 presents results for children who had at least one MMR or PCV7 dose in the calendar year and adolescents who had at least one HPV and MCV4 dose in 2008. More than 3.2 million of these children and adolescents were privately insured. Immunization rates for MMR and PCV7 were high, with 92.7% of these children having at least one dose of MMR and 94.3% receiving at least one dose of PCV7. However, the subpopulation facing cost sharing had substantially lower immunization rates, with 75.7% having at least one MMR dose and 70.9% having at least one dose of PCV7.

Among adolescents with private insurance, 36.9% of girls had at least one dose of HPV vaccine, and 44.1%

Figure. Schematic of costs and vaccination for a hypothetical vaccine under current cost-sharing practices and with first-dollar coverage

Figure a. Costs and vaccination percentage under current cost-sharing practices for a hypothetical vaccine

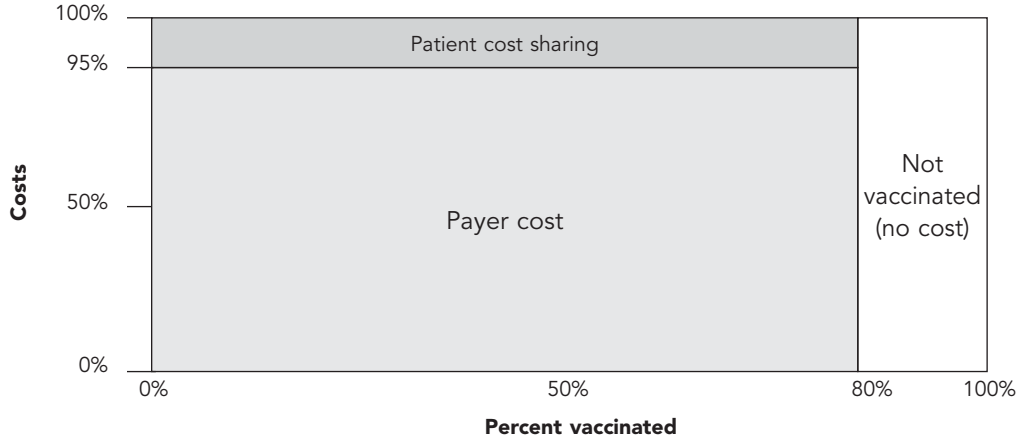

Figure b. Cost shift, new costs, and vaccination percentage under first-dollar coverage for a hypothetical vaccine

