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Middle East Respiratory Syndrome on Health Information Websites: How Much Credible They Are?

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Abstract:

Background: The most recent MERS outbreak has raised questions about prevention and symptoms since there is currently no vaccine to prevent MERS. People can help protect themselves from this illness by taking everyday preventive actions. To do so, it is helpful to get medical information on the Internet about this illness. Regarding the importance of ensuring the provision of accurate online information, the aim of this study was to assess the credibility of health websites about MERS by using HONcode tool.

Materials and methods: The term "MERS" was searched in Google, Yahoo, and Bing and the first three pages reported by each search engine were selected for evaluation. After excluding 26 websites, 64 unique websites were eligible for examination. Subsequently, the trustworthiness of the websites was then evaluated by using the HONcode of conducts quality rating tool.

Results: Our findings indicate that most of the retrieved websites were commercial and governmental (37.5%). Furthermore, only 7 out of 64 websites were officially HONcode certified. In general, the health websites regarding MERS were of poor credibility and while searching for MERS information people will encounter websites which include more commercial content rather than educational.

Conclusion: The internet is a place to educate individuals on their health condition and possible treatment options. Nevertheless, the internet cannot replace the role of health professionals in patient education. Regarding the poor credibility of MERS related websites, directing patients to reliable sources of online health information is important, mainly because search engine rank does not assure the trustworthiness of websites.

Keywords: Middle East Respiratory Syndrome Coronavirus, Patient Portals, Health Communication, Patient Education, HONcode, eHealth, Health information

Background:

Middle East Respiratory Syndrome (MERS) is a viral respiratory disease caused by a coronavirus, in the same family of viruses that causes the common cold that was first identified in Saudi Arabia in 2012(WHO, 2019). Since 2012, MERS-CoV has been identified in 27 countries including In European countries such as Italy and the Netherlands, in the Middle East such as Islamic Republic of Iran, and Jordan, in the African countries such as Egypt, Algeria and in the South Asia such as Republic of Korea and Thailand, in the United States and so on(WHO, 2019). Approximately 35% of reported patients with MERS-CoV infection have passed away("WHO EMRO | MERS situation update, April 2019 | MERS-CoV | Epidemic and pandemic diseases," 2019). The most recent MERS outbreak has raised questions about prevention and symptoms since there is currently no vaccine to prevent MERS. People can help protect themselves from illnesses by taking everyday preventive action. As with any virus, good hygiene practices can help people to reduce the risk of infection(Steckelberg, 2015). To do so, it is helpful to get information about preventive actions. People are exposed to a variety of information resources to satisfy their healthcare information needs(Moldovan-Johnson, Martinez, Lewis, Freres, & Hornik, 2014) which may influence their subsequent decisions about their personal health and make them better informed and more engaged in their own health care(Hornik et al., 2013; Sassenberg & Greving, 2016). Moreover, with the rise in living standards, people are demanding medical knowledge to achieve better health(Kim & Chang, 2007; Morahan-Martin, 2004). As consumer demand for health knowledge is growing, the Internet has emerged as a major source of information (Andreassen et al., 2007; Kim & Chang, 2007; Moorhead et al., 2013; Morahan-Martin, 2004). Medical consultations can be completed using other information resources such as the Internet(Marshall & Williams, 2006). Online health information is the most trusted source of health information for patients(Coulter et al., 2006) and eight out of 10 lay users look for health information through this medium(Lorence, Park, & Fox, 2006). It can help individuals by providing them with information about different diseases in a cost-effective way, because it is a popular and accessible medium(Moore & Ayers, 2011). Furthermore, disseminating

health and medical information on the Internet can improve knowledge transfer from health professionals to individuals, and help them maintain and improve their health(Benigeri & Pluye, 2003).

