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Financial Impact to Providers Using Pediatric Combination Vaccines

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KEY WORDS

combination vaccine, vaccine financing, immunization administration, commercial insurer, Medicaid

ABBREVIATIONS

IA—immunization administration
ECV—equivalent component vaccine
CPT—Current Procedural Terminology

Dr Shen provided the concept and design for the study, reviewed and analyzed all data, wrote the initial draft manuscript, and incorporated subsequent revisions; Ms Sobczyk reviewed the concept and design for the study and provided critical feedback and reviewed data and each version of the manuscript and provided critical revisions and content; Dr Simonsen provided feedback on the design for the study and analysis of the data, reviewed the manuscript, and approved the final version for publication; Mr Khan provided feedback on the design for the study, analyzed the data, reviewed the manuscript, and approved the final version for publication; Ms Esber provided background content for the manuscript and assisted with formatting the data; and Dr Andreae provided substantial review and recommendations on design of the study, reviewed and analyzed final data and provided critical revisions to each version of the manuscript, and approved the final version for publication.

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WHAT'S KNOWN ON THIS SUBJECT: In 1999, the Centers for Disease Control and Prevention recommended the use of combination vaccines when available. Several combination vaccines are licensed for use in the United States, but the financial impact to providers might prevent them from being fully utilized.



WHAT THIS STUDY ADDS: This is the first study to report the actual payments to providers for a combination vaccine and its equivalent component vaccines (for vaccine product and immunization administration) and estimate the financial impact to physicians for using pediatric combination vaccines.

abstract

OBJECTIVE: To understand the financial impact to providers for using a combination vaccine (Pediarix [GlaxoSmithKline Biologicals, King of Prussia, PA]) versus its equivalent component vaccines for children aged 1 year or younger.

METHODS: Using a subscription remittance billing service offered to private-practice office-based physicians, we analyzed charge and payment information submitted by providers to insurance payers from June 2007 through July 2009. We analyzed provider and payer characteristics, payer comments, and the ratio of vaccine product to immunization administration (IA) codes and computed total charges and payments to providers for both arms of the study.

RESULTS: Most providers in our data set were pediatricians (74%), and most payers were commercial (75%), primarily managed care. The ratio of the number of vaccine products to the number of IAs was 1:1 in the majority of the claims. Twenty percent of claims were paid with no adjustment by the payer, whereas 76% of the claims were adjusted for charges that exceeded the contract arrangement or the fee schedule. Providers received \$23 less from commercial payers and \$13 less from Medicaid for the use of Pediarix compared with the equivalent component vaccines. The mean commercial payment was greater for age-specific Current Procedural Terminology IA codes 90465 and 90466 than for non-age-specific codes 90471 and 90472, whereas the reverse was true for Medicaid.

CONCLUSIONS: Providers who administer vaccines to children face a reduction in payment when choosing to provide combination vaccines. The new IA codes should be monitored for correction of financial barriers to the use of combination vaccines. *Pediatrics* 2011;128:1087–1093

A child born today is protected against 16 diseases through immunization.¹ However, with the increase in available vaccinations, the immunization schedule is becoming more complex, which presents challenges to remaining immunized against the full spectrum of vaccine-preventable diseases.² Although many parents, nurses, and physicians feel that 3 injections during 1 visit is too many, adhering to the current recommended schedule means that a child could receive up to 8 injections in 1 visit.^{1,3} To fully meet the 2010 recommended childhood immunization schedule can require close to 30 injections plus annual influenza vaccine.¹ The Centers for Disease Control and Prevention and the public health community have recognized this burden on patients, parents, and providers and in 1999 issued a statement recommending the use of combination vaccines.⁴ Despite the availability of several licensed combination vaccines, financial barriers prevent some providers from using them.⁵

The cost to buy, store, and administer vaccines can be prohibitively high and has led some practices to either eliminate or threaten to eliminate immunization services.^{6,7} In addition, immunization administration (IA) payments often do not equal the actual IA costs per vaccine.^{7,8} Combination vaccines pose additional concern because, although manufacturers attempt to price combination vaccines competitively with the sum of the equivalent component vaccines (ECVs), providers receive fewer IA payments because of the reduced number of injections.⁶ Providers have voiced concerns about being reimbursed for only 1 IA even though combination vaccines can contain up to 5 components that protect the child against 5 diseases. Although the practice expense of administering 1 vaccine might be less than that associated with 5 vaccines,

the work of reviewing the record, discussing risks and benefits, and documenting must be done for each component in a combination vaccine. The extent of loss to a provider using combination vaccines is unknown, but there is a compelling push by providers to ensure payment for the product, and its administration incentivizes the use of combination vaccines. To better understand the financial impact on providers, we examined product and IA charges and payments by using a claims and remittance database to compare the use of a combination vaccine (Pediatrix [GlaxoSmith-Kline Biologicals, King of Prussia, PA]) with its ECVs.

