

# Immunization Safety in US Print Media, 1995–2005

## abstract

**OBJECTIVE:** To identify and describe vaccine safety in US newspaper articles.

**METHODS:** Articles (1147) from 44 states and Washington, DC, between January 1, 1995, and July 15, 2005, were identified by using the search terms “immunize or vaccine” and “adverse events or safety or exemption or danger or risk or damage or injury or side effect” and were coded by using a standardized data-collection instrument.

**RESULTS:** The mean number of vaccine-safety articles per state was 26. Six (not mutually exclusive) topics were identified: vaccine-safety concerns (46%); vaccine policy (44%); vaccines are safe (20%); immunizations are required (10%); immunizations are not required (8%); and state/school exemption (8%). Three spikes in the number of newspaper articles about vaccine-safety issues were observed: in 1999 regarding rotavirus vaccine and in 2002 and 2003 regarding smallpox vaccine. Excluding articles that referred to rotavirus and smallpox vaccines, 37% of the articles had a negative take-home message.

**CONCLUSION:** Ongoing monitoring of news on vaccine safety may help the content and framing of vaccine-safety messages. *Pediatrics* 2011; 127:S100–S106

**AUTHORS:** Hamidah Hussain, MBBS, MSc,<sup>a</sup> Saad B. Omer, MBBS, MPH, PhD,<sup>a</sup> Jennifer A. Manganello, MPH, PhD,<sup>b</sup> Elizabeth Edsall Kromm, MSc, PhD,<sup>a</sup> Terrell C. Carter, MHS,<sup>c</sup> Lilly Kan, MPH,<sup>a</sup> Shannon Stokley, MPH,<sup>d</sup> Neal A. Halsey, MD,<sup>a</sup> and Daniel A. Salmon, MPH, PHD<sup>a</sup>

<sup>a</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland; <sup>b</sup>Department of Health Policy, Management and Behavior, School of Public Health, University of Albany, Albany, New York; <sup>c</sup>PATH Malaria Vaccine Initiative, Bethesda, Maryland; and <sup>d</sup>National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia

### KEY WORDS

vaccine, adverse effects, safety, newspaper, mandatory programs, content analysis

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Address correspondence to Hamidah Hussain, MBBS, MSc, Johns Hopkins Bloomberg School of Public Health, 615 N Wolfe St, Room W5041, Baltimore, MD 21205. E-mail: [hhussain@jhsph.edu](mailto:hhussain@jhsph.edu)

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Vaccines are one of the most cost-effective interventions.<sup>1</sup> In the United States, immunizations have helped to reduce the incidence of many vaccine-preventable diseases by 98% to 100%.<sup>2</sup> Smallpox has been eradicated, polio has been eliminated from most of the world, and other vaccine-preventable diseases are at historic low rates in the United States and in many other countries. However, resurgences of measles in the United Kingdom in 2006 and 2008<sup>3,4</sup> and the United States in 2008,<sup>5</sup> polio in Nigeria,<sup>6</sup> diphtheria in the former Soviet Union in the 1990s,<sup>7</sup> and pertussis in the United Kingdom, Japan, and Sweden in the 1980s<sup>8</sup> illustrate the consequences of vaccine coverage below the level needed for effective control.

The success of immunization programs depends on a high rate of vaccine acceptance, particularly among parents with young children. Although the majority of parents comply with state school immunization requirements in the United States, many parents have concerns regarding vaccine benefit and safety. A decade-old population-based national survey revealed that 39% of the public believed that children should only be immunized against serious diseases, 23% believed that children get more immunizations than are good for them, and 25% had concerns that a child's immune system could be weakened by too many immunizations.<sup>9</sup> The results of 1 study suggested that the proportion of parents who refused vaccines for their children by claiming nonmedical exemptions to school immunization requirements increased from 0.99% in 1999 to 2.54% in 2004.<sup>10</sup> In some communities, rates of school exemptions are high (as high as 25% in selected counties in the state of Washington). Vaccine-safety concerns are the primary reason cited by parents who refuse vaccines for their chil-

dren.<sup>11</sup> However, the vast majority of parents nationwide vaccinate their children; <1% of children receive no vaccine by 19 to 35 months of age.<sup>12</sup>

