Exploratory Research in Clinical and Social Pharmacy 4 (2021) 100080

Contents lists available at ScienceDirect

Exploratory Research in Clinical and Social Pharmacy

journal homepage: www.elsevier.com/locate/rcsop

Regional drug information center disseminates educational materials related to the COVID-19 pandemic

Jaqueline Rocha Borges dos Santos *

Department of Pharmaceutical Sciences, Institute of Biological Sciences and Health, Federal Rural University of Rio de Janeiro, Brazil

ARTICLE INFO

Article history:
Received 12 January 2021
Received in revised form 8 September 2021
Accepted 7 October 2021

Keywords:
Drug information services
Pharmacist
Health education
COVID-19

ABSTRACT

Background: Drug information centers (DIC) play an important role in providing correct and scientifically supported information on medicinal products. In the pandemic scenario, this action is considered fundamental to the process of health education.
Objective: To describe and identify the dissemination of educational materials and their acceptance regarding the COVID-19 pandemic by a regional drug information center (RDIC) linked to a Brazilian public university.
Method: The educational materials were disseminated in the communication channels (social media) of the RDIC and university. Seventeen educational notices were produced and disclosed from May to August 2020. The measure of reach was considered to be the number of "likes", sharing and number of people reached.
Results: Overall, 28.9% (n = 4071) of the online visitors "liked" the material about vaccines tested for COVID-19, followed by 12.9% (n = 1824) "likes" of the material about ivermectin for COVID-19 treatment, and 8.9% (n = 1250) "likes" of the material that explained the time necessary to develop and test a vaccine and the duration of the pandemic.
Conclusion: The interest expressed by the "likes" of educational materials about vaccines indicates that the DIC in question has a strategic role in disseminating scientifically backed information about the COVID-19 pandemic.

1. Introduction

The structure that formalizes a drug information service is called a drug information center (DIC). A DIC is defined as an operational unit that provides technical-scientific information on drugs in an objective and timely manner, as part of a strategy to meet particular information needs.[1] The World Health Organization (WHO) recognizes that DICs are among the effective entities to promote the rational use of drugs.[2–4] DICs gather, analyze, evaluate and provide information on drugs to support their rational use.[5,6] DICs support the clinical practice of health professionals in drug therapy of patients. For that, DICs must provide clear, precise, impartial, timely and applicable information on drugs, in order to promote their rational use.[7,8] To achieve this goal, DICs use objective, updated and pertinent technical-scientific information, duly processed and critically evaluated.

Despite the advances in recent years, the drug policy in Brazil is still insufficient because of continued irrational and unsafe medication use,[9–11] exhibiting a need for more actions in prevention policies and promotion of the rational use of medicines. This could include educational campaigns in schools and universities, public health messages on television and within health services, and continuing education for prescribers. Therefore, the location of DIC in a university environment favors strong interaction of research groups and teaching activities,[12,13] with educational actions extended to society, on the rational use of medicines.

The irrational use of drugs is a major public health problem worldwide, with major economic consequences. However, when used appropriately, drugs are the most cost-effective therapeutic resources.[14,15] The rational use of drugs involves two fundamental actors: the prescriber and patients (individual and collective). These actors interact in a dynamic way. The prescriber, on the one hand, has a determining role in the patients' behavior, but patients also have expectations, cultural habits, etc., which may influence their adherence to the prescribed therapy. The relationship of these actors is permeated by a series of issues involving the ability to define and implement a drug policy, the relationships in the pharmaceutical market, particularly with regard to medical advertising, the organization of health services, the level of education of society, cultural factors in general and the legal framework. Another actor of great importance is the pharmacist, since the promotion of the rational use of medicines is strongly related to the process of dispensing medicines.[16,17] In addition, the pandemic has caused a paradigm shift and increased the work of DICs with respect to patient care[18] to strengthen communication between prescriber, patient and pharmacist, from providing adequate information to promoting the rational use of medicines.