METHODS

Data Source

The data are from SDI Health, LLC (Plymouth Meeting, PA) through a subscription remittance billing service offered to private-practice office-based physicians who elect to participate. The remittance data are collected from practice-management system vendors and clearinghouses of participating physicians and are linked to the Centers for Medicare and Medicaid Services 1500 form submitted by providers to payers regarding the patient visit; these data include demographic information on the patient and provider. The remittance data include payments relative to a claim and, if applicable, describe why the original charges were not paid in full or were rejected. Individual claims represent a single visit on a calendar day and contain 1 to multiple claim lines, which can include payment for the vaccine product, IA, and respective adjustments to the overall claim.

Study Database

The study sample included claims with dates of service from June 2007 to July 2009 and was limited to patients younger than 24 months. The claim

needed to include either Current Procedural Terminology (CPT) code 90723 (Pediatrix) or CPT code 90700, 90744, or 90713 (diphtheria, tetanus, acellular pertussis [DTaP], hepatitis B [HepB], or inactivated poliovirus [IPV] vaccines, respectively), which are the ECVs. Pediatrix, recommended at 2, 4, and 6 months of age, was selected because it was the multicomponent vaccine in use for the entire study period. The charge and payment for other "age-appropriate vaccine products" on the claim, including *Haemophilus influenzae* type b (Hib), pneumococcal conjugate, and rotavirus vaccines, were not included in the final analysis.

The sample included only claims submitted to commercial payers or Medicaid. Claims to other payers (eg, Medicare) comprised <0.1% of the original sample. Only final clean claims were studied, which eliminated the possibility of duplicative counting of claims that were submitted multiple times because of incomplete information from the provider. The remittance data included only the first payment processed on the claim and did not include subsequent adjustments that resulted from audits or other reviews. Payment amounts reported in this study are those paid by the payer, including payer adjustments, and do not include patient payment.

The IA codes extracted from the study database were limited to those CPT codes that describe route of IA by injection (Table 1) to allow for a comparison of administration of Pediatrix versus the ECVs, which are all given by injection.

Data Analysis

Vaccine Product

For each CPT code evaluated, we calculated the mean and median of the charge and payment by commercial and Medicaid payers. We compared the mean charge and payment for Pe-

TABLE 1 Select IA Codes^{11,20}

CPT Code ^a	Description	RBRVS Total Nonfacility RVU	2010 Medicare Payment, \$
90465	IA, younger than 8 y of age (includes percutaneous, intradermal, subcutaneous, or intramuscular injections) when the physician counsels the patient/family; first injection (single or combination vaccine/toxoid), per day	0.59	21.29
90466	IA, younger than 8 y of age (includes percutaneous, intradermal, subcutaneous, or intramuscular injections) when the physician counsels the patient/family; each additional injection (single or combination vaccine/toxoid), per day (list separately in addition to code for primary procedure)	0.30	10.83
90471	IA (includes percutaneous, intradermal, subcutaneous, and intramuscular); 1 vaccine (single or combination vaccine/toxoid)	0.59	21.29
90472	IA (includes percutaneous, intradermal, subcutaneous, and intramuscular); each additional vaccine (single or combination vaccine/toxoid)	0.30	10.83

RBRVS indicates resource-based relative value scale; RVU, relative value unit.

^a CPT codes 90465–90468 were deleted on January 1, 2011, and replaced with codes 90460 and 90461.

diarix to those for the ECVs. Although we would not expect to see payment for vaccines reported to Medicaid because the vaccines are provided at no charge under the Vaccines for Children program, we suspect that some states request that an entry be made into the billing system to enable payment for IA. Most payers will not process a payment for IA without a vaccine product reported on the claim, and most billing systems will not process a vaccine-product code unless a charge is entered. Therefore, we did not include any claims with a nominal charge (less than \$1.00) for the vaccine product in the vaccine-product analysis.

