RBFHSS
Revista Brasileira de Farmácia Hospitalar e Serviços de Saúde

Original Paper

Open Access

Development of mobile application for veterinary oncology drugs for dogs and cats

Karine Silva ALMEIDA[1], **Viviane de Souza MAGALHÃES**[1], **Tácio de Mendonça LIMA**[2]

[1]Universidade Federal Rural do Rio de Janeiro, Seropédica, Brasil; [2]Universidade Federal Fluminense, Niterói, Brasil.

Corresponding author: Lima TM, taciolima@id.uff.br

Submitted: 13-11-2023 Resubmitted: 15-03-2024 Accepted: 18-03-2024

Double blind peer review

Abstract

Objective: This study aims to develop a mobile application about medications used in veterinary oncology for dogs and cats. **Methods:** A technological production of rapid prototyping software for the Android operating system. The mobile app structure was developed in four stages: 1) conception (needs assessment, target audience, literature research, and content definition); 2) prototype planning (definition of topics and module writing, media selection, and layout); 3) mobile application production (selection of multimedia tools, navigation structure, and environment configuration planning); and 4) making the mobile application available. **Results:** OncoVet Info is a free web application, developed in the Portuguese language and requiring an internet connection. The application consists of eighteen screens, containing information on 13 medications: asparaginase, carboplatin, cyclophosphamide, cisplatin, chlorambucil, dacarbazine, doxorubicin, ifosfamide, lomustine, methotrexate, mitoxantrone, vinblastine, and vincristine. The information covers commercial presentations, indications, doses and administration routes, diluent and stability, incompatibilities, potential medication interactions, adverse reactions, toxicity, biosafety measures, extravasation risk, relevant aspects, and references. Additionally, the app provides information about the team, classification of the overflow risks, calculations needed to carry out therapeutic procedures, oncology therapeutic protocols, waste management, and biosafety. **Conclusion:** OncoVet Info is a tool that assists professionals involved in animal care, contributing to the safe and responsible use of oncological medications.

Keywords: medical oncology; veterinary drugs; drug utilization, mobile applications.

Desenvolvimento de aplicativo móvel sobre medicamentos oncológicos veterinários para cães e gatos

Resumo

Objetivo: Desenvolver um aplicativo móvel sobre medicamentos utilizados na oncologia veterinária de cães e gatos. **Métodos:** Foi realizada uma pesquisa aplicada à produção tecnológica do tipo prototipagem rápida de software para o sistema operacional Android. A estrutura do aplicativo móvel foi desenvolvida em quatro etapas: 1) concepção (avaliação das necessidades, o público-alvo, a pesquisa de literatura e a definição dos conteúdos); 2) planejamento do protótipo (definição dos tópicos e a redação dos módulos, a seleção de mídia e o layout); 3) produção do aplicativo móvel (seleção de ferramentas multimídia, estrutura de navegação e planejamento da configuração do ambiente); e 4) disponibilização do aplicativo móvel. **Resultados:** Foi possível desenvolver um aplicativo web gratuito (OncoVet Info), em língua portuguesa e com necessidade de conexão à internet. O aplicativo possui dezoito telas, contendo informações sobre 13 medicamentos: asparaginase, carboplatina, ciclofosfamida, cisplatina, clorambucila, dacarbazina, doxorrubicina, ifosfamida, lomustina, metotrexato, mitoxantrona, vimblastina e vincristina. As informações abordam as apresentações comerciais, indicações, doses e vias de administração, diluente e estabilidade, incompatibilidades, potenciais interações medicamentosas, reações adversas, toxicidade, medidas de biossegurança, risco de extravasamento, aspectos relevantes e a bibliografia. Além disso, o aplicativo conta com informações sobre a equipe, classificação dos riscos de extravasamento, cálculos necessários para realização das condutas terapêuticas, protocolos terapêuticos oncológicos, gerenciamento de resíduos e biossegurança. **Conclusão:** O OncoVet Info é uma ferramenta que auxilia profissionais envolvidos com o cuidado animal, contribuindo para o uso seguro e responsável de medicamentos oncológicos.

