

Utilization of a mobile platform for the dissemination of validated institutional measurements during CoVid-19 Outbreak : A practical example in the Children's Hospital

Ido Zamberg, Sergio Manzano, Klara Posfay-Barbe, Olivier Windisch, Thomas Agoritsas, Eduardo Schiffer

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Ido ZambergMD, ; Sergio ManzanoMD, ; Klara Posfay-BarbeMD, ; Olivier WindischMD, ; Thomas AgoritsasMD, PhD, ; Eduardo SchifferMD, PhD,

Corresponding Author:

Ido ZambergMD,

Phone: +41022 372 33 11

Email: idozamberg@gmail.com

Abstract

Background: As part of response plans for current outbreak of SARS-CoV-2, authorities are drafting and implementing containment measures across jurisdictions worldwide in the effort to slow transmission and infection rate. A solid communication strategy is needed to increase the reach of valid information to health professionals, reduce misinformation, and efficiently implement recommended measures.

Objective: The objective of this paper is to describe the utilization of a dedicated mHealth platform to disseminate up-to-date and validated information about the SARS-CoV-2 to all medical staff of the Children's hospital at the University Hospitals of Geneva.

Methods: Three documents containing institutional information concerning screening, local containment procedures as well as FAQ for parents were made available to the staff through a mobile application developed in the University of Geneva, Switzerland. Using a third-party statistics tool, we anonymously monitored user activity as well as content utilization patterns since the diagnostic of the first case of SARS-CoV-2 in Switzerland on February 25, 2020.

Results: During the period of February 25 to March 13, 2020 (18 days) information documents on SARS-CoV-2 were viewed 859 times which amounted for 35.6% of total content views. User activity increased significantly with 50.8 (SD = 14.4) vs 26.4 (SD = 9.8) users per day comparing to previous weeks ($p < 0.001$). In addition, sessions number per day more than doubled during mentioned period ($p < 0.001$). In a survey, medical staff found the information easy to find within the application. On a 10 point Likert-scale the ability of the application to reassure staff in clinical practice was rated 7.6 (SD = 2.1), time-saving ability was rated 8.5/10 (SD = 2.1) and the need to look for information from other sources was rated with a score of 5.9/10 (SD = 3.3).

Conclusions: The use of a mHealth solution to disseminate novel coronavirus related information seemed to be an effective and timesaving communication channel within our institution during SARS-CoV-2 outbreak. Medical staff felt reassured and informed in daily practice. More research should be done concerning the clinical impact and outcomes of integration of mHealth solutions as a communication channel of validated information within health institutions.

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I. Zamberg¹, S. Manzano^{*4}, K.M. Posfay-Barbe^{*5}, O. Windisch², T. Agoritsas¹, E. Schiffer³

¹ Division of General Internal Medicine, Department of Medicine, University Hospitals of Geneva and Faculty of Medicine University of Geneva, Geneva, Switzerland.

² Division of Urology, Department of Surgery, University Hospitals of Geneva, Switzerland

³ Division of Anesthesiology, Department of Anesthesiology, Clinical Pharmacology, Intensive Care and Emergency Medicine, Geneva University Hospitals and Faculty of Medicine University of Geneva, Geneva, Switzerland.

⁴ Division of Pediatric Emergency, Department of Pediatrics, Geneva University Hospitals

⁵ Division of General Pediatrics, Department of Pediatrics, Geneva University Hospitals and Faculty of Medicine University of Geneva, Geneva, Switzerland

* shared authorship

Key Words : covid-19 ; novel coronavirus ; smartphone ; SARS-COV-2; mHealth ; Knowledge ; Information ; dissemination ; health policy

Corresponding Author:

Ido Zamberg

Division of General Internal Medicine, Department of Medicine, University Hospitals of Geneva Rue Gabrielle-Perret-Gentil 4

CH-1205 Geneva

Switzerland

Phone: +41 76 803 56 83

ido.zamberg@unige.ch

Abstract

Background

As part of response plans for current outbreak of SARS-CoV-2, authorities are drafting and implementing containment measures across jurisdictions worldwide in the effort to slow transmission and infection rate. A solid communication strategy is needed to increase the reach of valid information to health professionals, reduce misinformation, and efficiently implement recommended measures.

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The aim of this paper is to describe the utilization of a dedicated mHealth platform to disseminate up-to-date and validated information about the SARS-CoV-2 to all medical staff of the Children's Hospital at the University Hospitals of Geneva.

Methods

Three documents containing institutional information concerning screening, local containment procedures as well as FAQ for parents were made available to the staff through a mobile application developed in the University of Geneva, Switzerland. Using a third-party statistics tool, we anonymously monitored user activity as well as content utilization patterns since the diagnostic of the first case of SARS-CoV-2 in Switzerland on February 25, 2020.

Results

During the period of February 25 to March 13, 2020 (18 days) information documents on SARS-CoV-2 were viewed 859 times which amounted for 35.6% of total content views. User activity increased significantly with 50.8 ($SD = 14.4$) vs 26.4 ($SD = 9.8$) users per day comparing to previous weeks ($p < 0.001$). In addition, sessions number per day more than doubled during mentioned period ($p < 0.001$). In a survey medical staff found the information easy to find within the application. On a 10 point Likert-scale the ability of the application to reassure staff in clinical practice was rated 7.6 ($SD = 2.1$), time-saving ability was rated 8.5/10 ($SD = 2.1$) and the need to look for information from other sources was rated with a score of 5.9/10 ($SD = 3.3$).

