Original Research

The role of primary care pharmacists in the response to the Zika epidemic

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Abstract

Background: Zika virus (ZIKV) infection emerged in Brazil in 2015, leading to the declaration of a national public health emergency, mainly due to its consequences for pregnant women and newborn babies. The Zika epidemic demanded major efforts from the public health system to address the full range of disease consequences.

Objective: The objective of this study was to investigate the role of Primary Health Care pharmacists working in the city of Campo Grande in the State of Mato Grosso do Sul.

Methods: A qualitative cross-sectional interview-based study with pharmacists working in municipal Primary Health Care services was carried out to investigate knowledge about the disease and involvement in the response to the health emergency. Informed consent was obtained. After coding, the corpus underwent thematic analysis.

Results: The data show that few professionals had received specific training in public health. Knowledge largely encompassed disease transmission by the mosquito and collective and individual preventive measures. Findings highlight knowledge gaps relating to signs and symptoms, diagnosis, consequences of infection, and the role of epidemiological surveillance. Most professionals mentioned at least one of the recommendations on the use of medicines in symptom management protocols. The practical implications surrounding knowledge gaps and misconceptions were reflected in pharmacists' role in response, restricted to counselling on preventive measures. Few respondents participated in institutional groups and committees or in multiprofessional teams involving case management.

Conclusions: The study identified important knowledge gaps and showed that the involvement of pharmacy professionals in the response to the Zika epidemic was timid or inadequate. The results also suggest that pharmacists failed to recognize their role in interventions related to the ZIKV epidemic. Findings highlight the need to increase the involvement of primary care pharmacists in community-based actions, for communication and reduction of health risks, and emergency preparedness and response.

Keywords

Zika Virus Infection; Zika Virus; Epidemics; Pharmacists; Pharmaceutical Services; Professional Role; Counseling; Infant; Pregnant Women; Public Health; Primary Health Care; Qualitative Research; Brazil

INTRODUCTION

The Zika virus (ZIKV) has had grave consequences for the Brazilian population since it first appeared in the country in 2015, when 37,011 probable cases of the disease were reported. The following year saw a sharp rise in this number, reaching 215,327 cases. Already declared a National Public Health Emergency by the Brazilian government in November 2015, the World Health Organization declared Zika a Public Health Emergency of International Concern in February 2016.[1,2]

Although ZIKV infection spread across the country, the distribution of cases has been uneven, with the South Region being the least affected. Case numbers have been greater in the country's Northeast, Southeast and Center-West regions, with the latter showing the highest incidence of the disease in 2016 and 2017 (218.8 and 38.9 cases per 100,000 inhabitants, respectively). In the state of Mato Grosso do Sul, in the Center-West Region, 14 probable cases of Zika were reported in 2015, 1,711 in 2016, and 76 in 2017.[3]

The most serious consequences of ZIKV infection are those related to fetal development. Between November 2016 and October 2019, 18,282 suspected cases of abnormal growth and development possibly related to ZIKV infection and other infectious etiologies were reported in the country, including 402 fetal, neonatal and infant deaths.[3] These cases included 3,474 cases of ZIKV-related microcephaly and 743 cases probably related to ZIKV infection.[3] The Center-West Region accounted for 7.7% of all suspected cases of abnormal growth and development in the country during this period. Seventy-five cases were reported in Mato Grosso do Sul alone, including 32 cases of ZIKV-related microcephaly and 4 cases probably related to ZIKV infection.[3] These 36 cases included six deaths.

The health emergencies that have affected Brazil over the last 15 years, in particular the ZIKA epidemic, have demanded actions across all levels of the health system, including case prevention, identification and treatment measures. In this regard, pharmaceutical services have played an important role in providing support to the health system.[4,5] However, it is possible to enhance health service routines and actions through preparedness underpinned by work methods aimed at increasing service effectiveness.

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The present study is justified by the need for additional research focusing on the contributions of pharmacists and pharmaceutical services in the response to epidemics such as the ZIKV. Although Ministry of Health manuals on ZIKV disease, such as the Microcephaly Surveillance and Response Protocol and Changes to the Central Nervous System, provide guidance on the prevention, control and notification of new cases of microcephaly, they do not offer a concrete framework for structuring pharmaceutical services in response to the Zika epidemic.[6]

In recent years, Campo Grande, the capital of the State of Mato Grosso do Sul, has invested in the expansion of primary health care (PHC), increasing the number of family health teams and family health care facilities with the aim of improving access to quality comprehensive care.[7] Pharmaceutical services play a key role in this context according to the Brazilian Pharmaceutical Services Policy, and cities are responsible for Primary Health Care.[8] The Campo Grande city council has also increased the number of pharmacists and expanded community-based initiatives such as pharmacist consultations and activities directly linked to care.[9]

With specific regard to the ZIKV, it is understood that this context provides a unique opportunity to gain a better knowledge about the engagement of primary health care pharmacists in response to Public Health Emergencies. The objective of this work was to investigate pharmacist's role in combating the Zika epidemic, specifically focusing on their knowledge of different aspects of the disease and involvement in the response to this public health emergency.