To maintain a high level of vaccine acceptance, parents and the public must have accurate and reliable sources of vaccine information, particularly with regard to vaccine safety. Most parents report consulting health care providers for vaccine information. However, many parents also report getting vaccine information from news media: in 1 study, 62% of the parents of vaccine-exempt children reported relying on media for vaccine information, and 46% of the parents of fully immunized children reported the same.<sup>11</sup> News media coverage provides the public with considerable information about disease—everything from prevention, diagnosis, and treatment to prognosis.<sup>13–16</sup> How a person understands and responds to a health issue often depends on how the issue is publicly presented, debated,<sup>17</sup> and framed, which highlights the crucial role that news media play in influencing attitudes and knowledge about vaccines.

There has been great variation in news media coverage of vaccines and their associated effects.<sup>18–21</sup> In a study of British newspapers in 1982, Harding<sup>22</sup> found that the press often focuses on adverse effects of vaccines. In addition, news media often highlight individual stories and anecdotal information. In the United States, studies have examined coverage of antivaccine Web sites<sup>23,24</sup> and the focus on theories of hypothesized relationships between vaccines such as the measles-mumps-rubella vaccine and conditions such as autism.<sup>25</sup> The objective of this study was to identify and describe discussions of vaccine safety in US newspaper articles from January 1995 to July 2005 to better understand news coverage about vaccine safety and US-recommended vaccines and to deter-

mine if news coverage of vaccine safety has changed over time.

## METHODS

A list was compiled of daily newspapers with  $\geq 50\,000$  circulation and state-capital city newspapers regardless of circulation in the 50 states and the District of Columbia as determined by the Gale Directory 2000. Only newspapers available electronically for the entire period of January 1, 1995, to July 15, 2005, were included to ensure consistent depictions in changes over time. The final sample size was 108 newspapers, which represented all states except Delaware, Hawaii, Idaho, Montana, Vermont, and Wyoming (because of limitations in electronic availability).

We searched each newspaper for articles about vaccine safety by using LexisNexis, West News, and News Library and applied the following search terms to the full text of the articles: “immunize or vaccine” (all variations) and “adverse events or safety or exemption or danger or risk or damage or injury or side effect.” The article types included were news articles, editorials, columns/syndicated columns, guest columns/opinion, editorials, and letters to the editor. Articles about animal vaccination, experimental vaccines, vaccine clinics or vaccine schedules, those with an international focus, and duplicate articles were excluded. The final sample size was 1147 articles.

Two trained persons conducted a quantitative content analysis by using a standardized data-collection instrument to record the type of article (news, editorial, etc), number of words, newspaper section, presence of photographs, charts, or graphs, and news peg of the article (reason the article was written). Data collection captured article content, including major topic, adverse event according to vaccine, number of sources from which

the reporter obtained information, source affiliations, if data or statistics were presented in the article, and data source(s). Coders assessed whether there was a mention of vaccine safety in the headline, if the article suggested that the number of immunizations is too much for children, and whether information was provided (such as a Web site) as a further resource. Coders also categorized the take-home message from the article as positive, mixed (both positive and negative), or negative. "Positive" and "negative" were defined as articles that the coders felt gave an overtly positive or an overtly negative presentation about immunizations and their effects; "mixed" articles presented more than 1 viewpoint. On the basis of the frequency of responses, positive and mixed-position articles were combined.

We calculated a prominence score to assess the likelihood of a reader notic-

ing the article.<sup>26-28</sup> Points were totaled to account for location of the article in the newspaper and whether the article appeared on any front section, the number of words per article, and whether there was a graph, chart, or photograph accompanying the text of the article. The possible score an article could receive ranged from 0 to 10 (most prominent).