Conclusions

The use of a mHealth solution to disseminate novel coronavirus related information seemed to be an effective and timesaving communication channel within our institution during SARS-CoV-2 outbreak. Medical staff felt reassured and informed in daily practice. More research should be done concerning the clinical impact and outcomes of the integration of mHealth solutions as a communication channel of validated information within health institutions.

Introduction

The global outbreak of the novel coronavirus – SARS-CoV-2 – responsible for CoVID-19 infection and its implications are still unfolding. With more than 800,000 confirmed cases worldwide[1], governments and local authorities are working on different response plans, adapted to local epidemiology and resources in order to reduce the risk of community spread and to slow disease transmission [2].

Local and global response plans include classic outbreak measures as travel restrictions to and from high risk areas, social distancing, community containment, quarantine for confirmed or suspected cases, and cancellation of large-scale public events and gatherings [3-5]. On the personal level, the World Health Organization (WHO) is recommending hygiene measures, such as avoiding contact with confirmed cases and hand washing in the effort to reduce viral transmission rate [2].

In parallel, local hospitals and health authorities worldwide are bracing themselves for the possibility of having a large influx of suspected and confirmed cases, and for preventing nosocomial transmission to patients' families and health workers [2, 3]. For example in the Children's Hospital at the University hospitals of Geneva, Switzerland, several local procedures were drafted to streamline patients sent for testing or medical care, diagnostic criteria were adopted and updated daily as per international consensus, and a contained screening facility was set up to separate possibly infected children from the rest of the hospital. In addition, a hotline was established and was rapidly overwhelmed.

In order to be efficient, disease containment measures require a solid communication strategy to avoid misinformation not only to the general public but also between global and local health authorities as well as within health institutions so that validated guidance can properly reach local medical staff [6].

In fact, as seen in recent outbreaks of measles, Zika virus and Ebola, the public is exposed to a large amount of information both from official channels as the WHO and local authorities, as well as from unofficial channels as newspapers and social media[7-9], with the obvious risk of the latter to provide confusion and misinformation [8]. Health professionals, who might have a more critical insight for these channels, would still find themselves exposed to a large amount of information for which validation could be lacking.

As mHealth solutions are becoming more relevant in health professions [10], the use of mobile devices via dedicated platforms as means of communication may increase reach of validated information to clinicians.

In this short paper, we describe our efforts to disseminate locally validated and up-to-date guidance about the CoVID-19 to the medical staff in the Children's Hospital in the University Hospitals of Geneva through a mobile platform developed in the University of Geneva, Switzerland. Our hypothesis was that providing guidance through the mobile application would be perceived as time-

effective by medical staff and would provide reassurance in clinical practice as validated information is readily available and updated regularly.

Methods

We have developed, due to a need of our medical students and residents to easily access locally endorsed and validated medical knowledge, a mobile platform called “HeadToToe” [11, 12]. The platform provides an institutional knowledge dissemination solution and consists of an iOS and Android mobile apps where medical students and health professionals can access medical content, organized by medical specialties, such as local and international guidance, clinical skills videos, and administrative material. The platform provides an administration interface accessed by delegated senior staff from each of the Hospital’s departments who select and validate content they deem important for continuous medical education, and daily practice. Content managers define revision dates and expiration dates for each item. Obsolete items are deleted automatically by the system. Automatic and anonymous statistics collection using Yahoo Flurry[®] provide data on user activity and content views patterns.

During CoVID-19 pandemic, the platform was used as a communication channel in the Children’s Hospital to disseminate local procedures, treatment plans as well as general information about the novel coronavirus to healthcare workers, mostly physicians.

To assess the impact of such mHealth information channel on clinical practice and provide feedback to medical leadership of its usefulness we used a Utilization-Focused Evaluation method [13]. We analyzed user activity and content use patterns collected by the platform since the introduction of outbreak measures in our institution. Data collected was average and total number of users and sessions per day, average usage time per user per day as well as total and specific content views per day.

In addition, we conducted an online survey among medical staff who used the platform during the same period. Survey questions focused on the impact of mHealth solution on daily practice, specifically on time-effectiveness and reassurance ability concerning a specific clinical challenge (CoVID-19 patient care).

p Values were calculated using SAS JMP[®] with a t-test for means. $p < 0.05$ was considered significant.

Results

Three novel-coronavirus related documents (Figure 2) were made available to medical staff of the Children's Hospital through the mobile platform: 1) institutional screening and containment procedures, 2) frequently asked questions and answers for parents and 3) a standardized consultation sheet. Medical staff's demographics are summarized in Table 1.

Since the first case of SARS-CoV-2 in Switzerland was announced on February 25th, 2020 until March 13th, 2020 (18 days), mentioned documents were viewed 859 times. This amounted to 35.6% of total documents views from a total of 332 documents.

