

Epidemiology of Varicella Disease among Vaccinated and Unvaccinated Individuals—Georgia, 2012-2014



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BACKGROUND

Prior to the introduction of the vaccine in 1995, varicella was a common childhood disease in the United States with an estimated 11,000 hospitalizations and 100 deaths annually¹. Since vaccine licensure, the incidence of varicella has decreased significantly^{2,3,4}.

Studies have shown that a single dose of varicella vaccine has an effectiveness range from 44% to 100%, with substantial protection against moderate and severe disease; however, breakthrough illness has been documented in up to 56% of individuals vaccinated with at least one dose^{1,4}. Despite high coverage rates, most of Georgia’s varicella cases are reported in vaccinated persons.

The objective of this analysis is to compare the severity of varicella illness among individuals vaccinated with 1 or 2 doses to that in persons with no history of varicella vaccine.

METHODS

- Passive varicella surveillance was conducted in Georgia and information concerning age, clinical signs and symptoms, and vaccination history was entered into the State Electronic Notifiable Disease Surveillance System (SendSS).
- Cases were classified using the CDC/CSTE case definition and classification (Table 1).
- SendSS data from January 1, 2012 to November 31, 2014 was analyzed using SAS 9.4.
- Similar to previous studies⁴, severity of disease was defined by the number of skin lesions (Mild <50 lesions; Moderate 50-500 lesions; Severe >500 lesions).
- Chi-square analysis was used to determine association and to calculate odds ratios by vaccination status.

Table 1. Varicella Case Definition and Classification ¹	
Case Definition	An illness with acute onset of generalized papulovesicular rash without other apparent cause
Probable	A case that meets the clinical case definition, is not laboratory confirmed, and is not epidemiologically linked to another probable or confirmed case
Confirmed	A case that is laboratory confirmed or that meets the clinical case definition and is epidemiologically linked to a confirmed or probable case
Note: Two probable cases that are epidemiologically linked are considered confirmed, even in the absence of laboratory confirmation.	

