

Measuring Instagram Activity and Engagement Rate of Hospital: A Comparison Before and During COVID-19 Pandemic

Badra Al Afa
Vocational Education Program
Universitas Indonesia
Depok, Indonesia
badra@vokasi.ui.ac.id

Wahyu Sulistiadi
Faculty of Public Health
Universitas Indonesia
Depok, Indonesia
wahyufphui@gmail.com

Faizah Abdullah Djawas
Vocational Education Program
Universitas Indonesia
Depok, Indonesia
faizah.abdullah14@ui.ac.id

Abstract—Social media operated by hospitals plays a significant role during the COVID-19 pandemic. However, the hospitals' effort to engage their followers during the pandemic is understudied. The study aimed to identify the hospitals' frequency post in their Instagram account and the engagement rate before and during the COVID-19 pandemic. The study observed the activities through the Instagram posts of each hospital. The observation was conducted using a cross-sectional review of the hospital-related activities of 19 Instagram accounts owned by the hospitals across Depok City, Indonesia. Further, to measure the engagement rate, the period of the posts was limited from January to June 2020. The rate was calculated by dividing the total number of likes by the total number of followers' times the number of posts times the probability of followers viewing the posts; then multiplied by 100%. The Mann Whitney U test was employed to determine the significant difference in the daily Instagram posts and the engagement rate before and during the pandemic. The study showed that 15 hospitals increase Instagram activities during the pandemic, and eight hospitals (42.11%) showed a significant increase compared to the pre-pandemic period. Besides, the results revealed that nine hospitals (47.37%) increased the engagement rate. Meanwhile, about 40% of the samples increased the frequency of post and engagement rates. However, few hospitals, primarily publicly owned hospitals, need to improve the posts and the engagement rate.

Keywords—social media, Instagram, hospital, engagement rate, pandemic

I. INTRODUCTION

Coronavirus Disease (COVID-19) is continuing its spread across the world, with over 18 million confirmed cases in 215 countries. Nearly 700,000 people have lost their lives, including the Indonesians [1]. With more than 110 thousand cases on August 1, 2020, Indonesia becomes a country with the highest number of COVID-19 among ASEAN countries [2], [3]. In terms of mortality rate, Indonesia continues to break the record, which was 4.7%, higher than the global average (3.8%) [2].

COVID-19 has influenced not only people's health but also various aspects of life. SARS-Cov-2, another name of the virus, spread from human to human through direct contact, droplet, and air (airborne) [4]. Preventive measurements, such as physical distancing, should be maintained to break the transmission chain. Therefore, social, business and educational activities are conducted online. For example, in the educational context, the government has issued guidance for the school's management to organize online learning or known as studying from home [5], [6]. Meanwhile, in business

activities, according to a survey conducted by Rakuten Insight, 33 percent of the research respondents claimed that during the pandemics, all purchases they have made by May 2020 were conducted online [7].

During the lockdown, online activities, including the utilization of social media, have increased [8]. The users grew by more than 10 percent over the past year, taking the total global to 396 billion by the start of July 2020 [9]. Unfortunately, the use of social media during the pandemic has an adverse effect. Social media enables people to share or cause misinformation related to COVID-19. World Health Organization reported that there was an *infodemic* condition in which the over-abundance of information (either accurate or inaccurate) has caused difficulty for people to find trustworthy resources and reliable guidance related to the pandemic [10]. An amount of research has identified the association between the use of social media as an information source and the individuals' condition during the pandemic. A study in Taiwan showed that the Internet was significantly associated with poorer psychological well-being for non-health-care workers [11]. Another study performed in Iran revealed that social media played a crucial role in spreading anxiety about the COVID-19 outbreak [8].

Nevertheless, it cannot be refused that social media has several benefits during the pandemic. The government and the healthcare authorities can utilize it to update the news and spread scientific discoveries related to the virus [12]. A study in Taiwan found that non-healthcare workers receiving information about COVID-19 from the medical staff had better psychological well-being [11]. Thus, hospitals, as one of the healthcare institutions, should take the role of spreading accurate information about the virus and other related news through social media.

