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45

46 **ABSTRACT**

47

48 **BACKGROUND:** HIV risk and prevention information is increasingly complex and poses  
49 challenges for gay, bisexual and other men who have sex with men (GBMSM) seeking to find,  
50 understand, and apply this information. We conducted a directed content analysis of Canadian  
51 HIV websites to see what information is provided, how it is presented, and experienced by users.

52 **METHODS:** Eligible sites provided information relevant for GBMSM on HIV risk or  
53 prevention, were from community or government agencies, and for the public. Sites were found  
54 by google search using French and English search terms, expert suggestion, and review of links.  
55 Eligibility and content for review was determined by two reviewers, and coded using a  
56 standardized form. Reading grade level and usability scores were assessed through Flesch-  
57 Kincaid and LIDO instruments.

58 **RESULTS:** Of 50 eligible sites, 78% were from community agencies, and 26% were focused on  
59 GBMSM. Overall, fewer websites contained information on more recent biomedical advances  
60 (e.g., pre-exposure prophylaxis, 10%) or community-based prevention strategies (e.g.,  
61 seroadaptive positioning, 10%). Many sites had high reading levels, used technical language, and  
62 relied on text and prose. 44% of websites had no interactive features, and most had poor usability  
63 scores for engageability.

64 **CONCLUSION:** Overall we observed less information about emerging topics and a reliance on  
65 text with high reading requirements. Our study speaks to potential challenges for agency website  
66 operators to maintain information relevant to GBMSM which is up-to-date, understandable for a  
67 range of health literacy skills, and optimizes user experience.

68

69 **Keywords:** health literacy; HIV; men who have sex with men; websites; Canada.

70

## 71 INTRODUCTION

72 Over the past decade, important advances in biomedical prevention of HIV have been  
73 added to the prevention repertoire of gay, bisexual and other men who have sex with men  
74 (GBMSM). Findings such as the demonstration of effectiveness of daily and intermittent HIV  
75 pre-exposure prophylaxis (PrEP),<sup>1</sup> or that HIV positive GBMSM with undetectable viral loads  
76 due to antiretroviral therapy pose a low risk of transmission to HIV negative partners<sup>2</sup> are being  
77 used and promoted as biomedical HIV prevention strategies to GBMSM alongside existing  
78 prevention tools such as condoms or sero-adaptive strategies.<sup>3</sup> These advances also add to the  
79 increasingly complex landscape of HIV prevention information that GBMSM must navigate to  
80 find, understand, compare, and apply these prevention strategies appropriately.

81 Participation in self-care like HIV prevention is predicated partly on individuals' health  
82 literacy skills.<sup>4</sup> Despite a lack of consensus on a singular definition of health literacy, there is  
83 conceptual agreement across all definitions that reflect competencies in accessing,  
84 understanding, appraising, and applying health-related information to engage with the demands  
85 of different health contexts in order to promote and maintain good health across the life-  
86 course.<sup>5,6,7</sup> In community, clinical and online settings, health care providers and agencies play an  
87 important role in ensuring access, understanding and appraisal of information by providing  
88 health materials and services that align with the range of knowledge and skills for target  
89 populations.<sup>8</sup> For example, ensuring text is written at less than a 6<sup>th</sup> grade level and using  
90 alternate ways of presenting information such as images or videos can help to reach people with  
91 lower health literacy skills.<sup>9</sup> The Internet is an important access point for health information and  
92 services with approximately 70% of North American adults searching for health information

93 online.<sup>10</sup> Beyond simple information retrieval, the Internet provides opportunities for interactive  
94 communication (e.g., online health communities, blogs or podcasts) and tailoring of information  
95 (e.g., risk calculators) to support and guide information seekers to online health resources.<sup>11</sup>