* Corresponding author at: Rodovia BR 465, km 07, s/n, Instituto de Ciências Biológicas e da Saúde, Departamento de Ciências Farmacêuticas, Centro Integrado de Ciências da Saúde, sala 7, Zona Rural, Seropédica, Rio de Janeiro 23890-000, Brasil.
E-mail address: jaqueroc.jr@gmail.com.

http://dx.doi.org/10.1016/j.rcsop.2021.100080

The Regional Drug Information Center (RDIC) of Federal Rural University of Rio de Janeiro (UFRRJ) began its activities in 2015. The physical structure is located in the premises of the Health Division of UFRRJ. Since the beginning of the COVID-19 pandemic, the activities carried out by the RDIC have been directed to remote action, involving the construction and dissemination of health educational materials for disclosure via the university's communication channels, with emphasis on the use of drugs. In this context, the dissemination of clear and reliable information is fundamental for the purpose of health promotion.

The objective of this work is to describe and identify the dissemination of educational materials and their acceptance by the public regarding the COVID-19 pandemic prepared by a DIC in Brazil.

2. Methods

2.1. Study design

In March 2020, the staff of the RDIC, consisting of 10 pharmacy students and one pharmaceutical teacher, decided to act in the fight against the pandemic. For this, a program was organized with the definition of themes and periods for publication, from March to August 2020. The themes and corresponding educational materials were defined and prepared by a pharmacist and eight pharmacy students, according to the demand for topics about COVID-19 drugs that appeared in the media and became popular on social networks.

The educational materials were developed with clear and accessible language, supported by information from scientific papers. The purpose of developing the educational materials was to disseminate scientifically referenced information written clearly and with easy understanding to the public about the COVID-19 pandemic. Therefore, the materials were designed in the form of "cards", with visible font and colors, with representative figures and diagrams (flowcharts, infographics) and all scientific articles used, listed at the end and along the "cards" with an identification number. The materials were programmed for dissemination in the RDIC communication channels via Instagram and Facebook. In addition, the materials were also disseminated through the UFRRJ communication channels (also Instagram and Facebook). At the time of the study, the RDIC page on Instagram had 665 followers. However, in the months that comprised the service provided, there were about 300 fewer followers. The RDIC page on Facebook had 535 followers. In the study period, the number of followers was similar to the current period. The official UFRRJ page on Instagram had 31,400 followers and UFRRJ's official page on Facebook had 44,996 followers. Added to this, there is no access to the number of people reached by the other official UFFRJ pages. Table 1 shows the themes, and period of disclosure of the 17 educational materials prepared and disclosed.

For data analysis, "likes", shares, and reach were considered as inclusion factors. Comments were excluded in the analysis of the publications of the educational materials.

2.2. Interpretation of results

The results were measured from the number of "likes" and sharing, both via Instagram and Facebook, of the four communication channels, and from the audience reached by the RDIC page on Facebook. Added to this, there was the engagement that considered the "likes", shares, opinions and clicks of the icons of RDIC Facebook page. For the calculation of engagement rate, engagement was divided by people reached and this value was multiplied by 100 (See Supplementary Material). The final value was expressed as a percentage. In order to identify the materials with the highest acceptance, all the "likes" were added in the four communication channels. For this, only the educational materials that were disclosed in all four channels were considered. There was no access to the reach of people in UFFRJ's communication channels. There was access only to the number of "likes" and the number of people who shared the respective notice.

Table 1
Themes and the first date of disclosure of materials in the form of cards in the communication channels of the RDIC and UFRRJ.

Theme/ Title of the first card	Dissemination date [a]
During the COVID-19 pandemic, don't be in doubt! RDIC is at the service of the population to answer questions and uncertainties regarding coronavirus or related drugs.	March 24, 2020
COVID-19 Pandemic: importance of quarantine	March 31, 2020
Do you have questions about medication? Access our networks and ask!	April 14, 2020
Fighting fake news about COVID-19	April 21, 2020
A race against the pandemic: how long will it take before a vaccine is available to the population?	May 15, 2020
Risk Groups	May 18, 2020
COVID-19: medicines to be used with caution and only with medical prescription	May 20, 2020
Do you know what off-label is?	May 27, 2020
Bacterial resistance to antimicrobials	May 29, 2020
Ivermectin studied for COVID-19	June 1, 2020
Dangers of the use of veterinary medicine in humans	June 4, 2020
Coronavirus residence time on surfaces	June 5, 2020
Substances that were on the special control list during the pandemic: hydroxychloroquine, chloroquine and nitazoxamide	June 8, 2020
The importance of taking the medicine with water	June 10, 2020
Self-medication and risks involved	June 28, 2020
Vaccines: learn about the main vaccines being tested against COVID-19	August 11, 2020
COVID-19: Types of tests	August 24, 2020

[a] UFRRJ Instagram.

