Published in final edited form as:

Vaccine. 2019 October 23; 37(45): 6803–6813. doi:10.1016/j.vaccine.2019.09.042.

Billing and Payment of Commercial and Medicaid Health Plan Adult Vaccination Claims in Michigan Since the Affordable Care Act

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Abstract

Background: Provider concern regarding insurance non-payment for vaccines is a common barrier to provision of adult immunizations. We examined current adult vaccination billing and payment associated with two managed care populations to identify reasons for non-payment of immunization insurance claims.

Methods: We assessed administrative data from 2014–2015 from Blue Care Network of Michigan, a nonprofit health maintenance organization, and Blue Cross Complete of Michigan, a Medicaid managed care plan, to determine rates of and reasons for non-payment of adult vaccination claims across patient-care settings, insurance plans, and vaccine types. We compared commercial and Medicaid payment rates to Medicare payment rates and examined patient cost sharing.

Results: Pharmacy-submitted claims for adult vaccine doses were almost always paid (commercial 98.5%; Medicaid 100%). As the physician office accounted for the clear majority (79% commercial; 69% Medicaid) of medical (non-pharmacy) vaccination services, we limited further analyses of both commercial and Medicaid medical claims to the physician office setting. In the physician office setting, rates of payment were high with commercial rates of payment (97.9%) greater than Medicaid rates (91.6%). Reasons for non-payment varied, but generally related to the complexity of adult vaccine recommendations (patient diagnosis does not match recommendations) or insurance coverage (complex contracts, multiple insurance payers). Vaccine administration services were also generally paid. Commercial health plan payments were greater

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Author contributions:

All authors should have made substantial contributions to all of the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.

Competing interests: The authors have no competing interests to declare.

for both vaccine dose and vaccine administration than Medicare payments; Medicaid paid a higher amount for the vaccine dose, but less for vaccine administration than Medicare. Patients generally had very low (commercial) or no (Medicaid) cost-sharing for vaccination.

Keywords

insurance reimbursement; adult vaccination

1. Introduction*

The Patient Protection and Affordable Care Act (ACA) was enacted in March 2010 and included essential health benefits, mandating first dollar coverage by insurers for preventive services including routine vaccinations. Provisions in the law allowed for legacy plans exempt from covering preventive services, which made the early years of ACA implementation a transition period for immunization benefits coverage. With the introduction of the ACA insurance exchanges in January 2014, penetration of the intended essential health benefits in the insured population grew as an increasing number of legacy plans lost their essential benefit–exempt status [1]. A 2012 national survey reported provider concerns regarding payment as a major barrier to offering adult vaccinations [2]. Other studies using 2011 and 2013 survey data showed pediatricians and family physicians were dissatisfied with payment received for both pediatric and adult vaccines and vaccine administration from all payer types [3, 4]. These studies demonstrated provider concerns regarding health plan payment for routine vaccinations before full implementation of the ACA. Presumably, mandated coverage for vaccines would alleviate provider concerns about payment. However, we are not aware of any studies that have assessed actual claims payment and non-payment for adult vaccinations since implementation of the ACA.

To address provider concerns regarding health plan payment for routine vaccinations as a barrier to provision of adult immunizations, we examined provider billing and health plan payment for adult vaccines and vaccine administration. We looked at several settings (e.g. office, pharmacy) but focused on the physician office setting.

2. Material and methods

We examined overall payment rates for vaccine doses and vaccine administration of adults age ≥18 years by setting and type of insurance (commercial vs. Medicaid), as well as payment by type of vaccine and reasons for non-payment. We then compared payment amounts with Medicare reimbursement and examined patient cost sharing.

Data

We obtained de-identified administrative data related to vaccine doses and vaccine administration from Blue Care Network of Michigan (BCN), a nonprofit statewide health maintenance organization (>700,000 annual commercial members) and a wholly owned

*Abbreviations: ACA- Affordable Care Act; ACIP- Advisory Committee on Immunization Practices; BCBSM- Blue Cross Blue Shield of Michigan; BCC- Blue Cross Complete; BCN- Blue Care Network of Michigan; CPT- Current Procedural Terminology; E&M- Evaluation and Management; HEDIS- Healthcare Effectiveness Data and Information Set

subsidiary of Blue Cross Blue Shield of Michigan (BCBSM). We also obtained de-identified administrative data from Blue Cross Complete (BCC) of Michigan, which provides medical services as a health maintenance organization to eligible Medicaid beneficiaries (on average, 70,000 members per year). BCC is owned equally by AmeriHealth Caritas and BCBSM. Data cover the time period of January 2014 through September 2015. Vaccination claims are handled differently if they come from a medical office or from a pharmacy. Both BCN and BCC de-identified health plan data sources included medical and pharmacy paid claims data as well as associated member and provider demographics. Combined, these plans' total membership covered about 8% of the overall Michigan population.

Adult vaccination benefits are determined by each state's Medicaid program. Since 2012, Michigan's Medicaid program has covered all vaccines routinely recommended for adults by the Advisory Committee on Immunization Practices (ACIP) [5]. Michigan's Medicaid program also allows for vaccines to be administered in pharmacies.

While the world of insurance billing and payment can be complicated, generally, when providers bill insurance for vaccinations, they may bill for the vaccine dose itself and for the labor and ancillary materials associated with delivering the vaccination. The labor and ancillary materials may be listed on the insurance claim as various Evaluation and Management (E&M) or administration codes. In our analysis, payment for vaccine doses, E&M, and administration were evaluated per service billed.† In cases when only a single relevant service is billed for an encounter (only one vaccine was administered at the visit), we may refer to this as per claim. For medical claims data, vaccine dose claims were identified by the presence of vaccine dose Current Procedural Terminology (CPT) codes. For pharmacy claims, data consisted of vaccine-related claims at the medication level of detail, as identified by billed National Drug Codes for vaccines. More details on the dataset can be found in the appendix.

An initial screening analysis demonstrated the physician office accounted for the majority (79% commercial; 69% Medicaid) of medical (non-pharmacy) vaccination services. Thus, we limited our analysis to the physician office place of service (i.e., treatment setting) for both commercial and Medicaid medical claims (Table 1). Mass immunization centers was the next most frequent for the commercial health plan patients (10.6%); hospital outpatient departments were the next most common for Medicaid insured individuals (24.5%).

We examined non-payment explanation codes per service billed. Non-payment can occur for reasons related to health plan member eligibility, contractual arrangements, and clinical appropriateness of the vaccine for the member. Health plan member eligibility may be an issue if a patient does not have coverage on the date of service, and may include issues regarding coordination of benefits if the patient has coverage with more than one insurance plan. Contractual arrangements may include provisions such as vaccination being bundled as part of a per-visit payment agreement. Finally, insurance may not pay for a vaccine if it is deemed to not be clinically recommended; for example, a patient <65 years old who is

†Service billed refers to each claim line submitted (as a claim may have multiple lines for different vaccines and services). For evaluating vaccine dose claims, the distinction between billed service and claim generally only a relevant distinction if an adult were to receive more than one vaccination at a visit, but that was not often the case in this dataset.

not immune compromised may not be eligible for the pneumococcal conjugate vaccine [5]. More details on reasons for non-payment can be found in the Appendix.