96 To date, little research attention has been given to understanding sexual health literacy  
97 skills. A recent scoping review to address this gap proposed the following definition of sexual  
98 health literacy: “an individual’s knowledge, beliefs, attitudes, motivations and competencies in  
99 accessing, understanding, evaluating and applying sexual health information in everyday life to  
100 negotiate and make judgements and decisions concerning sexual healthcare, health promotion,  
101 relationships and wellbeing”.<sup>12</sup> Little is also known about the health literacy skills of GBMSM,  
102 with studies focusing primarily on knowledge. For example, a recent Canadian study looking at  
103 PrEP knowledge found that only half of GBMSM were PrEP aware, and that knowledge varied  
104 based on sexual identity, geography, education and age.<sup>13</sup> GBMSM receive HIV-related  
105 information from multiple sources in physical and virtual spaces, including partners, peers,  
106 health care providers or agencies, and news media.<sup>14</sup> In a recent Ontario online survey of 1,830  
107 GBMSM, 92% reported ever looking for sexual health information online, and when asked to  
108 describe information they would like to see online, undetectable HIV viral load and sex with  
109 HIV positive partners, and risks associated with various sexual practices were common themes.<sup>15</sup>  
110 In addition to information *provision*, the internet also provides a space for *engaging* GBMSM  
111 who may have lower levels of HIV-related knowledge.<sup>16</sup> Accordingly, many organizations in the  
112 field of HIV prevention are committed to online health promotion including websites, social  
113 marketing campaigns, offering support through online chat rooms, sex-seeking websites or apps,  
114 or are active on social media<sup>17-19</sup> where messaging about combining multiple prevention  
115 strategies is increasingly common.<sup>20</sup>

116           Given these trends, there is a striking research gap in relation to *what* information is  
117 presented and *how* it is presented to, understood and applied by GBMSM. In this study, our  
118 objective was to use health literacy as a framework to assess the current state of information  
119 provided about risk factors and prevention strategies for HIV on Canadian agency websites to  
120 GBMSM. We focused on Canadian websites as Canadian agencies who are providing HIV  
121 related education on their websites were identified as the primary audience for the study  
122 findings. We set out to understand what information on risk factors and prevention strategies is  
123 provided and how it is presented. We also assessed the readability, usability, and interactivity of  
124 these websites. We also examined whether websites with an explicit focus on GBMSM would  
125 differ in the nature of the risk and prevention information provided. Ultimately, we hoped to  
126 better understand the extent to which agencies are meeting the online health literacy needs of  
127 GBMSM, and identify areas for improvement.

## 128 **METHODS**

129           We conducted a directed content analysis of Canadian health agency websites, using  
130 Nutbeam’s definition of health literacy as a theoretical framework for our study in determining  
131 website characteristics of interest.<sup>21</sup> *Functional* health literacy skills include reading, writing and  
132 numeracy necessary for everyday use, and support the comprehension and communication of  
133 health facts, awareness of health services, and health system use. To appropriately meet  
134 functional health literacy needs websites should be readable at a low grade level, use different  
135 formats for conveying information, and be easy to use. *Interactive* health literacy skills include  
136 cognitive and social skills necessary to support the development of personal skills in supportive  
137 environments, and are directed at improving individual motivation and self-confidence to  
138 enhance positive health behaviours, Website features enabling interactive health literacy include

139 comparisons of the effects of different behaviours or interventions, and interactive features that  
140 promote learning (e.g., quizzes). Finally, *critical* health literacy skills consist of advanced  
141 analytical, advocacy, and social skills enabling positive change within communities and  
142 societies. One way in which websites can support critical health literacy would be to provide  
143 tools and resources to support community advocacy.

144 Determining website eligibility and coding were performed by four team members  
145 (including two senior researchers and two research assistants with extensive training in gay  
146 men's health research). Each step was completed independently by two reviewers with resolution  
147 of discrepancies through discussion or consultation with a third reviewer.

148 Reviewed websites met the following criteria: i) developed by a Canadian agency (e.g.,  
149 government, community groups, AIDS Service Organizations); ii) included information on HIV  
150 risk or prevention deemed relevant for GBMSM (i.e., at minimum describing HIV transmission  
151 via anal sex); iii) targeted a lay audience (i.e. not for health care professionals or researchers),  
152 and iv) English or French language. Websites that represented social marketing campaigns were  
153 included if the campaign was released between January 2011 and October 2014 (when the  
154 website search was conducted).