For the interpretation of the results, the following was considered: (1) communication channel ($a + b = l1$), where "a" represents UFRRJ's Instagram page and "b" represents the RDIC's Instagram page; (2) communication channel ($c + d = l2$), where "c" represents UFRRJ's Facebook page and "d" represents the RDIC's Facebook page. For the estimated calculation of people, within the possibilities of accessible data on the number of people, the following formula was considered: $(l1 + l2^{c} + s^{c}) + pr$, where l1 corresponds to the number of "likes" of the Instagram page (a + b), "$l2^{c}$" corresponds to the number of "likes" of the UFRRJ Facebook page, "s^{c}" corresponds to the number of shares on the UFRRJ Facebook page, and "pr" corresponds to the number of people reached on the RDIC Facebook page. It is worth noting that reach represents the number of people who have encountered a publication, that is, viewed a publication. Therefore, reach is always greater than "likes" and shares. In a complementary manner, shares increase reach. For measurement of "pr", it was considered that the number of "likes" and the number of shares were already contained in the number of people reached. For this reason, these data ($l2^{d}$ and s^{d}) were not repeated in the total estimated calculation.

3. Results

The results show the dissemination through four communication channels (social media) of educational materials aimed at the population in the context of the pandemic. The estimated total number of visitors according to the accessible data was 14,096 people. Among the 17 educational materials prepared, only seven were disseminated in all four communication channels. Table 2 shows the themes/title of the first card, number of "likes", number of shares and number of people reached. It can be observed that the material about vaccines, research progress and the corresponding phases attracted the greatest interest, consisting of 28.9% ($n = 4071$) of the estimated total of number of people accessing the respective sites. The next most accessed educational material explained an in vitro study and why ivermectin is not supported by scientific evidence for preventive use and to ameliorate symptoms of COVID-19, associated with a warning about self-medication and irrational use of this drug. This educational material reached 12.9% ($n = 1824$) of the estimated total of people. In third position was the educational material entitled: "A race against the pandemic - How long will it take until a vaccine is available to the population?", with 8.9% ($n = 1250$) of the estimated total of number of people.

Table 2
Theme/title of the first card, number of people who liked the educational materials, marked with "like", sharing, reach of people and estimated total.

Theme/ Title of the first card	Communication Channel (a + b)	Communication Channel (c + d)	Total ($l1 + l2^c + s^c$) + pr
During the COVID-19 pandemic, don't be in doubt! RDIC is at the service of the population to answer questions and uncertainties regarding coronavirus or related drugs.	l1 = 102	l2 = 46 pr = 810 [d] s = 29	964 (6.8%)
COVID-19 Pandemic: importance of quarantine	l1 = 37 [b]	It was not disclosed in these communication channels.	37 (0.3%)
Do you have questions about medication? Access our networks and ask!	l1 = 43 [b]	It was not disclosed in these communication channels.	43 (0.3%)
Fighting fake news about COVID-19	l1 = 41 [b]	l2 = 59 pr = 832 [d] s = 44	956 (6.8%)
A race against the pandemic: how long will it take before a vaccine is available to the population?	l1 = 716	l = 11 [d] pr = 534 [d] s = 10 [d]	1250 (8.9%)
Risk Groups	l1 = 173	l = 5 [d] pr = 237 [d] s = 4 [d]	410 (2.9%)
COVID-19: medicines to be used with caution and with only medical prescription	l1 = 335	l2 = 68 pr = 369 [d] s = 54	808 (5.7%)
Do you know what off-label is?	l1 = 157	l2 = 31 pr = 380 [d] s = 11	562 (4.0%)
Bacterial resistance to antimicrobials	l1 = 196	l = 6 [d] pr = 179 [d] s = 3 [d]	375 (2.7%)
Ivermectin studied for COVID-19	l1 = 580	l2 = 92 pr = 1095 [d] s = 77	1824 (12.9%)
Dangers of the use of veterinary medicine in humans	l1 = 123	l2 = 18 pr = 229 [d] s = 5	366 (2.6%)
Coronavirus residence time on surfaces	l1 = 323	l2 = 105 pr = 543 [d] s = 76	1031 (7.3%)
Substances that were on the special control list during the pandemic: hydroxychloroquine, chloroquine and nitazoxamide	l1 = 111	l = 5 [d] pr = 67 [d] s = 0 [d]	178 (1.3%)
The importance of taking the medicine with water	l1 = 134 [b]	l = 3 [d] pr = 925 [d] s = 8 [d]	1059 (7.5%)
Self-medication and risks involved	l1 = 115	It was not disclosed in these communication channels.	115 (0.8%)
Vaccines: learn about the main vaccines being tested against COVID-19	l1 = 753	l2 = 112 pr = 3131 [d] s = 98	4071 (28.9%)
COVID-19: Types of tests	l1 = 48 [b]	It was not disclosed in these communication channels.	48 (0.3%)