Analysis

We first examined payment rates for the vaccine doses. Rates of payment are defined as the fraction of all vaccine dose billed services (as identified by CPT code) where the provider *billed* >$0 that had an insurance *allowed amount* >$0 divided by all billed (>$0) vaccine doses. (Appendix, “Data” section) We excluded services when the provider billed $0 since providers may choose to submit a $0 amount when they know their contract does not allow separate payment but want to create an administrative record of the event, e.g., for a Healthcare Effectiveness Data and Information Set (HEDIS®) or other health plan quality measurement or incentive program. We evaluated payment rates by payer (commercial vs. Medicaid) and for specific types of vaccines.

We next examined the services with an allowed amount of $0 and examined the reasons for non-payment. We examined the frequency of the reasons for non-payment overall and also grouped by vaccine type.

For office claims, E&M and vaccine *administration* CPT codes may be billed for provider work associated with evaluating the patient and/or administering the vaccine and are billed and paid separately from the vaccine doses. For this portion of the analysis, we focused on claims when only a single vaccine was billed (>$0) and paid to create a more homogeneous cohort. This mitigated any confounding of non-payment due to multiple vaccines. Single vaccine encounters represented about 90% of office vaccination encounters for commercial insurance, and about 87% for Medicaid, when the vaccine doses were paid. In this analysis of vaccine administration and E&M codes, we examined vaccination encounters with only a single vaccine dose billed/paid and also had a single administration and/or E&M service billed (>$0). Almost all (commercial 94.6%, Medicaid 89.4%) single vaccine office visits had a single administration code billed (>$0). For office visits with a billed E&M service, 95.8% billed a single E&M code (>$0) for commercial, and 88.3% a single E&M code for Medicaid. We calculated the proportion of these E&M/administration services that were paid (payment rate). Since pharmacies were paid in these health plans’ data in a bundled fashion for the vaccine dose and administration, we did not conduct this analysis for pharmacy claims. Additional technical details on the methodology can be found in the Appendix.

To examine levels of payment for vaccine doses and administration delivered in physician offices, we compared commercial and Medicaid payment levels to a benchmark of Medicare payments. We matched only to vaccine and administration codes that Medicare pays for. Additional details can be found in the Appendix.

Finally, we examined average patient cost-sharing amounts by type of insurance (commercial or Medicaid), location of service (pharmacy and provider office), and vaccine dose and administration. Cost-sharing includes the sum of any applicable copay, coinsurance and deductibles, and is the actual total amount.

3. Results

Payment Rates for *Vaccine Doses*

Among the approximately 43,000 vaccine billed services submitted by pharmacies, the proportion of billed services paid was high. Payment was 100% for Medicaid and 98.5% for commercial insurance. (Table 1).

For medical billed services in an office setting, payment was more frequent for commercial (97.9%) than for Medicaid (91.6%) insurance (Table 2 is sorted alphabetically; for Table 2 data sorted by payment rates, see Appendix Table A2. For Table 2 sorted by total service counts, see Appendix Table A3).

Physician Office Payment Rates by Vaccine Type—Overall, the influenza vaccine accounted for about half of all vaccine dose billed services and had the highest *number* of services not paid by both commercial and Medicaid insurance (Table 2), but the overall payment *rates* were high (commercial 98.8%; Medicaid 94.9%). Tetanus-diphtheria-acellular pertussis (Tdap) adult vaccine accounted for about 25% of all billed services and also had high payment rates (commercial 99.4%; Medicaid 96.4%). The payment rates were lower for the pneumococcal conjugate vaccine (57.7% commercial; 79.2% Medicaid), but the pneumococcal conjugate vaccine was infrequently provided in the physician office, representing <2% of all vaccines administered for both commercial and Medicaid patients in this treatment setting. In the Medicaid population, vaccines with lower payment rates were human papillomavirus (68.4%), meningococcal conjugate (serogroups A, C, W, Y) (53.4%), and hepatitis A (74.5%). Meningococcal recombinant (serogroup B) vaccine payment for commercial patients was also low (32.4%) but infrequently given.

Eventual Payment—Some office visit billed services that were not initially paid were paid eventually. For commercial insurance, about 10% of the initially non-paid were eventually paid (within the time frame of the available data set), dominated by influenza vaccines (73% of the 10% eventually paid). For Medicaid, about 3% of these billed services were eventually paid, and also mostly for influenza vaccines (70% of the 3%).

Reasons for Non-payment—The distribution of reasons for non-payment varied substantially by insurance type (Table 3). The most common reasons for non-payment from commercial insurance was the clinical inappropriateness of the vaccine (58.3%) followed by member health plan eligibility (18.6%). For Medicaid, the most common reasons for non-payment were contractual arrangements (52.3%) and health plan eligibility (37.0%). Additional details of the explanations can be found in the Appendix.

Influenza: Commercial claims for influenza vaccine had a non-payment rate of 1.2% (Table 2); however, 28% of associated claim non-payment was for a provider billing for two influenza vaccine codes for the same patient on the same date of service. In these cases, while one code was denied, the other was paid. Excluding these non-payment lines reduced the claim non-payment rate to <0.9%.

Medicaid had a 5.1% non-payment rate for influenza vaccine dose claims, but adjusting for occurrences of two vaccine codes on the same date of service lowered the non-payment rate to 4.7%. The remaining claim non-payments were driven by $0 being the contractual allowed amount (35%), patient not eligible for Medicaid benefits (33%), and coordination of benefits (COB) with Medicare as the primary payer (23%).

Pneumococcal: For pneumococcal vaccines (pneumococcal conjugate and pneumococcal polysaccharide), only commercial data were examined as Medicaid data had small numbers of claim non-payment (n = 27 polysaccharide; n = 36 conjugate). For commercial claims for conjugate pneumococcal vaccine, the non-payment rate was 42.3%; the pneumococcal polysaccharide non-payment rate was 0.7%.

Commercial conjugate vaccine claim non-payment was mostly for members <65 years old. Clinical inappropriateness accounted for about 94% of this age cohort's claim denials, with 98.6% of these edits due to the wrong diagnosis code associated with the claim and 1.4% due to billing an obsolete conjugate vaccine CPT code. The office denial rate for the age ≥65 cohort for commercial conjugate vaccine was 5.4%, with 76% of these denials due to the wrong diagnosis code associated with the claim. However, it should be noted that all but one of these wrong diagnosis denials were for patients with an age noted in these health plan claims data equaling 65. Additionally, member age in these data extracts made available from the health plans has age as a whole number, and it is unknown if an age was rounded up, rounded down, or truncated. Actual birthdates were not provided. The age cusp of the recommendations may be problematic if a provider chooses to round age up for the purposes of vaccination if member's 65^{th} birthday less than 12 months away, while claims software will precisely calculate using reported date of service and member birth date. The all-cause office non-payment rate was <1% for the age cohort >65 years of age.

