mation as well as results entries and publication information. We think that trial-registration numbers should be used in all documentation for referencing clinical trials to mitigate potential confusion about the study under consideration.

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Dr. Zarin reports being the director of and Dr. Tse reports being a program analyst at ClinicalTrials.gov of the National Library of Medicine, National Institutes of Health. No other potential conflict of interest relevant to this letter was reported.

Editor's note: Zarin and Tse are correct. It is our policy to refer to clinical trials by their registration number or to reference a publication in which they can be unequivocally identified, and we should have done so for the ones they mentioned in their letter.

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Priming with Whole-Cell versus Acellular Pertussis Vaccine

TO THE EDITOR: From January through August 2012, Oregon had its highest annual tally of reported pertussis cases since 1959. The incidence was highest among infants and children between 10 and 14 years of age. Increasing disease among school-aged children despite high vaccination coverage may be in part a consequence of using acellular pertussis vaccines (diphtheria–tetanus–acellular pertussis, or DTaP), which in 1997 were approved and recommended for all childhood series instead of whole-cell pertussis vaccines (diphtheria–tetanus–whole-cell pertussis, or DTwP).[1] We wanted to examine the effectiveness of first-dose DTwP priming in children fully immunized with DTaP beyond their first year of life and in those who subsequently received a tetanus–diphtheria–acellular pertussis (Tdap) booster.

Pertussis cases from statewide surveillance and immunization records from Oregon's population-based immunization information system, ALERT IIS, were reviewed for children born in Oregon in the years 1997 through 1999. Cases included all patients considered to have "confirmed" pertussis as defined by the Council of State and Territorial Epidemiologists.[2] The incidence of disease among children who initially received an acellular vaccine was compared with that among children who initially received a whole-cell vaccine in the context of a variety of pertussis vaccination scenarios.

ALERT IIS holds pertussis immunization records for 195,959 children born from 1997 through 1999. From April 1997 through July 2012, a total of 484 cases of pertussis were reported, of which 402 (83%) could be matched to ALERT IIS pertussis vaccination records; 346 of these children had been vaccinated 14 days or more before disease onset. In all scenarios, the reported rates of pertussis were significantly lower among children who had started the vaccination process with DTwP than among those who had started with DTaP (Table 1). This effect existed regardless of whether the pertussis vaccination series had been completed or a recent Tdap booster dose had been administered. The risk of pertussis in the cohorts diverged at 10 years of age.

Among children born during the 1997–1999 transition period, those who underwent priming with acellular rather than whole-cell pertussis vaccine had higher rates of reported pertussis. Our findings concur with those from Australia and are consistent with the recent epidemiologic reports on pertussis in the United States.[3,4] Although statewide surveillance data underestimate disease incidence, and population-based immu-

Table 1. Pertussis among Children in Oregon, According to Type of First Dose of Pertussis Vaccine.*

	First Pertussis Vaccine†		Pertussis Cases‡		Incidence per 100,000		Risk Ratio (95% CI)§
	Acellular	Whole Cell	Acellular	Whole Cell	Acellular	Whole Cell	
Any pertussis vaccination¶	164,885	31,074	315	31	191.0	99.8	1.91 (1.32–2.77)
3 pertussis vaccinations in first yr of life	120,712	24,569	243	23	201.3	93.6	2.15 (1.40–3.30)
≥5 pertussis vaccinations starting before 1 yr of age	111,965	22,093	190	18	169.7	81.5	2.08 (1.28–3.38)
≥5 pertussis vaccinations starting before 1 yr of age, and disease at age ≥10 yr	113,502	22,229	130	10	114.5	45.0	2.55 (1.34–4.84)
≥5 pertussis vaccinations starting before 1 yr of age, with Tdap at age ≥10 yr	86,105	16,800	65	5	75.5	29.8	2.54 (1.02–6.36)
Any receipt of Tdap	106,893	17,889	85	6	79.5	33.5	2.37 (1.04–5.42)

* The data apply to children born from 1997 through 1999. Pertussis cases were reported from April 1997 through July 2012. The immunization data for this cohort were reported from March 1997 through July 2012. CI denotes confidence interval, and Tdap the tetanus–diphtheria–acellular pertussis booster.
† Data were stratified according to whether the first pertussis vaccination administered was a whole-cell vaccine (diphtheria–tetanus–whole-cell pertussis, or DTwP) or an acellular vaccine (diphtheria–tetanus–acellular pertussis, or DTaP).
‡ Data were stratified according to whether the first pertussis vaccine was a DTwP or DTaP vaccine, with the first vaccination occurring at least 14 days before disease onset.
§ The risk ratio was calculated as the ratio of the incidence of disease among those first vaccinated with DTaP to the incidence among those first vaccinated with DTwP.
¶ Any pertussis vaccine was defined as at least one reported pertussis-containing vaccination received at least 14 days before disease onset.

nization registries such as ALERT IIS may be incomplete, biases would be expected to apply equally to those beginning the vaccination process with DTaP or DTwP, such as changes in local reporting, diagnosis, or vaccination patterns over time.

In the United States, the switch to DTaP was motivated by the higher rates of adverse events with DTwP.[5] The balance between vaccine side effects and effectiveness needs to be considered in developing and implementing recommendations on pertussis vaccination, particularly in light of recent outbreaks of pertussis. Until more effective vaccines are developed, however, the best practice continues to be timely and complete immunization with DTaP and Tdap.

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