Palavras-chave: oncologia, medicamentos veterinários, uso de medicamentos, aplicativos móveis.

Introduction

Animal health care has improved substantially over the years, leading to an increase in the life expectancy of these animals, which consequently results in the occurrence of a greater number of age-related diseases, such as cancer.[1,2]

Cancer is one of the biggest causes of death in the pet population, ranging from 15 to 30% in dogs and 26% in cats.[3] Animal cancer registry centers around the world are trying to understand the risks and associated factors of this condition, especially in the pet population, but the data is still scattered.[3] In the United States, more than 4.2 million dogs are diagnosed with this disease every year.[4] According to the Swiss Cancer Registry Center for dogs, adenoma/adenocarcinoma was the largest tumor diagnosed (18.0%), followed by mast cell tumor (6.5%) and lymphoma (4.4%), from 1955 to 2008.[5] In cats, the hematopoietic tissue was the most frequently affected by the disease, and mammary carcinoma, lymphoma and mast cell tumors were also observed.[3]

Antineoplastic agents are medications used to treat cancer because they are capable of inhibiting or preventing the proliferation of neoplastic cells and, although they are commonly used, they have marked toxicity and adverse effects, which can cause significant damage to the health of the patient, staff, and people they live with.[6,7] Medication intoxications are very common in veterinary clinics; this is due to administration without the guidance and monitoring of a qualified professional, often without respecting the medication's dosage and the physiology of each species, especially about the differences in the metabolization of substances.[8]

Prevention is an essential measure to minimize risks and avoid health problems resulting from exposure to antineoplastic medications. However, for this prevention to be effective, it is essential that the team involved has a comprehensive knowledge of these substances.[9] It is essential to explicitly highlight the risks and adverse effects on health, as well as emphasize the importance of appropriate safety measures to reduce them.[10]

In a globalized world, mobile technology presents an opportunity to assist professionals in health care. In recent years, the smartphone has been one of the most prosperous inventions, revolutionizing and facilitating health care.[11] The rapid growth of medical and health mobile applications for smartphones shows that developers see a current and promising market, offering benefits such as practicality. A growing number of healthcare professionals are using smartphones in different areas, including remote monitoring, diagnostic support, and decision-making support.[12] Studies have shown that the use of apps in daily clinical practice by healthcare professionals is high, ranging from 74% to 87%.[13,14]

However, health apps have grown exponentially in recent years. It is estimated that 40,000 health-related apps are available in all the major stores in this category. The sheer number of medical apps confuses healthcare professionals when it comes to choosing useful and reliable alternatives for use in clinical practice.[15,16] The development of a mobile app about medications in the veterinary field, based on reliable, quality information, is therefore extremely important. In the veterinary context, there is no data available on the number of apps available on platforms. In Portuguese, there are few mobile apps in this area and none with specific information on antineoplastic medications. The aim of this study was therefore to develop a mobile app on medications used in veterinary oncology services for dogs and cats.

Methods

Study design and teamwork

This is an applied methodological research project aimed at the technological production of rapid prototyping software.

The work team was made up of an undergraduate pharmacy student with experience in developing applications, a clinical pharmacist in the veterinary field, and a university professor in the field of pharmaceutical sciences.

Mobile application development phases

The mobile application was developed according to the method described by Dingsøyr et al.[17] and adapted by Lima et al.[18] following four well-defined stages: I) conception; II) prototype planning; III) building the mobile application; and 4) making the mobile application available.

Concept

The first stage included assessing the needs and target audience, defining the content, and analyzing the technological infrastructure. A literature search was carried out using databases of scientific articles (Medline, Scopus, and LILACS), veterinary medication databases, textbooks in the veterinary field, current legislation, information from the pharmaceutical industry, and pharmacotherapeutic guides from veterinary institutions. In addition, a search was carried out to identify similar free mobile applications in the Google Play (Android) and Apple Store (iOS) online stores. The content was defined through virtual and face-to-face team meetings. Relevant information such as the name of the app, information about the medications, and bibliographical references were discussed and outlined to guide the construction of the app. The team then identified the technological infrastructure needed to develop the mobile app, such as the graphical user interface (GUI), data storage, and internet use.