155 We identified websites meeting our inclusion criteria in three steps (Figure 1). First, we  
156 conducted a google.com search in October 2014 in each of Canada's official languages (English  
157 and French) with geographic restriction to Canada using combinations of relevant search terms.<sup>a</sup>  
158 We excluded search results for research abstracts and reviewed the top 100 remaining results in  
159 each search to identify websites to review. If a search result was a document (e.g., PDF file), the

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<sup>a</sup> English: HIV, risk, chance, probability, prevent, gay, bisexual, trans, GBMSM, men who have sex with men;  
French: VIH, risque, prevention, probabilité, chance, gay, gai, bisexual, trans, HARSAH.

160 website of the authoring agency was examined. Second, study team members, all of which have  
161 extensive experience in HIV prevention, as well as other Canadian experts who occupied  
162 leadership positions in sexual health and HIV prevention for GBMSM identified additional  
163 agency websites or social marketing campaigns. Websites and social marketing campaigns  
164 meeting the inclusion criteria were included. Third, while reviewing links and resources on  
165 websites during the coding step, we identified additional websites that met our inclusion criteria  
166 and that we included in our review.

167 Eligible websites were reviewed to identify the most relevant content related to HIV risk  
168 and prevention for detailed coding, documented via screen capture. If multiple websites were  
169 identified for a single agency these were reviewed as a group to yield one set of results per  
170 agency. We developed a standardized coding form to extract website characteristics which was  
171 finalized following pilot testing on five websites and included the following broad domains:

- 172 i. *Website description:* Agency type, language, focus (HIV, sexual health, and/or general  
173 health), and how GBMSM were targeted (no focus, specific focus, or sole focus on  
174 GBMSM).
- 175 ii. *HIV risk factors and prevention strategies:* The research team met in the Fall of 2014 to  
176 discuss and identify topics that were most relevant to GBMSM in relation to HIV risk and  
177 prevention. We identified 19 risk factor topics and 24 HIV prevention topics that became  
178 the focus of our analysis, and documented the number of topics on each website.
- 179 iii. *Presentation of risk and prevention information:* Whether risk factors and prevention  
180 strategies are compared or contrasted to indicate which activities are at greater or lower  
181 risk of HIV transmission, and which strategies are more or less effective for prevention,  
182 the use of prose or numeric formats to describe the effects of risk factors or prevention



183 strategies (and use of absolute or relative terms to describe those effects), and formats  
184 used to present the information.

185 iv. *Website readability, usability, and interactivity*: Using a representative sample of text  
186 from the home page, we assessed readability of websites (word complexity and sentence  
187 length) by calculating Flesch-Kincaid Reading Ease and Grade Level using a publicly  
188 available online tool<sup>22</sup> and assessing type of language used (colloquial, plain or technical).  
189 We used the usability sub-section of the Minervation validation instrument for healthcare  
190 websites to assess usability (a numeric score based on clarity and consistency of website  
191 design, functionality and engageability).<sup>23,24</sup> We assessed whether information was easy  
192 to find (if found by google search, on the home page, or one click away from the home  
193 page; if found within the website content versus in a resource that needed to be  
194 downloaded). We also assessed whether websites included interactive features (e.g.,  
195 opportunity to ask questions or search for clinics) and were connected to social media.

196 Coding was conducted separately by two reviewers and entered into EpiData; identified  
197 discrepancies were resolved using the same dual review process, with the following exceptions.  
198 Documentation of individual risk factors, prevention strategies or website features by at least one  
199 reviewer was considered sufficient. For numeric scores or grade level, we calculated the average  
200 of the two reviewers.

201 Our data analysis was primarily descriptive. We used ANOVA to test for differences in  
202 the number of risk factors and prevention strategies between websites with or without an explicit  
203 focus on GBMSM, and linear regression to assess the relationship between the number of risk  
204 factors and prevention strategies presented on a website and whether that differed by these two  
205 website types. Finally, we used Chi-square tests to compare whether individual risk or

206 prevention topics differed between websites with or without explicit focus on GBMSM, using  
207 the Holm-Bonferroni method to adjust for multiple comparisons. Statistical analyses were  
208 performed in SPSS and R. Ethics approval was not required as this study was based on a review  
209 of publicly available information. No user-generated content was included in our review.

## 210 **RESULTS**

211 We identified 50 Canadian agencies with websites eligible for review (Figure 1), with 24  
212 (48%) having an explicit GBMSM focus. The majority of websites were operated by  
213 community-based organizations (76%), were English language (60%), and focused on HIV or  
214 sexual health (78%; Table 1). Twenty percent of websites were or included social marketing  
215 campaigns.

