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Twitter as Health Information Dissemination Source: A Case Study of Saudi Health Institutions

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Abstrac:

Social media has brought significant changes into the health sector and many health institutions worldwide have been adopting Twitter to disseminate information, educate, inform and empower people about health-related issues. Twitter has become one of the most popular social media platforms used in health-related organisations. This study investigates the use of Twitter by Saudi health institutions (SHIs). A quantitative research approach was employed, including content analysis, and 15 SHIs' Twitter accounts were analysed, with a total sample of 3,415 tweets. The results show that Twitter usage can be described as in its early stages, and SHIs use Twitter to convey one-way messages. The majority of SHIs that use Twitter belong to the largest health institutions in the country, which service large populations. In terms of types of information tweeted, organisational news and health education were the most common type of tweets posted by SHIs. The study argues that if health organizations want to benefit from Twitter, they need to develop a strategic communication plan. The study concludes with a summary of the main findings and provides suggestions for future research.

Keywords: Twitter, Social Media, Health Information, Social Networking Sites, Saudi Arabia.

1. Introduction

The rapid development of information and communication technology has created new ways to deliver health information (Jane et al., 2018). More specifically, social media has found its way into public health and other health organisations (Hanson et al., 2011; Thackeray et al., 2012), and it has the potential to improve public health communication (Thackeray et al., 2012) and bring a new dimension to health care, as it can be used as a new tool for communication about health issues by the public, patients and health professionals (Harris et al., 2013; Moorhead et al., 2013). The reported literature shows that health organisations in different countries around the world are increasingly adopting social media (Chew & Eysenbach, 2010; Diddi & Lundy, 2017; Park et al., 2013; Thackeray et al., 2012). In particular, Twitter is one of the most popular social media



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platforms used by health institutions (Moorhead et al., 2013). Thus, several studies have examined the use of Twitter by health-related organisations for different purposes, for example, to promote health literacy (Jane et al., 2018; Park et al., 2016), to communicate during the outbreak of certain diseases, such as Ebola (Guidry et al., 2017; McInnes & Hornmoen, 2018) and to increase awareness about health issues such as breast cancer (Diddi & Lundy, 2017) and flu epidemics (Chew & Eysenbach, 2010). The following sub-section provides a detailed literature review.

2. Literature review

The revolutionary development of social computing has brought changes to the health sector. More specifically, social media is developing, and popular channels for health organisations can be used to disseminate information, educate, inform and empower people about health-related issues (Vance et al., 2009). According to Kies and Burtis (2012), health institutions can benefit from social media in four main areas, including social marketing campaigns, crisis and risk communication, health education delivery and professional development. Social marketing campaigns include the use of social media to promote health literacy and awareness. Twitter has become one of the most popular social media platforms used by health-related organisations (Guidry et al., 2017; Moorhead et al., 2013; Park et al., 2013). The microblogging service is a cost-effective and convenient platform for health organisations to disseminate and promote health information, and to communicate, engage and reach a target audience with less effort (Gomes & Coustasse, 2015; Jessen, 2008; Park et al., 2013).

As mentioned earlier, the study of Twitter adoption and usage by health organisations has attracted many researchers who addressed the topic from different perspectives. For example, Thackeray et al. (2012) investigated the adoption and use of social media among public health departments in the USA. The study showed that public health agencies' use of social media is in the early adoption stages. In addition, 60% of state public health departments (SHDs) reported using at least one social media application. Of these, 86.7% had a Twitter account. SHDs made one post per day on social media sites, which was primarily to distribute information with very little interaction with audiences. SHDs' use of Twitter can be described as a one-way social media communication pattern. Twitter helped to keep the public up to date with SHD-related news. The study showed that 79.7% of tweets were health-related, and 14.1% were non-health-related. The health-related tweets focussed on different topics, including staying healthy, diseases and conditions, environmental health, injury, violence, safety, emergency preparedness and response. The study concluded that if public health agencies are to use social media effectively, then they must develop a strategic communication plan that incorporates best practices for expanding their reach and fostering interactivity and engagement.

Dumbrell and Steele (2012) studied how Twitter was used by 114 health-related organisations in Australia. The study showed that health organisations used Twitter to communicate different issues about health topics, such as mental health, lifestyle, infectious diseases and organ donation. In addition, the type of information tweeted by health organisations was varied, and most of it was related to public health advice, ambulance updates, health awareness and organisational news. Furthermore, Twitter was utilised more extensively for research and project announcements.