Immunization Administration

To assess the IA payment, we could not compare the IA codes reported with Pediarix versus ECVs because the initial IA code, which has a higher value than the “subsequent” IA code and can only be used once per claim (Table 1), might not be linked to the study vaccines. If an initial IA code was linked to another “age-appropriate vaccine,” it might unintentionally affect the final analysis of using a combination vaccine versus ECVs. Instead, we set up a comparison based on the number of IA codes reported in relation to the number of injectable vaccine products on the claim. Pediarix was assigned 1 “initial” IA code, whereas the ECVs were assigned 1 initial and 2 subsequent IA

codes. Under the previous CPT guidelines, the number of IA codes should match the number of vaccines given; however, it is not clear if this occurred in practice. We then calculated the mean, median, maximum, and minimum of the charge and payment by both commercial and Medicaid payers across the data set according to number of IA codes on the claim.

Payer Comments

We analyzed the types of payer response to a claim and the frequency of adjustments to better understand reasons that a claim was not fully paid.

Total Payments

We computed the total mean charges and payments to a provider administering Pediarix vaccine with 1 IA code with the alternative scenario of administering 3 equivalent vaccines with 1 initial and 2 subsequent IA codes. The difference in both charge and payment between the 2 scenarios was then calculated.

RESULTS

Description of Vaccine Claims: Physician Practice and Payer Types

We identified 110 040 claims that fulfilled the study inclusion criteria: 56 503 in the Pediarix arm and 53 537 in the ECV arm. Pediatrics and family practice comprised 85% of the study

TABLE 2 Characteristics of Claims According to Physician Provider Type (*N* = 110 040)

Provider Type	<i>n</i> (%)
Pediatrician	81 196 (74)
Family practice	12 495 (11)
Undefined	11 878 (11)
Other	4471 (04)
Total	110 040 (100)

sample; 11% of the providers were undefined, which indicates no specialty, and 4% were other practice types including general practice (Table 2).

Of the 110 040 claims, 25% were submitted to Medicaid and 75% to commercial payers, including fee-for-service and managed care; however, commercial payers were primarily (85%) managed care organizations. The claims for Pediarix versus the ECVs were approximately evenly distributed according to payer group (Table 2). These claims represented 44 payer states (range: from 2 claims submitted in Nevada to 14 596 submitted in Texas). Fifteen states comprised 80% of the study sample.

Charges and Payments: Vaccine Products

From the 110 040 claims in the study sample, 108 192 claim lines were used to calculate the vaccine-product charge and payment (Tables 3 and 4). Twelve percent of product claim lines (3% of commercial, 42% of Medicaid) were not included in the final analysis, because

TABLE 3 Characteristics of Claims According to Payer Type (*N* = 110 040)

Payer Type	Pediarix, <i>n</i>	ECVs, <i>n</i>	Total, <i>N</i> (%)
Commercial	40 612	41, 978	82 590 (75)
Medicaid	15 891	11 559	27 450 (25)
Total	56 503	53 537	110 040 (100)

they contained a charge of less than \$1.00.

For commercial claims, the mean charge for Pediarix was \$111, and the mean payment was \$80; the mean charge for the ECVs combined was \$144, and the mean payment was \$82. For Medicaid claims, the mean charge for Pediarix was \$33, and the mean payment was \$6; the mean charge for the ECVs combined was \$64, and the mean payment was \$21.

Charges and Payments: IA

Of the 110 040 claims, 144 487 claim lines included IA codes of interest (Ta-

ble 5). The mean charges for commercial claims for initial IA CPT codes 90465 and 90471 were \$31 and \$24, respectively, and the mean payments were \$20 and \$17. For Medicaid, the average charges for initial IA CPT codes 90465 and 90471 were \$23 and \$15, respectively, and the mean payments were \$7 and \$11. For subsequent IA CPT codes 90466 and 90472, the mean charges for commercial claims were \$24 and \$18, and the mean payments were \$12 and \$10. The mean charges for these same codes for Medicaid claims were \$16 and \$11, and the mean payments were \$6 and \$7.

For commercial claims the mean charge and payment for age-specific (<8 years) CPT codes (90465 and 90466) were higher than for the non-age-specific codes (90471 and 90472). Similarly for Medicaid claims the mean charge for age-specific codes was higher than for the non-age-specific codes; however, mean payment was less for age-specific codes than for non-age-specific codes.

