In Reply: Drs Utter and Romano have made important contributions to society’s ability to measure patient safety using patient safety indicators based on administrative (billing) data. But their response to our article is puzzling. Our central claim was that billing data cannot be relied on to simultaneously measure quality, publicly report quality, and pay for performance. If they are, the ability to measure true changes in quality will be lost.

Our secondary claim was that there is no substitute for billing data as a widely available basis for measuring outcomes. We concluded that there is an urgent need to develop alternate data sources not currently used for public reporting or reimbursement that will provide time-consistent quality measures.

Rather than dispute our main claim, Utter and Romano state that a consultant report finds that the 2008 decreases in patient safety indicator 5 (leaving a foreign object in the body during surgery) and patient safety indicator 7 (CLABSI) reporting were only 15% and 23% (instead of the roughly 50% we found). This report uses data we cannot verify, uses annual instead of quarterly data, and shows decreases of 26% and 30% from fiscal 2008 to 2009.

Utter and Romano extract lower percentages from this report by including an increase in rates from 2009 to 2010, which is likely unrelated to the reimbursement change. Even if those percentages were accurate, our main message would remain unchanged. Decreases of this magnitude offer ample evidence that if payers stop paying for hospital-acquired conditions, many hospitals will stop billing for them. Utter and Romano also do not dispute our secondary claim.

We agree that the determinants of gaming are the ease of doing so and the associated incentives. We disagree, however, that performance metrics based on administrative data are less susceptible to gaming than indirect measures of performance and measures that are purposely collected for quality measurement. Moreover, not billing for events that insurers will not pay for is not even gaming, in a sense. No rule requires billing for adverse events. If there was such a rule, we cannot imagine that it would be accompanied by a serious effort to audit the events for which hospitals are not billing.

The intent of hospitals is to offer safe, high-quality care; however, we contend that financial imperatives are often paramount when generating administrative data. Significant discretion exists in the documentation and coding of patient episodes. This point was underscored by a recent Inspector General report that found adoption of electronic medical records has led to higher billing levels without true changes in care. Gaming reflects manipulation of data to improve apparent performance rather than improving true performance.

In our view, for safety and quality metrics to reach their full potential, these metrics must rely more on primary data and hospitals must have internal operational incentives to make these measures accurate. Stated differently, hospitals need to have incentives to maintain and respond to accurate performance metrics because they are central to operational and financial performance, not because they are responding to external demands. It is debatable how to get there from here, but the need is clear.

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Conflict of Interest Disclosures: The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.


RESEARCH LETTER

Temporal Trends in Smokeless Tobacco Use Among US Middle and High School Students, 2000-2011

To the Editor: Tobacco use remains the leading preventable cause of death and disease in the United States. Declines in smoking among youths were observed from the late 1990s, particularly after the Master Settlement Agreement in 1998. However, limited information exists on trends in smokeless tobacco use among youths.

One study showed a decreasing trend in smokeless tobacco use during 1986 through 2003 before the increased availability of flavored products that may appeal to youths. This study analyzed recent trends in prevalence of smokeless tobacco use among youths using the 2000-2011 National Youth Tobacco Survey (NYTS).

Methods. The NYTS is a repeated, biennial national cross-sectional survey of US middle and high school students. Samples during 2000 through 2011 ranged from 35,828 students in 324 schools in 2000 to 18,866 students in 178 schools in 2011. Overall response rates ranged from 72.7% (in 2000) to 84.1% (in 2011).

Parental permission was obtained for each student, and participation was voluntary and anonymous. The initial NYTS study protocols were reviewed and approved by the US Centers for Disease Control and Prevention’s institutional review board. The current trend analysis was performed on publicly available deidentified data and was
exempt from institutional review board approval as non-human research.

Current smokeless tobacco use was defined as use of snuff, chewing, or dipping tobacco for 1 or more days within the past 30 days. Because NYTS data are based on a sample of the population, they are subject to sampling error. Hence, estimates with relative standard errors of 40% or greater were considered statistically unreliable and not reported.