Prototype planning

At this stage, the topics and wording of the modules were defined, as well as the interface of all the application screens (layout). The design of the mobile application, including the layout of all the screens with information about the chosen oncology medications, was planned by the work team. The official language chosen was Brazilian Portuguese.

Building the mobile application

The multimedia tools, navigation structure, and environment configuration planning were selected at this stage. A layered application architecture model was used, specifically the presentation layer, so that users can access its services and functionality. The application was initially designed for devices with the Android operating system, due to the ease with which the file could be built without the need for programming. The Google Sites website creation tool and the Website 2 APK Builder v5.2 program[19], which converts websites or HTML5 into applications for the Android platform, were used to develop the mobile application.

Mobile application availability

The last stage consisted of configuring the technological tools and resources and building an environment for downloading the mobile application. The process of configuring the tools and technological resources was carried out by all the team members. The developer drew up the basic structure of the application, returning it to the whole team for evaluation through monthly virtual meetings. After three months, the beta version of the application was finalized. The Google Sites platform was chosen to make the application available.

Results

The target audience for the app was health professionals involved in the oncological care of pets. In addition to the lack of app options for these professionals, relevant data was identified in the literature for its development.

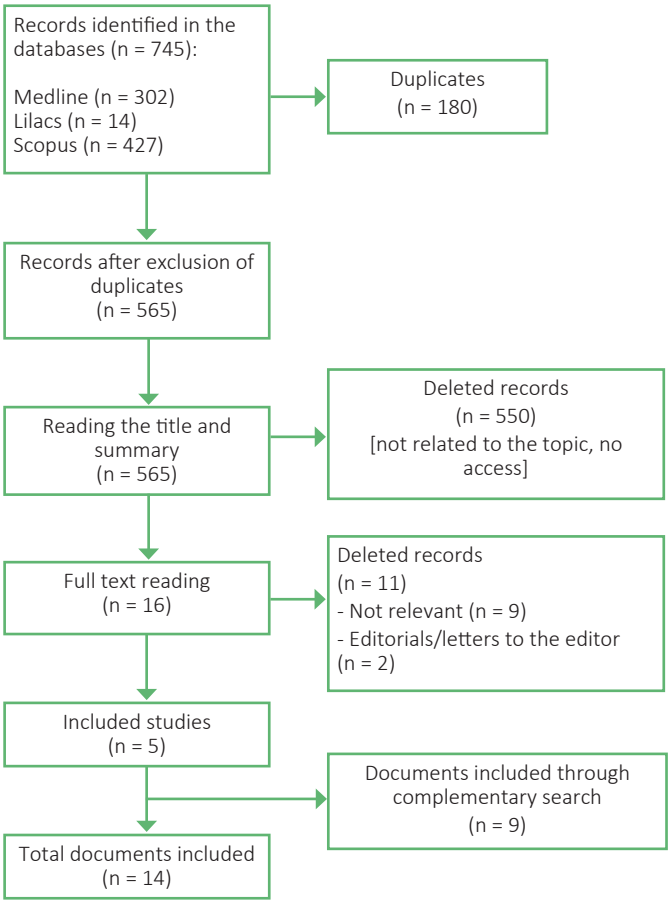
The literature search retrieved 565 studies. Of these, 5[6,20-23] studies were considered relevant for integrating the structure of the mobile application. The flowchart can be seen in Figure 1. In addition, an eBook on the correct management of oncology medication[24] pharmacotherapeutic guides and guides to potential medication interactions from a Brazilian public veterinary hospital,[25,26] three textbooks on veterinary chemotherapy,[27-29] a database of medications for veterinary use[30] and human hospital pharmaceutical manuals were used to expand the content of the mobile application.[31,32] In the search for similar products, another free mobile app (Vet Smart CG) was identified in Brazilian app stores, but its content was not used as a reference for Oncovet Info.