METHODS

A qualitative interview-based study with primary care pharmacists working in Campo Grande, capital of Mato Grosso do Sul state, located in Midwest Brazil was conducted. Using contact information provided by the Campo Grande City Council Department of Health, all the pharmacists working in municipal primary care facilities were previously contacted and invited to participate in the study.

COREQ guidelines were adhered to throughout the research process to promote complete and transparent reporting and improve the rigor, comprehensiveness and credibility of the study".[10]

The study was undertaken between late November and early December 2017, six months after the end of the National Public Health Emergency declared in response to the Zika epidemic, which lasted 18 months (from February 2016 to May 2017).[11] We therefore expected to find professionals who had worked during the Zika epidemic. It was assumed that all the pharmacists in PHC had been involved in implementing care and preventive measures and were therefore mindful of the ZIKV epidemic and prepared to respond to a possible new outbreak in the approaching southern hemisphere summer of 2017/2018.

Drawing on relevant literature on the role of pharmacists in primary health care and health emergencies, we developed a simple and straightforward semi-structured questionnaire designed to assess the pharmacists' general knowledge of the disease and measures that should be taken during a Zika outbreak/epidemic, and their perceptions on the importance of the role of pharmacists in responses to health emergencies. Brazilian Society of Infectious Diseases Guidelines on therapy management for the treatment of ZIKV infection were used as parameter for pharmacist practice.[12]

A pretesting of the instrument was done with pharmacists at a public health facility in another Brazilian city and a pilot study was carried out before the final application of the instrument, using a sample of PHC pharmacists at a different setting.

The face-to-face interviews were conducted privately and with confidentiality, either at pharmacists´ workplace or alternatively in a separate space at a convention center where a professional meeting was taking place. The interview instrument was filled out by interviewer, and field notes were taken. Interviews lasted in average 20 minutes. Interview contents were coded by three researchers, independently. The data were analyzed using thematic analysis. An initial reading was made of the corpus, consisting of the pharmacists' responses to the questionnaire items, followed by an in-depth reading to identify commonly recurring codes and themes, meaning units and key terms. This stage guided the organization of three core categories (and several subcategories): i) knowledge of ZIKV disease; ii) knowledge of prevention, surveillance, communication, and information measures, and iii) involvement in the response to the epidemic. Saturation was considered as linked to the emergence of new codes or themes, not explicitly to number of interviews.[13] The responses within each of these themes were also analyzed using simple measures of frequency. The results were compared and discussed in light of relevant national and international literature.

The research project was approved by the Sergio Arouca National School of Public Health Research Ethics Committee (Oswaldo Cruz Foundation, approval code number CAAE 67311617.8.0000.5240). The study was conducted in accordance with the standards for research involving human subjects set out in Resolution 466/2012 and all respondents signed an informed consent form.

RESULTS

Forty-two (87.5%) of the 48 pharmacists working in municipal primary care services at the time of the study and were interviewed. Six did not respond affirmatively because they would be on annual vacation or sick leave during the data collection period. Thirty-three of the respondents (78.5%) worked in primary care centers or family care centers, one (2.3%) in a family health support center, one (2.3%) in a psychosocial care center, one (2.3%) in a polyclinic, and five (12%) in urgent care centers.

With regard to work experience as pharmacists, nine (21%) had up to five years of experience, 16 (38%) had six to ten years, 13 (30%) had between 11 and 20 years, and four (9.5%) had more than 20 years. The number of years of experience in primary care services also varied: 14 respondents (33%) had less than one year of experience, 17

Table 1. Knowledge of ZIKV disease reported by the respondents (N=42).

Subcategory	N	%
Transmission		
Reported that Aedes is the vector	41	97.6
Intrauterine transmission	10	23.8
Transmission through blood and semen	3	7.1
Signs and symptoms		
Correctly reported at least 3 symptoms	3	7.1
Correctly reported 2 symptoms	11	26.1
Correctly reported 1 symptom	8	19.0
Admitted not being aware of the symptoms	2	4.7
Cases can be asymptomatic	2	4.7
Gave incorrect information about the symptoms	10	23.8
Diagnosis		
Didn't know how diagnosis is performed	36	85.7
Gave incorrect/imprecise information about diagnosis	4	9.5
Had knowledge about laboratory testing approach	2	4.7
Consequences		
Microcephaly and fetal malformation	19	45.2
Acute neurological syndrome	2	4.7

(40%) had between two and four years, seven (16%) had five to ten years, and four (9.5%) had more than ten years.