The number of IAs was not always 1:1 with the number of vaccine products on the claim. For example, among commercial claims with 1 reported vaccine product (*N* = 13 081), 11.9% (*n* = 1565) had no IA codes, 76.7% (*n* = 10 037) had 1 IA code, 7.1% (*n* = 935) had 2 IA codes, 3.2% (*n* = 429) had 3 IA codes, and <0.1% had 4 (*n* = 86), 5 (*n* = 28), or 6 (*n* = 1) IA codes. Regard-

TABLE 4 Charges and payments for Pediarix or an ECV Vaccine Product According to Payer Type (*N* = 108 192)

Payer Type	CPT Code and Vaccine Product	<i>n</i>	Charge Amount, \$				Payment Amount, \$			
			Mean	Median	Minimum	Maximum	Mean	Median	Minimum	Maximum
Commercial (<i>N</i> = 89 871)										
Pediarix	90723: DTaP, HepB, and IPV	35 303	111.22	105.00	3.00	528.71	79.64	84.12	0.00	185.30
ECV	90700: DTaP	23 835	46.25	45.00	3.00	100.00	27.35	25.63	0.00	63.50
	90713: IPV	18 213	44.76	44.00	3.00	115.00	29.18	28.93	0.00	71.68
	90744: HepB	12 520	53.40	55.00	2.79	152.00	25.37	25.49	0.00	82.00
Sum of ECVs	—	—	144.41	144.00	—	—	81.90	80.05	—	—
Medicaid (<i>N</i> = 18 321)										
Pediarix	90723: DTaP, HepB, and IPV	8941	32.81	10.00	2.30	218.00	5.78	6.50	0.00	84.79
ECV	90700: DTaP	3829	20.24	11.00	3.30	90.00	7.36	6.66	0.00	24.57
	90713: IPV	2797	20.14	11.00	3.30	100.00	7.27	6.66	0.00	28.31
	90744: HepB	2754	23.78	11.00	3.30	120.00	6.22	6.63	0.00	26.52
Sum of ECVs	—	—	64.16	33.00	—	—	20.85	19.95	—	—

DTaP indicates diphtheria, tetanus, acellular pertussis; HepB, hepatitis B; IPV, inactivated poliovirus.

TABLE 5 Charges and Payments for Injectable IA According to Payer Type (*N* = 144 487)

Payer Type	<i>n</i>	Charge Amount, \$				Payment Amount, \$			
		Mean	Median	Minimum	Maximum	Mean	Median	Minimum	Maximum
Commercial									
CPT 90465	28 417	30.50	25.00	2.00	159.00	20.37	19.74	0.00	59.85
CPT 90466	25 045	24.37	20.00	1.80	120.00	12.12	10.99	0.00	52.69
CPT 90471	31 078	24.06	24.00	1.18	150.00	16.63	18.00	0.00	83.30
CPT 90472	32 843	18.19	16.75	1.24	147.00	10.34	10.44	0.00	50.00
Total	117 383	—	—	—	—	—	—	—	—
Medicaid									
CPT 90465	1162	23.10	20.70	5.00	50.00	7.48	6.50	0.00	17.25
CPT 90466	1140	16.23	15.00	6.50	90.00	6.09	6.50	0.00	13.33
CPT 90471	12 298	15.32	16.00	2.00	98.00	11.16	13.33	0.00	19.95
CPT 90472	12 504	10.57	9.71	1.82	80.00	6.71	8.00	0.00	16.00
Total	27 104	—	—	—	—	—	—	—	—

TABLE 6 Comments According to Payer Type (*N* = 283 299)

Payer Comment	Commercial, % (<i>n</i>)	Medicaid, % (<i>n</i>)	All Payers Combined, % (<i>n</i>)
No adjustment	13.10 (29 475)	46.50 (27 448)	20.10 (56 923)
Adjustment	82.50 (184 984)	52.90 (31 259)	76.30 (216 243)
Charges exceed your contracted/legislated fee arrangement	92.4 (170 889)	44.50 (13 900)	85.50 (184 789)
Charges exceed our fee schedule or maximum allowable amount	3.90 (7296)	7.60 (2380)	4.50 (9676)
Contractual adjustment	0.80 (1491)	46.40 (14 492)	7.40 (15 983)
Other	2.90 (2882)	1.60 (477)	2.70 (3359)
Coinsurance	3.5 (7844)	0.00 (0)	2.80
Deductible	0.60 (1245)	0 (0)	0.40
Other Adjustment	0.30 (599)	0.60 (356)	0.30
Denial	0.04 (89)	0.00 (0)	0.03
Total, <i>n</i>	224 236	59 063	283 299

