

A Nationally Representative Content Analysis of Hospital Website Privacy Policies

Matthew S. McCoy, PhD¹
Angela Wu, JD¹
Sam Burdyl BS, BA¹
Yungjee Kim, MBA¹
Noell Kristen Smith, BA¹
Rachel Gonzales, MPH¹
Ari B. Friedman, MD, PhD¹

¹University of Pennsylvania, Philadelphia, PA

*Department of Medical Ethics and Health Policy
Blockley Hall
423 Guardian Drive
Philadelphia, PA 19104-4884
mmcco@pennmedicine.upenn.edu
215-746-4171

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Abstract

Importance: Hospital websites frequently use tracking technologies that transfer user information to third parties. It is not known whether hospital websites include privacy policies that disclose relevant details regarding tracking.

Objective: To determine whether hospital websites have accessible privacy policies and whether those policies contain key information related to third-party tracking.

Design: In this cross-sectional content analysis of hospital website privacy policies, hospital websites were first measured to determine whether they included tracking technologies that transferred user information to third parties. Hospital website privacy policies were then identified using standardized searches. Policies were assessed for length and readability. Policy content was analyzed using a data abstraction form. Tracking measurement and privacy policy retrieval and analysis took place from November 2023 to January 2024. Prevalence of privacy policy characteristics was analyzed using standard descriptive statistics.

Setting: Hospital websites.

Participants: A nationally representative sample of 100 non-federal acute care hospitals.

Main Outcomes: The primary study outcome was the availability of a website privacy policy. Secondary outcomes were the length and readability of privacy policies and the inclusion of privacy policy content addressing user information collected by the website, potential uses of user information, third-party recipients of user information, and user rights regarding tracking and information collection.

Results: Of 100 hospital websites, 96.0% (95% CI [90.1% - 98.9%]) transferred user information to third parties. Privacy policies were found on 71.0% (95% CI [61.6% - 79.4%]) of websites. Policies were a mean length of 2,527 (95% CI, [2,058 – 2,997]) words and written at mean grade level of 13.7 (95% CI [13.4 – 14.1]). Among 71 privacy policies, 97.2% (95% CI [91.4% – 99.5%]) addressed types of user information automatically collected by the website; 98.6% (95% CI [93.8% – 99.9%]) addressed how collected information would be used; 93.0% (95% CI [85.3% - 97.5%]) addressed categories of third-party recipients of user information, while 56.3% (95% CI [44.5 - 67.7%]) named specific third-party companies or services receiving user information.

Conclusions and Relevance: In this cross-sectional study of hospital website privacy policies, a substantial number of hospital websites did not present users with adequate information about the privacy implications of website use—either because they lacked a privacy policy or had a privacy policy that contained limited content about third-party recipients of user information.

Introduction

Hospital websites are an essential resource for patients seeking health information and services. With a few clicks, a visitor to a hospital website can find a physician, schedule an appointment, view test results, or access reliable medical information. Yet along with these benefits come privacy risks for patients. In 2021, Mass General Brigham and the Dana Farber Cancer Institute reached an \$18 million settlement with a class of plaintiffs who alleged that the hospital systems had used third-party tracking technologies on their public websites without seeking sufficient consent from users.¹ Although the settlement was noteworthy, subsequent research has shown that hospital websites' use of tracking technologies is commonplace.²⁻⁴

Privacy policies are often time-consuming to read and difficult to understand and thus provide an imperfect solution for protecting the privacy of hospital website users.⁵⁻⁷ Nonetheless, they serve important functions in the context of hospitals' use of tracking technologies. Because hospitals risk regulatory scrutiny or civil lawsuits if they fail to adhere to the terms of their privacy policies, privacy policies can provide a mechanism for holding hospitals accountable for commitments to protect user privacy. Privacy policies also allow researchers, journalists, and consumer advocates to identify any discrepancies between disclosed and actual privacy practices. Finally, though most hospital website users may not read the privacy policy, the availability of a privacy policy respects individuals' autonomy by giving them the ability to make better informed decisions about whether and in what ways they choose to use a site.