We explored an additional aspect of conjugate pneumococcal vaccine claim non-payment before and after the recommendations released September 19, 2014 [5]. Total billed vaccinations before 9/19/2014 represented about 4% (146 of 3,387) of all the pneumococcal conjugate vaccinations over the total date span. The non-payment rate before 9/19/2014 was 61% vs. 41% after. While this could be interpreted as greater provider confusion regarding the recommendations before the new guidelines were released, clinical inappropriateness accounted for 54% of the non-payments for this date range in the <65 age group vs. 94% over the entire study time frame. Thus, no conclusion can be drawn in regards to the impact of the 9/19/2014 update, possibly due to the relatively smaller sample size available for this subset.

Zoster: The non-payment rate among commercial claims was 4.5%, with 82.7% of claim non-payment specifying that $0 was the contractual allowed amount, 6.5% reporting that zoster vaccine was not a benefit, 4.7% due to coordination of benefits, and 1.8% due to the patient not being a member of the health plan on the date of service. Other reasons generated <1.5% non-paid lines. The Medicaid office zoster claim non-payment sample was too small for analysis (0.7%; n = 10).

Human Papillomavirus: While the human papillomavirus vaccine accounted for 4.1% of commercial vaccine claims, the non-payment rate was low at 2.3%. For Medicaid, the proportion of vaccines administered in offices was slightly greater at 5.1% but with a substantial claim non-payment rate (31.6%). Claim non-payment was driven by $0 as the contractually allowed amount (65%), no health plan authorization (15%), patient not eligible for Medicaid benefits (8.5%), and coordination of benefits (6%).

Hepatitis A: The hepatitis A vaccine had a more substantial claim non-payment rate for Medicaid (25.5%) than commercial (3.9%). Claim non-payment reasons were driven by contractual allowed amount of $0 was paid (60%) and clinically inappropriate due to age (21%). The age reason appears when a pediatric/adolescent CPT code was billed, although there were occurrences of the pediatric codes not being paid for reasons other than patient age. This may be due to the hierarchal specifics peculiar to a particular health plan's claims processing software, whereby the age reason was not identified if certain other reasons for non-payment co-existed. Notably, of all the denied hepatitis A claims, 81% had inappropriately billed a pediatric/adolescent code. The contractual allowed amount of $0 paid, coordination of benefits, and patient health plan eligibility were the main non-payment reasons when the *adult* hepatitis A code was billed.

Meningococcal Conjugate (Serogroups A, C, Y, W-135): This vaccine had a high claim non-payment rate for Medicaid at about 47%. Nearly 81% of the associated claim lines were not paid due to the contractual allowed amount of $0 was paid, followed by coordination of benefits at 10%, and not an eligible health plan member on the date of service at about 4%.

Meningococcal, Recombinant (Serogroup B): This vaccine had a high claim non-payment rate for commercial at about 68%. About 92% of the associated claim lines were not paid due to a clinically inappropriate diagnosis code. ACIP recommendations provide guidance regarding who is an appropriate candidate, including persons with persistent complement component deficiencies and persons with anatomic or functional asplenia.[5] Other indications include microbiologists routinely exposed to isolates of *Neisseria meningitidis* and persons identified as at increased risk because of a serogroup B meningococcal disease outbreak. The first two reasons can be programmed into a claims processing system.

Although the *Haemophilus influenzae* type B and polio vaccines had high non-payment rates for Medicaid, the non-payment sample sizes were too small for analysis.

Payment Rates for *Office Visits and Vaccine Administration*

Commercial insurance had nearly a 100% payment rate for vaccine administration services (99.8%). Medicaid had a similarly high payment rate (99.6%).

For commercial office vaccination visits, E&M codes had a high payment rate of 98.9%. Medicaid had a lower payment rate of 87.4%. For Medicaid, this lower payment rate was driven by the clinical editing rule that the E&M was incidental to a more inclusive service (93.6% of the unpaid E&M claims). Another service delivered, billed and paid may have included the service of physician evaluation of the patient for a vaccination (but not the vaccine dose itself) and thus may not allow for an E&M service to be paid. Examples of this

may be that the vaccine administration occurred during a global surgical period, or certain office-based procedures billed on that DOS, preventive visit or other contractual agreements.

Payment Levels

The average of the allowed amount for an E&M payment, when only a single E&M and vaccine were billed in the physician's office setting, was $128 for commercial insurance and $64 for Medicaid. The average of the allowed amount for a vaccine administration code payment was $29 for commercial insurance and $7 for Medicaid. For both commercial and Medicaid plans, multiple administration codes were sometimes billed for a patient encounter with only a single vaccine dose billed, but not all administration codes were necessarily paid.

The commercial plan paid about 110% of Medicare for vaccine doses. The commercial health plan paid substantially more than Medicare (136% of the Medicare payment amount) for the administration codes that could be matched to Medicare codes and about $22 for administration codes Medicare does not pay for. Medicaid paid about 122% of Medicare for vaccines doses themselves, but paid substantially less (38% of the Medicare amount) for administration codes and about $7.70 for the administration codes Medicare does not pay for. Medicaid paid 35% of the level paid by the commercial plan for the administration codes Medicare does not cover.

Patient Cost-Sharing

Commercial insurers—Vaccines delivered in the office setting had a member cost-share of $0 for the vaccine dose itself. Commercial members had average cost-sharing for the physician office administration codes of $0 and had cost-sharing of about $15 for E&M services per single-vaccine immunization encounter. Almost all vaccines delivered in the pharmacy had member cost-sharing, ranging from an average of $2.32 for the influenza vaccine to $73.77 for the pneumococcal conjugate vaccine. In the pharmacy setting, the cost-sharing includes the combined costs of the dose itself and administration.

Medicaid—All vaccines delivered in the office and pharmacy setting had a member cost-share of $0 for both the vaccine dose and for E&M and/or vaccine administration services.

4. Discussion

Overall, the vast majority of adult vaccine dose billed services were paid. Almost all billed services from pharmacies were paid (98.5% commercial; 100% Medicaid). The physician office was the dominant treatment setting (78.9% commercial; 69.2% Medicaid; Table 1) of *all* medical vaccination billed services, with 97.9% of commercial insurance billed services paid and 91.6% paid for Medicaid (Table 2). However, we found substantial variation among payers, types of vaccines, and delivery settings.

For commercial insurance, pneumococcal conjugate vaccine doses were frequently not paid when delivered in the office setting, likely due to the complex pneumococcal vaccination recommendations for adults. Most (92.7%) of the commercial pneumococcal conjugate vaccine non-payment for patients under 65 years of age was due to the wrong diagnosis code

associated with the claim. Indications for pneumococcal vaccination for persons <65 years vary between the two pneumococcal vaccines (conjugate and polysaccharide vaccines). This may result in confusion regarding which vaccine to use in a given patient and/or confusion in regards to coding for vaccines correctly administered to patients. [6] The low commercial payment rate of 57.7% was driven by patients <65 years old mainly because of issues with the diagnosis codes submitted. The Medicaid payment rate was higher (79.2%), but had similar reasons for non-payment. Anecdotal reporting from the BCN pharmacy department was that about 75% of these denials *that were appealed* with the patient chart for manual review *did not* have a record of any of the necessary diagnoses to allow for payment. The Centers for Disease Control and Prevention's clinical guidelines regarding which vaccine to administer do not appear to be well understood by office-based providers.[7]

Similarly, we observed low payment rates for the meningococcal recombinant (serogroup B) vaccine for commercial office-based providers and most (92%) of the incidents of non-payment were due to an incorrect diagnosis code. This suggests it is difficult for providers to determine who is an appropriate candidate [8]. There were no occurrences of this vaccination in the Medicaid data.