Concerning user activity, when compared to the period from January 1st, 2020 and February 24th, 2020, we observed a significant increase (92%, $p < 0.001$) in number of users per day 50.8 ($SD = 14.4$) vs 26.4 ($SD = 9.8$) since local outbreak (Figure 1a). Number of sessions per day increased significantly ($p < 0.001$) and more than doubled in the mentioned period with 182.9 ($SD = 60.0$) sessions per day vs. 84.2 ($SD = 33.6$). (Figure 1b)

In a survey answered by 125 health professionals of the Children's Hospital, 93 staff members (75%) said they are directly concerned with SARS-CoV-2 patient care. Eighty-four (67.2%) said they downloaded the mobile application. Within staff who downloaded the platform, 70 (83%) said that information concerning SARS-CoV-2 was easy to find thanks to the application. On a ten-point Likert-scale, the mHealth solution was rated 8.5/10 ($SD = 2.1$) for timesaving and 7.6/10 ($SD = 2.1$) for reassurance concerning SARS-CoV-2 patient care in daily practice. Finally, when asked for the need to seek other sources of information other than the mobile platform, medical staff rated the solution at 5.9/10 ($SD = 3.3$) on the Likert-scale. (Table 3)

Within staff who felt the need to search for more information, 42.5% answered they used national government websites, 27.4% used dedicated websites of health institution (WHO, CDC), 8% used non dedicated professional websites, and 15% used nonofficial sources, such as newspapers and television; none declared using social media.

Discussion

Communication strategies for sound clinical guidance are important in order for clinicians to choose evidence-based treatment plans. Even more so in times of infectious disease outbreaks where misinformation can play a key role in failing of containment methods [6, 8].

These strategies usually involve both information sources dedicated for the general public, as well as sources targeted for health institutions and professionals, such as dedicated websites, scientific papers and governmental procedures. Within an institution, local leadership would often use tools as emails, posters and conferences to reach and inform their staff [6]. These methods however have obvious flaws especially in situations as the current one of a newly discovered virus (SARS-CoV-2), where solid scientific evidence is still lacking, and new and sometimes contradictory information is being published on a daily basis.

Moreover, in these situations, health professionals may have to deal not only with growing amount of workload and patient consultations, but also with the difficulty of critically appraising the vast amount of published information in the subject in order to make evidence-based decisions.

Therefore, it is crucial, in our opinion, that health institutions are not only able to communicate with local, national and international authorities in order to create response plans and protocols during outbreaks, but are also able to communicate these protocols to their medical staff in order to inform them, reassure them and help them with clinical decision making. It is crucial as well that this information would reach as many clinicians possible with the possibility to keep them updated as new information unfolds.

Medical leadership's dissemination of CoVid-19 information through the mobile platform in our institution was answered with a significant increase in application usage and relevant content use. Medical staff found the information easy to find and the mHealth solution as timesaving concerning CoVID-19 information seeking. These results might provide more evidence for the timesaving benefits of mHealth solutions in daily practice.

Mobile information dissemination platforms, as used in our institution, may present an interesting communication method, especially in the era where smartphones are ubiquitous among clinicians [10]. User activity and content monitoring in real-time may provide institutional leadership with valuable information regarding staff's information needs as well as on information dissemination efficiency. In our institution, increased user activity and content views in the Children's hospital motivated medical leadership to produce and disseminate more CoVid-19 related material through the mobile platform. In addition, thanks to above presented results, institutional leadership decided to deploy the mobile platform within all medical departments in order to disseminate institutional CoVid-19 content to all of the hospital's medical staff.

mHealth solutions such as the one presented, may help solving some of presented challenges by

increasing the reach of information for health professionals and thus decreasing misinformation and confusion as key information is centralized in one platform and validated and up-to-date information is easy to find. Moreover, thanks to the administration interface, leadership was easily able to update information and users have access only to latest version of relevant content. These would be harder to achieve with classic methods as e-mails which may be hard to sort and find or with printed material, especially when frequent content updating is necessary.

Our study's main limitation is our inability at this stage to provide evidence concerning the impact of this mHealth intervention on quality and outcomes of patient care.

Conclusion

While more data is needed in order to study the short- and long-term clinical impact and outcomes of this type of mHealth intervention, the use of a mobile platform designed to disseminate information during SARS-CoV-2 outbreak seemed to be an effective and timesaving method for communicating local guidance within our institution. Medical staff felt reassured and informed concerning SARS-CoV-2 patient care procedures and seem to have less need to seek other sources of information.