RESULTS

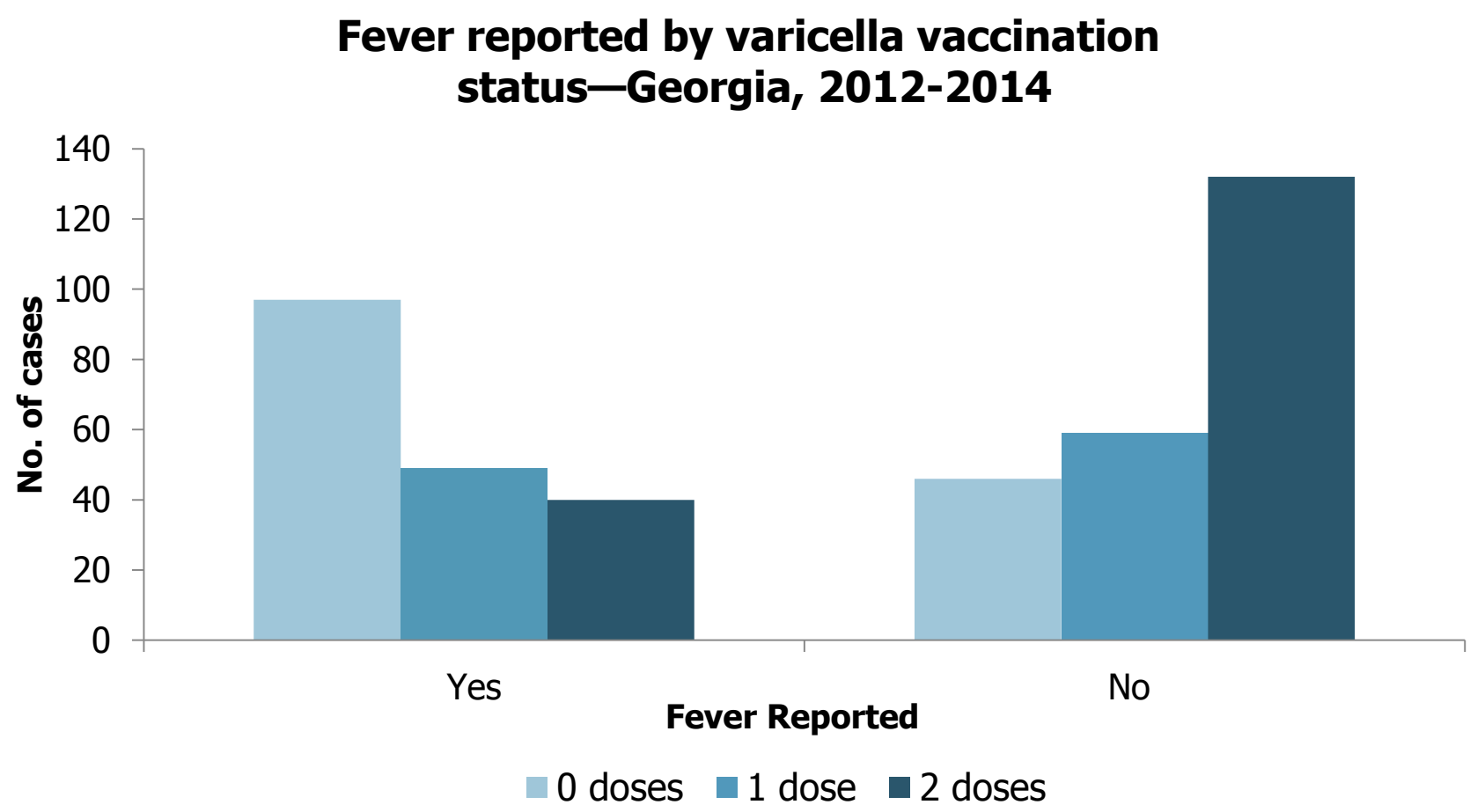
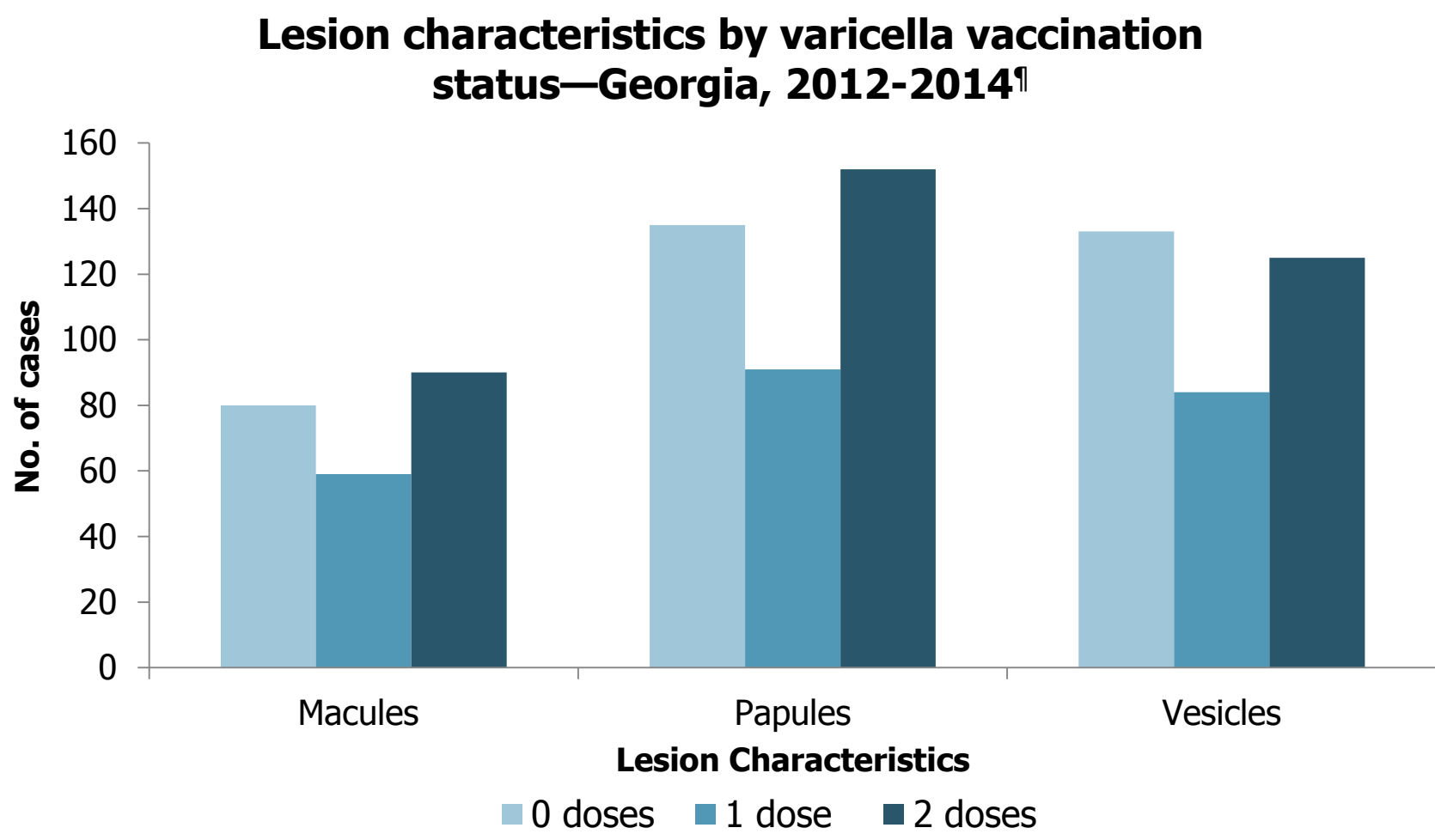
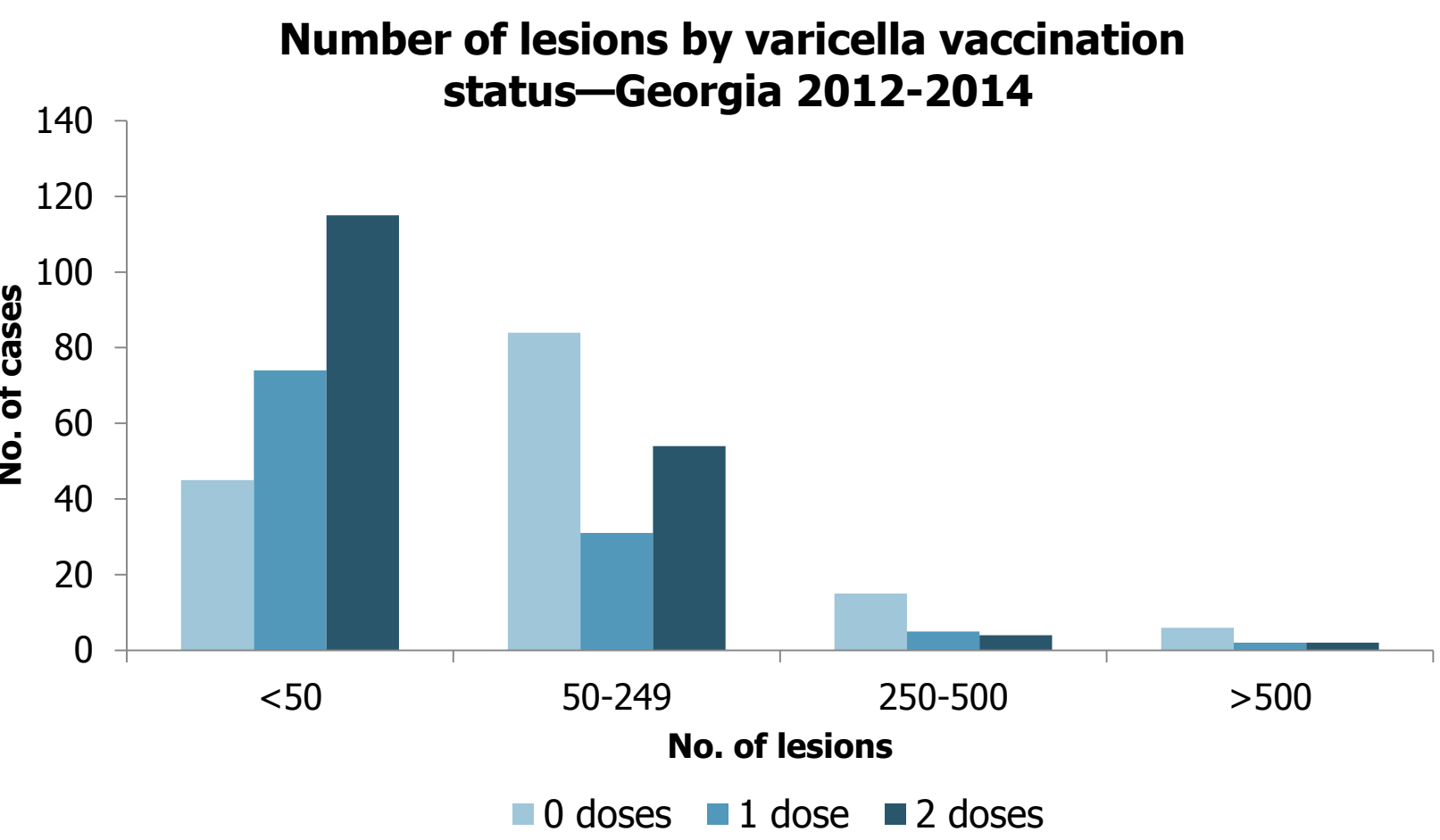
- There were 466 cases of varicella reported to the Georgia Department of Public Health between January 1, 2012 to November 31, 2014.
- Overall, persons with a history of having received either 1 or 2 doses of varicella vaccine were more likely to have milder disease than those with no history of varicella vaccination.

