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The findings and conclusions in this letter are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention, US Department of Health and Human Services.

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REFERENCES

1. Patel MS, Gebremariam A, Davis MM. Herpes zoster–related hospitalizations and expenditures before and after introduction of the varicella vaccine in the United States. *Infect Control Hosp Epidemiol* 2008; 29: 1157-1163.
2. Jackson LA, Reynolds MA, Harpaz R. Hospitalizations to treat herpes zoster in older adults: causes and validated rates. *Clin Infect Dis* 2008; 47: 754-759.
3. Yawn BP, Saddier S, Wollan P, Sauver JS, Kurland M, Sy L. A population-based study of the incidence and complications of herpes zoster before zoster vaccine introduction. *Mayo Clin Proc* 2007; 82:1341-1349.
4. Lin F, Hadler JL. Epidemiology of primary varicella and herpes zoster hospitalizations: the prevaricella vaccine era. *J Infect Dis* 2000; 181:1897-1905.
5. Brisson M, Gay NJ, Edmunds WJ, Andrews NJ. Exposure to varicella boosts immunity to herpes zoster: implications for mass vaccination against chickenpox. *Vaccine* 2002; 20:2500-2507.
6. Jumaan A, Yu O, Jackson L, Bohlke K, Galil K, Seward J. Incidence of herpes zoster, before and after varicella vaccination–associated decreases in the incidence of varicella, 1992–2002. *J Infect Dis* 2005; 191:2002-2007.
7. Mullooly JP, Riedlinger K, Chun C, Weinmann S, Houston H. Incidence of herpes zoster, 1997–2002. *Epidemiol Infect* 2005; 133:245-253.
8. Yih WK, Brooks DR, Lett SM, et al. The incidence of varicella and herpes zoster in Massachusetts as measured by the Behavioral Risk Factor Surveillance System (BRFSS) during a period of increasing varicella vaccine coverage, 1998–2003. *BMC Public Health* 2005; 5:68.
9. Ragozzino MW, Melton LJ 3rd, Kurland LT, Chu CP, Perry HO. Population-based study of herpes zoster and its sequelae. *Medicine* 1982; 61: 310-316.
10. Perez-Farinos N, Ordobas M, Garcia-Fernandez C, et al. Varicella and herpes zoster in Madrid, based on the Sentinel General Practitioner Network: 1997–2004. *BMC Infect Dis* 2007; 7:59.
11. Russell ML, Schopflocher DP, Svenson L, Virani SN. Secular trends in the epidemiology of shingles in Alberta. *Epidemiol Infect* 2007; 135:908-913.

Reply to Harpaz and Yawn

To the Editor—We welcome the comments of Harpaz and Yawn[1] regarding our article[2] on herpes zoster (HZ)–related hospitalizations and expenditures. We agree with Harpaz and Yawn[1] that the data we used from the Nationwide Inpatient Sample can be useful for epidemiologic research but have limitations, and that trends from such data should be interpreted cautiously. As we stated in our article,[2] we could not definitively draw a causal link between varicella-vaccination efforts and trends in HZ-related hospital discharges. Rather, we emphasized that the population-adjusted rate of HZ-related hospital discharges has changed significantly relative to past trends, and that the majority of these cases are among the HZ-vaccine–eligible group, which is meaningful for ongoing HZ-vaccination efforts.

After our article was accepted for publication, Jackson et al.[3] published an important study with regard to the accuracy of using discharge data to identify hospitalizations attributable to HZ. They found that 33% of hospitalizations were directly because of HZ or a complication of HZ treatment. They also found that, in another 52% of cases, HZ or postherpetic neuralgia was present but was not the primary reason for hospitalization[3]—that is, HZ was a secondary issue. Thus, 85% of hospitalizations in their study were HZ-related. If that adjustment factor is applied to our study, in which we measured HZ-related hospital discharges via primary and secondary diagnoses, the relative increase in HZ-related hospital discharges from 2000 through 2004 remains significant.

We agree with Harpaz and Yawn[1] that both the increasing age of the population and the changing immunosuppression patterns can affect the rate of HZ-related hospital discharges. However, it is unlikely that either of these factors played a significant role in the trends we reported. In 1996, the proportion of the overall population that was 65 years of age or older was 12.7%.[4] By 2000, this proportion had declined to 12.4%, and it remained unchanged through 2004.[4] Therefore, increasing age was not likely to play a role in the growth of HZ-related hospital discharges from 2000 through 2004. In our article,[2] we identified the top 10 most common primary diagnoses among HZ-related hospital discharges in 1994, 1999, and 2004. We found that the vast majority of primary diagnoses were not immunocompromised conditions. For instance, human immunodeficiency virus accounted for less than 2% of primary diagnoses in 1994, 2.50% in 1999, and 2.46% in 2004—substantially less than primary diagnoses such as viral infections, pneumonia, and cardiac conditions, which accounted for nearly 30% of primary diagnoses. Although we are not aware of national estimates of immunosuppression status, we doubt that population-level immunosuppression increased enough from 2000 through 2004 to explain the increase in HZ-related hospital discharges.