A 10% randomly selected sample was double-coded to assess intercoder reliability. The average simple agreement for all variables included in the study was 88.3% (range: 70%–98%), and the average kappa score was 0.70 (range: 0.5–0.9). Variables that assessed adverse events according to vaccine had <10% response rate per variable and, hence, were considered a rare outcome for kappa calculation; thus, although the kappa value was <0.5 for these variables, we included them in the analysis because they had a simple agreement of 97%, and the

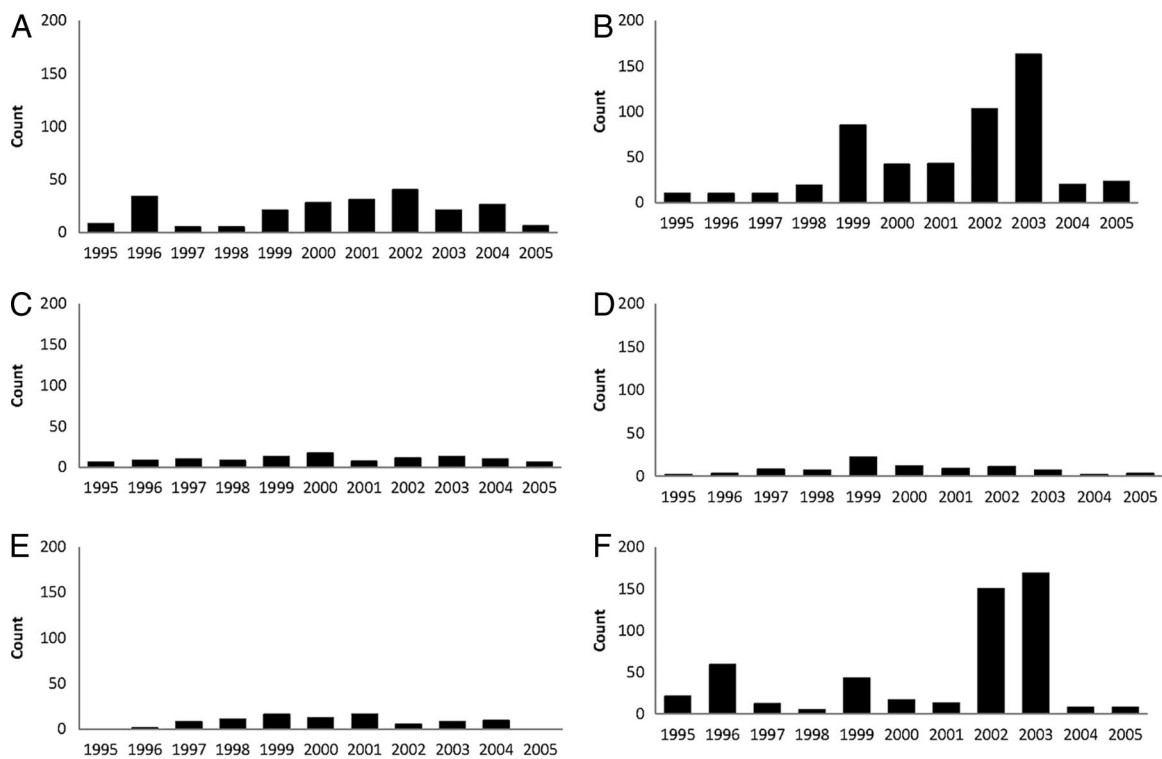
kappa statistic can be problematic when an outcome is rare.<sup>29-33</sup> Variables for thematic or episodic nature of the article and information on provider and/or parent knowledge attitudes, beliefs, or practices were dropped from the analysis, because reliability scores were too low.

Data were analyzed by using Excel (Microsoft Corporation, Redmond, WA) and Stata 10 (Stata Corp, College Station, TX).

The protocol was given an exempt status by the Committee on Human Research at the Johns Hopkins Bloomberg School of Public Health.

## RESULTS

Of the 1147 articles, 36% were written by newspaper staff, 25% were from wire services, 10% were letters to the editor, 9% were written by guest writers or were articles from other newspapers, and 20% did not identify the



**FIGURE 1** Major topics according to year (not mutually exclusive): A, vaccines are safe; B, vaccines have safety concerns; C, immunization required; D, immunization not required; E, school/state mandate; F, vaccine policy.

author. A substantial proportion of the articles (41%) had <500 words. Twenty percent of the articles were printed on the front page of any section of the newspaper; 42% were printed on page 6 or beyond. One-third (33%) of the articles were published in the main section of the newspaper, only 4% were printed in the health or science sections, and 63% either were published in other sections of the newspaper or the section was not documented in the electronic database.