216 The frequencies for the HIV risk factors and HIV prevention strategies available on the  
217 websites reviewed are shown in Table 2. The mean number per website was 8.5 risk factors  
218 (range=0-17, standard deviation (SD)=3.3) and 8.2 prevention strategies (range=0-18, SD=4.2).  
219 While these mean numbers were higher among websites with an explicit GBMSM focus, this  
220 was not statistically significant. Similarly, while many topics were more common on websites  
221 with an explicit GBMSM focus, these differences were not significant after adjusting for  
222 multiple comparisons (Table 2). On linear regression, we found a significant linear relationship  
223 between the numbers of risk factors and prevention strategies ( $p=3 \times 10^{-8}$ , adjusted  $R^2=0.53$ ), and  
224 the relationship was much stronger for websites with an explicit GBMSM focus (slope=1.1  
225 versus 0.3,  $p<0.01$ ).

226 Most websites compared risk factors directly to each other while direct comparisons were  
227 less common between prevention strategies (63% and 15% respectively; Table 3). Similarly,  
228 websites more commonly described the effects of HIV risk factors compared to the effects of

229 prevention strategies (86% and 65% respectively); where described, this was most commonly  
230 done through prose, with absolute terms (e.g., high, medium, low) more common for risk factors  
231 and relative terms (e.g., increases, lowers) for prevention strategies. Few sites presented numeric  
232 information, although this was more common for prevention strategies (23%). We found that  
233 19% of websites presented risk information using an equation format (e.g., HIV transmission =  
234 partner having HIV + body fluid that transmits HIV + nature of the sexual act). Information  
235 about risk factors was more often presented using formats other than text (such as tables, images,  
236 graphs; 27% of websites with risk information) compared to prevention strategies (17%).

237 Overall, the median Flesch-Kincaid Reading Ease score and mean Grade Level was 62.5  
238 (out of 100; range 39.3-80.3) and 9.8 (range 5.6-13.6, where  $\geq 10$  is fairly difficult) respectively.  
239 While most websites used plain language (88%), 40% also used technical language. The overall  
240 mean usability score was 36.6 (out of 50; range 26-46), with websites scoring lower on  
241 engageability (3.8 out of 12; range 1.5-8.5) compared to other usability sub-domains. Fifty-six  
242 percent of websites included interactive features, with submitting a question (40%) and ability to  
243 search for clinics (26%) being most common (Table 1). Websites were most frequently  
244 connected to Facebook (74%), Twitter (68%), and Youtube (36%) accounts. Information on risk  
245 factors or prevention strategies was easy to find (by google search, on home page, or one click  
246 away from home page) for approximately a quarter of websites, and often required downloading  
247 a document (Table 3).

## 248 **DISCUSSION**

249 While most websites contained information on well-established risk factors and  
250 prevention strategies (e.g., risk by body fluid type, condoms) more recent information or  
251 community-developed prevention strategies were less common (e.g., HIV viral load, acute HIV

252 infection; viral load reduction with antiretroviral treatment, pre- or post-exposure prophylaxis,  
253 sero-sorting, strategic positioning). We also found infrequent presentation of information  
254 regarding social and structural determinants of HIV risk (e.g., stigma, poor health care access),  
255 and the relationship of mental health problems excluding substance misuse to HIV risk (e.g.,  
256 anxiety, depression). This finding is troubling given the substantial body of evidence behind  
257 these associations and their associated theoretical constructs (i.e., minority stress<sup>25</sup>, syndemics<sup>26</sup>).  
258 We hypothesize that a number of factors at an agency level may be at play, including lacking  
259 financial or human resources to update websites or a lack of consensus on messaging for  
260 emerging evidence that may be presented in complex ways (e.g., scientific publications), or  
261 considering individual-level behavioural risk to be most relevant for the website audience. We  
262 also postulate that the health literacy skills of agency staff responsible for website content may  
263 be an important influence, and may reflect an agency's overall ability to access, understand and  
264 interpret recent or complex, scientific evidence.