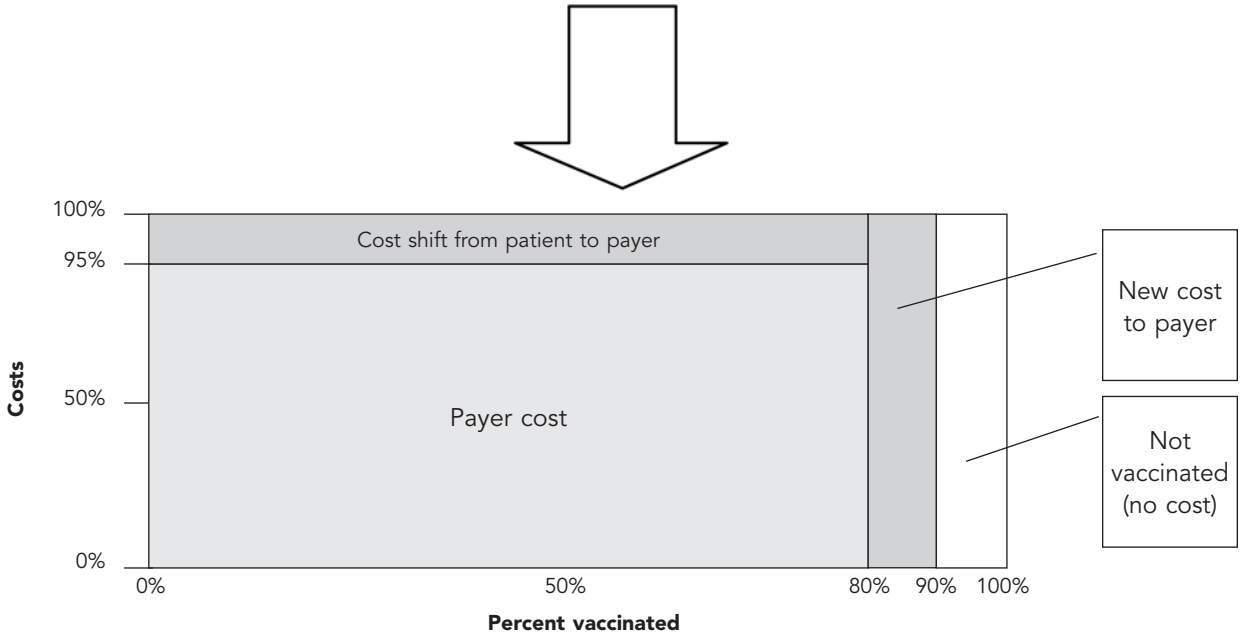

Table 2. U.S. population counts and immunization rates for privately insured young children and adolescents, with and without FDC for select vaccines, and effects of extending FDC for immunizations (in millions), 2008[a,b]

	Number of privately insured children and percent currently immunized			*Effect of extending FDC to all privately insured children*	
Vaccine and target population	*Total*	*With FDC*	*Without FDC*	*Additional children immunized*	*Total children immunized to FDC levels*
MMR					
Children 19–35 months of age	3.238	3.011	0.227		3.238
Number with ≥1 dose	3.003	2.831	0.172	0.042	3.044
Percent with ≥1 dose	92.7	94.0	75.7		94.0
PCV7					
Children 19–35 months of age	3.238	3.011	0.227		3.238
Number with ≥1 dose	3.055	2.894	0.161	0.057	3.112
Percent with ≥1 dose	94.3	96.1	70.9		96.1
HPV					
Girls 13–17 years of age	6.769	6.295	0.474		6.769
Number with ≥1 dose	2.495	2.358	0.137	0.040	2.535
Percent with ≥1 dose	36.9	37.5	28.9		37.5
MCV4					
All children aged 13–17 years	13.635	12.680	0.954		13.635
Number with ≥1 dose	6.007	5.729	0.277	0.154	6.161
Percent with ≥1 dose	44.1	45.2	29.0		45.2

[a]Approximately 10%–11% of children were reported as having ≥2 forms of insurance.

[b]Authors' calculations pulled data from two sources: (*1*) the 2008 National Immunization Survey (NIS) (http://www.cdc.gov/nchs/nis/data_files_09_prior.htm) and NIS-Teen (http://www.cdc.gov/nchs/nis/data_files_teen.htm) for population counts and overall vaccination rates of privately insured children, and (*2*) the 2006 MarketScan database to estimate the difference in vaccination rates for those with and without cost sharing.

FDC = first-dollar coverage

MMR = measles, mumps, and rubella

PCV7 = heptavalent pneumococcal conjugate

HPV = human papillomavirus

MCV4 = meningococcal conjugate

of all adolescents had at least one dose of MCV4. Again, the subpopulation facing cost sharing had substantially lower immunization rates, with 28.9% of adolescent girls receiving at least one dose of HPV vaccine and 29.0% of adolescents receiving at least one dose of MCV4 (Table 2).

Removing cost sharing for MMR immunizations had an estimated effect of 42,000 additional MMR immunizations at a cost of $2.0 million to payers. Removing cost sharing for PCV7 immunizations had an estimated effect of 57,000 additional PCV7 immunizations at a cost of $4.5 million. Removing cost sharing for HPV immunizations had an estimated effect of 40,000 additional HPV immunizations at a cost of $5.5 million to payers. Removing cost sharing for MCV4 immunizations had an estimated effect of 154,000 additional MCV4 immunizations at a cost of $14.0 million (Table 3).