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Moreover, the study revealed that none of the government accounts studied had been verified by Twitter. The author argued that it is important for government accounts to be verified by Twitter as this would make them more trustworthy and could lead to increasing the number of followers.

In another study, Van de Belt et al. (2012) examined the use of social media among 873 hospitals in 12 Western European countries. The study revealed that the use of social media increased in all of the countries. In particular, Twitter accounts were found in eight out of 12 countries. However, these hospitals had not fully utilised social media to maximise its benefits.

Park et al. (2013) investigated the use of Twitter by health organisations to deliver health literacy messages. The study analysed 571 tweets posted on Twitter by health organisations. The findings showed that two-thirds of the tweets (76%) were originally posted by health-related organisations, while the rest (24%) were retweets. Twitter is a great tool that speeds the delivery of information and has the ability to reach wider audiences, which makes it an effective and attractive device for organisations to reach relevant target groups or audiences. Furthermore, the study found that nonprofit organisations and community groups were more actively engaged in disseminating health-related information and interacting with the public on Twitter than other types of health organisations, such as government agencies, educational institutions and health business corporations.

Harris et al. (2013) investigated the adoption of social media (Twitter and Facebook) by 2,565 local health departments (LHDs) across the United States. The results show that social media platforms help health institutions to meet the local public's need for health-related information and offer opportunities to educate and inform their constituents. In addition, the study found that LHDs that serve larger populations were more likely to be innovators in the adoption of social media, and Twitter was more popular among larger health departments.

Neiger et al. (2013) examined how 210 LHDs in the United States used Twitter to share information, engage with followers and promote action. The findings revealed that while LHDs are more likely to use Twitter to deliver personal health information compared with information about the organisation, such as news, events and services, the core element and function of Twitter is underutilised. In addition, LHDs used Twitter almost exclusively for one-way communication, with very limited engagement with their audiences. Furthermore, LHDs should move to the next step and transition to more dialogic communication engagement, develop relationships with their audiences (individuals and organisations), create partnerships and foster participation. The study concluded that LHDs should consider the importance of developing strategic implementation and communication plans that address how health institutions can use Twitter effectively.

Huang and Dunbar (2013) analysed 23,300 posts/tweets on 172 US hospitals' Facebook and Twitter pages. The study showed that the flow of information was one-way communication and the interaction with audiences was very minimal. Furthermore, it found that 40% of the content was about hospital news, 19% was public service announcements, 19% was responses to visitors, 17%

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was event announcements and 5% was about patient stories. The study concluded that in order for hospitals to benefit from social media effectively, they should consider using it as a two-way communication channel to connect with their visitors.

Park et al. (2016) studied how major health organisations use Twitter for informing and engaging with the public, including the American Heart Association, American Cancer Society and American Diabetes Association. A total of 16 Twitter accounts associated with these organisations were analysed. The findings revealed that the majority of the tweets were about organisation-related news, whereas personal health-related tweets were a relatively small portion of the tweets analysed. Moreover, hashtags and hyperlinks were the most frequently used tools for communication, while photos and videos appeared less frequently among their Twitter posts.

In another study, McInnes and Hornmoen (2018) investigated the use of Twitter by Norwegian and UK authorities for communication during the 2014–15 Ebola outbreak. The findings showed that the UK authorities saw Twitter as useful for communicating with the general public and professional networks to deliver health information. The study also emphasised the importance of coordinated messaging to develop trust. The health authorities used Twitter as a monitoring tool rather than using its dialogical nature, as health authorities in both countries were less willing to explore social media's distinctive interactive communication features, so their use of Twitter can be described as a one-way communication pattern.

2.1. Objectives

Although the study of Twitter adoption and usage by health organisations has attracted the attention of many researchers, there is still little research about the uses, benefits and limitations of Twitter for public health settings and health communication (Diddi & Lundy, 2017; Moorhead et al., 2013; Thackeray et al., 2012; van de Belt et al., 2012). In particular, there is a need for more systematic research to understand what kind of health-related information is posted online (Guidry et al., 2017), and to develop best practices about disseminating health information across the public health system (Harris et al., 2013). Doing such research is likely to improve our understanding of how such tools can be utilised to deliver health information (Park et al., 2013). Finally, and in relation to Saudi Arabia, although some research has been reported about the use of social media in health settings, for example, the perceptions of healthcare professionals about the use of social media for patient care (Ahmed et al., 2017), the use of Twitter in a social media campaign (Bahkali et al., 2015), using Twitter by influencers for health promotion (Albalaw & Sixsmith, 2015) and the use of Twitter to seek health-related information among users in Saudi Arabia (Alrukban, 2014), there is less research at an organisational level that addresses how Saudi health institutions (SHIs) adopt and use Twitter. Therefore, this study aims to fill this gap. By doing so, this study seeks to answer the following research questions:

- What is the current status of Twitter usage among SHIs?
- What kind of health-related information is posted by SHIs on Twitter?