In the preliminary study, we found that 20 of 23 hospitals in Depok City have an Instagram account. We found that hospitals have utilized social media to deliver information about COVID-19, such as diagnosis and prevention. However, research that focused on identifying the hospital's social media performance during the COVID-19 pandemic is rarely found. Therefore, this study aimed to determine the hospital's Instagram activity and engagement rate before and during the pandemic of COVID-19 in Depok City, Indonesia. Hospital's Instagram activities in this study were described by calculating the Instagram posts from each account. Engagement rate is defined as a metric that measures the level of the audiences' involvement in the form of comments, shares, and likes [13]. The engagement rate on social media is

a crucial metric to measure follower's interaction with the content that is being posted [14]. Measuring the engagement rate might help companies to identify the followers' interests. In addition to that, the present study was expected to describe the hospitals' social media performance changes before and during the pandemic. The results can be used by the stakeholders to disseminate information related to COVID-19 and other relevant information.

II. METHOD

A. Study Design

A cross-sectional review of the hospital-related activities on Instagram has been performed for the study. The hospitals include all the registered hospitals in the Depok City Health Department. In the present study, there were 23 hospitals selected. Further, the focus of the research was on the hospitals' Instagram activities. Referring to the preliminary investigation, Instagram was the most used social media by hospitals in the city. Out of 23 hospitals, 20 have an Instagram account (86.96%), 15 have a Facebook account (65.22%), and 11 have a YouTube account (47.83%). However, one of the selected hospitals never posted anything on their Instagram account. Hence, the samples of the present study were 19 hospitals. Among the samples, two were owned by the government, four by social and educational (university) institutions and the rest were by private companies. The Instagram account of each hospital was browsed by typing the hospital's name. Each of them was confirmed by matching the address of the hospital written on the Instagram page with the original address listed in the Depok Health Profile.

B. Data Collection

The number of likes for each hospital between January and June 2020 was used as the data. The daily Instagram engagement rate was calculated by adopting a formula proposed by Arman and Sidik (2019). It was measured by dividing the total number of likes by the total number resulted from the full followers times the number of posts times the probability of the followers to see the posts. The result was multiplied by 100%.

$$Er = \frac{Li}{nPF}$$

Where:

Er = Engagement rate

Li = Total Like

n = Total posts

P = probability for followers to see posts

F = Total followers

C. Statistical Analysis

The descriptive statistics were performed to compute the average number of the daily posts and the engagement rate percentage rate of each hospital's Instagram account. Further, the Mann Whitney U test was employed to determine the significant difference in the daily Instagram posts and the engagement rate before and during the pandemic. The period before the pandemic was before the announcement of the confirmed first case in Indonesia (January 01, 2020 – March 01, 2020), and the pandemic period started from the date of the first detected and reported case (March 02, 2020). The data were analyzed using a statistic software.

III. RESULTS

A. Percentage of Instagram engagement rate among sampled hospitals

Table 1 showed the percentage of Instagram engagement rates of Hospitals across Depok City. We found that most Instagram account of hospitals in Depok City has a high quality of engagement rate based on the standard (n= 15, 78.95%). Only one hospital has a good quality of Instagram engagement rate (5.26%), and three hospitals have a low quality of Instagram engagement rate (15.79%). The standard of quality of engagement rate is also adopted from a previous study and can be seen in Table 2.