Despite their importance, little is known about the availability or content of hospital website privacy policies. While researchers have examined hospital websites, prior studies have focused on the content, accessibility, and usability of websites rather than their privacy policies.⁸⁻¹²

Conversely, there have been multiple studies of the privacy policies of health-related websites and apps, but these studies have not examined privacy policies of hospital websites despite the fact that these websites serve as an essential point of contact with the health care system.^{13–15}

Building on prior work examining the prevalence of third-party tracking on hospital websites,² the aims of this study were to determine, first, whether hospital websites have available privacy policies and, second, whether those policies contain information and are written in a way that would allow users to understand the types of personal information that the website may collect, potential third-party recipients of that information, and user rights with respect to tracking and data collection.

Methods

Study Population

To construct a nationally representative sample of U.S. hospitals, we identified all non-federal acute care hospitals in the American Hospital Association (AHA) database and their primary websites using an approach described in prior work.² Consistent with prior methodology, we excluded 47 hospitals for which a website could not be accessed.² We then selected 100 hospitals for privacy policy analysis via simple random sampling.

Tracking Measurement

To determine the prevalence and characteristics of tracking across hospital websites, we visited the homepage of each hospital website using webXray, an open source, automated tool that detects third-party tracking code on webpages and that has previously been used in academic

studies.¹⁶⁻¹⁹ We recorded the number of third-party data requests per page. These requests initiate data transfers, which typically include, at minimum, a user's IP address and the URL of the page being visited, to third-party domains—that is, domains other than that of the website the user is visiting. We also recorded the number of third-party cookies per page. Cookies are small pieces of code stored on a user's browser, which can serve as persistent identifiers, enabling third parties to track users across multiple sites. Tracking measurement took place on January 26, 2024. As a robustness check, we compared webXray results for a random subsample of 30 study websites to the results browser-based tools Ghostery and Privacy Badger, which identify and block transfers to third-party domains.

Privacy Policies

Privacy policies were independently obtained and analyzed by two reviewers (SB and YK) from November-December 2023. Disagreements were resolved in weekly consensus meetings with the lead and senior author.

To obtain website privacy policies, we visually inspected the homepage of each website for links to a “privacy policy”, “privacy statement”, “cookie statement”, or other documents that might plausibly contain information related to user privacy. If we were unable to locate a privacy policy, we used the browser's Find in Page functionality to perform a search for “policy” on the homepage. If we could not locate a privacy policy using these methods, we performed a Google search using the terms ([hospital name] AND “privacy policy”). Links to relevant documents were compiled for review.

We distinguished between website privacy policies and notice of privacy practice (NPP) documents based on their content, regardless of how they were labeled. A website privacy policy is a statement that describes how a website will collect, use, share, or sell data collected from users of the site, whereas an NPP describes how the institution will handle protected health information (PHI) collected during clinical encounters and billing.

Data Collection and Analysis

We collected data from privacy policies using a standardized data abstraction form. Drawing on prior studies of website privacy policies,²⁰⁻²³ we collected data in the following areas: information collected from website users (including both automatically collected and voluntarily provided information), uses of information collected from website users, third-party recipients of user information, user rights (such as a right to opt out of data collection), and any privacy protections for special populations.

In cases where a website had multiple relevant policy documents, documents were combined and treated as single policy for content analysis. In cases where a website combined an NPP and a privacy policy in a single document, we treated the document as a privacy policy and analyzed its contents using our standard approach.

Because length and complexity of privacy policies can be a barrier to user comprehension,^{13,24} we assessed the word count and readability of privacy policies, using document statistics in Microsoft Word Version 16.69.1. Readability was estimated using both the Flesch-Kincaid Grade Level, which indicates a reading level by school grade based on the number of syllables

per word and the average number of words per sentence, and the Flesch Reading Ease formula. Both scales have been validated in health care settings,^{25,26} are among the most commonly used measure of readability in the health care literature,²⁷ and have been used in prior studies of privacy policy readability.²⁴ Microsoft Word's embedded Flesch-Kincaid Grade Level tool has been found to be more reliable than other automated readability tools that use the Flesch-Kincaid Grade Level.²⁸ For websites that contained more than one document related to website privacy practices, we analyzed the reading level and word count of the document labeled "privacy policy." For websites that combined an NPP and a privacy policy in a single document, we calculated word count and readability over the entire document.