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• How are SHIs utilising Twitter to deliver health-related information?

2.2. Social media in Saudi Arabia

Regarding the context of this study, Saudi as a country has relatively high internet penetration, which has been growing at a fast rate, from 80% in 2017 to 84.48% in 2018, and is expected to reach 91.39% in 2020 (Statista, 2019). Social media has found its way into Saudi society and become an integrated part of people's lives. The use of these tools and applications has been growing rapidly, for example, in 2018 usage increased, reaching 91.7% of the total population (Altayar, 2018; Saudi Gazette, 2019).

In recent years, Twitter has gained popularity among social media users, both in developed and developing countries. Twitter was launched in 2006 and has quickly become one of the most popular social media networks in terms of use (Guidry et al., 2017). On Twitter, users can now write up to 280 characters, instead of the previously allowed 140 characters. Users can also post text, an image or a video and watch any events live via the Periscope service. Saudi is the fourth country worldwide in the use of Twitter after the United States, Japan and the United Kingdom. Twitter is the most popular social media platform used in Saudi Arabia, where, as of July 2019, the microblogging service had 9.9 million active users (Statista, 2019).

3. Research methodology

This study uses a quantitative research approach to investigate the adoption of Twitter by SHIs. It aims to measure and quantify the phenomena under investigation (Neuman, 2011; Robson, 2011). Content analysis is a popular method in quantitative research. Neuendorf (2002, p.1) defines it as 'the systematic, objective, quantitative analysis of message characteristics.' It has been used to analyse social media content, especially to analyse health content on Twitter (Diddi & Lundy, 2017; Guidry et al., 2017; Park et al., 2013; Park et al., 2016; Yang et al., 2015). For this study, content analysis is used to identify the characteristics of messages (tweets) posted by SHIs on their Twitter accounts.

The identification of Twitter accounts related to SHIs was made in three stages. First, the researchers gathered SHI websites from two official sources, 1: The National Health Information Center (2019) (https://nhic.gov.sa/en) and 2: The Saudi National Portal (https://www.saudi.gov.sa). This resulted in identifying 15 SHIs that were considered for analysis, including medical cities, military hospitals, specialist hospitals and university hospitals. Second, the researchers visited each SHI website and examined it to identify if the website had a Twitter account (Neiger et al., 2013). SHIs were excluded if there was no Twitter logo on their website. Third, each Twitter account was examined thoroughly and individually to identify main information, as shown in Table 1. The final important issue considered was active usage, which can be described as when an SHI actively uses their Twitter account and interacts with users during previous hours, days or in the previous month,

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including posting information, updating the agency account with recent information or interacting with users (Dumbrell & Steele, 2012).

#	Health Institution Name (English)	Health Institution Name (Arabic)	Twitter Account
1	Ministry of Health	وزارة الصحة السعودية	@SaudiMOH
2	Health-937	الصحة_٩٣٧	@SaudiMOH937
3	King Abdulaziz University Hospital	مستشفى الملك عبدالعزيز الجامعي -جدة	@KauHospital
4	King Abdullah University, Riyadh	مستشفى الملك عبدالله بجامعة نورة	@KAAUH_PNU
5	King Fahad University, AL Khobar	مستشفى الملك فهد الجامعي – الخبر	@KFHU_Biz
6	King Khaled Eye Specialist, Riyadh	مستشفى الملك خالد التخصصي للعيون	@KKESHKSA
7	King Faisal Specialist, Riyadh	مستشفى الملك فيصل التخصصي -الرياض	@KFSHRC
8	King Faisal Specialist, Jeddah	مستشفى الملك فيصل التخصصي ــجدة	@KFSHRC_J
9	King Fahad Specialist, Dammam	مستشفى الملك فهد التخصصي – الدمام	@KFSHDammam
10	Security Forces Hospital, Dammam	مستشفى قوى الأمن – الدمام	@SFHDmm
11	Security Forces Hospital, Makkah	مستشفى قوى الأمن – مكة	@SFHMP1
12	King Saud Medical City	مدينة الملك سعود الطبية	@ksmcmedia
13	King Abdulaziz Medical City, Riyadh	مدينة الملك عبدالعزيز الطبية - الرياض	@NGHAnews
14	King Abdullah Medical City, Makkah	مدينة الملك عبدالله الطبية – مكة	@KAMC_MAKKAH
15	King Fahad Medical City, Riyadh	مدينة الملك فهد الطبية – الرياض	@KFMC_RIYADH