Unadjusted average annual percentage changes (AAPC) during 2000 through 2011 were calculated using Joinpoint analysis. Binary logistic regression was used to assess for linear trends, controlling for age, sex, race/ethnicity, and sex (P < .05). Data were weighted and analyzed with Stata version 12 (StataCorp) and Joinpoint version 4.0.1 (National Cancer Institute) software.

**Results.** No significant change in overall smokeless tobacco prevalence occurred between 2000 (5.3%; 95% CI, 4.5% to 6.1%) and 2011 (5.2%; 95% CI, 4.2% to 6.1%) (Table). Downward trends were observed in the age groups of 9 to 11 years (AAPC, −4.6 [95% CI, −11.9 to 3.4]; P = .007 for linear trend) and 12 to 14 years (AAPC, −3.4 [95% CI, −5.3 to −1.4]; P = .02 for linear trend).

Conversely, prevalence increased in the age group of 15 to 17 years (AAPC, 0.9 [95% CI, −2.8 to 4.7]; P = .01 for linear trend). During 2000 through 2011, prevalence declined among middle school students (AAPC, −4.1 [95% CI, −5.7 to −2.4]; P = .02 for linear trend). No significant

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**Table.** Trends in Current Use of Any Smokeless Tobacco Product Among US Middle and High School Students, National Youth Tobacco Survey, 2000-2011

<table>
<thead>
<tr>
<th>Age group, y</th>
<th>Prevalence of Smokeless Tobacco Use Among US Middle and High School Students, % (95% CI)</th>
<th>Average Annual Percentage (95% CI)</th>
<th>P Value for Linear Trend (2000-2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>5.3 (4.5 to 6.1)</td>
<td>−0.2 (−4.6 to 4.2)</td>
<td>= .007</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-11</td>
<td>2.8 (1.6 to 4.1)</td>
<td>−4.6 (−11.9 to 3.4)</td>
<td>= .007</td>
</tr>
<tr>
<td>12-14</td>
<td>3.4 (2.5 to 4.3)</td>
<td>−3.2 (−11.4 to 1.3)</td>
<td>= .02</td>
</tr>
<tr>
<td>15-17</td>
<td>6.7 (5.7 to 7.7)</td>
<td>1.9 (−1.5 to 4.3)</td>
<td>= .01</td>
</tr>
<tr>
<td>≥18</td>
<td>9.6 (7.4 to 11.7)</td>
<td>1.6 (−2.9 to 5.5)</td>
<td>= .09</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1.5 (1.2 to 1.7)</td>
<td>0.7 (−1.0 to 2.3)</td>
<td>= .66</td>
</tr>
<tr>
<td>Male</td>
<td>9.0 (7.5 to 10.6)</td>
<td>−0.3 (−3.2 to 2.7)</td>
<td>= .20</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>3.5 (2.7 to 4.3)</td>
<td>1.9 (−0.2 to 4.1)</td>
<td>= .12</td>
</tr>
<tr>
<td>Non-Hispanic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>6.2 (5.2 to 7.2)</td>
<td>0.1 (−2.5 to 2.8)</td>
<td>= .37</td>
</tr>
<tr>
<td>Black</td>
<td>2.6 (2.0 to 3.3)</td>
<td>−3.0 (−6.6 to 2.9)</td>
<td>= .77</td>
</tr>
<tr>
<td>Asian</td>
<td>1.8 (1.0 to 2.6)</td>
<td>1.0 (−6.9 to 11.7)</td>
<td>= .31</td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>11.8 (8.0 to 15.7)</td>
<td>−3.4 (−9.5 to 2.0)</td>
<td>= .46</td>
</tr>
<tr>
<td>Native Hawaiian or other</td>
<td>7.8 (4.1 to 11.5)</td>
<td>−3.7 (−14.6 to 15.4)</td>
<td>= .16</td>
</tr>
<tr>
<td>School level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle (grades 6-8)</td>
<td>3.6 (2.7 to 4.5)</td>
<td>−4.1 (−5.7 to −2.4)</td>
<td>= .02</td>
</tr>
<tr>
<td>High (grades 9-12)</td>
<td>6.6 (5.7 to 7.6)</td>
<td>0.8 (−2.3 to 4.0)</td>
<td>= .25</td>
</tr>
</tbody>
</table>

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*Sample sizes are unweighted, but the prevalence rates are weighted estimates.