In addition to the direct cost of first-dollar coverage associated with newly vaccinated children and adolescents, Table 3 also presents estimates of costs shifted to insurers for those already receiving immunizations, but without first-dollar coverage. These additional costs to insurers from the cost shift were in the range of 27%–43% of the total new costs to payers.

DISCUSSION

The effects of eliminating cost sharing for vaccines vary by vaccine. The overall increases in immunization rates were generally modest, but these increases were more substantial for those currently facing cost sharing.

Current immunization rates for childhood vaccines are uniformly high, which may be due to a range of factors including recommendations by pediatricians, school requirements, and well-established medical homes for well-child visits.[15,25] Among the young children with insurance coverage who had cost sharing for vaccines, the immunization rates were substantially lower than for those with insurance coverage without

cost sharing (MMR: 75.7% vs. 94.0%, PCV7: 70.9% vs. 96.1%). To the extent that cost sharing acts as a barrier in this group, removing cost sharing would have a substantial impact and bring the members of this group up to the coverage levels of those without cost sharing.

Current immunization rates for adolescents are relatively low. In part, the lack of an effective medical home and systematic contacts for series vaccines can be a barrier to immunization for this population.[21] Among the cohort facing cost sharing for adolescent vaccines, the uptake rate was even lower (HPV: 28.9% vs. 37.5%; MCV4: 29.0% vs. 45.2%). Removing cost sharing would lead to a modest increase in compliance, but substantially raising immunization rates for these adolescent vaccines will require addressing other factors in the immunization delivery system. These factors could include barriers symptomatic of a fragmented health-care infrastructure, the sporadic nature of contact between adolescents and their health-care providers, and lack of adherence to clinical practice guidelines.

Total additional costs to payers to provide first-dollar coverage for these immunizations are estimated at nearly $37 million ($45.66 million in 2012 dollars). Despite the relatively small increases in immunization rates that may result in the short term, there may be a potential to impact long-term prevention goals, particularly as new vaccines are added to the schedule. In addition, these investments may still be an effective way to bridge the final gap in coverage rates to attain clinical and public health goals. Childhood immunizations are one of the few preventive services that are not only cost effective but also cost saving.[26,27] This benefit to individuals, payers, and society has the potential to help people live longer, healthier, and more productive lives and reduce costs to payers and long-term health spending across the health-care system.[28]

This study shows that cost sharing is a barrier to utilization and that removing that barrier can increase immunization rates, albeit modestly. It also shows that cost sharing is not the sole determining factor in immunization uptake. Other factors are as important or more important.[16,29] Reaching Healthy People national targets for vaccination rates will require a multifaceted approach where economic/financial factors are only one part of the solution.

Limitations

This study was subject to several limitations. First, the study's cross-sectional design reflects a point in time; therefore, findings cannot be extrapolated beyond that point in time. Although 2008 vaccination coverage data and 2006 claims data used to estimate the results are from different years, we believe there were no major policy changes that affected the estimates, including the use of a 2009 employer benefits survey to corroborate general findings and trends. However, specifically, HPV vaccine was licensed and approved in 2006 at the time of the vaccination coverage data.[30] Thus, low coverage for HPV, in part, is an artifact of initial uptake of a newly introduced vaccine.

Second, our original cost estimates were based on unit costs and utilization levels as derived from two major surveys and a large medical claims database. While it is not feasible to reproduce this analysis to more current dollars, we used the medical consumer price index (CPI) to trend the costs of full vaccination coverage to 2012, which produced an overall increase of 23.4% in the costs for 2012. This approach comes with three important caveats. First, we made no adjustment to utilization levels that may have changed since 2008. Second, the medical CPI is an imperfect proxy for vaccination price changes. In addition, there may

Table 3. Current and new costs[a] to U.S. private insurers for first-dollar coverage of immunizations for select vaccines (in millions), 2008