265         We did not find significant differences in specific risk factors and prevention strategies  
266 on websites that focused on GBMSM. While the total number of topics did not significantly  
267 differ between these two types of websites, our linear regression model suggests that websites  
268 with an explicit focus on GBMSM were more likely to pay equal attention to risk factors and  
269 prevention strategies compared to other more general sites, which appeared to have a greater  
270 emphasis on risk than prevention. As “localized” websites (i.e., adapted to a particular language  
271 and culture) GBMSM-focused websites are likely more effective<sup>27</sup> for improving health literacy  
272 related to HIV risk and prevention among GBMSM.

273         We found that many of the reviewed websites were not accessible across a range of  
274 functional health literacy skills (i.e., abilities to access and understand information). While

275 almost all websites contained information on HIV risk factors and prevention strategies, these  
276 were not always compared and contrasted, and this information was easily found in only a  
277 quarter of websites. We also found a reliance on text and prose, with few websites using other  
278 formats for presenting information effective for people with lower health literacy skills (e.g.,  
279 images or videos).<sup>9</sup> Most websites did use plain language, although the use of technical language  
280 requiring higher health literacy skills was also common.<sup>9</sup> Of concern, many websites had high  
281 reading requirements with a median score of 62.5 on reading ease (considered easily understood  
282 by students in senior elementary or first year of high school) and a median grade level of 9.8 (a  
283 grade level  $\leq 6$  is recommended).<sup>9</sup>

284 Our assessment of website information and design also found lower scores on measures  
285 of engageability (i.e., measures of user experience, such as ability to judge whether site is  
286 applicable, websites being interactive or customizable, or use of non-text media). Just over half  
287 of the websites had interactive features and most websites were connected to at least one form of  
288 social media (typically Facebook, Twitter, and Youtube). These aspects of an agency's website  
289 design and online presence may support interactive health literacy, by increasing user  
290 satisfaction and promoting active and engaged learning through allowing visitors to interact or  
291 engage with information on a website, contribute user-generated content, and construct their own  
292 knowledge.<sup>27</sup> Furthermore, these features may allow agencies to learn of important questions,  
293 concerns, or opinions of GBMSM on HIV risk and prevention, contributing to the development  
294 of shared knowledge (i.e., a bi-directional model of information sharing). For example, GBMSM  
295 were using undetectable HIV viral load as a prevention strategy prior to randomized control trial  
296 evidence demonstrating its effectiveness and endorsement by many agencies.<sup>28</sup> These interactive

297 features may also assist agencies in identify misinformation about HIV within the GBMSM  
298 community.

299         Our study represents just one part of a broader understanding of the importance of agency  
300 providers in improving the sexual health literacy of GBMSM. We need to better understand if,  
301 how, when and where GBMSM look for information about risk factors and prevention strategies  
302 on these websites. Our study was limited to Canadian websites, but GBMSM are likely to come  
303 across websites from other countries when looking for information online. As such future studies  
304 should investigate which sites are consulted by GBMSM and how information varies across sites  
305 and geographical regions. More research is also needed to understand the role of these websites  
306 within the broader online context and landscape of providers of information (including news  
307 media, health care workers, and peers). Future studies should investigate how well websites  
308 engender trust, satisfaction and loyalty among GBMSM, concepts which are increasingly being  
309 applied as measures of health website effectiveness.<sup>27</sup> It would also be informative to speak with  
310 individuals responsible for developing website content as this may shed further insight into our  
311 findings; for example, there may be more comfort in presenting risk information definitively than  
312 the impact of prevention strategies when some risk still exists.

313         We did not assess the quality or accuracy of information on websites, which contributes  
314 to credibility. We recognize there are other characteristics not assessed that are important, such  
315 as whether sites have responsive design (i.e., can be viewed easily from a variety of devices  
316 including smartphones and tablets) and how agencies provide information to GBMSM through  
317 other means (e.g., online outreach, through social media, in physical venues).<sup>29</sup> Navigating the  
318 internet can be challenging, and the amount and complexity of online health information can be  
319 overwhelming and may be inaccessible to some individuals.<sup>30</sup> Current evidence points to

320 inequitable access to health information related to individuals' literacy and health literacy skills;  
321 those with limited skills tend to prefer passive (e.g., television) over active (e.g., internet)  
322 information sources and may find accessing online information difficult given their level of skill  
323 and confidence in navigating the complexity of online resources.<sup>30</sup> Finally, we recognize that our  
324 study's approach has been focused on functional, and to a lesser extent, interactive health  
325 literacy. Given ongoing debates about the value and role of new biomedical prevention strategies  
326 such as PrEP among GBMSM and persistent challenges to their access in Canada and globally,<sup>31</sup>  
327 enhancing critical health literacy skills of GBMSM is also important. These are important areas  
328 for future research.