Thirty-seven of the respondents (88%) had postgraduate qualification: 23 (62%) had done a specialist training course in pharmaceutical sciences, seven (19%) had done specialist training in a related area, and seven (19%) had a master's degree.

Pharmacists' knowledge of ZIKV disease encompasses questions such as transmission and the signs and symptoms and consequences of the infection. All respondents (100%) reported having knowledge about the disease; however, this knowledge varied according to the aspect analyzed (Table 1).

All the pharmacists had knowledge about disease transmission and all but one cited the vector:

"It's transmitted by the bite of the mosquito, the same responsible for dengue, right? I think its Aedes" (pharmacist 2)

Other responses showed that some pharmacists had more comprehensive knowledge:

"Yes. It's transmitted by Aedes, but also through saliva, blood and semen. The symptoms are the same as dengue, like aches and pains, redness, swelling of the lower limbs and fever; and in children it can lead to abnormal neurological development" (pharmacist 9)

Only three pharmacists correctly reported at least three signs and symptoms and 19 correctly reported one or two. Twelve respondents (28.5%) admitted not being aware of the signs and symptoms or gave incorrect information:

"With regard to the symptoms, I confuse Zika and chikungunya. I don't remember which causes problems in pregnant woman" (pharmacist 41)

"I confuse Zika with dengue and that other one, chikungunya, I think that causes itching, right? I don't remember" (pharmacist 2)

Ten pharmacists were aware of the possibility of intrauterine transmission and only 21 (49.9%) reported the

consequences of Zika, such as microcephaly and acute neurological syndrome. However, a number of professionals appeared to have more comprehensive knowledge of this topic, as demonstrated by the following response:

"Yes, the vector is the same as the dengue [vector], Aedes aegypti, and the greatest concern is with pregnant women, because the virus has nerve cell tropism, being able to cause fetal malformation, particularly in the first trimester of pregnancy" (pharmacist 40)

Thirty-six (85.7%) of the respondents reported that they were unaware of how diagnosis was performed and four (9.5%) gave incorrect or imprecise information:

"Blood count? I don't know. Does Campo Grande do it? I think they send it somewhere else, I'm not sure" (pharmacist 14)

"Let me remember... I know that they differentiate the platelet count and differentiate one virus from the other, but I can't specify the parameters. I think only biochemists or doctors know" (pharmacist 36)

Only 2 pharmacists (4.7%) were aware of the laboratory testing approach for Zika:

"I know about antibody testing. I believe with IgM in the acute phase. I think the samples are sent to LACEN, the state laboratory, but I don't know the process" (pharmacist 1)

The pharmacists were asked if they felt prepared to counsel people on ZIKV prevention and control measures, with only 14 (33.3%) answering affirmatively (Table 2). However, some of the responses of this group showed lack of preparedness in this respect:

"Yes, basic counseling, yes, since it is the same as for dengue, but I think the CHWs do this job better" (pharmacist 11)

Some of those who did not feel prepared mentioned the need for training to be better able to counsel the public:

"No. I need training" (pharmacist 17)

All respondents mentioned at least one collective protection measure, with 76.1% mentioning vector combat, as the following response shows:

"Use of repellent, use of mosquito nets, eliminating mosquito breeding grounds, treating waste, notifying the council of breeding grounds on vacant land and keeping the yard clean" (pharmacist 23)

When asked about the role of epidemiological surveillance in tackling Zika and microcephaly, around 50% of the pharmacists responded correctly, citing activities such as the identification and follow-up of new cases and notification. However, 42.8% said that they were unaware of the role of epidemiological surveillance and 7.1% gave incorrect information (Table 3).