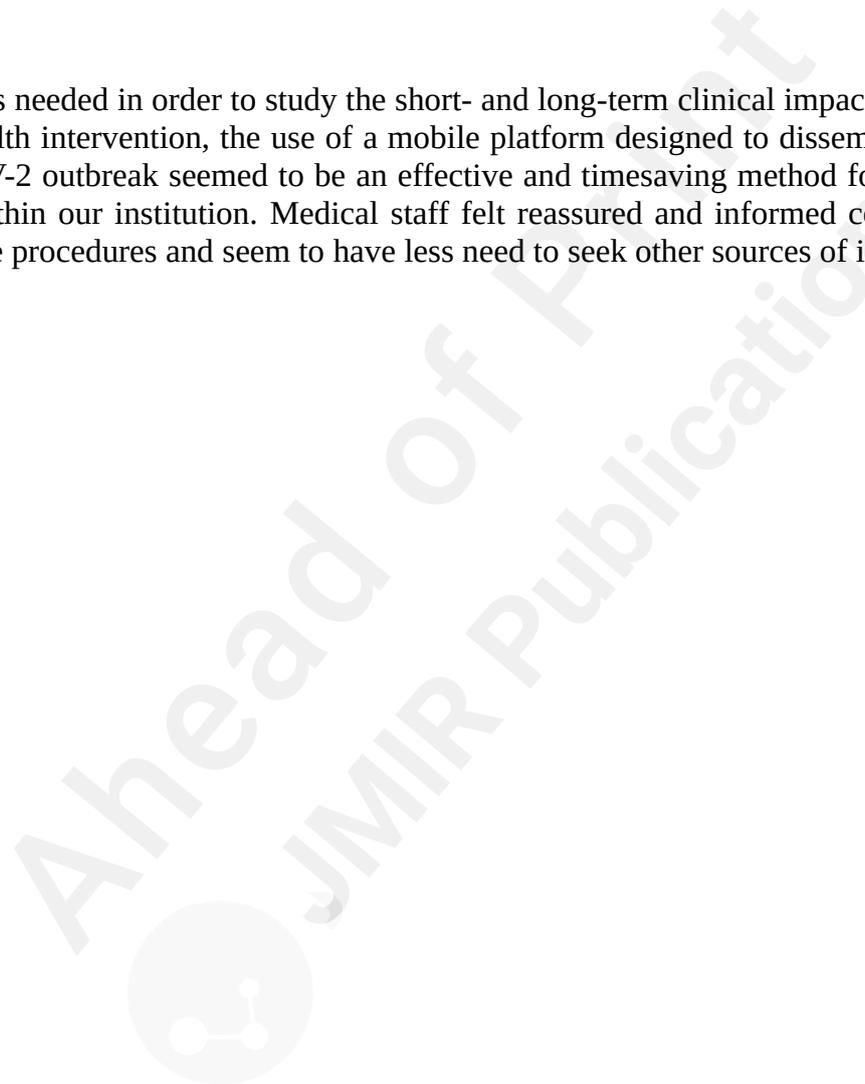


Table 1. Demographic Characteristics of Hospital Staff

Characteristic	No. (%) Staff members (N = 125) (a)
Sex	
Male	34 (27.20%)
Female	87 (69.90%)
Age, y	
25 – 30	28 (22.40%)
31 – 35	24 (19.20%)
36 - 40	18 (14.40%)
41- 50	29 (23.20%)
51 – 60	24 (19.20%)
>60	2 (1.6%)
Profession	
Medical Doctor	94 (75.20%)
Nurse	25 (20.00%)
Other (b)	6 (4.8%)
Medical unit affiliation	
Pediatric	41 (33.06%)
Emergency room	
Intensive Care and Neonatology	14 (11.29%)
Wards	25 (20.16%)
Outpatient units	30 (24.19%)
Other	14 (11.29%)

a – Total No. may sometimes not add up to a 100% as staff members were allowed to skip questions

b – psychologists, caregivers and administrators.

Table 2. User Activity of mobile platform during SARS-CoV-2 outbreak

Parameter	Mean \pm SD	<i>p</i>
Active users per day		
01.01.2020 – 24.02.2020	26.4 \pm 9.8	
25.02.2020 – 13.03.2020	50.8 \pm 14.4	< 0.001
Sessions per day		
01.01.2020 – 24.02.2020	84.2 \pm 33.6	
25.02.2020 – 13.03.2020	182.9 \pm 60	< 0.001

Table 3. Medical Staff utilization of a dedicated mHealth solution for SARS-CoV-2 information seeking

a. Question (Yes/no)	No. Responding yes (%)	No. Responding no (%)	No. Neutral (%)	No. Tot
Do your clinical activity directly concern children with suspected or confirmed SARS-CoV-2 infection?	93 (75%)	31 (25%)	1	124
Did you download the app “HeadToToe”?	84 (67.2%)	41 (32.8%)	-	125
Is information concerning SARS-CoV-2 easy to find thanks to “HeadToToe” app? (a)	70 (83%)	-	14 (17%)	84
b. Question (0 – 10 Likert Scale)	Mean ± SD			
0 = lowest score 5 = neutral 10 = highest score				
Do you consider the utilization of this dedicated mHealth solution as timesaving for finding information concerning SARS-CoV-2? (a)	8.5 ± 2.1			
Did you feel the need to use other sources in order to find information concerning SARS-CoV-2? (a)(b)	5.9 ± 3.3			
Did the use of dedicated mHealth solution for accessing information concerning SARS-CoV-2 reassured you in your clinical practice? (a)	7.6 ± 2.1			

(a) Information presented for this question concern medical staff who downloaded the application

(b) 0 – No need for other information sources, 10 – Important need for other information sources

References:

1. (2020) WHO. Novel Coronavirus(2019-nCoV) Situation Report - 72. 2020.
2. C S, Z A, N ON, M K, A K, A A-J, et al. World Health Organization Declares Global Emergency: A Review of the 2019 Novel Coronavirus (COVID-19). *International journal of surgery (London, England)*. 2020 02/26/2020. PMID: 32112977. doi: 10.1016/j.ijssu.2020.02.034.
3. Fisher D, Heymann D. Q&A: The novel coronavirus outbreak causing COVID-19. *BMC Medicine*. 2020 2020-02-28;18(1):1-3. doi: doi:10.1186/s12916-020-01533-w.
4. (2020) WHO. Novel Coronavirus(2019-nCoV) Situation Report - 41. 2020.
5. Z W, JM M. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention. *JAMA*. 2020 02/24/2020. PMID: 32091533. doi: 10.1001/jama.2020.2648.
6. Dearinger AT, Howard A, Ingram R, Wilding S, Scutchfield D, Pearce KA, et al. Communication efforts among local health departments and health care professionals during the 2009 H1N1 outbreak. *J Public Health Manag Pract*. 2011 Jan-Feb;17(1):45-51. PMID: 21135660. doi: 10.1097/PHH.0b013e3181f54110.
7. Chandrasekaran N, Gressick K, Singh V, Kwai J, Cap N, Koru-Sengul T, et al. The Utility of Social Media in Providing Information on Zika Virus. *Cureus*. 2017 Oct 23;9(10):e1792. PMID: 29282437. doi: 10.7759/cureus.1792.
8. Gesser-Edelsburg A, Diamant A, Hijazi R, Mesch GS. Correcting misinformation by health organizations during measles outbreaks: A controlled experiment. *PLoS One*2018.
9. Mwesiga A. Reporting epidemics: newspapers, information dissemination and the story of Ebola in the Ugandan district of Luweero. *Pan Afr Med J*2011.
10. Gagnon M-P, Faculty of Nursing UL, Quebec City, Canada, Public Health and Practice-Changing Research CdQRC, Quebec City, Canada, Ngangue P, Faculty of Nursing UL, Quebec City, Canada, Public Health and Practice-Changing Research CdQRC, Quebec City, Canada, et al. m-Health adoption by healthcare professionals: a systematic review. *Journal of the American Medical Informatics Association*. 2020;23(1):212-20. doi: 10.1093/jamia/ocv052.
11. Windisch O, Zamberg I, Iselin C, Schiffer E. [Head To Toe, a medical knowledge distribution platform : a practical example in urology]. *Rev Med Suisse*. 2019 Nov 27;15(673):2205-8. PMID: 31778051.
12. Zamberg I, Windisch O, Agoritsas T, Nendaz M, Savoldelli G, Schiffer E. HeadToToe: A Mobile Medical Knowledge dissemination platform: strengths, limitations and preliminary usage assessment. 2020.
13. Patton MQ. Utilization-Focused Evaluation. 2008 2020-03-22.

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Prof . Klara Barbe-Posfay - Critically revised the manuscript, responsible for data collection coming from staff from the general pediatrics wards and specialties.

Dr. Olivier Windisch – Co-founder of the project, critically revised the manuscript and took part in the analyses of results.

Prof. Eduardo Schiffer – Team leader, Co-founder of the project and idea, helped writing the first draft and critically revised the manuscript, supervised the project.

Prof. Thomas Agoritsas – Critically revised the manuscript and took part in literature review.

Financial disclosure
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Conflicts of Interest
none declared.