Table 1: Saudi Health Institutions Twitter Accounts

3.1 Data collection and analysis:

For the purpose of this study, the process of data collection and analysis has gone through several stages. First is the data collection and preparation, which included gathering, formatting, cleaning and blending the data. The dataset for this study was the original tweets posted on the Twitter accounts of SHIs, and thus the individual tweet served as the unit of analysis (Park et al., 2013; Park et al., 2016). This study examines a total of 15 health institutions' Twitter accounts during a time frame from the beginning of March 2017 to October 2017. The sampling procedures resulted in a total of 3,415 tweets for analysis.

Second, is coding the data (tweets), which aims to code all tweets considered for analysis. The tweets were read several times in chronological order (Diddi & Lundy, 2017). The categorising of tweets was conducted manually, as existing Twitter analytical tools cannot provide analysis of tweet content based on concepts, meaning and semantics within the context in which they were posted (Dumbrell & Steele, 2012). The researchers coded the tweets collaboratively to establish reliability (Guidry et al., 2017; Park et al., 2016). One researcher coded all 3,415 posts, while the other researcher reviewed the codes several times to ensure consistency across the tweets. This has resulted in identifying coding categories, which were based on previous research and studies about the use of Twitter in health institutions (Diddi & Lundy, 2017; Dumbrell & Steele, 2012; Guidry et al., 2017; Neiger et al., 2013; Park et al., 2013; Park et al., 2016). The coding categories include: organisation's news, health education, conferences and events, research and projects, and job and career.

The third stage was grouping the tweets. Each tweet was grouped and coded under one category according to similarities for the specific health-related type of tweet identified (Dumbrell &



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Steele, 2012). Although some tweets were mutually exclusive and could be coded in more than one category, they were not coded in different categories. The most dominant theme was chosen and coded for the final analysis (Neiger et al., 2013). The fourth stage was presenting the results using frequencies and percentages. The final stage was drawing conclusions, as described by Miles and Huberman (1994). This stage aims to make sense of the data and what they mean, and the researchers provided their explanation and interpretation of the analysed data and then compared and discussed them in relation to the literature and other research on the use of Twitter by health organisations.

4. Results

This section presents the results of the study as follows.

4.1 Identifying the main characteristics of the SHIs on Twitter:

As previously mentioned, a total number of 15 SHIs were considered for analysis, including two health organisations, three university hospitals, four specialist hospitals, two military hospitals and four medical cities. Twitter accounts that were identified as belonging to SHIs were those whose Twitter description information provided a web link to their official site ending with edu.sa for university hospitals, med.sa for medical cities, and gov.sa for other government health institutions. Table 2 presents basic information about each of the SHIs, including when they joined Twitter, the number of posts, the number of followers and followings, the average tweets and state of verification.

Saudi Health Institutions	Location	Joined	Followers	Following	State of Verification
Ministry of Health	Riyadh	2011	4.7 m	60	Yes
Health (937)	Riyadh	2015	294000	5	Yes
King Abdulaziz University	Jeddah	2014	22800	7	No
Hospital					
King Abdullah University Hospital	Riyadh	2014	19000	2	Yes
King Fahad University Hospital	ALKhobar	2016	2600	70	No
King Khaled Eye Specialist	Riyadh	2012	41700	7	Yes
Hospital					
King Faisal Specialist Hospital	Riyadh	2015	1179	6	Yes
King Faisal Specialist Hospital	Jeddah	2014	577	11	Yes
King Fahad Specialist Hospital	Dammam	2011	077	٢٤	Yes
Security Forces Hospital	Dammam	2012	1,042	2	No
Security Forces Hospital	Makkah	2016	3,604	399	No
King Saud Medical City	Riyadh	2013	999	۱.	Yes
King Abdulaziz Medical City	Riyadh	2011	907	33	Yes
King Abdullah Medical City	Makkah	2011	70	77	Yes
King Fahad Medical City	Riyadh	2011	146600	9	Yes

Table 2: Main Characteristics of the SHIs on Twitter

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These are the oldest and largest health institutions in the country that serve large populations in urban and rural areas in Saudi Arabia. They are located in different geographical areas around the country.