TABLE I. PERCENTAGE OF INSTAGRAM ENGAGEMENT RATE OF HOSPITALS ACROSS DEPOK CITY PERIOD JANUARY 01, 2020 – JUNE 30, 2020

	Followers	Post	Like	%ER	Quality or ER
Privatehosp1	15929	854	12569	0,09	Low
Privatehosp2	10772	182	9359	4,77	Low
Privatehosp3	1362	121	2229	13,53	High
Privatehosp4	2029	82	3156	18,97	High
Privatehosp5	3306	99	2441	7,46	Good
Privatehosp6	2441	58	2867	20,25	High
Privatehosp7	2779	59	1720	10,49	High
Privatehosp8	1111	22	301	12,31	High
Privatehosp9	3548	88	5022	16,08	High
Privatehosp10	1208	119	3947	27,46	High
Privatehosp11	1593	46	1658	22,63	High
Privatehosp12	242	103	1277	51,23	High
Privatehosp13	839	5	70	16,69	High
Socialhosp1	1024	425	4931	11,33	High
Socialhosp2	18003	247	35439	7,97	High
Socialhosp3	4063	89	3316	9,17	High
Socialhosp4	1597	3	33	6,89	High
Publichosp1	610	50	2470	80,98	High
Publichosp2	468	0	0	0,00	Low

TABLE II. INSTAGRAM ENGAGEMENT RATE STANDARD

Number of followers	Range of ER	Quality of ER
<5K	< 7.58	Low
	7.58 – 8.58	Good
	>8.58	High
5K – 20 K	< 4.98	Low
	4.98 – 5.98	Good
	> 5.98	High

B. Hospital Instagram Activity before and during the pandemic

Figure 1 showed a trend towards an increasing number of posts after the pandemic compared to the period before the pandemic. Table 3 showed that more than 75% of hospital Instagram (n= 15, 78.95%) showed an increase in the average number of posts per day during the pandemic compared to the pre-pandemic period, and only three hospitals Instagram experienced a decrease in Instagram activities during pandemic compared to the pre-pandemic period. One hospital's Instagram activity showed no average One hospital's Instagram showed no change in average activity during the pandemic compared to the pre-pandemic period. However, from 15 hospitals that experienced an increase of Instagram activity during the pandemic, only eight hospitals (42.11%) showed a significant increase in Instagram activity

during pandemic compared to the period pre-pandemic period.

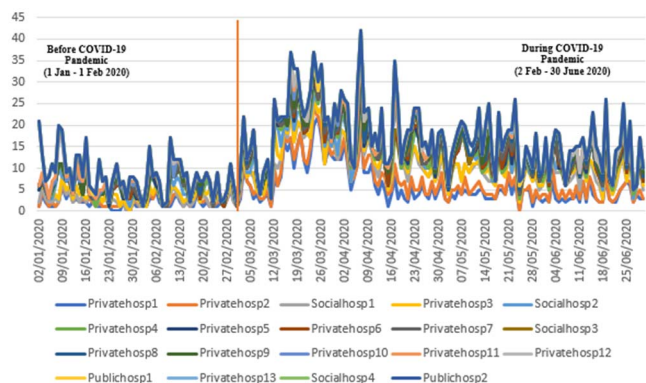


Fig. 1. Hospital's Instagram post frequency before and during COVID-19 Pandemic

TABLE III. STATISTICAL TEST OF HOSPITAL'S INSTAGRAM POST FREQUENCY BEFORE AND DURING COVID-19 PANDEMIC

	Mean		Mean rank		p-value
	Before pandemic	During pandemic	Before pandemic	During pandemic	
Privatehosp1	1.80	6.15	44.98	114.95	0.000*
Privatehosp2	0.79	1.11	71.00	101.83	0.000*
Privatehosp3	0.74	0.63	99.05	87.69	0.127
Privatehosp4	0.30	0.53	85.45	94.55	0.154
Privatehosp5	0.33	0.65	77.52	98.55	0.004*
Privatehosp6	0.25	0.36	87.08	93.73	0.293
Privatehosp7	0.25	0.36	78.37	98.12	0.002*
Privatehosp8	0.00	0.18	85.50	94.52	0.011*
Privatehosp9	0.07	0.69	66.90	103.90	0.000*
Privatehosp10	0.56	0.70	83.06	95.76	0.073
Privatehosp11	0.41	0.17	103.11	85.64	0.002*
Privatehosp12	1.07	0.31	108.94	82.71	0.000*
Privatehosp13	0.02	0.03	90.98	91.76	0.712
Socialhosp1	0.44	3.29	38.93	118.00	0.000*
Socialhosp2	1.23	1.42	84.61	94.97	0.192
Socialhosp3	0.34	0.56	84.20	95.18	0.117
Socialhosp4	0.00	0.02	90.00	92.26	0.216
Publichosp1	0.05	0.39	83.18	95.69	0.009*
Publichosp2	0.00	0.00	91.50	91.50	1.000