However, there are some disadvantages and shortcomings regarding medical information on the Internet. People need reliable information to understand their health situation and make health decisions(Coulter & Angela, 2011). Although people may benefit from the availability and accessibility of online health information, not all of this information is equally reliable(Coulter et al., 2006; Mun, Yoon, Davis, & Lee, 2013; Patel & Cobourne, 2011). Therefore, concerns have been raised regarding the dissemination of inaccurate, incomplete or out of date information from unqualified resources(De Boer, Versteegen, & van Wijhe, 2007; Wathen & Burkell, 2002; Winker et al., 2000). The overall quality of the health information available on the Internet appears to be highly variable. In several studies many websites have scored poorly regarding the reliability of their content since they contain misleading, inaccurate, incomplete and inappropriate information(Ahmed, Sullivan, Schneiders, & McCrory, 2012; Aldairy, Laverick, & McIntyre, 2012; Elliott, Bartel, Simonson, & Roukis, 2015; Goslin & Elhassan, 2013; Grewal & Alagaratnam, 2013; Haymes, 2016; Livas, Delli, & Ren, 2013; Moore & Ayers, 2011; Patel & Cobourne, 2011; Starman et al., 2010; Tavare, Alsafi, & Hamady, 2012).

On the other hand, people usually try to recognize the quality of online health information(Sillence, Briggs, Harris, & Fishwick, 2007), but it is difficult for them to assess the quality of the provided information properly (Aslani, Pournik, Abu-Hanna, & Eslami, 2013). Meanwhile almost half of those using online health information do not discuss the information obtained with their physicians(Bartlett & Coulson, 2011), which increases the risk of them trusting and using low quality health information(Mun et al., 2013). Given that there is a close association between online health information use and overall health, low quality or misleading information can lead to a variety of risky consequences(Clark, 2002; Mun et al., 2013) such as wrong treatment or delay in seeking medical care(Clark, 2002; De Boer et al., 2007; Hu, Bell, Kravitz, & Orrange, 2012).

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The internet is considered as an information source on MERS disease. Regarding the role of the credibility of health websites on the provision of accurate health information and given the absence of studies on the trustworthiness of health websites concerning MERS, the present study was conducted to assess the credibility of health websites that focus on this disease.

Materials and Methods:

Most people find online information by using general-purpose search engines rather than accredited medical websites or portals(Bernstam et al., 2008). Therefore, to emulate the real user experience, the term " MERS" was searched in the three most used search engines: Google, Yahoo, and Bing(PURCELL, BRENNER, & RAINIE, 2012) in April 2018, using the Chrome browser. The first three pages reported by each search engine were selected. All URLs were analyzed, and Websites were excluded if they were repeated, were journal articles, had Non-accessible links, were not in English and/or had no information on "MERS". The Internet search flow diagram is shown in Figure1. After excluding 26 websites, 64 unique websites were eligible for examination.
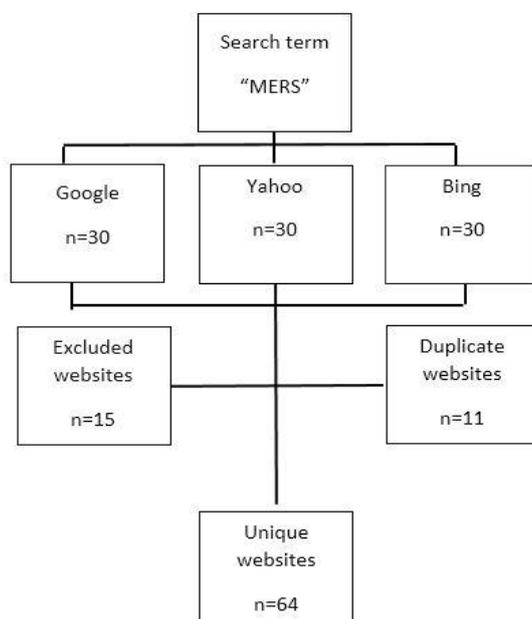