TABLE 7 Mean Charges and Payments for Providers Using Pediarix Versus ECVs, According to Payer

	Charge Amount, \$	Payment Amount, \$
Commercial: vaccine product plus IA(s) arms		
Pediarix plus initial IA, CPT 90471	135.28	96.27
ECV plus initial IA, CPT 90471, and 2 subsequent IAs, CPT 900472	204.85	119.21
Difference between 2 arms	(69.57)	(22.94)
Medicaid: vaccine product plus IA(s) arms ^a		
Pediarix plus initial IA, CPT 90471	48.13	11.16
ECV plus initial IA, CPT 90471, and 2 subsequent IAs, CPT 900472	100.62	24.58
Difference between 2 arms	(52.49)	(13.42)

^a Only the IA charge and payment were used for Medicaid, because the vaccine product is not payable under Medicaid in addition to the IA.

less of the number of vaccine products, the ratio was 1:1 for the majority of commercial claims. The finding was similar for Medicaid claims when 1 or 6 vaccine products were on the claim; however, when the number of vaccine products was 2, 3, 4, or 5, the majority of claims contained no IA codes.

Claim-Line–Level Descriptive Analysis: Payer Comments

From the 110 040 claims in the study sample, 283 299 claim lines were used to calculate the proportion of payer comments (Table 6). Of the 20% of claims paid in full, ~13% were commercial and 47% were Medicaid. Most claims were adjusted (83% for commercial, 53% for Medicaid) by the payer, because the charge amount exceeded either the contracted amount or the fee schedule. Other payer com-

ments, such as denials, comprised <5% of the comments.

Total Payments: Pediarix Versus ECVs

The total payment to providers for vaccine product and IA (using CPT codes 90471 and 90472) for commercial payers and for IA alone for Medicaid for both arms was calculated by using the sum of the means (Table 7). Providers received \$23 less from commercial payers and \$13.42 less from Medicaid for the use of Pediarix compared with ECVs.

DISCUSSION

The results of our study corroborate the assertion that using combination vaccines can result in a financial loss for physicians and act as a barrier to adoption, primarily because of pay-

ment for IA rather than vaccine product. In fact, commercial payment for vaccine product neither encourages nor discourages the provision of combination vaccines. This payment practice is consistent with the practice of manufacturers pricing combination vaccines near the aggregate of ECVs to promote the use of new combination vaccines. Commercial payments for Pediarix and ECV products were \$79.64 and \$81.90, respectively, approximately \$10 above the list price for Pediarix and \$7 to \$10 above the price for ECVs combined.⁹ This result is consistent with findings by Freed et al,^{5,6} who found that the mean payments self-reported by practices were \$81.90 for Pediarix and \$76.67 to \$78.00 for ECVs. Both our and the Freed et al study found wide variation in payments. This variation helps explain why as many as 1 in 5 pediatricians have reported not using combination vaccines because of inadequate payment for the vaccine product.¹⁰

Despite similar list price, providers charged commercial payers \$33 less on average for Pediarix than the ECVs combined. Because the actual vaccine purchase price was not examined, the relationship between purchase price and charge to payers is unclear. However, the charge did not seem to affect the average product payment, as already stated; hence, the charge-to-payment ratio is less meaningful than the actual payments.

Although commercial payments for Pediarix and ECV are similar, Medicaid payments are not. Under Medicaid, providers receive more for ECVs than for Pediarix (\$20.85 vs \$5.78), which disincentivizes providers for using combination vaccines. These unexpected greater-than-nominal charges and payments for both Pediarix and ECVs under Medicaid might be related to state policies for payment of IA for Vaccines for Children products. The

finding was limited to specific states, and payment was consistent with reported IA payment for those states.¹¹ State policies indicate that providers are asked by Medicaid to report IA under the vaccine-product codes for quality tracking and reporting, not that Medicaid is paying providers for vaccines provided by the Vaccines for Children program.^{12–14} Some charges might also be a result of provider error. Payer rules that require reporting of IA by using the vaccine-product CPT code create barriers to the adoption of new component-based IA codes that were effective January 1, 2011, when it became appropriate to report multiple IAs per combination vaccine.¹⁵