SHIs began to join Twitter in 2011, and about a third of SHIs joined Twitter in 2011. These were the leading health institutions in the country, so it is not surprising they were early adopters of social media. The highest number of tweets and followers came from the Ministry of Health, with about 50,869 tweets and 1.73 million followers.

In terms of verifying Twitter accounts, 11 SHI accounts were verified by Twitter, and four accounts were not. This finding suggests that SHIs are aware of the benefits associated with verifying Twitter accounts, such as being perceived as trusted accounts and being respected by the public.

4.2 Types of information tweeted:

One of the aims of this study is to identify what types of health information are posted by SHIs. This section of the findings addresses the second research question about the types of tweets posted on SHIs Twitter accounts. As reported earlier, a total of 3,415 tweets were considered for analysis. The results show that five broad categories have been identified as shown in Table 3. The first form of categorisation identified was the Organisation's News with 1,530 tweets or 45%, followed by Health Education with 1,502 tweets or 44%. Other types of information included Conferences and Events with 307 tweets or 9%, Jobs and Careers with 43 tweets or 1%, and Research and Projects with 33 tweets or 1%.

Health Information Types	Total of Tweets	Percentage
Organization's News	1,530	45%
Health Education	1,502	44%
Conferences and Events	307	9%
Jobs and Careers	43	1%
Research and Projects	33	1%
Total	3,415 Tweets	100%

Table 3:	Types	of Health	Information
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Organisational news is defined as any post about the events and activities of the health institution. The analysis shows that posting the organisation's news aims to encourage engagement, share stories and keep the public up to date about the events and activities of the health institution. This category consists of 1,530 tweets, 45% of the total sample. Table 4 presents the results related to the organisational news category for each SHI.

#	Health Institution	Number of Tweets	Percentage
1	Ministry of Health	275	18%
2	King Fahad Medical City	217	14%
3	King Saud Medical City	212	14%



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4	King Faisal Specialist Hospital	141	9%
5	King Abdullah University Hospital	134	9%
6	King Abdullah Medical City	126	8%
7	King Abdul-Aziz Medical City	121	8%
8	King Fahad Specialist Hospital	103	7%
9	King Abdul-Aziz University Hospital	83	5%
10	King Khaled Eye Specialist Hospital	45	3%
11	King Faisal Specialist Hospital	30	2%
12	Security Forces Hospital - Dammam	23	1%
13	Security Forces Hospital - Makkah	10	1%
14	Health- 937	8	1%
15	King Fahad University Hospital	2	0 %
	Total	1,530 tweets	100%

Table 4: Organisation's News

The Ministry of Health posted the highest number of tweets with 275 or 18%. King Fahad Medical City followed with 217 or 14%, and King Saud Medical City was next with 212 or 14%. The rest of the SHIs posted some tweets about their organisational news. Out of all the SHIs, the Ministry of Health 937 and King Fahad University Hospital shared the smallest number of overall tweets, eight and two, respectively.

The second category identified was Health Education with a total of 1,502 tweets, 44% of the total analysed tweets, as shown in Table 5. All SHIs posted tweets about health education. Three large institutions were at the top of the list: King Fahd Medical City with 416 or 28%, followed by the Ministry of Health with 266 or 18% and King Faisal Specialist Hospital with 212 or 14%. About six SHIs posted less than 100 tweets, and four SHIs posted less than 10 tweets.

#	Health Institution	Number of Tweets	Percentage
1	King Fahad Medical City	416	28%
2	Ministry of Health	266	18%
3	King Faisal Specialist Hospital	212	14%
4	King Khaled Eye Specialist Hospital	127	8%
5	King Fahad Specialist Hospital	124	8%
6	King Abdullah Medical City	105	7%
7	King Abdul-Aziz Medical City	89	6%
8	King Saud Medical City	71	5%
9	King Abdullah University Hospital	32	2%
10	King Faisal Specialist Hospital	30	2%
11	Health- 937	15	1%
12	King Abdul-Aziz University Hospital	6	0.4%
13	Security Forces Hospital - Dammam	5	0.33%
14	Security Forces Hospital - Makkah	3	0.19%
15	King Fahad University Hospital	1	0.06 %
	Total	1,502 tweets	100%

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Table 5: Health Education

There were 307 health-related tweets focussed on conferences and events, accounting for 9%. The majority of SHIs posted tweets about conferences and events. The highest number of tweets was posted by King Fahd Medical City with 84 tweets or 27%, followed by King Abdul-Aziz Medical City with 65 or 22%. Only two institutions, namely the Ministry of Health 937 and King Fahd University Hospital, did not post any content about this category, as shown in Table 6.

