Content and Design Attributes of Antivaccination Web Sites

Robert M. Wolfe, MD
Lisa K. Sharp, PhD
Martin S. Lipsky, MD

Background

Antivaccination movement has challenged the safety and effectiveness of recommended vaccines. The extent of concern in the United States was highlighted by a national survey that found that although the majority of parents supported vaccination, 25% believed that too many vaccinations could weaken children’s immune systems and 23% believed that children get too many immunizations.

Recent studies indicate that 66% of US adults (137 million) are now online and that 80% of all adults online use the Internet to look for health information. Furthermore, 52% of those who have visited online health sites believe that “almost all” or “most” of the health information they find online is credible. Individuals searching for vaccination information may find themselves visiting antivaccination sites. This study explored the content and design attributes of antivaccination sites that an individual might encounter doing a typical Web search, with the goal of enhancing our understanding of concerns raised on these sites.

Methods

Search Strategy

Using the Netlingo Dictionary of Internet Words (http://www.netlingo.com) and the Webopedia Online Computer Dictionary of Internet Terms (http://www.pcwebopedia.com), we defined a “Web page” as a single html file or document viewed on a Web browser and a “Web site” as a site (location) on the World Wide Web. Each Web site contains a “home page,” which is the first document users see when they enter the site. Each site is owned and managed by an individual, company, or organization.

A “link” (or “hyperlink”) is an element in an electronic document that links to another place in the same document or to an entirely different document. Typically, clicking on a hyperlink will transport a user to another document or section of the document.

Antivaccination Web pages were identified using Copernic 2000 v4.55a (Copernic Technologies Inc, Sainte Foy, Québec), an Internet search utility program designed to simultaneously submit searches on numerous search engines. We used 10 search engines: AltaVista, EuroSeek, Excite, Google, GoTo.com, HotBot, Infoseek, Lycos, Yahoo, and All the Web FAST Search, with up to 30 results returned on each engine for a maximum of 300 results per search. Two of the investigators (R.M.W., L.K.S.) jointly conducted 4 searches between August 3, 2000, and June 26, 2002.

Results

The most commonly found content claims were that vaccines cause idiopathic illness (100% of sites), vaccines erode immunity (95%), adverse vaccine reactions are underreported (95%), and vaccination policy is motivated by profit (91%). The most common design attributes were the presence of links to other antivaccination sites (100% of sites), information for legally avoiding immunizations (64%), and the use of emotionally charged stories of children who had allegedly been killed or harmed by vaccines (95%).

Conclusion

Antivaccination Web sites express a range of concerns related to vaccine safety and varying levels of distrust in medicine. The sites rely heavily on emotional appeal to convey their message.

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Author Affiliations: Department of Family Medicine, Northwestern University, Feinberg School of Medicine, Chicago, Ill (Drs Wolfe, Sharp, and Lipsky); Evanston-Northwestern Healthcare, Evanston, Ill (Drs Wolfe and Lipsky).

Corresponding Author and Reprints: Robert M. Wolfe, MD, Department of Family Medicine, Northwestern University, Feinberg School of Medicine, 710 N Lake Shore Dr, Room 1417, Chicago, IL 60611 (e-mail: r-wolfe@northwestern.edu).

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September 3, 2000, using the keywords vaccine, vaccinate, vaccination, immunize, immunisation, anti-vaccination, anti-immunization, and anti-immunisation.

The initial searches identified 851 links to Web sites, of which 79 were invalid or duplicate links. The resulting 772 sites were reviewed together by both searchers to select those for study based on the criteria below.

Inclusion and Exclusion Criteria
A Web site was considered for review if it contained content specifically opposing vaccination for human infants or children. The following Web sites were excluded: (1) online health/medical journals or newspaper sites, (2) listservs or newsgroups containing online conversations, and (3) sites not written in the English language. Two authors (R.M.W., L.K.S.) reviewed the 772 links, identifying 12 Web sites opposing childhood vaccinations. A secondary survey of all links leading from the 12 sites to other antivaccination sites identified 10 additional links resulting in a total of 22 sites for final data extraction. Of the final 22 sites, there were 16 from the United States, 2 from the United Kingdom, 2 from Australia, 1 from New Zealand, and 1 from France (text available in English).