## 329 **CONCLUSION**

330         In consideration of health literacy theory and the findings from our study, we recommend  
331 that developers of HIV prevention websites for GBMSM think about both how information is  
332 presented as well as what content is needed. As online provision of information will continue to  
333 be a mainstay of health promotion efforts for GBMSM, it is important for agencies to maintain  
334 up to date information on their websites that is easy to find, understandable for a range of health  
335 literacy skills and presented in a variety of engaging and interactive formats. Our findings  
336 suggest that HIV-related websites for GBMSM could improve both interactivity and the overall  
337 user experience. As these are becoming differentiating factors in the effectiveness of e-Health  
338 interventions<sup>25</sup>, future research should assess how to integrate these features effectively into the  
339 design of HIV prevention websites targeted to GBMSM.

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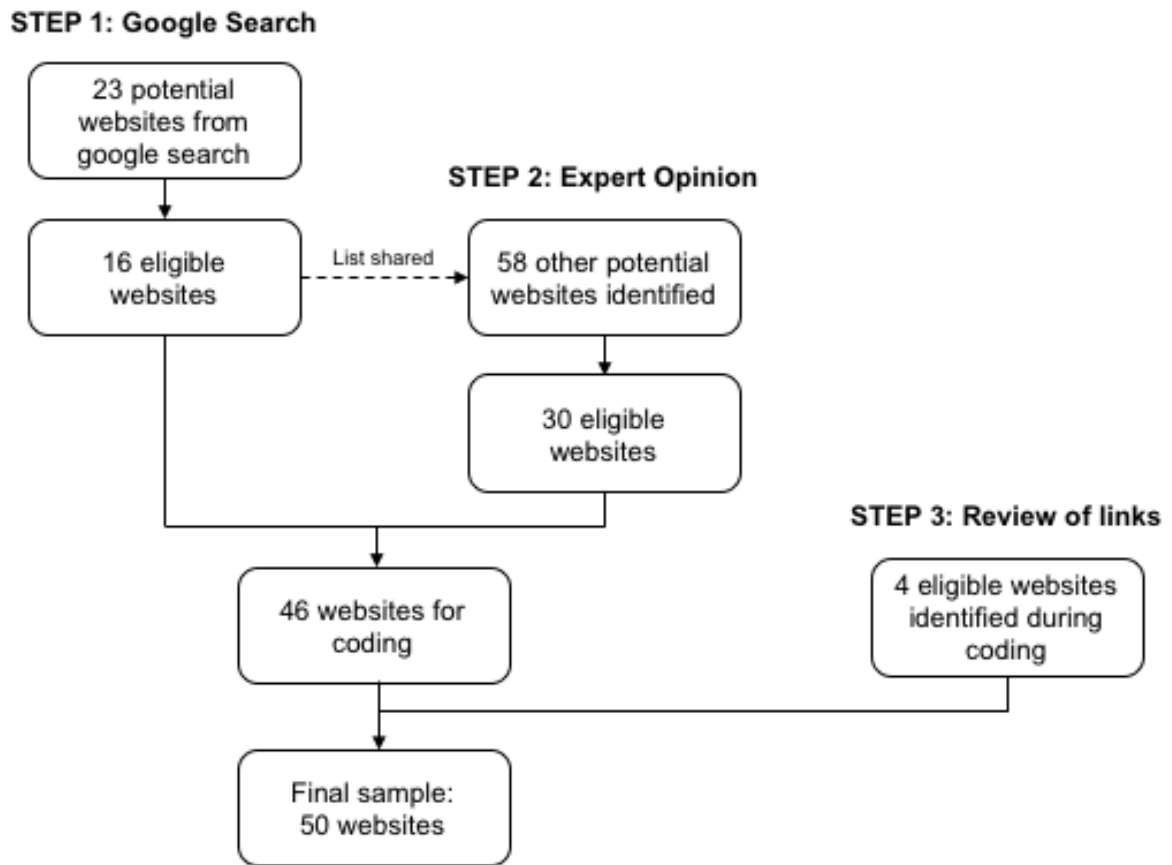