Although commercial payment for vaccine product is similar between combination vaccines and ECVs, IA payment discourages combination vaccines by paying per injection. Under commercial plans, using age-specific IA codes, a provider receives, on average, \$23 less for combination-vaccine administration than for ECVs. In Medicaid, using age-specific IA codes, a provider receives, on average, \$13 less. In addition, commercial payers provide similar mean payments for age-specific and non-age-specific IAs; however, Medicaid reimburses less for using age-specific IAs, which perhaps explains the 10-fold higher use of non-age-specific IA codes. Payment was expected to be similar for the age- and non-age-specific IA codes, because both sets of codes were valued the same by the Centers for Medicare and Medicaid Services. The low Medicaid IA payment as well as the even-lower payment for age-specific IAs further highlights the financial disparity that physicians who care for children experience in immunizing the Medicaid population. This is especially concerning, because Medicaid payment for IA was recently shown to correlate with vaccination rates for influenza,

which indicates that payment might influence physician behavior.¹⁶

The results of this study provide insight into IA reporting and payment practices relative to the number of injectable products administered. Although the findings suggest that physicians are usually charging a 1:1 ratio of vaccine product to IA, some charge more and some less than this ratio. Some physicians claim that payers limit the number of IA codes paid regardless of the number of vaccines administered. In this case, a ceiling on IA payments would be expected as the number of vaccines increases on the claim. Instead, mean payments steadily increase. Practices that charge less than a 1:1 ratio can optimize their payment by claiming the appropriate number of IAs. Understanding the coding guidelines for pairing vaccine product with the appropriate IA code is even more important with the recently released component-based IA codes. The age-specific CPT codes 90465 and 90466 have been replaced with new codes (90460 and 90461) that focus on the work of physician counseling for each component in the vaccine. Physicians will need to match the number of IA codes claimed with the number of vaccine components, thus potentially increasing IA payment for the use of combination vaccines.

Physicians who receive payment on a greater than 1:1 ratio of vaccine to IA might have arrangements with payers that support this practice. Although the remittance data did not allow verification, such arrangements have been proposed by state Medicaid plans to address the perceived financial barrier to using combination vaccines.¹⁷ As such, providers might be able to negotiate with payers for increased payment for combination vaccines.

The majority of claims were adjusted downward for exceeding the con-

tracted or fee-schedule amount. We do not know patient responsibility; however, the vast majority of plans have reported providing first-dollar coverage with no copayment for preventive services including vaccines, a provision now mandated by federal health reform in the Patient Protection and Affordable Care Act.^{18,19} Thus, patient responsibility is not expected to significantly increase payment to the provider. It should be noted that few claims are denied (0.04%), which indicates that providers are typically billing appropriately for their services. With such a low denial rate, zero-dollar payments are unlikely to have had a significant impact on mean payments in this study.

Overall, providers receive \$22.94 less from commercial plans when providing combination vaccines instead of ECVs and \$13.42 less from Medicaid. By incentivizing providers per injection, payers greatly discourage using combination vaccines, which are preferred by the Centers for Disease Control and Prevention, the American Academy of Pediatrics, and other medical groups. However, the empirical calculations presented here reflect only charges and payments. Although payment is less for combination vaccines, there might be potential cost savings to the provider from stocking fewer vaccines and using fewer office supplies. Payment should be at least at neutral levels for both products and IA associated with combination-vaccine use.

LIMITATIONS

We did not collect the overall costs to practices for acquisition and administration of combination and non-combination vaccines. Consequently, comparison of payments was made in isolation of other factors that might influence the administration of vaccines. In addition, the claims data reflect a convenience sample of primarily 15

states and might not be nationally representative. Third, to optimize the sample size, the study database included claims of any ECVs that were not necessarily administered on the same day. Therefore, the calculation for ECVs is not reflective of actual vaccines administered to a single child on a given day but, rather, a calculation based on an aggregate of claims over the study period. In addition, we were not able to compare the exact IA codes reported with Pediarix versus ECVs, because the IA codes might not have been linked to the study vaccine of interest; however,

this would not change the ratio of vaccine products relative to IA. A lack of contractual information between providers and payers limited our ability to fully assess the relationship between charge and payments. We did not examine patient responsibility in the calculations of payment to providers.