Vaccination payment in general was rarely denied due to the vaccine not being a plan benefit. This is likely because vaccinations are an essential benefit under the ACA, and even prior to the ACA implementation most commercial health plans covered routine adult vaccines.

Medicaid generally had lower rates of payment than commercial insurance, often due to complexities related to contractual arrangements or when and how coverage applies to an individual patient. Nearly half (47.1%, Appendix Table A4) of Medicaid vaccine dose billed services were not paid due to contractual arrangements which did not allow for any additional payment for the vaccine dose. This is likely due to bundling or other flat per-visit fee arrangements. The level of penetration of managed care and use of capitation versus fee-for-service payments specific to Michigan may help explain these findings.

In addition, Medicaid data revealed issues with coverage not related to vaccinations per se, such as not being a member on the DOS and coordination of benefits with other insurance. A significant issue for Medicaid patients nationally is frequent disenrollment, with 43% disenrolling within 12 months. [9] Inconsistent or transitory patient eligibility may contribute to non-payment for vaccines. Strategies to reduce the frequency of disenrollment, like extending eligibility [10], may help alleviate this issue.

Overall, lack of vaccine and administration coverage from health plans do not appear to be reasons for non-payment occurrences, whereas errors due to provider misunderstanding of complex guidelines (especially for the pneumococcal conjugate and meningococcal recombinant (serogroup B) vaccines), billing errors and other administrative reasons (e.g., eligibility, coordination of benefits) appear to be the most important drivers of non-payment in the office setting.

In vaccines delivered in an office, average allowed payment amounts for vaccines and administration appear to be greater for commercial payers than for Medicare. However,

it appears Medicaid reimburses somewhat higher than Medicare for vaccine doses, but substantially less for vaccine administration. Physician costs for vaccine administration can be substantial and limited payment for vaccine administration has been reported as a major barrier to adult vaccination [2, 11, 12]. Future research could examine if provider payment *levels* represent a provider barrier to stocking vaccines.

We observed occurrences of multiple E&M and/or administration codes submitted for office visits when only a single vaccine was given, with not all paid. There may be confusion on the part of providers concerning appropriate billing of E&M and administration codes.

Finally, it appears patient cost-sharing was not a substantial patient burden, and would likely not represent substantial lost office-based provider revenue due to any non-collectable patient cost-sharing.

It appears the complexities of clinical recommendations, billing procedures, contractual arrangements and the patchwork of insurance coverage (e.g. multiple payers and churn) in the United States are the main causes of non-payment.

Limitations

The use of administrative data has inherent limitations. Claims analyses look at what was billed to the health plan and cannot capture what was discussed, charted, refused by the patient, or otherwise not part of what the claim represents: a financial transaction instrument for services stated to have been rendered. It does not capture vaccination events not billed to the health plan, foregone vaccinations due to known or *perceived* non-coverage, or the *outcome* of any applicable coordination of benefits when a member has coverage with more than one insurer, since what the other plan paid may not be known. This study assessed data from two health plans both from the same single state and thus may not be generalizable, especially since each state has the latitude to determine their own Medicaid benefits. However, this analysis may serve as a template for future studies that examine rates of payment for vaccines in additional states.

5. Conclusion

Past studies indicated physician decisions to stock and offer vaccination were influenced by their concerns regarding health plan payment for vaccines and vaccine administration [2, 3]. But, with the ACA exchanges beginning in January 2014, and the gradual decline of non-compliant legacy employer-sponsored coverage, and ACA requirements that private insurers coverage includes ACIP-recommended vaccines, we sought to quantify providers concerns by examining vaccine claims data. Using these HMO plans as a proxy for ACA compliant plans, we see that adult vaccine doses and vaccine administration payment is provided in the physician office setting over 97% of the time for commercially insured patients and over 91% for Medicaid patients. Patients no longer insured by their study health plan on the date of service was a substantive contributor to vaccine dose non-payment, as would be true for any health care service and not just those vaccine-related.

In some situations, however, vaccine non-payment was high (e.g. pneumococcal conjugate vaccination); this may be a substantial disincentive to providing vaccination services. Occurrences of non-payment appear to largely be driven by contractual agreements, lack of understanding of proper billing and/or vaccine indications, or other administrative reasons, instead of health plan unwillingness to reimburse for these services. Surveys suggest that providers may not recommend needed vaccines to patients based on perceptions of the risk of claims rejection or inadequate payment; especially Medicaid claims [3, 13, 14]. Some respondents to these surveys may have considered experiences prior to implementation of ACA essential benefits coverage for vaccines. In the case of Medicaid, providers could be seeing non-payment resulting from frequent changes in patient Medicaid eligibility. There could also be some misperception of risk of non-payment. In addition to concern about general non-payment or low payment amounts relative to provider costs, one study indicated that about half of surveyed internal medicine and family medicine practices report that they lose money vaccinating patients with Medicaid insurance [13].

Reducing coding and billing errors may lower instances of non-payment and help alleviate some concerns regarding provider payment. Tools are available for providers to improve the accuracy of vaccine coding and billing though it is not known how many providers utilize these resources [15]. Although this study compares commercial and Medicaid payments to Medicare payments, it does not address the adequacy of these payments from the provider perspective. While some research has evaluated the costs of providing vaccination services, more research may inform issues of payment adequacy relative to the payment received and costs of providing vaccination services in different settings [16].

Future research should examine how providers' and healthcare systems' evaluation of potential billing and coding errors may reduce risk of non-payment for vaccination services and thereby increase confidence in providing such services with a lower risk of financial loss to providers.

Funding statement:

This research was supported as part of a cooperative agreement with the Centers for Disease Control and Prevention (CDC), 5-U01-IP-000965-03. CDC co-authors had a role in study design, interpretation of the data, the writing of the report, and the decision to submit for publishing. However, the findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Appendix