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423 **FIGURE 1. Search Strategy and Results**



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**TABLE 1. Characteristics of Reviewed Websites (N=50)**

<b>Characteristic</b>	<b>n (%)</b>
<b>Agency operating website:</b>	
Community or non-profit	38 (76)
Government	11 (22)
Pharmaceutical industry	1 (2)
<b>Language:</b>	
English	30 (60)
French	5 (10)
Both	15 (30)
<b>Topic focus:</b>	
HIV only	20 (40)
Sexual health including HIV	19 (38)
General health including HIV	10 (20)
Other	1 (2)
<b>Focus on GBMSM:</b>	
No explicit focus on, or section for, GBMSM	26 (52)
A partial focus on, or section for, GBMSM	13 (26)
Focus only on Gay, bisexual or GBMSM	7 (14)
Focus only on sub-group of GBMSM (e.g., youth)	4 (8)
<b>Readability: (median, [inter-quartile range])</b>	
Flesch-Kincaid Reading Ease (0-100; higher scores easier to read)	62.5 [52.0-68.4]

Flesch-Kincaid Grade Level (U.S. grade level needed to read)	9.8 [8.6-11.2]
<b>Usability LIDA score: (mean, [standard deviation])</b>	
Clarity of design (18 points possible)	14.1 [2.1]
Consistency of design (9 points possible)	8.0 [1.0]
Functionality (ability to find information; 15 points possible)	10.7 [1.7]
Engageability (user experience; 12 points possible)	3.8 [1.2]
Total (54 points possible)	36.6 [4.3]
<b>Type of language used:</b>	
Colloquial language (e.g., butt, fuck, top, bottom)	19 (38)
Plain language (e.g., sex, penis, infection)	44 (88)
Technical language (e.g., intercourse, insertive sex)	20 (40)
<b>Interactive website features:</b>	
Ask-a-question	20 (40)
Search for clinic	13 (26)
Quizzes	7 (14)
Audio	6 (12)
Chat feature	4 (8)
Risk Assessment tools	3 (6)
Games	1 (2)
At least one interactive feature	28 (56)
<b>Connection of website to social media accounts:</b>	
Facebook	37 (74)

Twitter	34 (68)
Youtube	18 (36)
Instagram	4 (8)
LinkedIn	3 (6)
Pinterest	2 (4)
Google+	2 (4)
Blogspot	1 (2)
Tumblr	1 (2)
Flickr	1 (2)
Foursquare	1 (2)

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429 **TABLE 2. Description of HIV Risk Factors and Prevention Strategies Presented on**  
 430 **Reviewed Websites (N=50)**

	<b>Total n (%)</b>	<b>GBMSM Explicit n (%)</b>	<b>Not Explicit n (%)</b>
Number of websites	50 (100)	24 (48)	26 (52)
<b>Risk factors (n=19)</b>			
<i>Number of risk factors presented: mean [SD]</i>	8.5 [3.3]	9.3 [4.0]	7.8 [2.2]
Body fluid type	49 (98)	23 (96)	26 (100)
Sexual transmission	48 (96)	22 (92)	26 (100)
Type of sex (anal, vaginal, oral, other)	45 (90)	21 (88)	24 (92)
Syringe or drug paraphernalia sharing	44 (88)	19 (79)	25 (96)
Other routes of transmission (e.g., blood products)	42 (84)	18 (75)	24 (92)
Sex toys	31 (62)	14 (58)	17 (65)
Sexually transmitted infections	30 (60)	18 (75)	12 (46)
Substance misuse	18 (36)	12 (50)	6 (23)
Knowledge of HIV status (own, partner)	17 (34)	8 (33)	9 (35)
Position (insertive, receptive)	16 (32)	11 (46)	5 (19)
HIV viral load	14 (28)	11 (46)	3 (12)
Partner number	13 (16)	5 (21)	8 (31)
Partnership risk factors (e.g., communication)	12 (24)	7 (29)	5 (19)
Social or structural determinants of risk	11 (22)	7 (29)	4 (15)
Rectal douching	10 (20)	8 (33)	2 (8)