*Unadjusted estimates; these prevalence rates are assumed to change at a constant percentage of the rate of the previous year.

*Adjusted for age, sex, race/ethnicity, and school level as appropriate in a binary logistic regression model. Orthogonal polynomials were developed for the regression analysis to account for variations in time between survey years.

*Based on the standards for the classification of federal data from the Office of Management and Budget, and was determined by self-reported information, in which ethnicity was collected first before race. This variable was assessed because of differences in use of smokeless tobacco among different racial/ethnic groups.

*Estimate not shown because of relative standard error of 40% or greater.
changes were noted among high school students, or by race/ethnicity or sex.

Discussion. The prevalence of smokeless tobacco use among US youths did not change between 2000 and 2011 and remained generally low. However, subgroup differences were observed. The use of modified traditional smokeless tobacco products, such as moist snuff, coupled with lower taxes on smokeless tobacco products (vs cigarettes) may have contributed to the stable prevalence of smokeless tobacco (vs the declining trend for cigarettes).

In addition, use of flavors is not currently prohibited for smokeless tobacco products, unlike with cigarettes. The significant declines among respondents aged 14 years or younger and those in middle school may be attributable to the proliferation of bans and restrictions in many states on remote (mail order or Internet) sales of tobacco products coupled with the recent implementation of federal legislation enforcing age verification at points of purchase.

Despite these developments, significant increases were observed among those aged 15 to 17 years, whereas no significant changes were seen among respondents aged 18 years or older, suggesting that current access laws are not completely effective in preventing tobacco access among older adolescents. Furthermore, the promotion of smokeless tobacco use as an alternative to smoking is more likely directed at smokers, who are more likely to be older than younger adolescents.

This study is subject to limitations. First, insufficient data existed on smokeless tobacco type, and the analysis did not include newer smokeless tobacco products such as snus and dissolvable tobacco products, which may have resulted in an underestimation of smokeless tobacco prevalence. In addition, recall bias may have resulted in an underreporting of tobacco use. Nonetheless, these findings emphasize the need for evidence-based interventions to reduce smokeless tobacco use among youths.

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Author Contributions: Dr Agaku had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Agaku, Vardavas, Connolly.

Acquisition of data: Agaku, Connolly.

Analysis and interpretation of data: Agaku, Vardavas, Ayo-Yusuf, Alpert, Connolly.

Drafting of the manuscript: Agaku, Vardavas.

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Obtained funding: Connolly.

Study supervision: Vardavas.

Conflict of Interest Disclosures: The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Dr Ayo-Yusuf reported serving on speakers bureaus for Pfizer. No other authors reported disclosures.

Funding/Support: National Cancer Institute grants 3R01 CA125224-03s1rev i+ i and 2R01 CA087477-09A2 funded the research for this study.

Role of the Sponsor: The National Cancer Institute had no role in the design and conduct of the study; in the collection, analysis, and interpretation of the data; or in the preparation, review, or approval of the manuscript.


CORRECTION

Incorrect Sentence: In the Preliminary Communication titled “Effect of Shock Wave–Facilitated Intracoronary Cell Therapy on LVEF in Patients With Chronic Heart Failure: The CELLWAVE Randomized Clinical Trial,” published in the April 17, 2013, issue of JAMA (2013;309[15]:1622-1631), a sentence was incorrect. In the last paragraph of the Results section, the first sentence beneath the “Clinical Outcome” heading should have read “As shown in the analysis of multiple and recurrent clinical events (eFigure 3), the overall frequency of MACEs was significantly reduced in patients receiving shock wave + BMCs (32 events) compared with patients receiving shock wave + placebo infusion (61 events) or placebo shock wave + BMCs (18 events) (hazard ratio, 0.58 [95% CI, 0.40-0.85]; P = .02).” This article has been corrected online.