#	Health Institution	Number of Tweets	Percentage
1	King Fahad Medical City	84	27%
2	King Abdul-Aziz Medical City	65	22%
3	King Abdullah University Hospital	47	16%
4	King Abdullah Medical City	26	9%
5	Security Forces Hospital - Makkah	19	6%
6	King Faisal Specialist Hospital	16	5%
7	King Saud Medical City	13	4%
8	King Fahad Specialist Hospital	10	3%
9	Ministry of Health	9	3%
10	King Khaled Eye Specialist Hospital	7	2%
11	King Faisal Specialist Hospital	6	2%
12	Security Forces Hospital - Dammam	4	1%
13	King Abdul-Aziz University Hospital	1	0.32%
14	Health 937	0	0%
15	King Fahad University Hospital	0	0 %
	Total	307 tweets	100%

Table 6: Conferences and Events

The fourth category identified was Jobs and Careers, which consisted of 43 tweets, or 1% of the total analysed tweets, as shown in Table 7. The Ministry of Health had the highest number of tweets with 10, or 23%. All medical cities posted tweets about jobs and careers. Seven SHIs did not post any content about this category.

#	Health Institution	Number of Tweets	Percentage
1	Ministry of Health	10	23%
2	King Fahad Medical City	8	18%
3	King Saud Medical City	7	16%
4	King Abdullah University	6	14%
5	King Abdullah Medical City	5	12%
6	King Abdul-Aziz Medical City	4	9%
7	King Faisal Specialist Hospital	2	5%
8	King Abdul-Aziz University Hospital	1	2%
9	King Fahad Specialist Hospital	0	0%
10	King Khaled Eye Specialist Hospital	0	0%



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11	King Faisal Specialist Hospital	0	0%
12	Security Forces Hospital - Dammam	0	0%
13	Security Forces Hospital - Makkah	0	0%
14	Health 937	0	0%
15	King Fahad University Hospital	0	0 %
	Total	43 tweets	100%

 Table 7: Jobs and Careers

The last category identified was Research and Projects, which consisted of 33 tweets, or 1% of the total analysed tweets, as presented in Table 8. The findings show that only six SHIs tweeted about research and project announcements, whereas the other 9 SHIs did not post any tweets related to this category. SHIs who tweeted in this category may consider Twitter to be a good platform for research and project announcements, whereas the majority may not have seen Twitter as a good platform for announcing research and projects, and they may be considering other channels.

#	Health Institution	Number of Tweets	Percentage
1	King Abdullah University Hospital	16	48%
2	King Faisal Specialist Hospital	7	22%
3	King Abdul-Aziz Medical City	4	12%
4	King Fahad Medical City	3	9%
5	King Faisal Specialist Hospital	2	6%
6	King Abdullah Medical City	1	3%
7	King Saud Medical City	0	0%
8	King Fahad Specialist Hospital	0	0%
9	Ministry of Health	0	0%
10	King Khaled Eye Specialist Hospital	0	0%
11	Security Forces Hospital - Makkah	0	0%
12	Security Forces Hospital - Dammam	0	0%
13	King Abdul-Aziz University Hospital	0	0%
14	Health 937	0	0%
15	King Fahad University Hospital	0	0 %
	Total	33 tweets	100%

Table 8: Research and Proje	cts
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4.3 Observational notes about the analysed tweets

The analysis shows that there is a common pattern among tweets posted by SHIs. For example, many SHIs use hashtags as a tool for communication on Twitter. The hashtags can be local (related to a particular event or a local health issue, such as #تبرع بالدم# donateblood) or regional and international hashtags, such as international health day #worlddiabetesday. The hashtags are related to health and non-health issues. In addition, some SHIs hashtag themselves (#مدينة الملك عبدالله الطلك عبدالله الملك عبدالله الملك عبدالله الملك عبدالله الملك الملك المحدينة الملك عبدالله الملك المحدينة الملك عبدالله الملك عبدالله الملك المل

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Another common pattern is that tweets from the SHIs are more likely to include hyperlinks, and those links are linked to other websites. Moreover, it is generally found that most SHIs use videos, photos and infographics in conjunction with text to deliver health content.