* p-value < 0.05 by Mann Whitney test

C. Hospital Instagram engagement rate before and during the pandemic

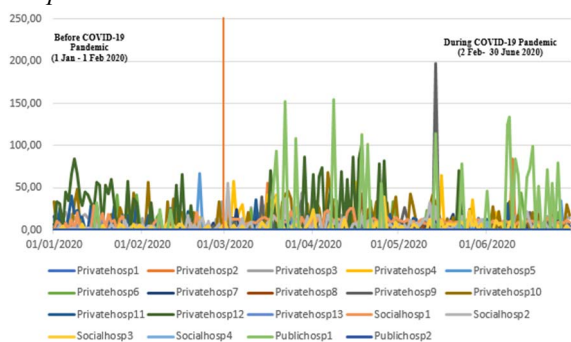


Fig. 2. Hospital's Instagram daily engagement rate before and during COVID-19 Pandemic

Figure 2 showed a trend towards a fluctuate daily engagement rate in hospitals' Instagram before and during COVID-19 pandemic. Table 4 showed 13 (68.42%) hospitals experienced an increase in the average daily Instagram engagement rate during pandemic compared to the pre-period epidemic. However, an average daily Instagram rate decreased in four (21.05%) hospitals and remained stagnant in

two (10.53%) hospitals during pandemic compared to the pre-pandemic period. Out of 19 hospitals, 9 (47.37%) hospitals' Instagram engagement rate showed a significant increase during pandemic compared to the pre-pandemic period.

TABLE IV. STATISTICAL TEST OF HOSPITAL'S INSTAGRAM DAILY ENGAGEMENT RATE BEFORE AND DURING COVID-19 PANDEMIC

	Mean		Mean rank		p-value
	Before pandemic	After pandemic	Before pandemic	During pandemic	
Privatehosp1	1.03	0.97	95.86	89.30	0.428
Privatehosp2	1.24	3.32	75.34	99.64	0.002*
Privatehosp3	8.05	6.47	100.35	87.04	0.085
Privatehosp4	2.63	6.25	83.86	95.35	0.071
Privatehosp5	3.00	3.31	79.62	97.49	0.015*
Privatehosp6	3.93	6.19	86.52	94.01	0.240
Privatehosp7	1.29	3.72	77.61	98.50	0.001*
Privatehosp8	0.00	1.23	85.50	94.52	0.011*
Privatehosp9	0.43	6.83	66.70	104.00	0.000*
Privatehosp10	8.55	10.34	85.46	94.55	0.202
Privatehosp11	7.25	3.07	103.39	85.51	0.002*
Privatehosp12	19.36	9.11	107.06	83.66	0.000*
Privatehosp13	0.31	0.31	91.00	91.75	0.720
Socialhosp1	4.50	11.03	56.16	109.32	0.000*
Socialhosp2	3.03	6.98	71.04	101.81	0.000*
Socialhosp3	1.71	4.21	81.91	96.33	0.042*
Socialhosp4	0.00	0.17	90.00	92.26	0.216
Publichosp1	1.34	16.31	82.93	95.82	0.009*
Publichosp2	0.00	0.00	91.50	91.50	1.000

* p-value < 0.05 by Mann Whitney test

IV. DISCUSSION

The present study showed that 75% of the hospitals increased their online activities during the pandemic. A survey performed to more than 25 thousand of samples showed the same pattern in which Instagram usage increased by 40% in the mid-phase of the pandemic [15]. Other than that, Facebook, and YouTube are two other media that experienced an increase, 27.0%, and 15.3%, respectively, in the United States during the pandemic [16]. Maintaining physical distancing is the key to prevent the spread of the disease. Therefore, most countries implemented lockdown or partial lockdown in which people were obliged to work and study from home. The condition influenced the use of social media and the way the business market sells its products.