We calculated descriptive statistics using Stata SE (17.0, StataCorp LLC, College Station, TX) and R (4.2.3, open source) using two-tailed 95% confidence intervals and hypothesis tests. For comparison of the sample to the sampling frame of all non-federal acute care hospitals, chi-square tests were used. For comparisons within the sample, survey statistics were used (R survey package version 4.2) to allow for finite population correction.²⁹ For binary variables, the survey-weighted Rao-Scott scaled chi-squared distribution for the loglikelihood from a binomial distribution was used. Where either exactly 0 or 100% of sampled privacy policies contained an element, the Clopper-Pearson exact CI was used. We followed STROBE reporting guidelines for cross-sectional studies.³⁰ This study did not include human subjects and was therefore exempt from IRB review.

Results

Sample Characteristics

Table 1 compares the characteristics of the 100 hospitals included in the study sample to the characteristics of all nonfederal acute care hospitals included in the AHA database. The 100 hospitals included in the sample had 90 distinct websites. There were fewer websites than hospitals because some hospitals belonged to the same health system and shared a common website.

Tracking

We found that 96.0% (95% CI [90.1% - 98.9%]) of hospital websites had at least one third-party data request and 86.0% (95% CI [77.6% - 92.1%]) had at least one third-party cookie (Table S1). Websites transferred user information to a median of 9 (interquartile range [6 - 14]) third-party domains and had a median of 9 (interquartile range [3 - 16]) third-party cookies (Table S1). We validated webXray output against two non-automated, commercially available tools for a random subset of 30 hospital websites. For these websites, webXray recorded a median of 7 data transfers to third-party domains per website, Privacy Badger recorded a median of 7 with a correlation of 0.91 to webXray, and Ghostery recorded a median of 6, with a correlation of 0.84 to webXray.

Policy availability and readability

Overall, 71 (71%, 95% CI [61.6% - 79.4%]) websites had an accessible website privacy policy, of which 67 (67.0%, 95% CI [57.3% - 75.8%]) were found via visual inspection and 4 (4.0%, 95% CI [1.2% - 9.1%]) were found via Google search (Table 2). Additionally, 69 (69.0%, 95% CI [59.4% - 77.6%]) websites had a single privacy policy document, while 2 (2.0%, 95% CI [0.3% - 6.1%]) divided information related to website privacy practices into two or more

documents. Additionally, 1 (1.0%, 95% CI [0.1% - 4.4%]) website included only a document that was labeled as a privacy policy but was an NPP that contained no information regarding website privacy practices. Privacy policies were a mean length of 2,527 (95% CI [2,058 – 2,997]) words and were written at mean Flesch-Kincaid Grade Level of 13.7 (95% CI, [13.4 – 14.1]) and a mean Flesch Reading Ease score of 35.6 (95% CI [33.9 – 37.2]), which is considered difficult (Table 3).²⁶

Policy Content

Of 71 privacy policies, 69 (97.2%, 95% CI [91.4% - 99.5%]) addressed types of user information automatically collected by the website (Table 4). The most common information types were IP address (80.3%), web browser name and version (74.6%), pages visited within the site (73.2%), and the website from which the user arrived (73.2%). Additionally, 68 (95.8%, 95% CI [89.3% – 99.0%]) policies addressed the collection of information voluntarily provided by users, including contact information (94.4%), name (87.3%), and demographic information (60.6%).

Nearly all policies, 70 of 71 (98.6%, 95% CI [93.8% - 99.9%]), addressed purposes for which user information is collected (Table 5). Nearly three quarters of policies (73.2%, 95% CI [62.1 - 82.7]) indicated that user information would be utilized for marketing and advertising purposes. A majority of policies, 66 (93.0%, 95% CI [85.3 - 97.5]), addressed third-party data recipients (Table 5). The most common categories of disclosed third-party recipients were service providers (70.4%), marketers and advertisers (38.0%), and subsequent firm owners (38.0%). Specific third-party companies receiving user data were named in 40 (56.3%, 95% CI [44.5% - 67.7%]) policies, with Google (49.3%) being the most common.