Another finding is the use of mentions by some SHIs when they tweet. They sometimes mention individuals and organisations who have shown their support for the organisation, as well as acknowledging their participation in particular events. In addition, they mention other individuals, departments and units that belong to the same institution.

In terms of the language, Arabic is the main language used in tweets. However, some SHIs post tweets in two languages, Arabic and English (bilingual content), to provide content information. A number of issues can be observed in this regard. For example, some SHIs post a tweet in Arabic and then post a separate tweet of the same content in English, as in Figure 1.



Other SHIs tweet content in Arabic and English in one post, as in Figure 2.



This section discusses the findings of the study and relates them to the literature and other works. As reported earlier, Twitter adoption has been widespread among the public in Saudi Arabia, as it is the most popular social media used with nearly 9.9 million active users (Statista, 2019). Thus,

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it is not surprising to find that many SHIs have adopted Twitter. This agrees with other research showing that higher use of certain social media, such as Twitter, is linked to the higher use of the same tool by the general public in a particular society (Harris et al., 2013; Smith & Brenner, 2012). These findings support the view of Cameron (2011), who argued that organisations and institutions are likely to adopt the most pervasive communication media that are used by the general public. Twitter may also be more appealing to government health institutions for a number of reasons, including being a convenient platform to disseminate and promote health information that allows them to communicate, engage and reach a target audience with less effort, and being a great tool that speeds the delivery of information (Gomes & Coustasse, 2015; Jessen, 2008; Park et al., 2013).

Although SHIs have been using Twitter since 2011, the use can be described as in its early adoption stages. This is consistent with the study of Thackeray et al. (2012). SHIs have not fully utilised Twitter to maximise its benefits, and this finding corresponds with other research, including that of Neiger et al. (2013) and van de Belt et al. (2012). For example, the analysis of tweets indicates that SHIs are mainly using Twitter to convey one-way messages (one-way communication) rather than two-way interaction with the public. Similar findings have been reported by Diddi and Lundy (2017), Huang and Dunbar (2013), McInnes and Hornmoen (2018), Neiger et al. (2013) and Thackeray et al. (2012). If health organisations want to benefit from Twitter and fully utilise its features, they should consider developing strategic implementation and communication plans that address how health institutions can use Twitter effectively (Neiger et al., 2013), as well as consider using it as a two-way communication channel to connect and interact with their audiences (Huang & Dunbar, 2013).

As mentioned in the findings, the health institutions' Twitter accounts that were identified belong to the largest health institutions in the country, which service large populations. This confirms the findings of Harris et al. (2013), who reported that LHDs serving larger populations were more likely to be innovators or in the early adopter or majority group.

It is interesting to note that the majority of SHI accounts were verified by Twitter (11), and only four accounts were not. This is inconsistent with the study of Dumbrell and Steele (2012), which showed that none of the government accounts studied had been verified by Twitter. The importance of verification for government accounts cannot be overemphasised. According to Twitter (2018), the verified badge lets people know that an account of public interest is authentic and trusted, and it can lead to increases in follower numbers (Dumbrell & Steele, 2012), more respect from the public and may prevent others from impersonating health institutions with a stolen identity (Altayar, 2016). It is important to note that the issue of having a verified account for health institutions on Twitter has not been well studied.

In terms of types of information tweeted, organisational news was at the top of the list with 1,530 tweets (45%). This is in line with other research, such as Dumbrell and Steele (2012), Huang and Dunbar (2013) and Park et al. (2016). This suggests that SHIs are most interested in disseminating their organisational news to the public. Providing organisational news via Twitter

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accounts represent a great opportunity for health institutions to encourage engagement with their potential stakeholders and keep them abreast of the events and activities of the health institution. When it comes to delivering information, Twitter is very cost-effective in comparison with traditional media (Dumbrell & Steele, 2012; Gomes & Coustasse, 2015; Jessen, 2008; Park et al., 2013).