Figure 1. Internet search flow diagram

The eligible websites were classified into five categories: commercial, governmental, non-governmental organizations (NGOs), university websites and unspecified (Table2). This was

performed to gain an understanding of what kinds of organizations were offering information on MERS on the Internet. Several organizations have developed guidelines to evaluate the health-related websites. HONcode was selected for this research. ("The HON Code of Conduct for medical and health Web sites (HONcode)," n.d.). The research tool consisted of a checklist developed according to the HONcode criteria (Table 1). HONcode tool is considered to be a reliable indicator of website reliability and quality(Bruce-Brand, Baker, Byrne, Hogan, & McCarthy, 2013; Nassiri, Bruce-Brand, O'Neill, Chenouri, & Curtin, 2015) and has been used frequently for studies that have evaluated health websites quality(Bedell, Agrawal, & Petersen, 2004; Burke, Fenelon, Dalton, Mohan, & Schmidt, 2015; Hamzehei, Ansari, Rahmatizadeh, & Valizadeh-Haghi, 2018; Hirasawa et al., 2012; Khazaal, Chatton, Zullino, & Khan, 2012; Morel, Chatton, Cochand, Zullino, & Khazaal, 2008; Nghiem, Mahmoud, & Som, 2016; Rahmatizadeh & Valizadeh-Haghi, 2018; Valizadeh-Haghi & Rahmatizadeh, 2018). Manual evaluation was done by two investigators (AK and NF) and then the validity of the resulting data was reassessed by two independent ones (SV and SR). In case of disagreement, this was debated to come to an agreement. Moreover, the HONcode toolbar function (downloaded from the official website of the HON foundation) was utilized to recognize HONcode officially accredited websites. The data were analyzed using SPSS 18.0 software.

Table1. HONcode principles[*]

HONcode principles	Description
1. Authoritative	Indicates the qualifications of the authors
2. Complementarity	Information should support, not replace, the doctor-patient relationship
3. Privacy	Respects the privacy and confidentiality of site users
4. Attribution	Cites the source(s) and dates of published medical information
5. Justifiability	Site must back up claims relating to benefits and performance
6. Transparency	Accessible presentation, accurate email contact
7. Financial disclosure	Identifies funding sources
8. Advertising policy	Clearly distinguishes advertising from editorial content

[*]the table information is adapted from the HON website ("The HON Code of Conduct for medical and health Web sites (HONcode)," n.d.)

Results:

The Internet search flow and frequency of the unique websites retrieved by Bing, Yahoo, and Google are shown in Fig 1. A total of 64 unique websites were included in the study and analyzed. Most of the websites were commercial and governmental. Only 1.5% of the retrieved websites were provided by universities (Table 2). Furthermore, only 7 out of 64 websites were officially HONcode certified which were identified by the HONcode toolbar function.

Table2. Characteristics of retrieved websites

Search Engine Number of Websites	Yahoo N=30	Google N=30	Bing N=30	Total N=90
Redundant Websites	8(26.7%)	4(13.3%)	14(46.7%)	26(28.9%)
Unique Websites	22(73.3%)	26(86.7%)	16(53.3%)	64(71.1%)
Website category				
Organizational	3(13.6%)	5(19.2%)	1(6.2%)	9(14%)
Commercial	8(36.4%)	10(38.5%)	6(37.5%)	24(37.5%)
Governmental	9(40.9%)	8(30.8%)	7(43.8%)	24(37.5%)
University	0(0.0%)	1(3.8%)	0(0.0%)	1(1.5%)
Unspecified	2(9.1%)	2(7.7%)	2(12.5%)	6(9.4%)
HON verified	2(9.1%)	3(11.5%)	2(12.5%)	7(11%)

The compliance of the websites with the HONcode principles is presented in Table 3. The highest compliance in all search engine results belongs to "Transparency" and "Financial disclosure" criteria (100%). In general, the "authority" criterion is less considered in all search engine results (87.5%). With regard to the HONcode officially accredited websites, only 7 websites fulfilled all eight criteria. None of the other websites, which were evaluated manually, complied with all the eight principles. Since every website must comply with eight criteria in terms of HONcode criteria. So, in general, for retrieved websites by Yahoo (22×8=176), Google (26×8=208) and Bing (16×8=128) criteria should ideally be met. While the results showed that of all the criteria, websites retrieved from the Yahoo 94.9%, Google search engine have met 94.6%, and Bing 97.5% of the criteria.