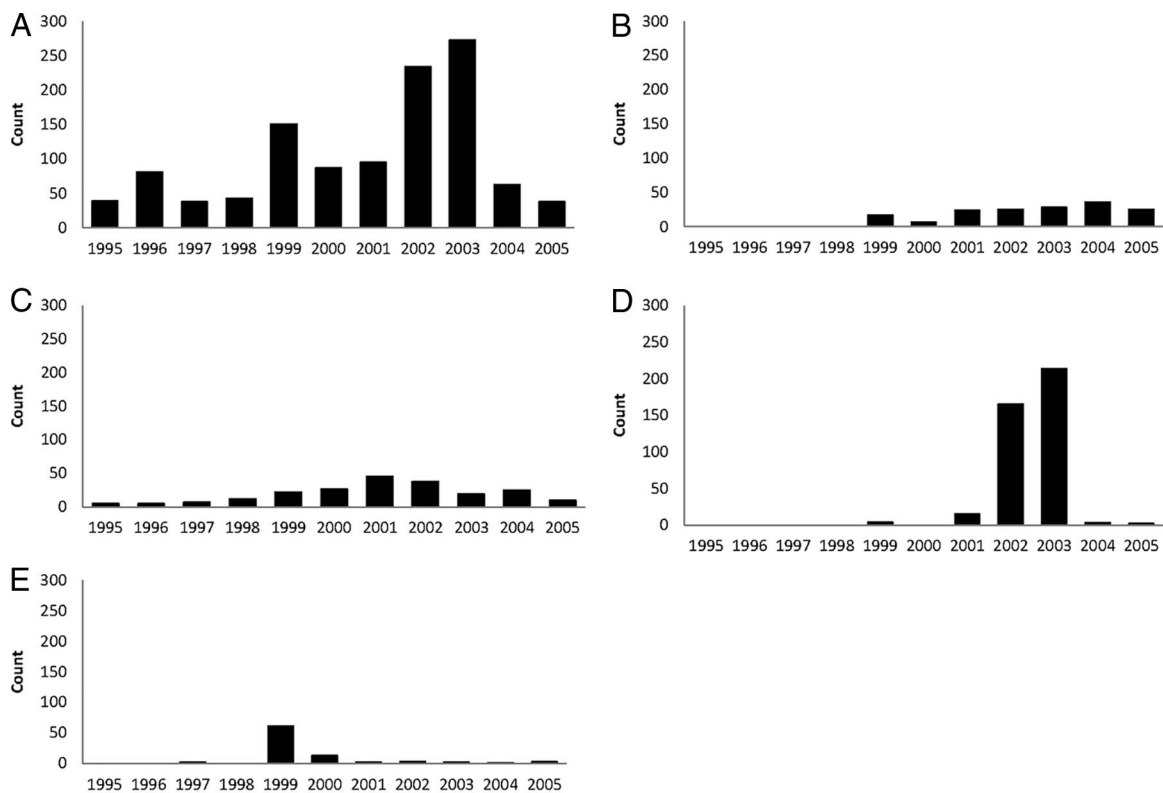
The mean number of vaccine-safety articles per state was 26 (median: 18). The majority (81%) was news articles, 10% were letters to the editor, 3.5% were editorials, and 3% were opinion pieces. Of the letters to the editor, health providers wrote 26% of them, parents wrote 17% of them, and 9% were written by advocacy groups; 44% of the articles could not be assessed because the writers' affiliations were

not identified. The average prominence score was 5.3 of a possible score of 10 (interquartile range: 3). There was no statistical difference in the prominence score of articles according to take-home message.

Most (72%) of the articles were written because of a policy/program or announcement about vaccines (eg, articles referring to a smallpox vaccination program or an announcement from the US Food and Drug Administration, pharmaceutical companies, or other groups). Six major topics were consistently discussed in the print media throughout the study period; vaccine-safety concerns and vaccine policy were the most frequent topics (Fig 1). The main topic in 20% of the articles was that vaccines are safe. During the 10 years studied, there were 3 spikes in the number of newspaper articles regarding vaccine-safety issues: in 1999, 40% (61 of 151)

of the articles were related to rotavirus vaccine, and in 2002 and 2003, 71% (165 of 234) and 79% (214 of 271), respectively, dealt with the smallpox vaccination–implementation program and smallpox vaccine–associated adverse events. Articles in which measles-mumps-rubella and thimerosal were discussed appeared throughout the study period (Fig 2). Over the 10 years studied, 45% of the articles had a negative take-home message. Excluding articles that referred to rotavirus and smallpox vaccines, 37% of the articles had a negative take-home message (range: 12%–61%). No time trends were apparent.