Data Extraction
Data extraction included 11 Web site content attributes (antivaccination claims, Figure 1) modified from the work of Leask and Chapman, on the antivaccination movement in Australia, from the US Centers for Disease Control and Prevention criteria, and 2 items developed by the authors. In addition, 10 design attributes (Figure 2) were identified based on criteria published by Kim et al. Only material present on the original Web site was evaluated. Links to other sites were excluded. For each site, each content and design item was classified as present or absent. Two authors (R.M.W., L.K.S.) reviewed 4 sites separately, with 100% interrater reliability. These authors reviewed the 18 remaining sites jointly.

RESULTS
Content Variables: Antivaccination Claims
The total number of claims per site ranged from 2 to 11, with 18 (82%) of the sites exhibiting 7 or more of the 11 claims. Two sites with the fewest claims were created by medical researchers with publications in peer-reviewed medical journals.

“Vaccines cause idiopathic illness.” All of the sites included content suggesting that vaccines cause idiopathic illnesses. The most common illnesses ascribed to vaccination included: autism (specifically from measles/mumps/rubella [MMR] and/or diphtheria/pertussis/tetanus [DPT] vaccine), sudden infant death syndrome (SIDS), immune dysfunction, diabetes, neurologic disorders (including seizures, brain damage, learning disabilities, attention deficit disorder, antisocial behavior), and atopic disorders, including allergic rhinitis, eczema, and asthma.

“Hot Lots” and “Increased Risk From Multiple Simultaneous Vaccines.” Two claims related to issues of vaccine manufacture and administration. The first claim, that allegedly contaminated vaccination lots (ie, “hot lots”) are more likely to cause an adverse reaction, was addressed by 12 (55%) of the sites. The second claim, that giving multiple vaccines at the same time increases the risk of an adverse event, appeared on 11 (50%) of the sites. A number of sites where this claim appeared cited 2 published case reports that suggested that combined MMR vaccine was a risk factor for au-
tism. Several studies and medical review panels that have not supported this hypothesis were not referenced.

“Vaccines Erode Immunity” and “Immunity Is Temporary/Ineffect-
vive medicine without men-
ting homeopathy were often associated
vaccination reactions. Sites advocat-
tial methods of enhancing immunity,
reduction due to improved nutrition and
mune system, specifically inducing
several claims that naturally occurring
ting illnesses such as asthma and atopy, and that vaccinations inter-
that vaccine manufacturers make enormous
usual vaccination recommendations and
verse effects. More extreme argu-
by financial inducements from
manufacturers, especially in the
of gifts or research grants.

“Violation of Civil Liberties.” Seven

ted the fact that
ruses grown from cell cultures of
vaccines: lines MRC5 and WI-
uberty concerns associated with
mandated vaccination. Electronic vac-
cine registries, designed to allow track-
ing of childhood immunizations, were
example of “Big Brother”
nto the lives of citizens.

“Use of Aborted Fetal Tissue.” Seven
sites raised the fact that
vaccines (lines MRC5 and WI-
A vaccines.

Eleven (77%) of the sites mentioned
civil liberty concerns associated with
mandated vaccination. Electronic vac-
cine registries, designed to allow track-
ing of childhood immunizations, were
example of “Big Brother”
nto the lives of citizens.

“Diseases Have Declined” and “Ho-
mopathy Alternative.” Sixteen sites
stated that prior to the use of vacc-
cinations these diseases had begun to
decline due to improved nutrition and
giene, and that vaccines were given
due credit for these declines. Home-
opathy, alternative health, and natu-

nal methods of enhancing immunity,
such as breastfeeding or proper diet,
were promoted on many of these sites.
Homeopathy was also endorsed as a
means of reducing the severity of post-
vaccination reactions. Sites advocat-
ing homeopathy were often associated
with statements attacking Pasteur and
the germ theory of disease.

“Vaccine Policy Is Motivated by
Profit.” The idea that vaccine policy is
motivated by profit was found on 20 of
the sites (91%). The general thesis was
that vaccine manufacturers make enor-
mous profits, which influences uni-
versal vaccination recommendations and
promotes the cover-up of vaccine ad-
verse effects. More extreme argu-
ments posited that physicians are bi-
ased by financial inducements from
manufacturers, especially in the
form of gifts or research grants.