We also agree with Harpaz and Yawn[1] that, if an increase in HZ-related hospital discharge rates were due to reduced exposure to wild-type varicella, the effect should be seen across multiple age groups. They note our finding that, among persons aged 65 and older, the rate of HZ-related hospital discharges grew 23% (from 11.30 to 13.89 HZ-related hospital discharges per 10,000 population) during the study period. While not easily seen within the second figure in our article,[2] the rate of HZ-related hospital discharges grew 40% (from

0.20 to 0.28 HZ-related hospital discharges per 10,000 population) among persons aged 10-19 and 16% (from 1.78 to 2.07 HZ-related hospital discharges per 10,000 population) among persons aged 45-64. Although we focused our discussion on persons within the HZ-vaccine–eligible group, it is important to note that we found 3 age cohorts that had a significant increase in the rate of HZ-related hospital discharges, with the majority of the change occurring during the final 4 years of the study period.

Finally, with regard to the economic implications of HZ-related hospital discharges, in our article[2] we acknowledge as a limitation that we could not disaggregate the incremental hospital charges attributable to HZ. We do not suggest that our data would be suitable for cost-benefit evaluation of the varicella vaccine program, and we are cautious in describing potential implications for the hospitalization component of HZ-vaccine cost-effectiveness analyses that have been conducted by other authors. Our economic findings serve as a reminder that HZ-related hospitalizations are expensive and that HZ occurs primarily in the age group for which there is now an effective vaccine available.

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REFERENCES

1. Harpaz R, Yawn BP. Trends in rates of herpes zoster–related hospitalizations: are they real, are they costly, and are they linked to varicella vaccination? *Infect Control Hosp Epidemiol* 2009; 5:495-496 (in this issue).
2. Patel MS, Gebremariam A, Davis MM. Herpes zoster–related hospitalizations and expenditures before and after introduction of the varicella vaccine in the United States. *Infect Control Hosp Epidemiol* 2008; 29:1157-1163.
3. Jackson LA, Reynolds MA, Harpaz R. Hospitalizations to treat herpes zoster in older adults: causes and validated rates. *Clin Infect Dis* 2008; 47: 754-759.
4. US Census Bureau, Administrative and Customer Services Division, Statistical Compendia Branch. Statistical abstract of the United States. Available at: http://www.census.gov/compendia/statab/past_years.html. Accessed February 9, 2009.

Why We Disagree With the Analysis of Wenzel et al.

To the Editor—Wenzel et al.[1] suggest that their hypothetical analysis and the nonrandomized 2006 study by Pronovost et al.[2] should convince us that preventing healthcare-associated infections (HAIs) due to all pathogens is better than preventing just HAIs due to methicillin-resistant *Staphylococcus aureus* (MRSA) and that infection control works best using a team approach. These things were already known. Wenzel et al.[1] state that some policy makers nonsensically propose that hospitals should focus on MRSA control only. We've seen several state laws requiring active detection and isolation (ADI) for MRSA, but none of these state laws implied ADI was necessary for MRSA control but that control of all other pathogens could be ignored. Therefore, it would enhance the credibility of this statement if Wenzel et al.[1] would cite the source document. Otherwise, some may suspect that the claim was created like a straw opponent in debate (ie, merely as an excuse to disparage ADI).

The approach proposed by Wenzel et al.[1] would permit the spread of MRSA and would allow too many HAIs due to MRSA, in the hospital and out,[3] and their analysis has more errors than we can address in a letter. For example, they state that all pathogens are associated with the same mortality rate, that different infection control measures have the same success rate, that the 2003 Society for Healthcare Epidemiology of America guideline didn't mention MRSA decolonization, that half of the deaths after primary bloodstream infection (BSI) were attributable to primary BSI, and that DiGiovine et al.[4] confirmed that half the crude mortality rate was attributable to primary BSI—DiGiovine et al.[4] actually found *no association* between primary BSI and death after adjusting for underlying severity of illness the day before BSI onset (like multiple other recent studies[5]).

The analysis by Wenzel et al.[1] exaggerates what most hospitals must do to start an effective ADI program to control MRSA and the costs involved (eg, they state that all hospitals must start by screening all patients admitted to the hospital [and they cite as documentation a study that does not do that[6]], that MRSA screening is associated with an unacceptably high rate of false-positive results, and that a screening test must cost $20–$30). Of more than 100 studies reporting control of MRSA using ADI, the vast majority didn't screen all patients admitted to the hospital and used screening cultures; this approach resulted in rare false-positive results during almost 3 decades of ADI at the University of Virginia, where screening was estimated to cost $6.57 for a negative result and $9.97 for a positive result (which included material and personnel costs for collection and processing).[7] Because the vast majority of screening culture results are negative, the cost estimated by Wenzel et al.[1] is 3–4.5-fold higher than the