Article headlines mentioned vaccine safety or adverse reactions 48% of the time. Eighty-seven percent of the articles mentioned an effect of a vaccine or vaccine-related component; the highest number of adverse events, including death, autism, fever, seizures,



**FIGURE 2** Number of published vaccine-safety-related articles according to year: A, all topics; B, thimerosal-related articles; C, measles-mumps-rubella (MMR)-related articles; D, smallpox-related articles; E, rotavirus-related articles.

bowel disorders, and neurologic disorders, were attributed to diphtheria, tetanus, and whole-cell pertussis vaccine (DTwP), diphtheria, tetanus, and acellular pertussis vaccine (DTaP), smallpox vaccine, rotavirus vaccine, polio vaccine, measles-mumps-rubella vaccine, and thimerosal (Fig 3).

The mean number of sources used per article was 2.4 (SD: 0.7 [interquartile range: 1]). The majority of sources used were affiliated with government agencies (Table 1).

Data or statistics were reported in 76.3% of the articles and were generally related to vaccine adverse effects (45%), burden of disease (30%), vaccine coverage (20%), and safety of vaccines (5%). The data came from local, state, and/or federal government (27%), research studies (10%), and health care providers (5%); however, the majority (58%) of data sources was not identified.

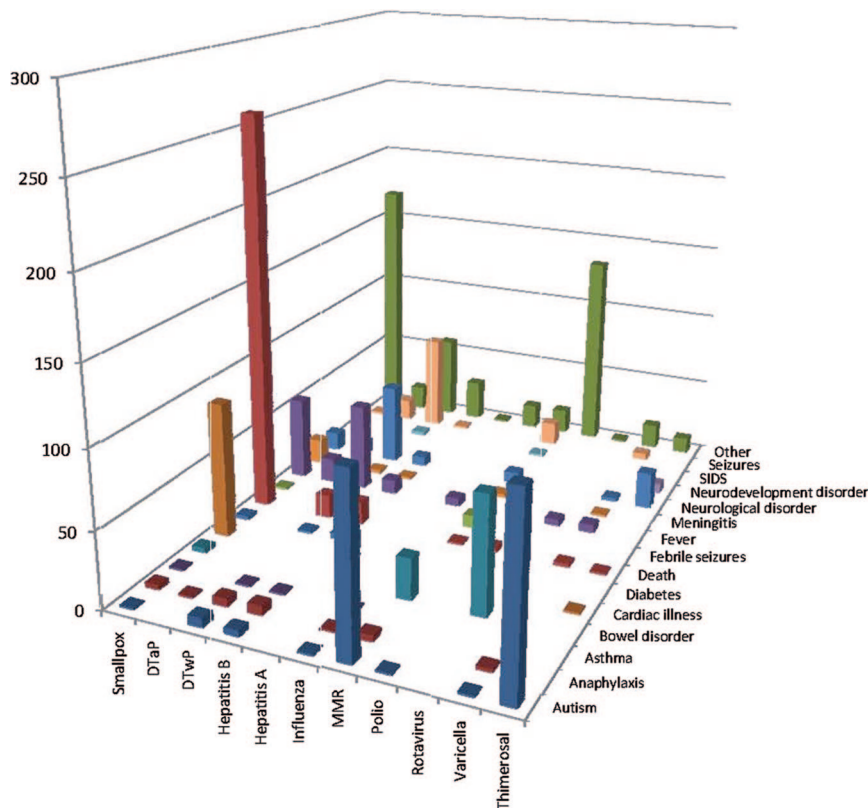
Only 188 (16.4%) articles mentioned the number of immunizations given to a child. Of these articles, 20.2% ( $n = 38$ ) suggested that the children received too many vaccines or that there is an immune-system overload; no major variation was seen over the 10-year period. Only 9% of the articles provided resources for more information about vaccines or vaccine safety.