Additional Methodological Details

Data

We obtained de-identified administrative data related to vaccine dosing and administration in all billed places of service for commercial members age ≥18 years from Blue Care Network of Michigan (BCN), a nonprofit statewide health maintenance organization (>700,000 annual commercial members) and wholly owned subsidiary of Blue Cross Blue Shield of Michigan (BCBSM) for dates of service (DOS) 1/1/2014–9/30/2015. BCN did not make available their Medicare Advantage data. We also obtained de-identified administrative

data from Blue Cross Complete (BCC) of Michigan, which is a qualifying health plan contracted by the Michigan Department of Community Health (MDCH) to provide medical services to eligible Medicaid beneficiaries. BCC is owned equally by AmeriHealth Caritas and BCBSM. BCC averaged 70,000 annual members during the BCC DOS time period of 1/2/2014–9/1/2015. The end dates for both health plans' data were the result of health plan administrative issues involved with obtaining the primary data extracts, and allowance for processing within the planned timeframe for this study's completion. It is unknown if any members included in this study had legacy certificates of coverage in regard to ACA essential benefits. Both BCN and BCC de-identified health plan data sources included medical and pharmacy paid claims as well as associated member and provider demographics. *Vaccine dose* data were obtained at the *claim line* (i.e. "billed service") level consisting of commercial (n = 261,494) and Medicaid (n = 19,486) claim lines. Claim lines are entries on provider-submitted medical claims for each specific service billed as described by the American Medical Association's Current Procedural Terminology (CPT) codes. There is only one CPT per line but multiple lines may be on a single claim, each with its own billed, allowed, and paid amounts. The distinction is made between *claims* and *claim lines* as non-payment for a claim line does not mean the entire claim is not paid. The provider *billed amount* for a CPT code is set by the submitting provider. *Allowed amount* represents the health plan payment, as per the provider's contract with the health plan, for specific CPT codes. Finally, the *paid amount* equates to the allowed amount minus any patient cost sharing and/or other contractual adjustments (e.g., payments withheld to fund a provider performance incentive pool). Medical vaccine dose claims were identified by vaccine dose CPT code. Pharmacy data consisted of vaccine-related pharmacy claims (commercial n = 39,633; Medicaid n = 2,910) at the medication level of detail, as identified by billed National Drug Codes (unique, three-segment numbers required of all drugs created for commercial distribution) for vaccines.

Health plan non-payment was defined as an allowed amount of $0 for vaccine dose claims. In the case of medical claims, non-payment explanation codes at the claim line level were examined. Non-payment can occur for several reasons related to health plan member eligibility, contractual arrangements, and clinical appropriateness of the vaccine for the member.

To understand health plan non-payment, three insurance claims processing issues require brief explanation.

First, "clinical editing" (CE) is the evaluation of all the codes (one code per claim line) on a medical claim to identify items such as unbundling of procedures, invalid data relationships (e.g., patient not a member of the health plan), patterns of utilization that deviate from practice standards, or coding that may be invalid for the age and/or gender of the patient. One example of clinical editing would be that a billed evaluation and management code (E&M) is determined to be "incidental to a more inclusive service" such as when an E&M service occurs within the global period for a surgical procedure. The global surgical period concept includes pre-operative, intra-operative, and post-operative care, where care during those periods is considered included in the surgery's CPT code. Another is the specific CE of "age edit," meaning the patient is not within the age range indicated for that vaccine.

This would be invoked if a provider billed a pediatric vaccine code for an adult member. An example edit driven by submitted diagnosis codes from practice standards would be a patient <65 years old who is not immune compromised, who may not be eligible for the pneumococcal conjugate vaccine (5).

Second, “Allowed amount paid” (when $0) refers to a non-payment event where $0 represents the contractual allowed amount for a claim line. This represents a health plan and provider payment agreement that does not allow for the separate payment for a given CPT code. The “allowed amount” takes into consideration (in a hierarchal manner) factors like setting (e.g., if service is part of a diagnosis-related group [DRG] or per diem for inpatient care); specific provider financial contractual arrangements (e.g., a financial [as opposed to clinical as in CE] bundled per visit payment agreement); or other agreed-upon qualifiers to determine what the allowed amount should be for a given service by a given provider under a given circumstance.

Third, coordination of benefits (COB) refers to when a patient has insurance coverage with more than one insurer and determining which policy has the primary responsibility for processing and paying a claim. This can occur in the case of working spouses both with commercial insurance, but also what is termed “dual-eligibility” for patients who qualify for both Medicare and Medicaid.

Analysis

Analyses focused on the physician office setting and the definition of non-payment narrowed to claims for which the provider *billed* >$0. To simplify an overview of reasons for non-payment, only claim lines with a single explanation code were examined. Satisfying both conditions simultaneously (>$0 billed and one explanation code) comprised 77% of non-payment lines in the commercial study cohort and 91% for Medicaid.

To examine the eventual payment status of claims that were initially *not* paid, we examined later claims within the office setting on the same dates of service when only a single vaccine was billed with no payment and matched these with later claims for the same patient, date of service and provider with matching on vaccine *type* (i.e., not matching on vaccine CPT code).

Evaluation and Management Services is a medical CPT code set maintained by the American Medical Association and contains CPT codes for office or other outpatient, hospital observation, hospital inpatient, consultations, emergency department, critical care, preventive and other services such that the service must be within the scope of practice billing provider type in the State in which they are furnished.

Typically, when a patient sees their physician, an E&M code is billed that describes the nature of the visit and allows insurers to set appropriate payment levels when submitting providers adhere to the documentation rubrics. Vaccine administration is a service typically coded separately from the E&M per se. A patient, for example, could visit their physician’s office strictly for an influenza vaccination and see only the nurse. In such a circumstance, the physician would bill the administration and the vaccine dose codes, but no E&M.

Alternatively the patient could be in the office for a preventive, routine or acute condition visit and also receive a vaccine. In this second scenario, billing all three codes may be appropriate (E&M, vaccine dose and vaccine administration).

Our data are a limited data set and we do not have all the claim lines from the encounter when an immunization was billed. Thus, we do not know what else occurred (via health plan administrative claims data) during that visit.

Another issue relates to CPT "modifiers", specifically modifier 25, which is defined as a "significant, separately identifiable evaluation and management [E/M] service by the same physician on the same day of the procedure or other service". This modifier allows an E&M code to pay when otherwise clinical editing software would disallow payment. One example would be a patient when a patient has an office procedure that is inclusive of the E&M (per the "global surgical package" concept in CPT), but then has a clinical issue unrelated to the procedure that needs attention. Another would be a patient presents for a preventive office visit, but then also has an acute condition (e.g. earache). Modifier 25 may then allow both the preventive office visit code and another E&M to also pay (for the E&M of the earache).

Payment of E&M codes, including the handling of modifier 25, was governed by both the clinical editing as well as the health plans' fee schedule management software packages in the context of the billed codes available in the limited data set made available for this study, and other unknown codes that may have also been billed on the claim. Anecdotally, providers sometimes superfluously attach modifier 25 to an E&M code that would pay regardless, making analyses of its use problematic.

For medical claims, E&M and vaccine *administration* CPT codes may be billed for provider work associated with evaluating the patient and/or administering the vaccine and are billed and paid separately (i.e., same claim but separate *claim lines*). Analysis of provider E&M and vaccine administration payment was done on a subset of these data. Vaccine dose claim lines, when only a single vaccine was billed with a health plan allowed amount >$0 in the office setting, were then matched on the same member, DOS, and provider as the vaccine dose claim for any related E&M and vaccine administration CPT codes with health plan allowed amounts >$0. Only billed and paid single vaccine encounters were used in this part of the analysis to create a more homogeneous cohort so as to mitigate any confounding of non-payment identification due to multiple vaccines, clinical editing rules, and issues with the correctness of how providers coded their claims. This subset represented about 90% of office vaccination encounters for commercial, and about 87% for Medicaid, for when the vaccine dose allowed amounts were >$0. In this analysis of E&M and vaccine administration codes, we examined the proportion of overall claim lines paid as well as the level of payment.