We found that 57 (80.3%, 95% CI [69.9% - 88.5%]) of policies addressed user privacy rights, the most common of which was the ability to disable site cookies (66.2%) and the ability to change or delete information collected by the website (47.9%) (Table S2). Additionally, 51 (71.8%, 95% CI [60.5 - 81.5]) privacy policies addressed privacy protections for special populations. All 51 of these policies addressed protections for children and 2 (2.8%) also addressed protections for disabled website users.

Discussion

In this cross-sectional study of a nationally representative sample of 100 non-federal acute care hospitals, we found that while 96.0% of hospital websites exposed users to third-party tracking, only 71.0% of websites had an available website privacy policy. Policies averaged more than 2,500 words in length and were written at a college reading-level. Given estimates that more than half of adults in the United States lack literacy proficiency and that the average patient in the United States reads at a grade 8 level, the length and complexity of privacy policies likely pose substantial barriers to users' ability to read and understand them.^{25,31}

When available, privacy policies frequently detailed types of user information collected by the website and how that information might be used, but were less informative with respect to specific third-party recipients of user information. Only 56.3% of policies (and only 40 hospitals overall) identified specific third-party recipients. Named third-parties tended to be companies familiar to users, such as Google. This lack of detail regarding third-party data recipients may lead users to assume that they are being tracked only by a small number of companies that they

know well, when in fact hospital websites included in this study transferred user data to a median of 9 domains. Prior research has also shown that a wide range of companies commonly operate trackers on hospital websites, including data brokers and advertising companies with little or no consumer facing presences.²

This study is limited by the fact that our manual search strategies may have failed to identify some website privacy policies and, thus, undercounted the number of available policies.

However, because we systematically searched for policies using multiple methods, it is unlikely that typical website users would be able to find policies not identified in this study. We assessed policy readability using the Flesch-Kincaid Grade Level formula and the Flesch Reading Ease formula. Other readability formulas may generate different scores, though their outputs are generally well correlated.³² Additionally, we are unable to determine the extent to which hospitals abide by key provisions in their privacy policies. We were limited by resources to evaluating only 100 hospital websites. However, since we used the AHA database as a sampling frame, the results are nationally representative within their calculated confidence intervals.

Despite these limitations, our findings make a significant contribution to the growing literature on hospital and other health care providers' use of tracking technologies on their websites by showing that a substantial number of hospital websites do not present users with adequate information about the privacy implications of website use—either because they lack a privacy policy or have a privacy policy that contains incomplete information about third-party tracking.

In addition to presenting risks for users, inadequate privacy policies may pose risks for hospitals. While hospitals are generally not required under federal law to have a website privacy policy that discloses their methods of collecting and transferring data from website visitors, hospitals that do publish website privacy policies may be subject to enforcement by regulatory authorities like the Federal Trade Commission (FTC).³³ The FTC has taken the position that entities that publish privacy policies must ensure that these policies reflect their actual practices.³⁴ For example, entities that promise they will delete personal information upon request but fail to do so in practice may be in violation of the FTC Act.³⁴ Additionally, as a contractual matter, website privacy policies can become legally binding documents, and breaches of such policies can elicit breach of contract claims under state law.³⁵ Websites that collect specific categories of information from certain users may also be subject to other federal and state-specific requirements in terms of data collection and notice.³⁶ While the suit against Mass General Brigham and the Dana Farber Cancer Institute was brought under Massachusetts law, plaintiffs have brought similar class action lawsuits in multiple states.¹

To effectively protect user privacy, hospitals should carefully weigh the costs and benefits of including third-party trackers on their websites and should eliminate unnecessary third-party tracking technologies. They should also ensure that they have accessible and comprehensive privacy policies, which allow others to hold the hospitals accountable for their privacy practices and give users the resources they need to make informed decisions about website use.

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Table 1: Sample characteristics compared to all non-federal acute care US hospitals