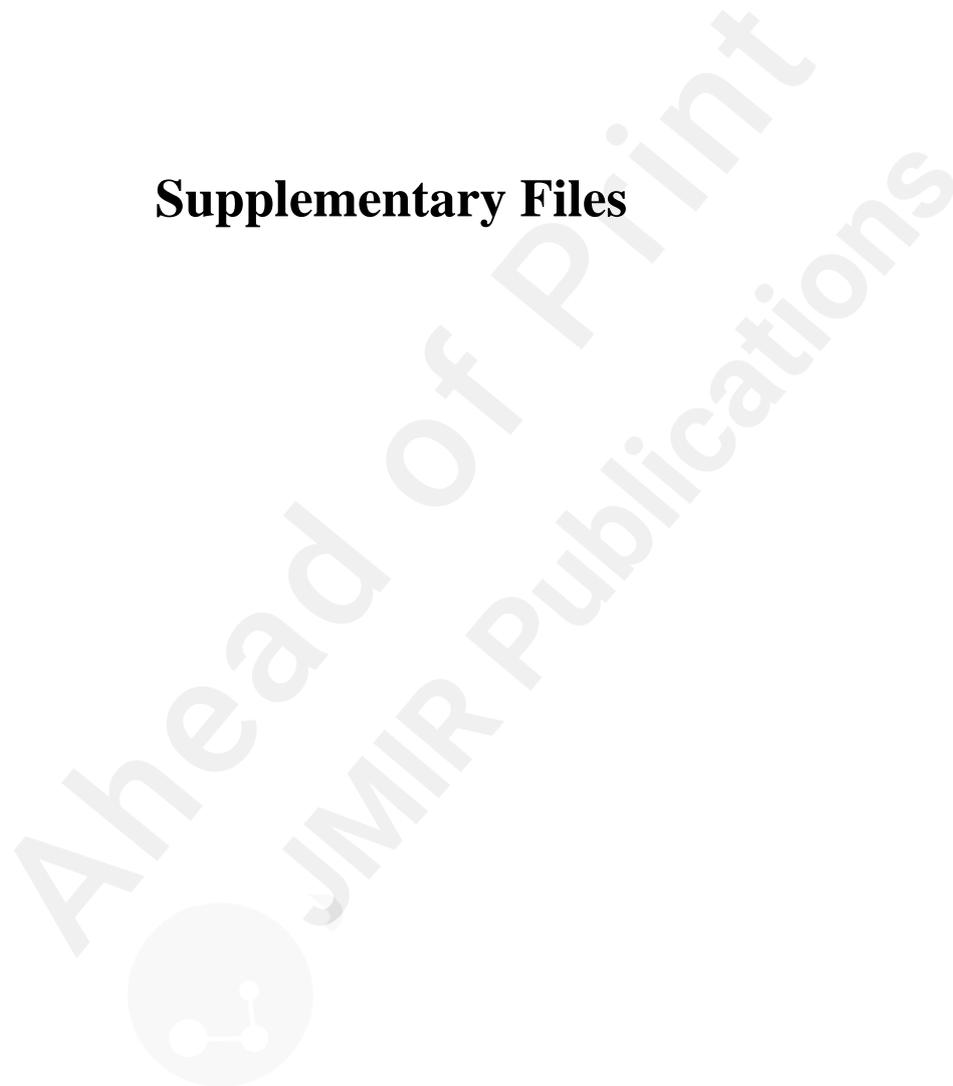
Abbreviations

SARS-CoV-2 : Severe Acute Respiratory Syndrome Coronavirus 2

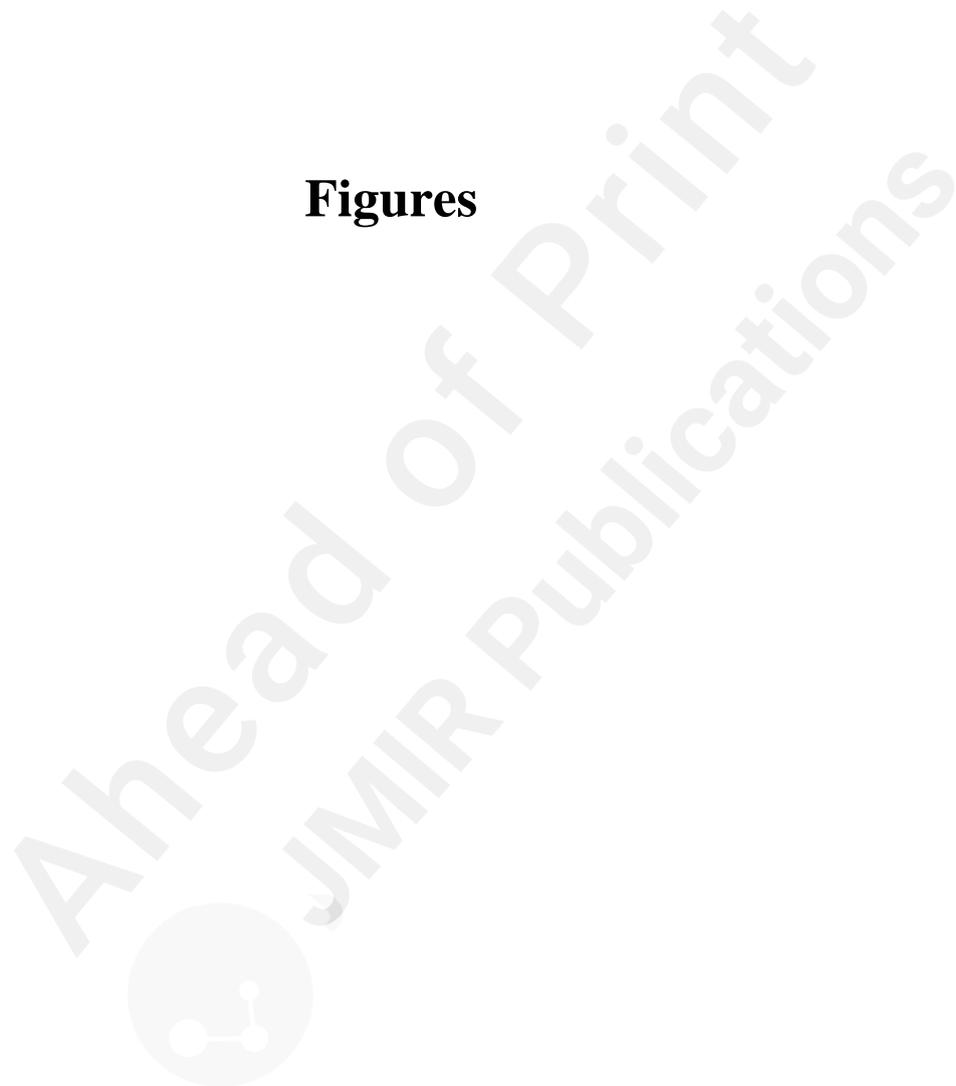
CoVid-19 – Coronavirus disease 2019