Although some hospitals' Instagram accounts experienced a significant increase in the engagement rate, more than half of them decreased. A similar study found that Instagram accounts for food and beverages, influencers, a non-profit organization, sports teams, educational, and software sectors that have declined since the beginning of the pandemic [17]. As a result, most hospitals made more frequent posts on Instagram, causing the engagement rate to go down. When the company posted less frequently, each post has a better chance on earning impressions and has a higher per-post performance [17].

Social media has several advantages for healthcare and health professionals. For example, it can be the media for networking and education, for providing patient care and education, for organizing public health programs and healthcare promotion [18]. In particular, during the pandemic, social media has taken a significant role in sharing the information; and it influenced the people's interaction and responses [12]. In the Indonesian context, social media is expected to be a tool for rectifying the misinformation regarding the virus [19]. Different from the previous pandemic, the transfer of knowledge related to diseases should be performed through direct communication, such as

a home visit by health volunteers or posters [20]. Besides, with the help of technological advances, the transfer can be carried out through social media. It was particularly useful to minimize direct contact between the communicators and the communicates, leading to the diminishing of the virus transmission.

In the business context, Instagram has a significant, positive effect on consumer trust which in turn, these conditions can have positive implications for purchase intensity [21]. Another study also stated that Instagram is an effective medium in advertising to be able to increase consumer relationships with certain product brands [22]. In addition, one study also stated that there is a role for the key opinion leader in shaping consumer confidence in the products or services offered on Instagram where this has a positive effect on the intention to buy or use the product or service [23].

In addition, engagement was evident in the number of shares and reposts by the followers. We suggested that shares and reposts number for each post be included in further research. Besides, the measurement of the engagement rate of other social media owned by hospitals can be taken into consideration. It will be useful to identify the best media to use by the hospital industries.

V. CONCLUSION

About 40% of the hospitals' Instagram accounts showed a significant increase both in the post frequency and the engagement rate during the pandemic. However, several hospitals, especially the public ones, need to increase these aspects. Increased social media activities are expected to enhance the people's general knowledge about COVID-19, allowing to improve the compliance behavior of the people related to the health protocol during the pandemic. The hospitals' social media is also expected to be a marketing tool to inform and promote health services since people cannot directly access the hospital due to the lockdown. Besides, the hospitals also need to increase their social media engagement rate by creating more engaging content for the public and adjusting the posting time to the changes of the society because they have to work and study from home.

ACKNOWLEDGMENT

We would like to extend our gratitude to the Directorate of Research and Development of *Universitas Indonesia* for financial support provided for the entire process of this research with grant number NKB-1254/UN2.RST/HKP.05.00/2020.