Thirteen oncology medications most commonly used in clinical practice for dogs and cats in Brazil were identified based on the literature analyzed and previous experience of the work team for inclusion in the OncoVet application: asparaginase, carboplatin, cyclophosphamide, cisplatin, chlorambucil, dacarbazine, doxorubicin, ifosfamide, lomustine, methotrexate, mitoxantrone, vinclastine and vincristine. The following information has been systematized and included: commercial presentations, indications, doses, and administration routes, diluent and stability, incompatibilities, potential medication interactions, adverse reactions, toxicity, biosafety measures, overflow risk, relevant aspects, and bibliography. In addition, the app contains information on the work team, classification of the overflow risks, calculations needed to carry out therapeutic procedures, oncology therapeutic protocols, waste management and biosafety, and bibliographical references.

OncoVet Info was developed for devices running the Android operating system and requiring an internet connection. It has eighteen screens in Portuguese, where health professionals can navigate the side tabs or type the medication's name into the search engine to obtain specific information on each product. The application's main screens are shown in Figure 2.

The information contained in OncoVet Info applies to dogs and cats and is mostly taken from veterinary sources rather than extrapolating human health information. The application has a side navigation menu, where users can access medication information via the "Therapeutic Forms" menu; in addition, definitions of terms, calculations needed to carry out therapeutic procedures, canine and feline oncology therapeutic protocols and legal information on waste management and biosafety are also available in my "Additional Information" section.

Figure 1. Flowchart of relevant studies to integrate the theoretical framework of OncoVet Info.



The application has been made available on the https://sites.google.com/ufrrj.br/oncovetinfo.

Discussion

This is the first free application developed in the Brazilian context to gather specific information on oncology medications used in veterinary clinical practice in dogs and cats, aimed at health professionals. OncoVet Info provides information on veterinary oncology therapeutic protocols and comprehensive information on antineoplastic medications. The tool assists health professionals involved in animal care in the safe and responsible use of these medications.

In the search carried out, a free mobile application for Android devices (Vet Smart CG) was found in the Brazilian app store, which provides information on veterinary medications. However, OncoVet Info focuses specifically on antineoplastic medication, offering detailed information on the dilution and stability of each Brazilian commercial presentation, as well as addressing occupational risk categories, risks, and protocol for extravasation and the use of visual elements to highlight information that demands greater attention from the user.

Figure 2. Screenshots of the OncoVet Info application. A: Main screen; B: About the OncoVet Info application. Subtitle: *Sobre* is About; C: Additional information. Subtitle: *Informações adicionais* is Additional information, *Glossário* is Glossary, *Classificação dos riscos de extravasamento* is Classification of hazardous drugs; D. Contact. Subtitle: *Contato* is Contact; E:Drug formularies. Subtitle: *Formulários terapêuticos* is Drug formularies; F: Example of a drug formulary. Subtitle: *Carboplatina* is Carboplatin, *Apresentações* is forms of drug apresentation, *Medicamentos com som e grafia semelhantes* is Drugs with similar sound and spelling, *Indicações* is Indications, *Doses e vias de administração* is Doses and routes of administration.

Currently, there is a growing number of health professionals using smartphones in different areas and, at the same time, an increase in the number of health-related apps.[11,12] However, few studies have demonstrated their use in the animal health scenario. One study described the use of an application for the prevention and control of digital dermatitis in dairy herds, highlighting that the tool made it possible to monitor the stages of the disease, guide treatment, and determine animal prognoses.[33] The "Veterinary Dictionary" app, which focuses on a glossary of veterinary terms and abbreviations, was rated positively by users in terms of easy use (94%), availability without an internet connection (86%) and convenience/time spent using it daily (84% for both).[34] Another study evaluated the "Petable" app to help dogs with atopic dermatitis adhere to treatment, showing better results when using the app compared to not using it (12.6% versus 60% non-adherence, respectively).[35] The literature is also scarce on apps with information for pet owners.[36] reported on the development and validation of the "Flockr" application, which provides users with tools designed to help with animal health care, making the solution dynamic and effective. Another study described the "MyDog" app, which is capable of easily managing dog events, sequential organization by calendar, and reminder notifications for future appointments.[38] It is important to note that no study has evaluated the use of apps with information on medications in the veterinary field, highlighting the need for future studies on this topic.