WHO : World Health Organization

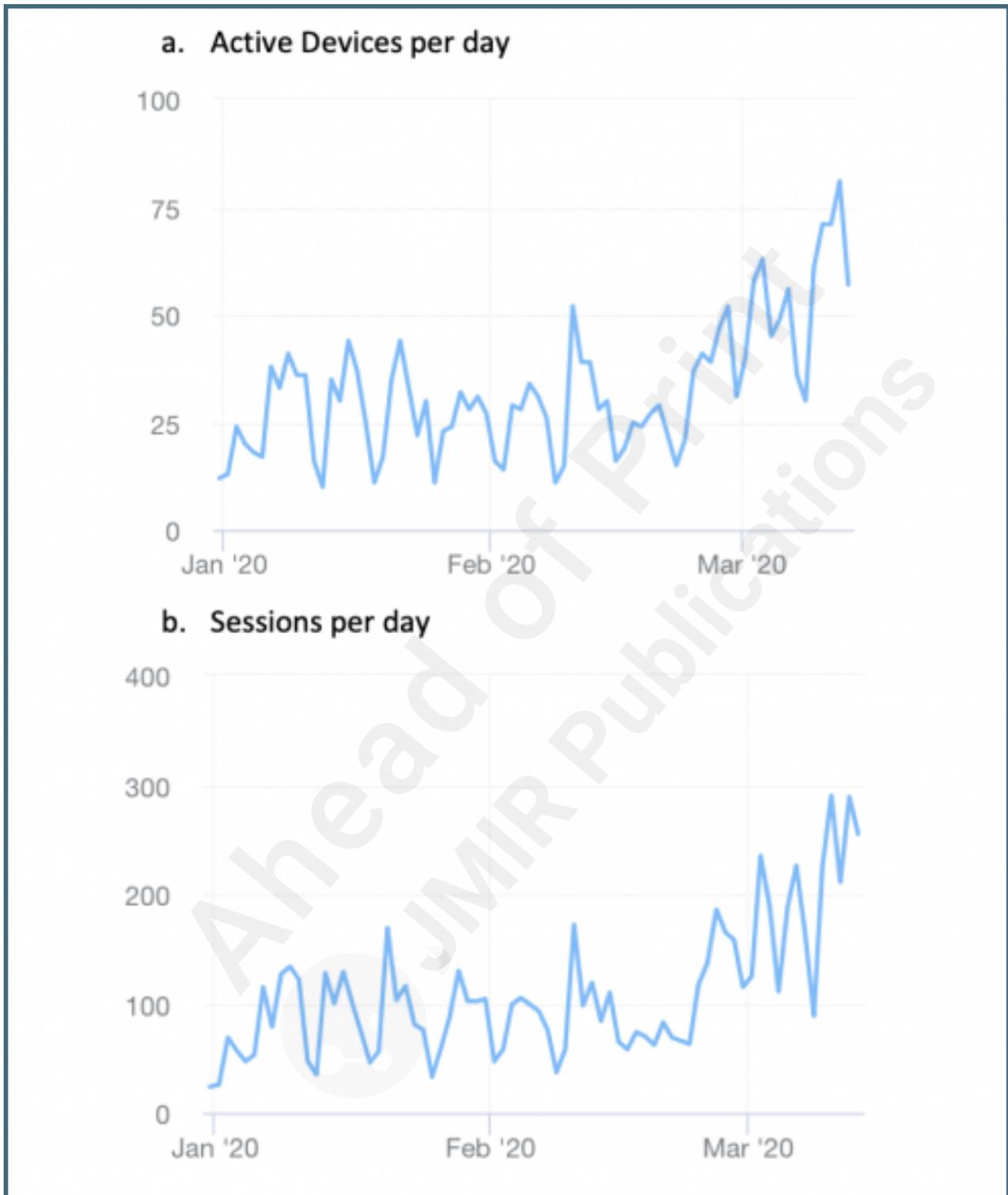
Supplementary Files



Figures



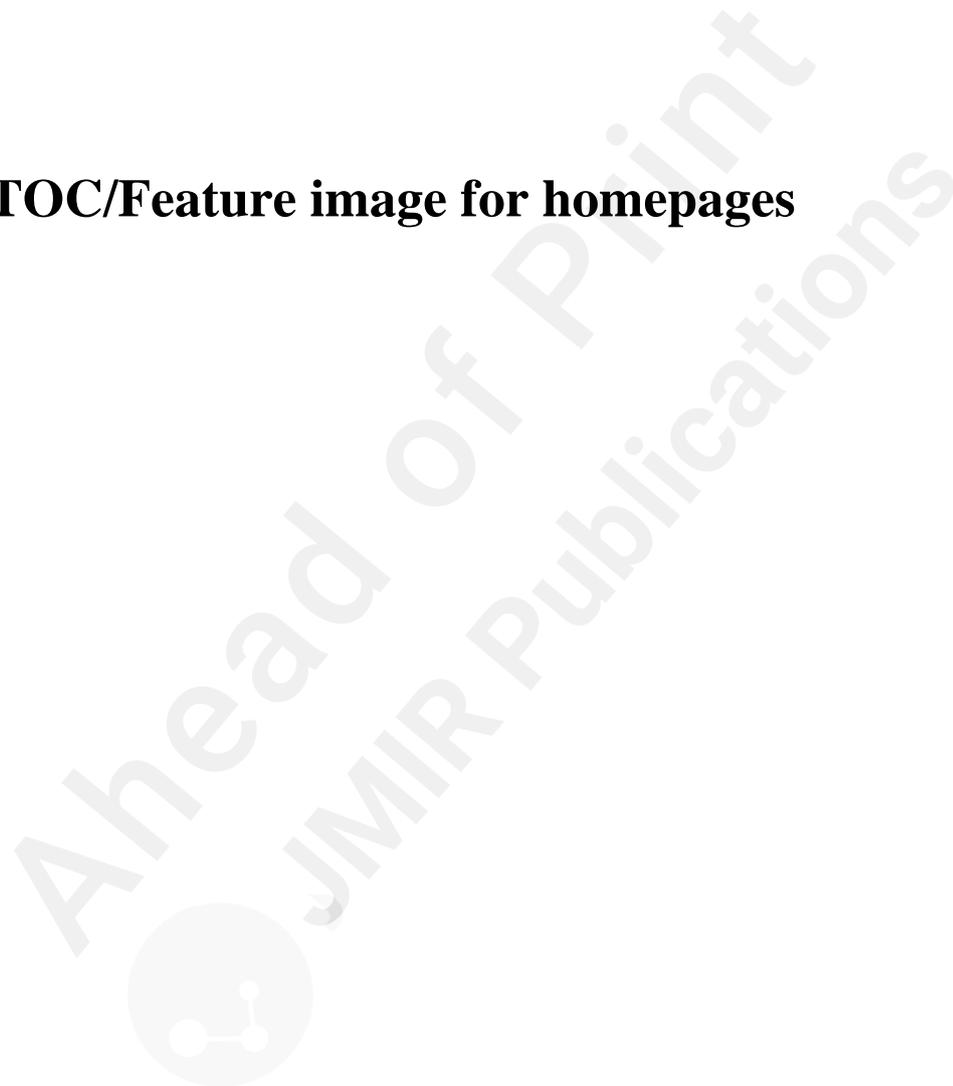
Mobile platform user activity between January 01, 2020, and March 13, 2020.