Acute HIV	9 (18)	8 (33)	1 (4)
Mental health problems	8 (16)	5 (21)	3 (12)
Concurrency or overlapping relationships	4 (8)	2 (8)	2 (8)
Circumcision	4 (8)	4 (17)	0 (0)
No risk factor presented	1 (2)	1 (4)	0 (0)
<b>Prevention Strategies (n=24)</b>			
<i>Number of prevention strategies presented: mean [SD]</i>	<i>8.2 [4.2]</i>	<i>9.2 [4.8]</i>	<i>7.3 [3.3]</i>
Condoms	48 (96)	23 (96)	25 (96)
Lubricants	36 (72)	20 (83)	16 (62)
Syringes or other drug use harm reduction	31 (62)	15 (63)	16 (62)
Other barriers (dental dams, gloves)	30 (60)	14 (58)	16 (62)
HIV testing to know status	29 (58)	14 (58)	15 (58)
Communicating with partners, disclosing HIV status	26 (52)	11 (46)	15 (58)
Having sex other than anal sex	25 (50)	16 (67)*	9 (35)
STI testing or treatment	24 (48)	14 (58)	10 (39)
Cleaning sex toys	24 (48)	12 (50)	12 (46)
Addressing problematic substance use	19 (38)	10 (42)	9 (35)
Female condoms	17 (34)	6 (25)	11 (42)
Post-exposure Prophylaxis (PEP)	14 (28)	8 (33)	6 (23)
Withdrawal	14 (28)	11 (46)*	3 (12)
Rectal douching	13 (26)	8 (33)	5 (19)
Viral load reduction with antiretroviral treatment	12 (24)	9 (38)*	3 (12)
Monogamy	9 (18)	2 (8)	7 (27)

Abstinence	6 (12)	1 (4)	51 (19)
Sero-sorting	6 (12)	4 (17)	2 (8)
Having a partnership agreement / negotiated safety	6 (12)	5 (21)	1 (4)
Addressing emotional or mental health problems	6 (12)	6 (25)*	0 (0)
Strategic positioning	5 (10)	4 (17)	1 (4)
Pre-exposure prophylaxis (PrEP)	5 (10)	2 (8)	3 (12)
Other new technologies (vaccines, microbicides)	3 (6)	2 (8)	1 (4)
Circumcision	3 (6)	3 (13)	0 (0)
No prevention strategy presented	2 (4)	1 (4)	1 (4)

431 \* Bivariate  $p < 0.05$ . No significant difference using Holm-Bonferroni method for multiple comparisons.

432 **TABLE 3. How HIV Risk Factors and Prevention Strategies Were Presented on Reviewed**  
 433 **Websites (N=50)**

<b>Characteristic</b>	<b>Risk Topics n (%)</b>	<b>Prevention Strategies n (%)</b>
Topics/strategies directly compared to each other	31/49 (63)	7/48 (15)
Contains information on effects of risk factors and prevention strategies	42/49 (86)	31/48 (65)
<b>If yes, how these effects are presented:</b>		
Prose	41/42 (98)	30/31 (97)
<i>Absolute (e.g., high/medium/low risk)</i>	37/41 (90)	18/30 (60)
<i>Relative (e.g., increase/decrease risk)</i>	30/41 (73)	28/30 (93)
Numeric	2/42 (5)	7/31 (23)
Equation (e.g., HIV positive person + fluid with HIV + type of sex)	8/42 (19)	N/A
<b>Format used to present information:</b>		
Text	49/49 (100)	47/48 (98)
Table	10/49 (20)	2/48 (4)
Image	3/49 (6)	4/48 (8)
Graph	3/49 (6)	1/48 (2)
Interactive or tailored to individual	2/49 (4)	0/48 (0)
Video	2/49 (4)	1/48 (2)
<b>Ease of finding information:</b>		
Found by google search, on home page, or one click away from home page	13/49 (27)	12/48 (25)
Located as part of website content (e.g., text, image)	40/49 (82)	40/48 (83)
Located in PDF or document that needs to be downloaded	11/49 (22)	9/48 (19)