Table3. Compliance of retrieved websites with HONcode principles

Quality criterion	Yahoo (n = 22)	Google (n=26)	Bing (n=16)	No. of websites (n= 64)
Authority	19 (86.4%)	22(84.6%)	15(94%)	56 (87.5%)
Complementarity	20 (91%)	23(88.5%)	14 (87.5%)	57 (89%)
Privacy	21 (95.5%)	26(100%)	16 (100%)	63 (98.4%)
Attribution	21 (95.5%)	26 (100%)	16 (100%)	63 (98.4%)
Justifiability	21 (95.5%)	24 (92.3%)	16 (100%)	61 (95%)
Transparency	22 (100%)	26 (100%)	16 (100%)	64 (100%)
Financial disclosure	22 (100%)	26 (100%)	16 (100%)	64 (100%)
Advertising policy	21 (95.5%)	24 (92%)	16 (100%)	61 (95%)
Mean	167/176(94.9%)	197/208(94.6%)	125/128(97.5%)	489/512(95.5%)

Discussion:

This study evaluated the trustworthiness of health websites concerning MERS. The different categories of websites in three search engines: Google, Yahoo and Bing were analyzed using the HON tool to assess the trustworthiness of the websites.

The present study revealed that the majority of the evaluated websites(89%) were not officially approved by HONcode foundation and the result was weaker than those assessed in recent studies of health-related websites on various health topics(Bruce-Brand et al., 2013; Hendrick et al., 2012; Rahmatizadeh & Valizadeh-Haghi, 2018; Weymann, Harter, & Dirmaier, 2014). One of the reasons is that website owner' base ethical codes on self-regulation, and this certification is given to websites on demand.

In this study, the health websites regarding MERS were of poor reliability. Similar to this study, previous studies have repeatedly stated the poor quality of health websites on various health topics (Fast, Deibert, Hruby, & Glassberg, 2013; Hirasawa et al., 2012; Kaicker, Debono, Dang, Buckley, & Thabane, 2010). So, while searching for health information regarding MERS disease, individuals will encounter with unreliable websites and may receive poor quality information, whereas well-informed decision-making will not be optimized if patients cannot access high quality and

comprehensive information(Ellsworth, Patel, & Kamath, 2016; Ream, Blows, Scanlon, & Richardson, 2009).

Government and university websites generally seek only to educate the readers("Cancer Information on the Internet," 2016). In this study, only 1.6% of retrieved websites were of the university type. The highest number of retrieved websites were commercial and governmental (37.5%), as in similar studies on various health topics(Bruce-Brand et al., 2013; Hamzehei et al., 2018; López-Jornet & Camacho-Alonso, 2010; Rahmatizadeh & Valizadeh-Haghi, 2018). Then, while searching for MERS information, people will encounter information that is more commercial than educational. Since commercial websites have lower quality compared to other types of websites(Khazaal, Chatton, Cochand, & Zullino, 2008; Kunst, 2002; Ostry, Young, & Hughes, 2008), during the search for health information on MERS, users will find websites that are of poor reliability and quality. It should be noted that, although university websites are expected to be highly compliant with the HONcode of conduct compared with other types of websites, the present findings suggest that they are not so, as other studies` findings on various health topics (Flanagin & Metzger, 2013; Hamzehei et al., 2018). University websites, which a person would tend to trust more, showed no significant advantage in trustworthiness compared with other site types. Thus, academic organizations need to monitor whether their institution's website is in concordance with the evaluation tool's principles. Meanwhile, as shown in Table 3, the present research revealed that all website types were of poor reliability, except those websites that had been officially certified by the HONcode of conducts.

The present study revealed that the HONcode principles were highly considered by the surveyed websites (Table 3). Nevertheless, the results demonstrate that health websites on MERS disease are not completely in compliance with HONcode principles. Thus, MERS websites are potentially unreliable, similar to health websites on other topics(Elliott et al., 2015; Grewal & Alagaratnam, 2013; ShahrabiFarahani, Shekofteh, Kazerani, & Emami, 2018; Sullivan, Anderson, Ahn, & Ahn, 2014). Although the HONcode does not necessarily reflect the accuracy or quality of the information on the website, it helps individuals to understand the purpose and source of the information(Hendrick

et al., 2012). Therefore, physicians need to advise their patients about the need for a very critical evaluation of all medical information obtained from the web, even when it seems to be from a "reliable" source.