Design Attributes
Figure 2 shows the frequencies of the
design attributes we used to fur-
ther characterize these sites. All sites
had links to other antivaccination sites.
Ten (45%) of the sites displayed links
to authoritative provaccination sources
such as the Centers for Disease Con-
trol and Prevention. Stories of chil-
dren harmed by vaccines were very
common, as was information on how
to legally avoid vaccinations. Seven sites
(32%) displayed pictures of menacing
needles, and 5 sites (23%) displayed pic-
tures of children allegedly harmed or
killed by vaccine reactions.

COMMENT
This study systematically collected
formation on the content and design at-
tributes of antivaccination Web sites.
Our results show that such sites ex-
press a variety of claims that are largely
unsupported by peer-reviewed sci-
entific literature. There were 3 broad
themes expressed on the antivaccina-
tion Web sites: concerns about vac-
cine safety and effectiveness, concerns
about governmental abuses, and a pre-
ference for alternative health practices.
The key concern relates to the per-
ceived risk of disease, harm, or death
when a child receives a vaccine. Sec-
ond, mandated vaccination is viewed as
an unacceptable infringement of per-
sonal choice and civil liberties. Fur-
thermore, there is a pervasive sense of
distrust, expressed in beliefs that gov-
ernmental oversight bodies suppress re-
ports of adverse vaccine reactions and
collude with the pharmaceutical indus-
try to profit from vaccine sales. And
third, alternative health practices are
valued over allopathic health care, and
are believed to obviate the need for vac-
cination. The arguments used on these
sites are not new: most were used in the
19th century by opponents of compul-
sory smallpox vaccination.

Fifty-five percent of the sites pro-
vided personal accounts written by par-
ents who believed that their child was
killed or permanently harmed by vac-
cination, and almost one fourth of the
sites included pictures of the affected
children. Such visual images of pur-
ported adverse consequences can be un-
settling to parents facing vaccination de-
cisions. In social psychology terms,
these parents may be swayed by “false
consensus bias,” a tendency to rely on
personal experience as opposed to sci-
entific evidence. In essence, an indi-
vidual’s beliefs regarding vaccination are
unduly swayed by personal and emo-
tional anecdotes to the exclusion of evi-
dence. In contrast, the once overwhel-
mingly apparent visual images of the
benefits from vaccination have disap-
peared as their respective diseases—
such as polio—have disappeared.

Although this study did not for-
nally evaluate the accuracy of medi-
cal references provided on antivacci-
nation Web sites, a separate review
found that sites that contain citations
to scientific papers often misrepresented
their contents. Many claims we en-
countered were supported by refer-
ces from homeopathic or alterna-
tive medical literature. Typically,
arguments connecting vaccination to
adverse effects were made using the logical fallacy *post hoc ergo propter hoc* (“after this, therefore because of this”), which mistakes association for causation. For example, since autism occurs in the first 2 years of life when multiple vaccines are given, many anti-immunization proponents conclude that vaccines cause autism. Although controlled studies do not support this association, it remains an area of contention between public health authorities and antivaccinationists, reflected in recent congressional hearings about vaccine safety.27,28

This study is limited by the dynamic nature of the Internet, where entire Web sites appear and disappear or move to other “addresses” overnight. Defining the content of a site is also a problem. On the Internet, a document on another site, accessed by clicking on a link, is often no harder to reach than a document on the original site. This study looked only at pages on the original site, believing this implied more “ownership” of the material and provided a standardized method of assessing each site. The study was limited to English-language sites; therefore, the findings may not extend to antivaccination sites written in other languages.

Vaccination is not risk free, but most in mainstream medicine agree that the benefits of vaccination outweigh the risks.29 While the majority of the public accepts immunization, it appears that increasing numbers of parents are seeking philosophical exemptions from vaccination for their children. For example, in Colorado the rate of philosophical exemptions from vaccination rose from 0.87% in 1988 to 1.87% in 1998, with the rate of religious exemption holding steady at about 0.2%.30 Although a few unimmunized individuals are most likely protected by herd immunity, growing numbers of unvaccinated individuals could eventually pose a risk to both themselves and society.31 We believe our study findings can help direct research aimed at more effectively addressing the concerns of individuals opposing childhood vaccination.

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