[a]UFRRJ Instagram page; [b] RDIC Instagram page; [c] UFRRJ Facebook page; [d] RDIC Facebook page; l = like; l1 = like (a + b); l2 = like (c + d); pr = people reached by RDIC Facebook page; s = sharing (c + d); s^c = sharing in Facebook UFRRJ page; s^d = sharing Facebook RDIC page. Total estimated: 14,096 people.

Table 3 presents the percentage in descending order of "likes" of the seven educational materials disseminated in the four communication channels. The references used for each material are listed in the third column. It can be seen that the educational material about vaccines attracted the greatest number of "likes", 865 (30.4%); followed by the notice about ivermectin, with 672 (23.6%), and the notice on how long the coronavirus remains active on surfaces. Among the references used (n = 12), six were scientific articles, five were reports from research institutes, from clinical studies directed by pharmaceutical companies, from the Brazilian drug regulatory agency (ANVISA) and from a newspaper with online publication. Only one came from a course made available by the Pan American Health Organization (PAHO).

4. Discussion

The results showed there was strong interest about vaccines for COVID-19, clinical studies, the time to develop and approve a vaccine and how the vaccines are produced. The next most popular notice was the one on the lack of scientific evidence for the use of the ivermectin, its side effects and risks of self-medication. It is believed that the number of people reached was greater than quantified because the data presented here include only publicly accessible numbers. Access to the communication channels managed by the RDIC made it possible to quantify the reach represented by "views", "likes" and shares in the Facebook page. But the University's social media reach was obtained only by the number of "likes" of the educational materials. It is believed that the number of people reached by UFRRJ's communication channels was high in relation to the number of followers of the RDIC's profiles. However, the information is restricted to the administrator of these profiles. The materials were prepared with references to support the quality of the information and its veracity. The service provided by the RDIC associated with UFRRJ regarding medicines and possible treatment to combat COVID-19 was important to inform the public about the risky use of spurious remedies and off-label use of drugs.[19] Added to this, the RDIC acts to combat the misinformation or incorrect information disseminated on social networks.[20] For this reason, pharmacists are considered essential in health education activities, to

Table 3
Educational material disclosed, number of people who liked it, confirmed with "like" (N = 2845), and references used. Only the materials disseminated through the four communication channels were considered.