Vaccine type	*Current costs for children currently immunized*	*New costs for children currently immunized*	*New costs for children newly immunized*	*Total new costs to insurers*
MMR (number vaccinated with ≥1 dose)	$159.4 (3.003)	$1.5 (0.172)	$2.0 (0.042)	$3.4 (0.213)
PCV7 (number vaccinated with ≥1 dose)	$271.7 (3.055)	$1.7 (0.161)	$4.5 (0.057)	$6.2 (0.218)
HPV (number vaccinated with ≥1 dose)	$346.0 (2.495)	$2.6 (0.137)	$5.5 (0.040)	$8.0 (0.177)
MCV4 (number vaccinated with ≥1 dose)	$617.8 (6.007)	$5.2 (0.277)	$14.0 (0.154)	$19.2 (0.431)

[a]Authors' calculations pulled data from two sources: (*1*) the 2008 National Immunization Survey (NIS) (http://www.cdc.gov/nchs/nis/data_files_09_prior.htm) and NIS-Teen (http://www.cdc.gov/nchs/nis/data_files_teen.htm) for population counts and overall vaccination rates of privately insured children, and (*2*) the 2006 MarketScan database to estimate the difference in vaccination rates for those with and without cost sharing.

have been significant changes in the baseline coverage offered by employers and insurers as we approach full implementation of the ACA.

Third, our estimates of the behavioral effects of insurance benefit type on immunization rates come from the MarketScan data, which are comprised primarily of large employers' health plans. These health plans may be more generous in coverage benefits than small employer or individual health plans. Thus, our behavioral estimates may understate the extent of member cost sharing for these immunizations and, therefore, understate the effects of removing this cost sharing. We assumed that the behavior of enrollees who currently face cost sharing would be similar to the behavior of those currently under a first-dollar coverage benefit, but this assumption may have resulted in an overestimate of the effect of the benefit change. However, we do not have any empirical reason to think that the current enrollees covered by a first-dollar benefit are systematically different in terms of their behavior than those without coverage. We do not distinguish between beneficiaries who face larger or smaller amounts of cost sharing. We assumed that those plans not paying 100% paid for immunizations in the same manner that they paid for other primary care services, but it was not possible to verify this assumption with the available data.

Another limitation was that we did not evaluate the impact of cost sharing on compliance with the full-series need for any particular vaccine. Lastly, this study estimated the effects of extending first-dollar coverage independent of the provisions of health-care reform, which will not only expand Medicaid eligibility, thereby decreasing the uninsured and underinsured population, but also most likely shift some children into coverage groups not accounted for in the estimates of this study.

CONCLUSIONS

These findings suggest that, even with the first-dollar coverage required by the ACA, additional outreach efforts will be needed to substantially increase immunization rates, particularly among adolescents. These outreach efforts may vary, as each vaccine may have different barriers to uptake. More expensive vaccines, such as PCV7, have been a challenge to purchase in the public sector due to increased cost to public funding. These vaccines have been rapidly adopted by the private sector, particularly as the use of PCV7 contributed to substantial declines in disease compared with pre-vaccine years.[31–33] However, the use of HPV vaccine among adolescent girls has not yet experienced the same success.[34,35] Identifying effective strategies to extend the reach of these new types of vaccines, especially as they touch on sensitive issues such as child sexuality, are essential. Annual well-child visits are the foundation for the adolescent immunization platform; however, additional visits required to complete the necessary number of doses to be fully immunized are a logistical challenge in addressing this population.

Given the modest differences in overall immunization rates for children and adolescents with and without first-dollar coverage, our model suggests that the challenges to higher immunization rates most likely vary by vaccine. Reducing the financial burden through this policy change will highlight the need for additional strategies and improved performance of the immunization system.

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The Institutional Review Board (IRB) of NORC declared this study exempt from IRB approval. The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the U.S. Department of Health and Human Services or the experts who were consulted.

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