Health Education was the second category with 1,502 tweets (44%) and all SHIs posted tweets in this category. Promoting health education and increasing health awareness is one of the main reasons that drive health institutions to adopt Twitter (Dumbrell & Steele, 2012; Harris et al., 2013; McInnes & Hornmoen, 2018; Thackeray et al., 2012). Three large institutions were at the top of the list, including King Fahd Medical City, with 416 or 28%, followed by the Ministry of Health with 266. It was surprising to discover that the Ministry of Health was focussing first on the organisation's news with 275 tweets, and second on health education with 266 tweets. This is because the Ministry of Health is the main health service provider in the country, and it is expected that health education should be its priority in using social media, including Twitter.

Other types of tweeted information were related to conferences and events with 307 tweets (9%). Some SHIs, including all medical cities, posted tweets about conferences and events. This might be attributed to the fact that they consider Twitter to be an important source for raising awareness and spreading health content related to conferences and other events.

Although Twitter is one of the most popular and effective social media platforms that can be used for jobs and careers, only a few tweets (43), 1% were related to jobs and career, and nearly half of SHIs did not post any information in this category. One possible explanation for this finding may be that SHIs did not consider Twitter to be a convenient platform to promote job vacancies, and they may be considering other channels.

The findings show that 6 SHIs tweeted about research and project announcements. This is consistent with the study of Dumbrell and Steele (2012), which showed that health institutions in Australia utilised Twitter for research and project announcements. One plausible explanation for the result may be that Twitter is a good platform for research and project announcements as it can reach a wider audience who are interested in doing research and projects related to health, including individual researchers, companies, government and non-governmental bodies. On the other hand, the majority of SHIs (9) did not post any tweets related to this category. This can be attributed to the fact that they may not have seen Twitter as a convenient platform for announcing research and projects, and they may be considering other channels.

Content analysis of the tweets indicates that many SHIs use hashtags as a tool for communication on Twitter. This agrees with the findings of Park et al. (2016). Most SHIs are active in using hashtags, as they are a useful mechanism that can help to drive engagement and participation in health organisations social media accounts, as well as help increase exposure to their content at local, regional and international levels, which may result in reaching a wider audience and increasing their followers. Furthermore, tweets from the SHIs were more likely to include hyperlinks, which were linked to other websites (Park et al., 2016). Such links provide access to



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further information about issues relating to health content that cannot be posted via Twitter due to the character limit.

It was generally found that most SHIs use videos, photos and infographics in conjunction with text. This is inconsistent with Park et al. (2016), who reported that some USA health organisations used photos and videos less frequently among their Twitter posts. Using visual material such as photos and video could provide a better understanding of what is being communicated regarding health issues, as they are easier, faster and clearer to understand compared to written words. Photos and video also help to create rich health-related content that can attract the attention of users as well as increasing the usefulness of the tweets for followers (Park et al., 2016; Rybalko & Seltzer, 2010).

Another limited pattern of interaction can be seen in the use of mentions by some SHIs when they tweet. They sometimes mention individuals and organisations who have shown their support for the organisation, as well as acknowledging their participation in particular events (Park et al., 2016). While this can be regarded as a form of interaction with users, it should be conducted with care, and according to the agreed policy of the institution.

6. Conclusions

This study aimed to investigate the adoption and use of Twitter by SHIs. SHIs use of Twitter can be described as in the early adoption stages, and they use it to convey one-way messages rather than interact with the public through two-way communication. The majority of SHIs that use Twitter belong to the largest health institutions in the country, which service large populations. In terms of types of information tweeted, it was found that organisational news, health education, conferences and events, jobs and careers, research and project were the most common type of tweets posted by SHIs. The findings of this study have confirmed some previous research on the use of Twitter by health organisations, while other results have conflicted with those from other studies. By investigating the Saudi context, this study extends the line of research on the use of social media, and more specifically, Twitter, by health institutions.

As with any research, this research paper has some limitations, including that it only focussed on the use of Twitter by SHIs. Future research should consider other social media platforms, such as Snapchat, YouTube and Facebook, to gain a better understanding of how different kinds of social media are adopted in the health sector. Another possible avenue for future research is to look at other countries, such as the Gulf States or the Arab world, and compare their use of Twitter. Another interesting research avenue is to study how Twitter is used to communicate certain health issues or diseases. Furthermore, and from a methodological perspective, the view of practitioners who work in the health sector should be investigated using survey and interviews to understand their perceptions of the use of social media. Finally, this study did not aim to provide a detailed description of current Twitter use in the health sector in Saudi; rather, it focussed on government

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health institutions. Other health accounts could be studied, such as those belonging to nonprofit organisations, profit organisations and individuals who run health-related information accounts.



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