Regardless of being this more homogeneous single-vaccine billed and paid subgroup, some providers billed multiple E&M and administration codes for the same member on the same date of service. The appropriateness of paying all, some or none of these E&M and administration codes is typically driven by clinical editing and health plan fee schedule management software. If all billed claim lines are not paid, there exists potential for provider

perception of non-, or insufficient, payment. The exception might be if a provider bills a claim line with a $0 amount for the purpose of tracking delivery of specific services and not an expectation of payment, e.g., when a service may be covered under a primary care physician capitation arrangement. The analysis in this study explores how many single vaccine encounter-related codes were billed and paid to establish whether perceived non-payment for vaccine related services is supported by claims experience.

To examine levels of payment for vaccine doses and administration delivered in physician offices, we compared commercial and Medicaid payment levels to Medicare payments, using Medicare as the benchmark. Some administration “G” codes are paid for by commercial and Medicaid insurance but are not paid for by Medicare. Those payment levels are reported separately. To mitigate bias in evaluating vaccine encounter claims payment, we only examined the vaccine administration codes in order not to conflate the different billable levels for E&M payment related to other reasons for that office visit. Although pediatric/adolescent vaccine codes were seen in the main dataset (driving non-payment due to CE age edits), for this comparison of payment levels with Medicare the dataset was cleaned to exclude pediatric/adolescent codes from the analysis. To obfuscate any contractual differences and eliminate any biases due to differing contracts and changes in rates over time, we reported the average plan allowed amounts by CPT code across all providers and dates of service. Member cost-sharing amounts were not altered. Health plan–specific average allowed amounts at the CPT code level were used to compute relative Medicare payment percentages only using available matching CPT codes. This was done using publicly-available Centers for Medicare and Medicaid Services (CMS) Average Sales Price (ASP) amounts (as of 10/2014). These payment percentages were then prevalence-weighted by each health plan’s data set to compute overall average payment percentages relative to Medicare for BCN and BCC separately.

Additional Results

Although representing a smaller number of total medical claim lines, payment rates were lower in the emergency care setting (60.3% commercial), at Federally Qualified Health Centers (85.7% Medicaid), in hospital outpatient department treatment settings (84.9% commercial; 46% Medicaid), and in the urgent care setting (71.3% commercial; 86.4% Medicaid).

Table A1.

Payment Rate of Office Setting *Claim Lines* (Billed Services) by Vaccine and Insurance Type*

	Commercial				Medicaid			
Vaccine	Payment Rate	Paid (Allowed >$0)	Total Vaccines	Vaccine Row % of Total (Prevalence in Table)	Payment Rate	Paid (Allowed >$0)	Total Vaccines	Vaccine Row % of Total (Prevalence in Table)
Vaccine, not otherwise specified	0.0%	-	1	0.0%	-	-	-	-

Vaccine	Commercial				Medicaid			
	Payment Rate	Paid (Allowed >$0)	Total Vaccines	Vaccine Row % of Total (Prevalence in Table)	Payment Rate	Paid (Allowed >$0)	Total Vaccines	Vaccine Row % of Total (Prevalence in Table)
Diphtheria-Tetanus-Pertussis (pediatric)	2.9%	2	68	0.0%	0.0%	-	15	0.1%
Rotavirus	16.7%	2	12	0.0%	0.0%	-	29	0.2%
Other (e.g., pediatric combination vaccines)	93.5%	290	310	0.2%	33.3%	22	66	0.5%
Yellow fever	99.0%	409	413	0.2%	0.0%	-	1	0.0%
Typhoid	99.3%	1087	1,095	0.5%	100.0%	2	2	0.0%
Bacille Calmette-Guerin (BCG)	100.0%	2	2	0.0%	-	-	-	-
Japanese encephalitis	100.0%	156	156	0.1%	-	-	-	-
Other Vaccines, Total	94.7%	1,948	2,057	1.0%	21.2%	24	113	0.9%

*Counted with data aggregated at the level of vaccine type and CPT code overall payment/non-payment.

Table A2.

Payment Rate of Office Setting Billed Services by Vaccine and Insurance sorted by *commercial payment rate**

Vaccine	Commercial				Medicaid			
	Payment Rate§	Paid (Allowed >$0) ¶	Total Vaccines/	Vaccine Row % of Total (Prevalence in Table)	Payment Rate	Paid (Allowed >$0)	Total Vaccines	Vaccine Row % of Total (Prevalence in Table)
Meningococcal B, recombinant‡	32.4%	24	74	0.0%	-	-	-	-
Pneumococcal, conjugate‡	57.7%	1,954	3,387	1.6%	79.2%	137	173	1.3%
Other vaccines, total/	94.7%	1,948	2,057	1.0%	21.2%	24	113	0.9%
Zoster‡	95.5%	5,698	5,969	2.9%	88.6%	78	88	0.7%
Hepatitis A‡	96.1%	6,255	6,510	3.2%	74.5%	309	415	3.2%
Haemophilus influenzae type B	97.1%	68	70	0.0%	10.0%	3	30	0.2%
Hepatitis B‡	97.3%	4,758	4,892	2.4%	89.7%	356	397	3.0%
Human papillomavirus‡	97.7%	8,310	8,509	4.1%	68.4%	458	670	5.1%
Varicella‡	97.7%	990	1,013	0.5%	87.0%	100	115	0.9%

Vaccine	Commercial				Medicaid			
	Payment Rate[§]	Paid (Allowed >$0) [¶]	Total Vaccines[‖]	Vaccine Row % of Total (Prevalence in Table)	Payment Rate	Paid (Allowed >$0)	Total Vaccines	Vaccine Row % of Total (Prevalence in Table)
Polio	98.3%	293	298	0.1%	71.4%	10	14	0.1%
Seasonal influenza[≠]	98.8%	102,153	103,446	50.4%	94.9%	5,932	6,253	47.6%
Measles, mumps, and rubella[≠]	98.8%	1,426	1,444	0.7%	94.0%	94	100	0.8%
Meningococcal ACWY, conjugate[≠]	98.8%	2,897	2,933	1.4%	53.4%	87	163	1.2%
Tetanus, diphtheria (adult) [≠]	98.8%	1,585	1,604	0.8%	91.7%	66	72	0.5%
Meningococcal, polysaccharide[≠]	98.9%	88	89	0.0%	100.0%	7	7	0.1%
Pneumococcal, polysaccharide[≠]	99.3%	9,333	9,399	4.6%	96.8%	812	839	6.4%
Tetanus-diphtheria-acellular pertussis (adult) [≠]	99.4%	52,006	52,311	25.5%	96.4%	3,430	3,559	27.1%
Rabies	99.7%	314	315	0.2%	-	-	-	-
Hepatitis A/B[≠]	99.7%	1,135	1,138	0.6%	98.3%	116	118	0.9%
Total	**97.9%**	**201,235**	**205,458**	**100.0%**	**91.6%**	**12,019**	**13,126**	**100.0%**

[*] Counted with data aggregated at the level of vaccine type and CPT code overall payment/non-payment. Services with billed amounts >$0.