CONCLUSIONS

Combination vaccines are an important advancement in vaccine innovation and offer benefits to providers and consumers, including fewer injections and fewer doctor office visits,

which decrease the likelihood of missed opportunities. The real financial burden imposed by providing combination vaccines might place a strain on some providers. The adoption of new component-based IA codes might minimize this burden and promote the use of combination vaccines.

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REFERENCES

- Centers for Disease Control and Prevention. Recommended immunization schedules for persons aged 0 through 18 years: United States, 2010. *MMWR Morb Mortal Wkly Rep*. 2010;58(51 and 52):1–4
- Luman ET, Stokley S, Daniels D, Kleven RM. Vaccination visits in early childhood: just one more visit to be fully vaccinated. *Am J Prev Med*. 2001;20(4 suppl):32–40
- Madlon-Kay DJ, Harper PG. Too many shots? Parent, nurse, and physician attitudes toward multiple simultaneous childhood vaccinations. *Arch Fam Med*. 1994;3(7):610–613
- Centers for Disease Control and Prevention. Combination vaccines for childhood immunizations. *MMWR Recomm Rep*. 1999;48(RR-5):1–14
- Freed GL, Cowan AE, Clark SJ, Santoli J, Bradley J. Use of a new combined vaccine in pediatric practices. *Pediatrics*. 2006;118(2). Available at: www.pediatrics.org/cgi/content/full/118/2/e251
- Gidengil CA, Rusinak D, Allred NJ, Luff D, Lee GM, Lieu TA. Financial barriers to implementing combination vaccines: perspectives from pediatricians and policy makers. *Clin Pediatr (Phila)*. 2009;48(5):539–547
- Hammer LD, Curry ES, Harlor AD, et al; American Academy of Pediatrics, Committee on Practice and Ambulatory Medicine; Council on Community Pediatrics. Increasing immunization coverage. *Pediatrics*. 2010;125(6):1295–1304
- Coleman MS, Lindley MC, Ekong J, Rodewald L. Net financial gain or loss from vaccination in pediatric medical practices. *Pediatrics*. 2009;124(suppl 5):S472–S491
- Centers for Disease Control and Prevention. CDC vaccine price list. Available at: www.cdc.gov/vaccines/programs/vfc/cdc-vac-price-list.htm. Accessed December 26, 2010
- Gidengil CA, Dutta-Linn MM, Messonier ML, Rusinak D, Lieu TA. Financial barriers to the use of combination vaccines by pediatricians. *Arch Pediatr Adolesc Med*. 2010;164(12):1138–1143
- Medicare program: payment policies under the physician fee schedule and other revisions to Part B for CY 2010. *Fed Regist*. 2010;75(226):62120
- Maryland Medical Assistance Program. Physicians' services provider fee manual. Available at: http://dhmh.maryland.gov/mma/providerinfo/pdf/2010/Nov10/Phys-svcs-prov-fee-man_Nov-2010.pdf. Accessed April 4, 2011
- Arizona Medicaid. AHCCCS fee-for-service provider manual. Available at: www.azahcccs.gov/commercial/ProviderBilling/manuals/FFSProviderManual.aspx. Accessed April 4, 2011
- Georgia Department of Community Health. Georgia CMS 1500 billing manual. Available at: www.mmis.georgia.gov/portal/PubAccess.Provider%20Information/Provider%20Manuals/tabId/54/Default.aspx. Accessed April 4, 2011
- Centers for Disease Control and Prevention. VFC: federal register. Available at: www.cdc.gov/vaccines/programs/vfc/fee-fedreg.htm. Accessed December 26, 2010
- Yoo BK, Berry A, Kasajima M, Szilagyi PG. Association between Medicaid reimbursement and child influenza vaccination rates. *Pediatrics*. 2010;126(5). Available at: www.pediatrics.org/cgi/content/full/126/5/e998
- Texas Medicaid and Healthcare Partnership. Children's services handbook. Available at: www.tmhp.com/HTMLmanuals/TMPPM/2010/2010TMPPM-19-344.html. Accessed December 27, 2010
- Hunsaker J, Veselovskiy G, Gazmararian JA. Health insurance plans and immunization: assessment of practices and policies, 2005–2008. *Pediatrics*. 2009;124(suppl 5):S532–S539
- The Patient Protection and Affordable Care Act of 2010, Pub L No. 111-148
- American Academy of Pediatrics. *Comprehensive Overview: Immunization Administration*. Elk Grove Village, IL: American Academy of Pediatrics; 2010. Accessed November 24, 2010

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