REFERENCES

- [1] Worldometers, "COVID-19 Coronavirus Pandemic," *worldometers.info*, 2020. [Online]. Available: https://www.worldometers.info/coronavirus/?utm_campaign=homeAdvegas1?%22%5C1%22countries. [Accessed: 08-Aug-2020].
- [2] Ministry of Health Republic of Indonesia, "Corona Virus Update," *Infeksi Emerging*, 2020. [Online]. Available: <https://infeksiemerging.kemkes.go.id/>. [Accessed: 08-Aug-2020].
- [3] Dezan Shira and Associates, "The Coronavirus in Asia and ASEAN – Live Updates by Country," *ASEAN Briefing*, 2020. [Online]. Available: <https://www.aseanbriefing.com/news/coronavirus-asia-asean-live-updates-by-country/>. [Accessed: 20-Aug-2020].
- [4] World Health Organization, "Transmission of SARS-CoV-2: implications for infection prevention precautions," *World Health Organization*, 2020. [Online]. Available: <https://www.who.int/news-room/commentaries/detail/transmission-of-sars-cov-2-implications-for-infection-prevention-precautions>. [Accessed: 08-Aug-2020].
- [5] Ministry of Education and Culture of Indonesia, *Pedoman Pelaksanaan Belajar Dari Covid-19 Rumah Selama Darurat Bencana Di Indonesia Surat Edaran Sekretaris Jendral No. 15 Tahun 2020*. Jakarta: Ministry of Culture and Education of Indonesia, 2020.
- [6] X. Feng, X. Hu, K. Fan, and T. Yu, "A Brief Discussion About the Impact of Coronavirus Disease 2019 on Teaching in Colleges and Universities of China," in *2020 International Conference on E-Commerce and Internet Technology (ECIT)*, 2020, pp. 167–170.
- [7] Rakuten Insight, "Impact of Covid-19 on Consumer Behaviour," 2020.
- [8] A. R. Ahmad and H. R. Murad, "The impact of social media on panic during the COVID-19 pandemic in iraqi kurdistan: Online questionnaire study," *J. Med. Internet Res.*, vol. 22, no. 5, p. e19556, 2020.
- [9] We Are Social & Hootsuite, "Digital use around the world in July 2020," New York, 2020.
- [10] World Health Organization, "Coronavirus disease 2019 (COVID-19) Situation Report – 95," 2020.
- [11] N. Y. Ko *et al.*, "COVID-19-related information sources and psychological well-being: An online survey study in Taiwan," *Brain. Behav. Immun.*, vol. July, no. 87, pp. 153–154, 2020.
- [12] D. L. Lima, M. A. A. A. d. M. Lopes, and A. M. Brito, "Social media: friend or foe in the COVID-19 pandemic?," *Clinics (Sao Paulo)*, vol. 75, p. e1953, 2020.
- [13] TrackMaven, "Engagement Rate," *TrackMaven*, 2020. [Online]. Available: <https://trackmaven.com/marketing-dictionary/engagement-rate/>. [Accessed: 08-Aug-2020].
- [14] M. Smura, "Comparative research on engagement in social media platforms: Using multiple measurements to analyse the attractiveness of content on social media platforms," Helsinki Metropolia University of Applied Sciences, 2016.
- [15] Kantar, "COVID-19 Barometer: Consumer attitudes, media habits and expectations," London, 2020.
- [16] E. Koeze and N. Popper, "The Virus Changed the Way We Internet," *The New York Times*, 2020. [Online]. Available: <https://www.nytimes.com/interactive/2020/04/07/technology/coronavirus-internet-use.html>. [Accessed: 08-Aug-2020].
- [17] B. Feehan, "The Impact of Coronavirus on Social Media Engagement for Brands," *Rival IQ*, 2020. [Online]. Available: <https://www.rivaliq.com/blog/coronavirus-on-social-media-engagement-for-brands/>. [Accessed: 08-Aug-2020].
- [18] C. Lee Ventola, "Social media and health care professionals: Benefits, risks, and best practices," *P T*, vol. 39, no. 7, pp. 491–499, 2014.
- [19] N. M. Nasir, B. Baequni, and M. I. Nurmansyah, "Misinformation related to COVID-19 in Indonesia," *J. Adm. Kesehatan Indones.*, vol. 8, no. Special Issue 1, pp. 51–61, 2020.

- [20] M. Ott, S. F. Shaw, R. N. Danila, and R. Lynfield, "Lessons learned from the 1918-1919 influenza pandemic in Minneapolis and St. Paul, Minnesota," *Public Health Rep.*, vol. 122, no. 6, pp. 803–810, 2007.
- [21] B. Astuti and A. P. Putri, "Analysis on the Effect of Instagram Use on Consumer Purchase Intensity," *Rev. Integr. Bus. Econ. Res.*, vol. 7, no. Supplementary Issue 2, pp. 24–38, 2018.
- [22] H. R. Gaber, L. T. Wright, and K. Kooli, "Consumer attitudes towards Instagram advertisements in Egypt: The role of the perceived advertising value and personalization," *Cogent Bus. Manag.*, vol. 6, no. 1, pp. 1–13, 2019.
- [23] A. Algi and Irwansyah, "Consumer trust and intention to buy in Indonesia instagram stores," in *Proceedings - 2018 3rd International Conference on Information Technology, Information Systems and Electrical Engineering, ICITISEE 2018*, 2018, pp. 199–203.