[†] Other non-routine vaccines include: BCG (Bacille Calmette-Guerin), diphtheria-tetanus-pertussis (DTaP, pediatric), Japanese encephalitis, typhoid, yellow fever, other (e.g., pediatric vaccine combinations), adenovirus vaccines, and vaccines not otherwise categorized. See Appendix Table A1. Please note that this study focuses on billing and payment of vaccinated adults. Only adults were included in these data. The presence of pediatric vaccines in these adult member data is the result of providers either administering, or mis-coding on a submitted claim, pediatric vaccinations when treating an adult (age>=18) patient.

[≠] Recommended from https://www.healthcare.gov/preventive-care-adults/

[§] Payment rate is defined as the number of claims paid divided by the total number of claims for each vaccine

[¶] Claims paid by the insurer >$0

[‖] Total vaccine claims during the study period

Table A3.

Payment Rate of Office Setting *Claim Lines* (Billed Services) by Vaccine and Insurance sorted by *total commercial vaccine claim lines*[*]

Vaccine	Commercial				Medicaid			
	Total Vaccines	Vaccine Row % of Total (Prevalence in Table)	Paid (Allowed >$0)	Payment Rate	Total Vaccines	Vaccine Row % of Total (Prevalence in Table)	Paid (Allowed >$0)	Payment Rate
Seasonal influenza[≠]	103,446	50.4%	102,153	98.8%	6,253	47.6%	5,932	94.9%

Vaccine	Commercial				Medicaid			
	Total Vaccines	Vaccine Row % of Total (Prevalence in Table)	Paid (Allowed >$0)	Payment Rate	Total Vaccines	Vaccine Row % of Total (Prevalence in Table)	Paid (Allowed >$0)	Payment Rate
Tetanus-diphtheria-acellular pertussis (adult) ‡	52,311	25.5%	52,006	99.4%	3,559	27.1%	3,430	96.4%
Pneumococcal, polysaccharide‡	9,399	4.6%	9,333	99.3%	839	6.4%	812	96.8%
Human Papillomavirus‡	8,509	4.1%	8,310	97.7%	670	5.1%	458	68.4%
Hepatitis A‡	6,510	3.2%	6,255	96.1%	415	3.2%	309	74.5%
Zoster‡	5,969	2.9%	5,698	95.5%	88	0.7%	78	88.6%
Hepatitis B‡	4,892	2.4%	4,758	97.3%	397	3.0%	356	89.7%
Pneumococcal, conjugate‡	3,387	1.6%	1,954	57.7%	173	1.3%	137	79.2%
Meningococcal, conjugate‡	2,933	1.4%	2,897	98.8%	163	1.2%	87	53.4%
Other vaccines, total†	2,057	1.0%	1,948	94.7%	113	0.9%	24	21.2%
Tetanus, diphtheria (adult) ‡	1,604	0.8%	1,585	98.8%	72	0.5%	66	91.7%
Measles, mumps, and rubella‡	1,444	0.7%	1,426	98.8%	100	0.8%	94	94.0%
Hepatitis A/B‡	1,138	0.6%	1,135	99.7%	118	0.9%	116	98.3%
Varicella‡	1,013	0.5%	990	97.7%	115	0.9%	100	87.0%
Rabies	315	0.2%	314	99.7%	-	-	-	-
Polio	298	0.1%	293	98.3%	14	0.1%	10	71.4%
Meningococcal, polysaccharide‡	89	0.0%	88	98.9%	7	0.1%	7	100.0%
Meningococcal, recombinant‡	74	0.0%	24	32.4%	-	-	-	-
Haemophilus Influenzae type B	70	0.0%	68	97.1%	30	0.2%	3	10.0%
Total	205,458	100.0%	201,235	97.9%	13,126	100.0%	12,019	91.6%

* Counted with data aggregated at the level of vaccine type and CPT code overall payment/non-payment.

† Other non-routine vaccines include: BCG (Bacille Calmette-Guerin), diphtheria-tetanus-pertussis (DTaP, pediatric), Japanese encephalitis, typhoid, yellow fever, other (e.g., pediatric vaccine combinations), adenovirus vaccines, and vaccines not otherwise categorized. See Appendix Table A1. Please note that this study focuses on billing and payment of vaccinated adults. Only adults were included in these data. The presence of pediatric vaccines in these adult member data is the result of providers either administering, or mis-coding on a submitted claim, pediatric vaccinations when treating an adult (age>=18) patient.

‡ Recommended from https://www.healthcare.gov/preventive-care-adults/

§ Payment rate is defined as the number of claims paid divided by the total number of claims for each vaccine

¶ Claims paid by the insurer >$0

‖ Total vaccine claims during the study period

Additional Detail on Reasons for Non-payment

Common reasons for non-payment (Table A4) include “Allowed Amount Paid” and the broader category of CE. The most common reasons for commercial non-payment were CE (58.3%), COB (15.6%), and allowed amount paid (13.8%). For Medicaid, the most common reasons for non-payment were allowed amount paid (47.1%), patient not a health plan member on that DOS (25.7%), and COB (11.3%). The explanation of “not a benefit” was rare (0.7% commercial; 0.2% Medicaid).

A more detailed review of the Medicaid hospital outpatient department setting, which had a low rate of vaccine payment (46%), revealed that 91% of these occurrences of non-payment had a reason of “allowed amount paid.” Due to idiosyncrasies of this Medicaid health plan’s data, the emergency department setting was coded using the hospital outpatient CMS “place of service” (POS) identifier, as opposed to the available emergency POS identifier. Examination of the billed E&M codes (and not the POS codes) associated with these unpaid vaccines administered in the hospital outpatient department setting on those matching DOS (billed >$0, regardless of explanation code count) revealed that about 93% of these visits had either an administration and/or E&M code billed (>$0). 98% of the 93% had an administration code billed and only about 40% had any E&M code billed.

Of those 40% E&M occurrences, about 95% used emergency care E&M codes. This is meaningful as emergency vaccine non-payment, which contributes substantially to the low Medicaid hospital outpatient department vaccine payment rate, may be driven by contractual agreements regarding emergency care payments to the facility. The remaining ~60% of these Medicaid hospital outpatient department vaccine encounters (after excluding those cases with no E&M or administration code) with only an administration code billed may represent immunization clinic encounters for the Medicaid population without an associated physician examination, or some other arrangement such as face-to-face physician visits included as part of an overall capitation arrangement and thus not billed, with vaccine dose non-payment reflective of a contractual agreements concerning how these facilities were paid by Michigan Medicaid.

Table A4.

Detailed Explanation for Vaccine Doses Medical Claim Non-Payment [*]

	Commercial		Medicaid		
Explanation	**Claims**	**% of Total**	**Claims**	**% of Total**	**Broader category:**
Clinical Editing	2,183[†]	58.3%	63[‡]	6.2%	Clinically inappropriate vaccine
Coordination of Benefits	586	15.6%	115	11.3%	Health plan member eligibility
Allowed Amount Paid	519	13.8%	481	47.1%	Contractual arrangements
Not a Member on Date of Service	112	3.0%	263	25.7%	Health plan member eligibility
Claim Submission Error	111	3.0%	45	4.4%	Other
Duplicate Claim	106	2.8%	2	0.2%	Other

	Commercial		Medicaid		
Explanation	**Claims**	**% of Total**	**Claims**	**% of Total**	**Broader category:**
Out of Network	64	1.7%	1	0.1%	Contractual arrangements
Not a Benefit	27	0.7%	2	0.2%	Contractual arrangements
No Authorization	21	0.6%	50	4.9%	Contractual arrangements
Miscellaneous	20	0.5%	-	-	Other
TOTAL	**3,749**	**100%**	**1,022**	**100%**	

*With an allowed amount of $0, billed amount of >$0 and only a single claim line explanation code

†Includes 381 clinical edits due to age (i.e., pediatric vaccines given to adult patients)

‡Includes 58 clinical edits due to age.