It was decided to choose 13 main medications used in veterinary oncology in the Brazilian context. According to the World Association of Small Animal Veterinarians, the essential list of oncology medications should include alkylating agents (cyclophosphamide, chlorambucil, lomustine), anti-tumor agents (doxorubicin), vinca alkaloids (vincristine and vinblastine) and platinum-derived agents (carboplatin).[39] In Brazil, the Pharmacotherapeutic Guide of the Veterinary Hospital of the Federal University of Goiás describes cyclophosphamide, doxorubicin, vinblastine, and vincristine as standardized medications at the institution.[26] All of these antineoplastic agents described are included in OncoVet Info. On the other hand, medications such as fluorouracil, melphalan, bleomycin, and actinomycin D can also be seen in clinical practice in Brazil, although less frequently.

The content incorporated into the mobile app is crucial to its reliability and applicability to healthcare professionals. In this study, OncoVet Info was developed by a team specializing in the topic, following four stages, including comprehensive literature research, ensuring evidence-based information, and user safety. One of the advantages of OncoVet Info is its small file size, which takes up less storage space on your phone and improves your agility.[40] In addition, it is a free, easy-to-use, and clear tool, since there is no need to register beforehand and there are no advertisements involved during its operation.

It is worth considering some limitations of this research and the product obtained. OncoVet Info does not cover all the antineoplastic agents used in veterinary practice or other animal species targeted by cancer therapy. In addition, the application is only available for Android devices and requires an internet connection to operate. It was necessary to extrapolate some information from human medicine, such as overflow protocols, diluents, and stability and incompatibilities, due to the difficulty of obtaining this specific information in veterinary use. Finally, the application was not tested for usability. It is understood, however, that discussing the results of the OncoVet development process can be useful for professionals involved in animal and human health who prescribe, administer, and monitor the use of medication.

Conclusion

A free 18-screen app has been developed on oncology medications for dogs and cats in Portuguese and requires an internet connection, offering essential information on 13 oncology medications most commonly used in veterinary clinical practice in Brazil. This tool has great potential to assist professionals involved in animal care in the safe and responsible use of oncology medications.

As an outlook, OncoVet Info will be constantly updated to include other oncology medications and new pertinent information, as well as validated through usability testing. The app will also be upgraded to an offline version (without an internet connection) and made available for operating systems other than Android, to reach a wider audience.

Funding sources

This study was funded by the Institutional Scholarship Program for Initiation in Technological Development and Innovation of the Federal Rural University of Rio de Janeiro. The funders did not influence the design of the study, the development of the mobile application, the writing of the manuscript, or the decision to publish.

Collaborators

KSA: Analyzing and interpreting the data, building the mobile app, and writing the article. **VSS:** Analysis and interpretation of data and critical review of the article. **TML:** Conception of the project, analysis and interpretation of the data, and critical revision of the article. All the authors have approved the final version to be published and take responsibility for all the information in the paper.

Declaration of conflict of interest

The authors declare no conflicts of interest to this article.

References

1. Babicsak VR, Zardo KM, Santos DR dos, et al. Aspectos tomográficos de tumores cerebrais primários em cães e gatos. Veterinária e Zootecnia. 2011;18(4):531-4.
2. Mestrinho LA, Santos RR. Translational oncotargets for immunotherapy: From pet dogs to humans. Adv Drug Deliv Rev. 2021;172:296-313. doi: 10.1016/j.addr.2021.02.020.
3. Brønden LB, Flagstad A, Kristensen AT. Veterinary cancer registries in companion animal cancer: a review. Vet Comp Oncol. 2007;5(3):133-44. doi: 10.1111/j.1476-5829.2007.00126.x.
4. Schiffman JD, Breen M. Comparative oncology: what dogs and other species can teach us about humans with cancer. Philos Trans R Soc Lond B Biol Sci. 2015;370(1673):20140231. doi: 10.1098/rstb.2014.0231.