While searching for MERS information on a health website, individuals may require further information, which is vital for their health. This study revealed that "transparency" was the most considered principle (100%), followed by "privacy" and "attribution" (95%), across all selected websites. Thus, due to the compliance of all surveyed websites with the "transparency" principle, individuals who seek further support or information will be provided with information in the clearest manner, as well as contact addresses for more questions. Moreover, the source of medical information is usually regarded as the main criterion for its credibility; websites should display the source of the information clearly(Kunst, 2002). Due to the compliance of 95% of the surveyed websites with the "attribution" principle, individuals will be able to identify the source(s) of the published information, which may help them to find supplementary information. However, 5% of the surveyed websites did not quote the source(s) or the last update date, and individuals should be aware of possibly unreliable/outdated information.

The "authority" principle was less considered (85%) compared with other principles, while compliance with this principle reflects the credibility and reliability of the information resource, as resources written by experts are more credible(Austin Peay State University, 2015). Thus, individuals must use the MERS information with more caution.

The majority of adults search the Internet when they have health questions(Ritchie, Tornari, Patel, & Lakhani, 2016). Due to the variability in the quality of health websites(Elliott et al., 2015; Ellsworth et al., 2016; Goslin & Elhassan, 2013), this highlights the importance of physicians understanding the credibility of online health information about MERS and knowing how to guide patients to high quality reliable websites. In this regard, physicians and health care providers must be aware of the variable quality of health websites, and they must direct patients to high quality online health resources(Fox & Duggan, 2013).

Moreover, according to the Pew Internet & American Life Project(Ritchie et al., 2016), 77% of online health seekers use general search engines such as Google, Bing, or Yahoo, while only 13% use a website specialized in health information, such as WebMD. Hence, individuals who seek health information online must be very cautious. Furthermore, to obtain higher quality information, people should select certified websites or those that are positioned higher on the results page, because it seems that Google ranks the retrieved websites by quality(Diaz et al., 2002). Nevertheless, directing patients to reliable sources of online health information is important, mainly because search engine rank does not assure the trustworthiness of the websites(Tavare et al., 2012). In this regard, administrators of credible health websites should become familiar with SEO principles and help to place the websites in a better ranking of search engines results. In this regard, the focus should not be only on the popular search engines such as Google, Yahoo and Bing, but should also consider the popular search engines in other geographic region and countries such as Yandex (Russia), Baidu (China), Seznam (Czechoslovakia), and Naver (Korea)(Enge, Spencer, & Stricchiola, 2015).

This study would suggest that people looking for health information on MERS, or other health topics, should start by selecting websites which their trustworthiness has been officially approved by quality evaluation tools such as the HONcode to obtain trustworthy information.

Conclusion:

The Internet is a place that can educate individuals on their health condition and possible treatment options. Nevertheless, the Internet cannot replace the role of health professionals in patient education, since the current study demonstrates that health websites regarding MERS are of poor quality for the proper education of patients. Websites that a person would tend to trust more (e.g. academic and government sites) showed no advantage in quality compared with the other types. Thus, improvements are needed to increase the trustworthiness of MERS websites in order to empower individuals for the prevention of MERS and related issues. The Internet is a source of information for MERS but qualifying online health information is not easy. It would be an enormous and costly task requiring health care professionals in various fields to monitor the large number of health-related

websites. Hence, it is recommended that health care professionals in MERS most affected countries can direct patients to high-credible Websites that meet high standards. Furthermore, in order to reduce the risk of accessing misleading or unreliable information, patients' use of validated tools to identify reliable health websites is necessary.

Limitation:

The present study encounters with some limitations. While patients may generally view the first three pages after searching a given topic, we believe that some high-quality websites may have been missed. Furthermore, if an individual were to use a search engine other than what we have used, the results from this study would be less applicable. Another limitation is that this study was done using the general search term "MERS." That term was selected, because it was the one we supposed individuals would be most likely to use and would result in websites that directly discuss MERS. While many people may use this general search term, others may use a more focused search term for their diagnosis such as "Middle East Respiratory Syndrome" or "MERS-CoV". Additionally, the geographical location from which the search was conducted (Tehran, Iran), may have affected the search results. Moreover, websites are constantly being updated or removed and new ones are emerging; all of which may change the results found in this study.

Conflicts of Interest: None

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