Educational material disclosed	Number of people who liked it [a,b,c,d]	References used
Vaccines: learn about the main vaccines being tested against COVID-19	865 (30.4%)	Research Institute (Butantan Institute) explains the phases of the studies/clinical trials: http://www.butantan.gov.br/pesquisa/ensaios-clinicos; News published: https://www.pfizer.com.br/noticias/releases/pfizer-e-biontech-unem-esforcos-para-vacina-contra--covid-19; Material on clinical trials with vaccines (Camacho, 2013): https://www.paho.org/hq/dmdocuments/2013/CursoVacinas-LuizCamacho-BRA2013.pdf; News published: https://www.pharmaceutical-technology.com/comment/astrazeneca-oxford-covid-vaccine/; News published: https://www.bbc.com/portuguese/geral-53477483.
Ivermectin studied for COVID-19	672 (23.6%)	Caly L, Druce, JD, Catton MG, Jans DA, Wagstaf KM. The FDA-approved drug ivermectin inhibits the replication of SARS-CoV-2 in vitro. Antiviral Res. 2020; 178:104787. doi:https://doi.org/10.1016/j.antiviral.2020.104787. Molento MB. COVID-19 and the rush for self-medication and self-dosing with ivermectin: A word of caution. One Health 2020; 10:100148. doi:https://doi.org/10.1016/j.onehlt.2020.100148.
Coronavirus residence time on surfaces	428 (15%)	Kampf G, Todt D, Pfaender S, Steinmann E. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. J Hosp Infect. 2020; 104(3): 246–251. doi:https://doi.org/10.1016/j.jhin.2020.01.022.
COVID-19: medicines to be used with caution and only with medical prescription	403 (14.2%)	Fang L, Karakiulakis G, Roth M. Are patients with hypertension and diabetes mellitus at increased risk for COVID-19 infection? Lancet Respir Med. 2020; 8(4): e21. doi:https://doi.org/10.1016/S2213-2600(20)30116-8.
Do you know what off-label is?	188 (6.6%)	Barbosa C, Matos MF. Prescrição off-label, direito à informação, consentimento informado e processo clínico eletrônico no direito português. Revista Cadernos Ibero-Americanos de Direito Sanitário 2016; 5(3):157–179. Nobre PFS. Prescrição Off-Label no Brasil e nos EUA: aspectos legais e paradoxos/ Off-label prescriptions in Brazil and in the US: legal aspects and paradoxes Ciênc. Saúde Colet. 2013; 18(3):847–854.
During the COVID-19 pandemic, don't be in doubt! RDIC is at the service of the population to answer questions and uncertainties regarding coronavirus or related drugs.	148 (5.2%)	The use of references was not necessary.
Dangers of the use of veterinary medicine in humans	141 (4.9%)	Report of the National Health Surveillance Agency of Brazil in November 2019: https://bityli.com/YEyxd.

[a] UFRRJ Instagram.
[b] RDIC Instagram.
[c] UFRRJ Facebook.
[d] RDIC Facebook.

support preventive measures during the ongoing COVID-19 pandemic[21]; linked to DICs or other health services.

The preparation and dissemination of educational materials that are accurate, enlightening and referenced is particularly important to counteract the infodemic, characterized by an excess of false news about the pandemic.[22]

4.1. Study limitations

The University social communication office did not disseminate ten materials in the university channels. Therefore, only 7/17 materials were disseminated in all four communication channels (social media). In addition, consumer opinion of the material was not explored and systematic validation with experts and readers was not undertaken for the educational materials produced. Some materials were also shared at UFRRJ's official Twitter site. These data were not considered.

5. Conclusions

This work shows there is interest from the population in the development of vaccines and drugs to fight the COVID-19 pandemic, especially the duration of research and clinical trials. In this regard, communication channels of official international institutions, such as PAHO/WHO, national public health institutions, universities and research institutes play important roles by developing and publicizing educational and informative materials. DICs with the participation of pharmacists are key to forming a link between scientific information published and disseminated by health research institutions and their dissemination with accessible and clear language to the population, especially in relation to the COVID-19 pandemic.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

Declaration of Competing Interest

I declare that there is no conflict of interest related to the work entitled: Regional drug information center disseminates educational materials related to the COVID-19 pandemic.

Acknowledgements

Special thanks go to the pharmacy students who work voluntarily at the Regional Drug Information Center and Social Communication Office of UFRRJ.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.rcsop.2021.100080.