### DISCUSSION

Immunization-safety issues have received positive/mixed and negative coverage. In the 10-year period studied, excluding articles regarding smallpox and rotavirus vaccine, 37% of the articles suggested that vaccines are not safe. Articles were often driven by policy/program announcements or triggered by individual events, as has been noted by other studies.<sup>34,35</sup> The level of coverage has been consistent

**TABLE 1** Affiliation of Sources Quoted in the Articles

Affiliation	Frequency (%)
Federal government agencies	603 (52.7)
Local or state government personnel	335 (29.3)
Health providers	273 (23.8)
Universities	255 (22.3)
Public health officials	193 (16.9)
Advocacy groups	168 (14.7)
Parents/guardians/relatives	166 (14.5)
Federal elected officials	164 (14.3)
Research (with unnamed sources)	147 (12.8)
Journal articles or books	146 (12.8)
Medical professional associations	137 (12.0)
Institute of Medicine/National Academy of Sciences	131 (11.4)
Pharmaceutical companies	107 (9.3)
Combination of institutions (eg, university and Centers for Disease Control and Prevention)	92 (8.0)
Advisory groups	88 (7.7)
Lawyers/legal advocate/court rulings	54 (4.7)
World Health Organization	40 (3.5)
Vaccine Adverse Event Reporting System	12 (1.1)
School officials/teachers	10 (0.9)
Others	348 (30.4)



**FIGURE 3**

Frequency of specific vaccine or vaccine component referred to in the articles (not mutually exclusive). DTwP indicates diphtheria, tetanus, and whole-cell pertussis; DTaP, diphtheria, tetanus, and acellular pertussis vaccine; MMR, measles-mumps-rubella; SIDS, sudden infant death syndrome.

except for years in which specific events triggered intense media interest in issues such as intussusception and rotavirus vaccine in 1999 and the smallpox vaccination program implementation in 2002–2003.

The majority of the news articles quoted government personnel and health care providers, sources one might expect to be supportive of vaccines. However, the benefits of vaccines did not always come across in the articles. Data were quoted in the majority of the articles; however, in 60% of the news articles, the data source was not identified. A 2007 review of videos available at youtube.com regarding immunization revealed similar results: 50% of the videos posted were not supportive of immunization.<sup>36</sup> Selective reporting of safety concerns is not unique to vaccines; newspapers generally favor report-

ing on events instead of themes or issues.<sup>37</sup>

Although we did not assess the impact of newspaper articles on public perceptions or the behavior of parents with respect to vaccination, the association between parents' self-reports of receiving information from the media and school exemptions<sup>11</sup> suggests the potential for the media to influence parents' opinions about the safety of vaccines and contribute to increasing parents' uncertainty about the safety of vaccines. Future research should focus on determining how parents interpret media messages about immunization and if vaccine-safety reporting from the news media affects parental vaccine knowledge, attitudes, and behaviors.

Despite vocal concerns raised by some parents and consumer groups,<sup>38</sup> only ~3% of articles dealt with the question of whether the current vaccination schedule results in young children

receiving too many vaccines. The majority (72%) of articles in this review was written because of policy or program announcements suggesting that such events may be an opportunity to educate the public about the safety and utility of vaccines.

We could not study newspaper coverage in 6 states (Delaware, Hawaii, Idaho, Montana, Vermont, and Wyoming), because electronic coverage of the newspapers for the complete duration of the study was not available. We only examined print news articles, although television and the Internet are potentially influential sources of information for parents.<sup>39,40</sup> However, newspaper coverage may be similar to coverage in other media formats.<sup>41</sup> We did not determine how readers interpreted messages provided by these articles.

## CONCLUSIONS

A small minority (9%) of the articles provided additional resource informa-

tion for parents. Health care providers can use encounters with media as a means to direct parents to reliable resources that provide current and appropriate information about vaccines, such as the Centers for Disease Control and Prevention, the American Academy of Pediatrics, and the World Health Organization. In addition, there is a need for the health care provider community to build better relationships with the media and contribute articles that are supportive of vaccines.<sup>42</sup> Ongoing monitoring of news reports on vaccine safety may help inform the content and framing of vaccine-safety messages.

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