5. Grüntzig K, Graf R, Boo G, et al. Swiss Canine Cancer Registry 1955-2008: Occurrence of the Most Common Tumour Diagnoses and Influence of Age, Breed, Body Size, Sex and Neutering Status on Tumour Development. J Comp Pathol. 2016;155(2-3):156-170. doi: 10.1016/j.jcpa.2016.05.011.

6. Biller B, Berg J, Garrett L, et al. 2016 AAHA Oncology Guidelines for Dogs and Cats. J Am Anim Hosp Assoc. 2016;52(4):181-204. doi: 10.5326/JAAHA-MS-6570.

7. Bonassa EMA, Santana TR. Enfermagem em terapêutica oncológica. 3. ed. São Paulo: Atheneu, 2005.

8. Medeiros RJ, Monteiro FO, Silva GC, et al. Casos de intoxicações exógenas em cães e gatos atendidos na Faculdade de Veterinária da Universidade Federal Fluminense durante o período de 2002 a 2008. Cienc. Rural. 2009;39(7):2105-10. doi: 10.1590/S0103-84782009005000151

9. Xelegati R, Robazzi MLCC, Marziale MHP, et al. Riscos ocupacionais químicos identificados por enfermeiros que trabalham em ambiente hospitalar. Revi Latino-Am Enfermagem. 2006;14(2):214-219. doi: 10.1590/S0104-11692006000200010.

10. Oliveira ADS, Alves AEC, Silva JA, et al. Riscos ocupacionais da exposição da equipe de enfermagem a quimioterápicos: revisão integrativa de literatura. Ver Enfermagem Ufpe. 2013;7(3):794-802.

11. Baig MM, GholamHosseini H, Connolly MJ. Mobile healthcare applications: system design review, critical issues and challenges. Australas Phys Eng Sci Med. 201538(1):23-38. doi: 10.1007/s13246-014-0315-4.

12. Tibes CMS, Dias JD, Zem-Mascarenhas SH. Aplicativos móveis desenvolvidos para a área da saúde no Brasil: revisão integrativa da literatura. Rev Min Enferm. 2014;18:471-478. doi: 10.5935/1415-2762.20140035

13. Hofer F, Haluza D. Are Austrian practitioners ready to use medical apps? Results of a validation study. BMC Med Inform Decis Mak. 2019;19(1):88. doi: 10.1186/s12911-019-0811-2.

14. Koehler N, Vujovic O, Mcmenamin C. Healthcare professionals' use of mobile phones and the internet in clinical practice. J Mob Technol Med. 2013;2:3-13. doi: 10.7309/jmtm.2.1.2

15. Herron J. Bad Apps: mHealth Apps Doubling as Medical Devices. J Electron Resour Med Libr. 2016;13:177-181. doi: 10.1080/15424065.2016.1256800

16. Boulos MN, Brewer AC, Karimkhani C, et al. Mobile medical and health apps: state of the art, concerns, regulatory control and certification. Online J Public Health Inform. 2014;5(3):229. doi: 10.5210/ojphi.v5i3.4814.

17. Dingsøyr T, Dybå T, Moe NB. Agile Software Development: Current Research and Future Directions. Netherlands: Springer. 2010.

18. Lima TM, da Silva MP, Luz LDS, et al. Development of a mobile application for vancomycin dosing calculation: A useful tool for the rational use of antimicrobials. Explor Res Clin Soc Pharm. 2022;5:100115. doi: 10.1016/j.rcsop.2022.

19. Website 2 APK Android App Builder. Disponível em: https://websitetoapk.com/. Accessed on: Aug 2, 2023.

20. O'Keefe DA, Harris CL. Toxicology of oncologic drugs. Vet Clin North Am Small Anim Pract. 1990;20(2):483-504. doi: 10.1016/s0195-5616(90)50040-6.