Mobile app user interface displaying the documents section with COVID-19 content.

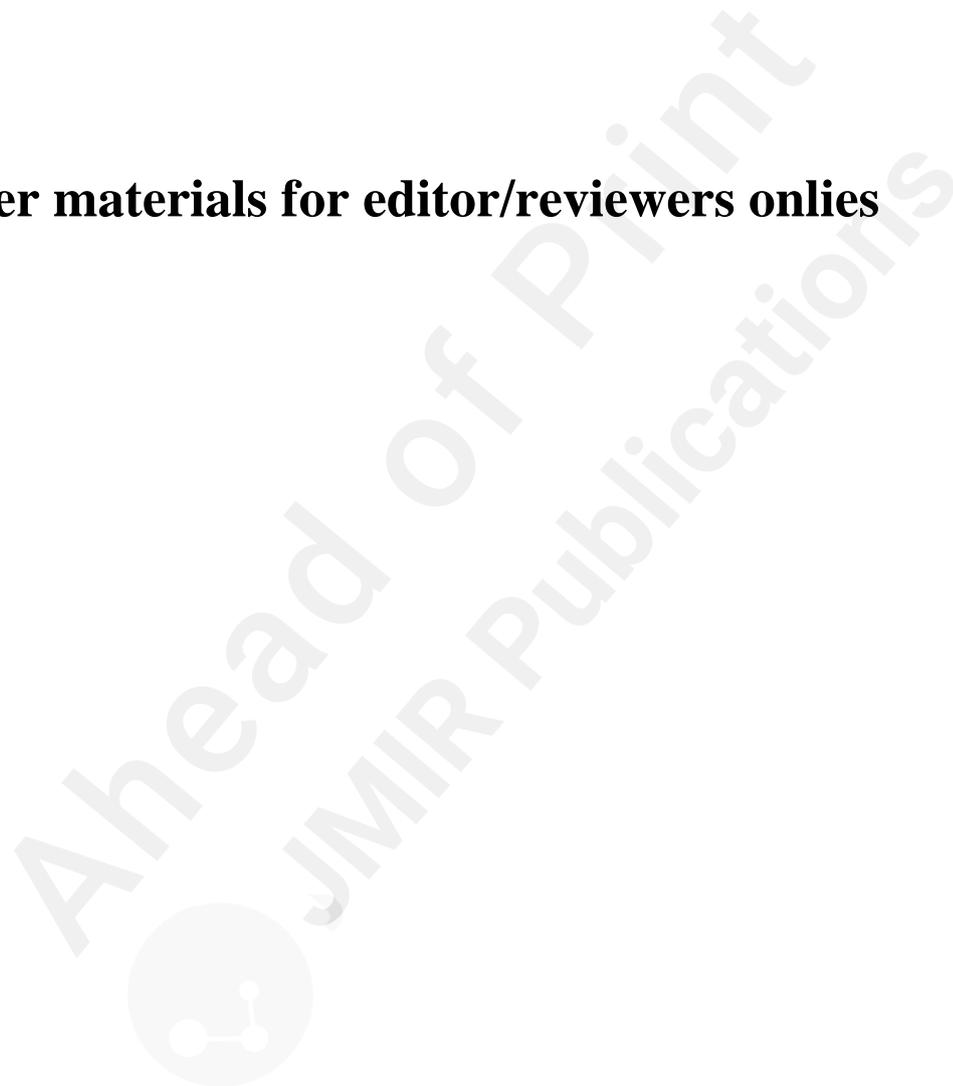


TOC/Feature image for homepages





Other materials for editor/reviewers onlies



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