Descriptive statistics of varicella cases—Georgia, 2012-2014 (n= 466)	
Case Classification	n (%)
Probable	305 (65.5)
Confirmed	161 (34.6)
Gender*	
Male	243 (52.1)
Female	219 (47.0)
Age	
<1	59 (12.7)
1-4	127 (27.3)
5-9	157 (33.7)
10-14	56 (12.0)
15-19	21 (4.5)
>20	46 (9.9)
Race	
White	311 (66.7)
Black	79 (17.0)
Other/Unknown	76 (16.3)
Hospital Admission	
Yes	23 (4.9)
No	443 (95.1)
Fever†	
Yes	186 (40.6)
No	238 (51.1)
Vaccination Status‡	
0 doses	163 (34.9)
1 dose	119 (25.5)
2 doses	183 (39.3)
Physician Diagnosis	
Yes	425 (91.2)
No	41 (8.8)
Lab Confirmation	
PCR	20 (4.3)
IgM	13 (2.8)
Virus Isolation	7 (1.5)

Severity of disease by 1 dose of varicella vaccine, 2012-2014 (n=112) [§]				
	n (%)	Odds Ratio (95% CI)	P-value	
Severity				
<50 lesions	74 (66.1)	4.54 (2.6-7.95)	<.0001	
50-500 lesions	36 (32.1)	0.244 (0.14-0.424)	<.0001	
>500 lesions	2 (1.8)	0.437 (0.042-2.51)	0.3027	
Fever				
Reported fever	49 (43.8)	0.4832 (0.29-0.804)	0.4832	
Lesion Characteristics¶				
Macules	59 (52.7)	0.905 (0.52-1.578)	0.1406	
Papules	91 (81.3)	0.476 (0.198-1.118)	0.0597	
Vesicles	84 (75.0)	0.0597 (0.22-0.93)	0.0183	

Severity of disease by 2 doses of varicella vaccine—Georgia, 2012-2014 (n=183) [§]				
	n (%)	Odds Ratio (95% CI)	P-value	
Severity				
<50 lesions	115 (50.6)	4.47 (2.72-7.35)	<.0001	
50-500 lesions	59 (32.2)	0.226 (0.157-0.416)	<.0001	
>500 lesions	2 (20.0)	0.278 (0.027-1.588)	0.098	
Fever				
Reported Fever	40 (21.5)	0.193 (0.11-0.317)	<.0001	
Lesion Characteristics¶				
Macules	90 (49.2)	0.81 (0.49-1.32)	0.3707	
Papules	152 (83.1)	0.587 (0.256-1.288)	0.1527	
Vesicles	125 (68.3)	0.352 (0.183-0.658)	0.0004	

* Gender was not reported for 4 cases.
† Presence of fever was not reported for 42 cases.
‡ Zero doses includes cases who were previously diagnosed by a physician or parent
§ Compared to persons with no history of vaccination
|| Severity of disease, fever and lesion characteristics were not reported for 7 cases
¶ Multiple lesion characteristics may have been present.



DISCUSSION

The burden of varicella disease is highest among children 5-9 (33.7%) years of age. A majority of cases had a history of 2 doses of varicella vaccine (39.3%), followed by 0 doses (34.9%) and 1 dose (25.5%).

Breakthrough disease, defined as varicella disease occurring more than 42 days after vaccination, continues to occur in Georgia. Persons vaccinated with either 1 or 2 doses of varicella vaccine were over 4 times more likely to have milder disease compared to persons who had no history of vaccination. This is consistent with previous studies^{2,4}.

Lab confirmation was available for 40 cases (8.6%). Future efforts should focus on increasing lab confirmation among vaccinated cases to confirm disease etiology and the presence of breakthrough disease.

LIMITATIONS

- Due to passive reporting, the total number of cases reported could be an under estimate of the actual burden of disease.
- Some cases were lost to follow up resulting in incomplete data.
- Since data is based on self report from the healthcare provider and the case-patient, misinformation could be introduced due to responder bias.
- Since cases who were previously diagnosed with varicella were considered to have “zero doses”, this may have affected the severity of illness in that category.

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