21. Melo SR. O uso de drogas citotóxicas na oncologia veterinária – importância da comunicação e cuidados aos tutores. Boletim Apamvet. 2018;9(1):16-17.

22. Klahn S. Chemotherapy safety in clinical veterinary oncology. Vet Clin North Am Small Anim Pract. 2014;44(5):941-63. doi: 10.1016/j.cvsm.2014.05.009.

23. Franco N, Degregori EB, Mattos NF, et al. Utilização de antibióticos quimioterápicos na oncológica de pequenos animais: Revisão. Pubvet. 2019;13(2):1-8. doi: 10.31533/pubvet.v13n2a279.1-8

24. Almeida KS, Magalhães VS, Lima TM. Manejo correto de medicamento oncológico na saúde animal: Guia farmacoterapêutico. 1ª ed. Seropédica: Ebook; 2023.

25. Ferreira JPA, Santos AS, Fonseca BCO et al. Guia farmacoterapêutico HV/UFG. Curitiba: Brazil Publishing; 2020. doi: 10.31012/978-65-86854-11-4.

26. Fonseca BCO, Zorzin LCD, Martins MR, et al. Guia de potenciais interações medicamentosas do Hospital Veterinário da Universidade Federal de Goiás. Curitiba: Brazil Publishing; 2020. doi: 10.31012/978-65-86854-17-6.

27. Crump K, Thamm DH. Cancer chemotherapy for the veterinary health team. 1ª ed. Oxford: John Wiley & Sons; 2011.

28. Withrow SJ, Vail DM, Page RL. Small Animal Clinical Oncology. 5ª ed. St. Louis: Elservier; 2013.

29. Souza GB. Medicamentos oncológicos na prática clínica. 2ª ed. São Paulo: editora farmacêutica LTDA, 2019. 1023p.

30. Budde JA, McCluskey DM. Plumb's Veterinary Drug Handbook. 10ª ed. Madison: Wiley-Blackwell; 2018.

31. Hospital Albert Einstein. Manual Farmacêutico. Disponível em: https://aplicacoes.einstein.br/manualfarmaceutico.

32. Hospital Sírio Libanês. Guia Farmacêutico. Disponível em: https://guiafarmaceutico.hsl.org.br

33. Tremblay M, Bennett T, Döpfer D. The DD Check App for prevention and control of digital dermatitis in dairy herds. Prev Vet Med. 2016;132:1-13. doi: 10.1016/j.prevetmed.2016.07.016.

34. Devi SP, Chamundeeswari G, Kumar ST. Offine Mobile App for Veterinary Professional. Indian Vet. J. 2019;96 (05):85-88.

35. Ribas M, Lourenço AM, Cavaco A. Exploring Medication Adherence Using M-Health: A Study from Veterinary Medicine. Pharmacy (Basel). 2020;8(1):38. doi: 10.3390/pharmacy8010038.

36. Haase L. Requirements to mHealth Applications for Animal Owners: A Narrative Review. Stud Health Technol Inform. 2023;302:1017-1018. doi: 10.3233/SHTI230332.

37. Mota Tl. Flockr: aplicativo móvel multiplataforma KMM para tutores de pets que combina rede social com gestão de saúde animal [Trabalho de Conclusão de Curso]. Universidade Federal Do Rio Grande Do Sul, Porto Alegre, 2021.

38. Jordão HC. MyDog: Um aplicativo mobile para gerenciamento e cuidado de cachorros [Trabalho de Conclusão de Curso]. Universidade Federal Do Rio Grande Do Sul, Porto Alegre,

2021.

39. Steagall PV, Pelligand L, Page SW, et al. Lista de Medicamentos Essenciais para Gatos e Cães. 1ª ed. Ontario: Associação Mundial de Médicos Veterinários de Pequenos Animais (WSAVA); 2020.

40. Virani A, Duffett-Leger L, Letourneau N. Parenting apps review: in search of good quality apps. Mhealth. 2019 Sep 30;5:44. doi: 10.21037/mhealth.2019.08.10. PMID: 31620471; PMCID: PMC6789304.