| | Study Sample (N=100) | All nonfederal acute care US hospitals (N=3747) | p value |
|-----------------------------------|---------------------------------|--|----------------|
| | No. (%) | No. (%) | |
| Region | | | 0.282 |
| Northeast | 15 (15.0) | 452 (12.1) | |
| Midwest | 19 (19.0) | 816 (21.8) | |
| South | 39 (39.0) | 1657 (44.2) | |
| West | 27 (27.0) | 774 (20.7) | |
| Puerto Rico | 0 (0.0) | 48 (1.3) | |
| Profit Status | | | 0.619 |
| For Profit | 18 (18.0) | 754 (20.1) | |
| Non-Profit | 58 (58.0) | 2275 (60.7) | |
| Public | 24 (24.0) | 714 (19.1) | |
| Unknown | 0 (0.0) | 4 (0.1) | |
| Part of a hospital system | | | 0.199 |
| Yes | 71 (71.0) | 2434 (65.0) | |
| No | 29 (29.0) | 1313 (35.0) | |
| Medical school affiliation | | | 0.385 |
| Yes | 36 (36.0) | 1199 (32.0) | |
| No | 64 (64.0) | 2548 (68.0) | |
| Size | | | 0.335 |
| Small (<100 beds) | 55 (55.0) | 1814 (48.4) | |
| Medium (100 – 499 beds) | 14 (14.0) | 694 (18.5) | |
| Large (> 500 beds) | 31 (31.0) | 1239 (33.1) | |

* Excludes 47 hospitals for which a website could not be identified

**P-values calculated from Chi-square goodness of fit test

Table 2: Availability of privacy policies for hospital websites

| | N=100 |
|---|-------------------------|
| | No. (%) [95% CI] |
| Websites with a website privacy policy | 71 (71.0) [61.6 – 79.4] |
| Single document | 69 (69.0) [59.4 - 77.6] |
| Multi document | 2 (2.0) [0.3 – 6.1] |
| Found via visual inspection | 67 (67.0) [57.3 - 75.8] |
| Found via Google search* | 4 (4.0) [1.2 - 9.1] |
| Found via browser search** | 0 (0.0) [0.0 - 3.6] |
| Websites without a website privacy policy | 29 (29.0) [20.6 – 38.4] |
| NPP mislabeled as privacy policy | 1 (1.0) [0.1 - 4.4] |
| No privacy policy located | 26 (26.0) [18.0 - 35.2] |
| Policy link broken | 2 (2.0) [0.3 - 6.1] |

*Privacy policy was located using a Google search for the hospital name and “privacy policy.”

**Privacy policy was located by searching within the page using the web browser’s Find in Page functionality.

Table 3: Length and readability of 71 hospital website privacy policies

| | Mean [95% CI] |
|----------------------------|-----------------------|
| Word Count | 2,527 [2,058 – 2,997] |
| Flesch-Kincaid Grade Level | 13.7 [13.4 - 14.1] |
| Flesch Reading Ease | 35.6 [33.9 - 37.2] |

Table 4: Prevalence of hospital website privacy policy statements addressing user information collection

| | N=71 |
|---|--------------------------------|
| | No. (%) [95% CI] |
| Privacy policy addresses automatically collected information | 69 (97.2) [91.4 - 99.5] |
| IP address | 57 (80.3) [69.9 - 88.5] |
| Web browser name and version | 53 (74.6) [63.6 - 83.9] |
| Pages visited within the site | 52 (73.2) [62.1 - 82.7] |
| Operating system name and version | 44 (62.0) [50.2 - 72.9] |
| User behavior on site | 40 (56.3) [44.5 - 67.7] |
| Date and time of visit | 38 (53.5) [41.8 - 65.0] |
| Location data | 27 (38.0) [27.1 - 49.8] |
| Duration of activity | 22 (31.0) [20.9 - 42.5] |
| Terms used in site search engine | 12 (16.9) [9.3 - 26.9] |
| Passwords | 11 (15.5) [8.3 - 25.2] |
| Volume of data storage and transfers | 1 (1.4) [0.1 - 6.2] |
| Privacy policy addresses voluntarily provided information | 68 (95.8) [89.3 - 99.0] |
| Contact information | 67 (94.4) [87.3 - 98.3] |
| Name | 62 (87.3) [78.1 - 93.8] |
| Demographic information | 43 (60.6) [48.8 - 71.6] |
| Financial/legal information | 27 (38.0) [27.1 - 49.8] |
| Interests | 24 (33.8) [23.4 - 45.4] |