References

1. International Pharmaceutical Federation (IPF). *Pharmacy information section. Access to Medicines Information Working Group.* Requirements for drug information centres. 2005.
2. World Health Organization (WHO). *Promoting rational use of medicines: core components. WHO policy perspectives on medicines. Geneve: World Health Organization; 2002. p. 6.*
3. World Health Organization (WHO). *Medicines strategy: countries at the core, 2004-2007.* Geneve: World Health Organization. 2004:12.
4. World Health Organization (WHO). *The pursuit of responsible use of medicines: sharing and learning from country experiences.* Geneve: World Health Organization. 2012:78.
5. Vidotti CCF, Heleodoro NM, Arrais PSD, Hoefler R, Martins R, Castilho SR. *Centros de informação sobre medicamentos: Análise diagnóstica no Brasil.* Conselho Federal de Farmácia/Organização Panamericana Da Saúde: Brasília. 2000.
6. Almazrou DA, Ali S, Alzhrani JA. Assessment of queries received by the drug information Center at King Saud Medical City. J Pharm Bioallied Sci 2017;9:246–250.
7. Johnson KW. *Drug and therapeutics information.* In: *OMJ Kasilo, Quick JD, Rankin JR, et al, eds. Managing drug supply: The selection, procurement, distribution, and use of pharmaceuticals. 2nd ed. rev. and expanded. Management Sciences for Health in collaboration with World Health Organization. Connecticut: Kumarian Press; 1997. p. 450–463.*
8. Rodriguez R, Patel YA, Koppen L, Ellinger L. Characteristics of shortage related drug information requests and recommendations from a nationally serving drug information center. Am J Health Syst Pharm 2019;76:1900–1902.
9. Lima SIVC, Diniz RS, Egito EST, Azevedo PRM, Oliveira AG, Araújo IB. Rationality of antimicrobial prescriptions in community pharmacy users. PLoS One 2015;10, e0141615.
10. Bortolon PC, Medeiros EFF, Naves JOS, Karnilowski MGO, Nóbrega OT. Analysis of the self-medication pattern among Brazilian elderly women. Cien Saude Colet 2008;13: 1219–1226.
11. Silva AS, Maciel GA, Wanderley LSL, Wanderley AG. Indicadores do uso de medicamentos na atenção primária de saúde: uma revisão sistemática. Rev Panam Salud Publica 2017;41, e132.
12. Vidotti CCF, Silva EV, Hoefler R. *Implantação e desenvolvimento de Centro de Informação de Medicamentos em hospital como estratégia para melhorar a farmacoterapia.* Revista Pharmacia Brasileira: Brasília. 2010.
13. Hoover RM, Hunter ML, Krueger KP. Survey of faculty workload and operational characteristics for academic drug information centers. Curr Pharm Teach Learn 2018;10:579–583.
14. McIsaac W, Naylor CD, Anderson GM, O'Brien BJ. Reflexions on a month in the life of the Ontario Drug Benefit Plan. CMAJ 1994;150:473–477.
15. Yevstigneev SV, Titarenko AF, Abakumova TR, Alexandrova EG, Khaziakhmetova VN, Ziganshina LE. Towards the rational use of medicines. Int J Risk Saf Med 2015;27:S59–S60.
16. Carvalho FD, Capucho HC, Bisson MP. *Farmacêutico Hospitalar – conhecimentos, habilidades e atitudes.* Barueri: Manole. 2014:210–219.
17. Ghaibi S, Ipema H, Gabay M. ASHP guidelines on the pharmacist's role in providing drug information. Am J Health Syst Pharm 2015;72:573–577.
18. Khatiwada AP, Shakya S, Shrestha S. Paradigm shift of drug information centers during the COVID-19 pandemic. Drugs Ther Persp 2020:1–7.
19. Scerri M, Grech V. COVID-19, its novel vaccination and fake news - what a brew. Early Hum Dev 2020;105256.
20. Hernández-García I, Giménez-Júlvez T. Assessment of health information about COVID-19 prevention on the internet: infodemiological study. JMIR Public Health Surveill 2020;6, e18717.
21. Aruru M, Truong H-A, Clark S. Pharmacy emergency preparedness and response (PEPR): a proposed framework for expanding pharmacy professionals' roles and contributions to emergency preparedness and response during the COVID-19 pandemic and beyond. Res Soc Adm Pharm 2021;17:1967–1977.
22. Rathore FA, Farooq F. Information overload and Infodemic in the COVID-19 pandemic. J Pak Med Assoc 2020;70:S162–S165.