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Table 1.

Overall Medical Claim Line (Billed Service) Payment Rate by Treatment Setting and Insurance Type*

	Commercial				Medicaid			
Setting	**Allowed = $0**	**Total Cases**	**Medical* Setting % of Total**	**Payment Rate**	**Allowed = $0**	**Total Cases**	**Medical* Setting % of Total**	**Payment Rate**
Assisted living facility	1	1	0.0%	0.0%	-	-	-	-
Birthing center	-	1	0.0%	100.0%	-	-	-	-
Emergency department	2,509	6,325	2.4%	60.3%	-	-	-	-
Federally Qualified Health Center	-	35	0.0%	100.0%	89	624	3.2%	85.7%
Group home	-	1	0.0%	100.0%	1	1	0.0%	0.0%
Home	-	18	0.0%	100.0%	-	10	0.1%	100.0%
Hospice	1	1	0.0%	0.0%	-	-	-	-
Independent clinic	-	-	-	-	-	6	0.0%	100.0%
Independent laboratory	-	1	0.0%	100.0%	-	-	-	-
Inpatient hospital	2	5	0.0%	60.0%	-	-	-	-
Mass immunization center	315	27,842	10.6%	98.9%	14	102	0.5%	86.3%
Missing/invalid	8	3,543	1.4%	99.8%	-	-	-	-
Mobile unit	1	2	0.0%	50.0%	-	-	-	-
Nursing facility	-	3	0.0%	100.0%	-	-	-	-
Physician Office	**5,134**	**206,372**	**78.9%**	**97.5%**	**1,461**	**13,481**	**69.2%**	**89.2%**
Other	27	79	0.0%	65.8%	-	-	-	-
Hospital outpatient departments	1,638	10,854	4.2%	84.9%	2,578	4,774	24.5%	46.0%
Pharmacy	**576**	**39,633**	**NA**	**98.5%**	**0**	**2,910**	**NA**	**100.0%**
Public health clinic	77	1,974	0.8%	60.1%	21	212	1.1%	90.1%
Rural health clinic	16	191	0.1%	91.6%	1	6	0.0%	83.3%
Urgent care	814	2,833	1.1%	71.3%	34	250	1.3%	86.4%

* Excludes pharmacy claims (noted separately). As opposed to other focused analyses in this study, this table *includes* medical claim lines when $0 billed.

Table 2.

Payment Rate of Office Setting Billed Services by Vaccine and Insurance sorted alphabetically by vaccine [*]

	Commercial				Medicaid			
Vaccine	Payment Rate[§]	Paid (Allowed >$0) [¶]	Total Vaccines[‖]	Vaccine Row % of Total (Prevalence in Table)	Payment Rate	Paid (Allowed >$0)	Total Vaccines	Vaccine Row % of Total (Prevalence in Table)
Haemophilus influenzae type B	97.1%	68	70	0.0%	10.0%	3	30	0.2%
Hepatitis A[‡]	96.1%	6,255	6,510	3.2%	74.5%	309	415	3.2%
Hepatitis A/B[‡]	99.7%	1,135	1,138	0.6%	98.3%	116	118	0.9%
Hepatitis B[‡]	97.3%	4,758	4,892	2.4%	89.7%	356	397	3.0%
Human papillomavirus[‡]	97.7%	8,310	8,509	4.1%	68.4%	458	670	5.1%
Measles, mumps, and rubella[‡]	98.8%	1,426	1,444	0.7%	94.0%	94	100	0.8%
Meningococcal ACWY, conjugate[‡]	98.8%	2,897	2,933	1.4%	53.4%	87	163	1.2%
Meningococcal B, recombinant[‡]	32.4%	24	74	0.0%	-	-	-	-
Meningococcal, polysaccharide[‡]	98.9%	88	89	0.0%	100.0%	7	7	0.1%
Other vaccines, total[†]	94.7%	1,948	2,057	1.0%	21.2%	24	113	0.9%
Pneumococcal, conjugate[‡]	57.7%	1,954	3,387	1.6%	79.2%	137	173	1.3%
Pneumococcal, polysaccharide[‡]	99.3%	9,333	9,399	4.6%	96.8%	812	839	6.4%
Polio	98.3%	293	298	0.1%	71.4%	10	14	0.1%
Rabies	99.7%	314	315	0.2%	-	-	-	-
Seasonal influenza[‡]	98.8%	102,153	103,446	50.4%	94.9%	5,932	6,253	47.6%
Tetanus, diphtheria (adult) [‡]	98.8%	1,585	1,604	0.8%	91.7%	66	72	0.5%
Tetanus-diphtheria-acellular pertussis (adult) [‡]	99.4%	52,006	52,311	25.5%	96.40%	3,430	3,559	27.10%
Varicella[‡]	97.7%	990	1,013	0.5%	87.00%	100	115	0.90%
Zoster[‡]	95.5%	5,698	5,969	2.9%	88.60%	78	88	0.70%
Total	**97.9%**	**201,235**	**205,458**	**100.0%**	**91.6%**	**12,019**	**13,126**	**100.0%**

[*] Counted with data aggregated at the level of vaccine type and CPT code overall payment/non-payment. Services with billed amounts >$0.

[†] Other non-routine vaccines include: BCG (Bacille Calmette-Guerin), diphtheria-tetanus-pertussis (DTaP, pediatric), Japanese encephalitis, typhoid, yellow fever, other (e.g., pediatric vaccine combinations), adenovirus vaccines, and vaccines not otherwise categorized. See Appendix Table A1. Please note that this study focuses on billing and payment of vaccinated adults. Only adults were included in these data. The presence of pediatric vaccines in these adult member data is the result of providers either administering, or mis-coding on a submitted claim, pediatric vaccines when treating an adult (age>=18) patient.

[‡] Recommended from https://www.healthcare.gov/preventive-care-adults/

§ Payment rate is defined as the number of claims paid divided by the total number of claims for each vaccine

¶ Claims paid by the insurer >$0

‖ Total vaccine claims during the study period

Table 3.

Explanation for Vaccine Doses Medical Billed Services Non-Payment by Insurance Type

	Commercial		Medicaid	
Explanation	**Claims**	**% of Total**	**Claims**	**% of Total**
Health plan member eligibility	698	18.6%	378	37.0%
Contractual arrangements	6,317	16.8%	534	52.3%
Clinically inappropriate vaccine	2,183	58.3%	63	6.2%
Other *	237	6.3%	47	4.6%
TOTAL	**3,749**	**100%**	**1,022**	**100%**

* E.g., claim submission error, duplicate claim, or other miscellaneous error.