Table 5: Prevalence of hospital website privacy policy statements addressing uses and third-party recipients of user information

| | N=71 |
|--|-------------------------|
| | No. (%) [95% CI] |
| Privacy policy addresses uses of user information | 70 (98.6) [93.8 - 99.9] |
| Contact user regarding programs or services | 62 (87.3) [78.1 - 93.8] |
| Track and analyze site use | 61 (85.9) [76.4 - 92.8] |
| Provide information that may be of interest | 57 (80.3) [69.9 - 88.5] |
| Provide marketing and advertising communications | 52 (73.2) [62.1 - 82.7] |
| Improve experience as a user of hospital programs and services | 49 (69.0) [57.5 - 79.1] |
| Manage programs and services | 48 (67.6) [56.0 - 77.9] |
| Maintain and gain access to specially personalized areas of the site | 37 (52.1) [40.4 - 63.7] |
| Prevent, detect, and investigate misuses | 30 (42.3) [31.0 - 54.1] |
| Administer surveys or contests | 25 (35.2) [24.6 - 46.9] |
| Verify user identity | 23 (32.4) [22.1 - 44.0] |
| Auditing and security | 13 (18.3) [10.4 - 28.5] |
| Process and ship requested and purchase products | 11 (15.5) [8.3 - 25.2] |
| Maintain philanthropic endeavors and programs | 7 (9.9) [4.3 - 18.3] |
| Manage business relationships | 4 (5.6) [1.7 - 12.7] |
| Privacy policy address third-party data recipients | 66 (93.0) [85.3 - 97.5] |
| Service providers | 50 (70.4) [59.0 - 80.3] |
| Specific third-party company* | 40 (56.3) [44.5 - 67.7] |
| <i>Google/Alphabet</i> | 35 (49.3) [37.7 - 61.0] |
| <i>Facebook/Meta</i> | 20 (28.2) [18.5 - 39.5] |
| <i>X/Twitter</i> | 10 (14.1) [7.2 - 23.6] |
| <i>Other named company**</i> | 7 (9.9) [4.3 - 18.3] |
| Marketing and advertising companies | 27 (38.0) [27.1 - 49.8] |
| Buyers or successors in the event of a merger | 27 (38.0) [27.1 - 49.8] |
| Contractors | 23 (32.4) [22.1 - 44.0] |

*Subcategories sum to more than the total number of websites naming a specific third-party company because some privacy policies named more than one specific third-party company.

**The number of website privacy policies naming a specific company other than Google, Facebook, or X. There were 9 companies mentioned by these 7 policies.

Table S1: Third-party tracking on hospital website homepages

| | (N = 100) |
|--|-------------------------|
| Homepages with a third-party request, No. (%) [95% CI] | 96 (96.0) [90.0 – 98.9] |
| Homepages with a third-party cookie, No. (%) [95% CI] | 86 (86.0) [77.6 – 92.1] |
| Third-party requests per homepage (Median, IQR) | 9 (6 - 14) |
| Third-party cookies per homepage (Median, IQR) | 9 (3 - 16) |

Table S2: Prevalence of hospital website privacy policy statements addressing special populations and user rights

| | N=71 |
|---|-------------------------|
| | No. (%) [95% CI] |
| Policy addresses user rights | 57 (80.3) [69.9 - 88.5] |
| Disabling site cookies | 47 (66.2) [54.6 - 76.6] |
| Ability to change/delete information | 34 (47.9) [36.3 - 59.6] |
| Right to access information | 20 (28.2) [18.5 - 39.5] |
| Opting out of analytics collection | 28 (39.4) [28.4 - 51.2] |
| Do Not Track functionality | 14 (19.7) [11.5 - 30.1] |
| Right to opt out of sale of information | 7 (9.9) [4.3 - 18.3] |
| Opting in or out of sharing location data | 7 (9.9) [4.3 - 18.3] |
| Ability to clear location data | 2 (2.8) [0.5 - 8.6] |
| Ability to change or disable location sharing functionality | 2 (2.8) [0.5 - 8.6] |
| Policy addresses privacy for any special population | 51 (71.8) [60.5 - 81.5] |
| Children* | 51 (71.8) [60.5 - 81.5] |
| Children under 13 | 41 (57.7) [45.9 - 69] |
| Children under 18 | 11 (15.5) [8.3 - 25.2] |
| Disabled | 2 (2.8) [0.5 - 8.6] |

*Subcategories sum to more than 51 because some privacy policies included multiple provisions for different child age groups.