"It's very important, but I don't know anything about it" (pharmacist 2)

Table 2. Knowledge about prevention, surveillance, communication and information measures reported by the respondents (N=42)		
Subcategory	**N**	**%**
Individual protection		
Avoid contact with the vector	35	83.3
Condom use	1	2.3
Special precautions for pregnant women	1	2.3
Collective protection		
Vector combat (insecticides, larvicides)	32	76.1
Avoid standing water	14	33.3
Keep surroundings clean	6	14.2
Prevention measures related to health services		
Home visits from endemic disease control agents	16	38.0
Distribution of repellent for pregnant women under the *Bolsa Família Program*	6	14.2
Prevention campaigns in health facilities with distribution of material	2	4.7
General counseling in health facilities	1	2.3
The role of epidemiological surveillance		
Identification and follow-up of new cases	13	30.9
Notification	8	19.0
Vector prevention and combat campaigns	6	14.2
Informs decision-making	3	7.1
Didn't know	18	42.8
Incorrect response	3	7.1
Notification		
Reported being aware of the notification process	5	11.9
Reported not being aware of the notification process	37	88.0
Health information and communication measures		
Dissemination of information by TV	8	19.0
Vector control bulletins	1	2.3
Breeding ground elimination campaigns	1	2.3

"It's more for recording notifications, right, you have to have it. But I don't know if it's the CHWs who do it" (pharmacist 8)

"I believe notifications are made, and I think it's the hospitals that do the surveillance, not us on the frontline" (pharmacist 12)

With regard to health information and communication measures, TV was mentioned as a source of information by 19% of the respondents, while one respondent reported vector control bulletins and breeding ground elimination campaigns. A number of the pharmacists mentioned lack of provision of information to the general public and health professionals alike, as the following responses illustrate:

"(...) raising public awareness, wider dissemination of information to the public. Information is restricted to doctors and lacking for other professionals" (pharmacist 27)

"It's necessary to raise awareness among the general public, talk more about the disease and the risks; the public are unaware of the seriousness of the problem" (pharmacist 29)

Table 3 shows the information that the pharmacists reported having provided to the public.

The advice provided to the public reflects the pharmacists' knowledge of Zika, which largely encompassed transmission and individual and collective prevention measures.

The most commonly reported items were notification and elimination of vector breeding grounds and use of repellent, mentioned by 97.6% and 69% of respondents, respectively. Seven pharmacists mentioned advice on seeking health services, while others mentioned the importance of hydration and warning against self-

medication, which, although important, is general information:

"Seek a health care facility when you have symptoms. If they are mild, go to a primary care center, if they are severe go to a 24h urgent care center. Drink plenty of fluids and don't self-medicate so as not to mask the symptoms" (pharmacist 3)

Although over 50% of the pharmacists reported at least one sign or symptom in the questions regarding knowledge of ZIKV disease (Table 1), paradoxically, only 14.2% provided this information to the public.

All respondents reported having provided information on individual and collective prevention measures to pregnant women. However, the responses encompassed only the use of repellent, wearing long-sleeved shirts and trousers, and putting mosquito netting on windows:

Table 3. Information provided to the public by the respondents (N=42)		
Subcategory	**N**	**%**
To the general public		
Notification and elimination of breeding grounds	41	97.6
Use of repellent	29	69.0
Domestic health measures	15	35.7
Seeking health services	7	16.6
Use of mosquito nets	4	9.5
Use of protective clothing	4	9.5
Use of over-the-counter medicines	4	9.5
Importance of hydration	2	4.7
Warning against self-medication	2	4.7
To pregnant women		
Individual prevention measures	42	100
Prevention measures in the surroundings	42	100
Advice on precautions and seeking services	18	42.8
Information about ZIKV disease	6	14.2
Contraceptive measures	3	7.1
Risks to the fetus	1	2.3

"Use of repellent, maximum protection against the mosquito and avoid going out in the afternoon (between midday and sunset)" (pharmacist 39)

"Use of repellent, eliminate mosquito breeding grounds, I would talk about transmission and prevention, what to do. I would cite severe cases (microcephaly), and the main symptoms of the disease. Here the council began to provide repellent for pregnant women, and gave one flask to around six women, when they had the right to two a month, but it seems they don't care. I think it´s a chronic problem among the population, not really caring even when they have information" (pharmacist 2)

Three professionals mentioned the adoption of contraceptive measures for women of childbearing age:

"Use of repellent, eliminate mosquito breeding grounds, use protective clothing, contraceptive measures, use a physical barrier on the windows and doors. In fact, the ideal would be to avoid pregnancy, right? But in the case [of pregnancy] it's too late..." (pharmacist 14)

While the information provided to women is dominated by keeping the surroundings clean, the advice on vector control invariably highlights the elimination of standing water:

"Use of repellent, use protective clothing, protection of water tanks, window netting, cleaning the yard, and talking to the neighbors too. If everyone does their bit...and ah, wiping out the mosquito as well" (pharmacist 18)

None of the pharmacists mentioned any of the therapy management guideline items / treatment recommendations (Table 4).

Sixty-nine percent of the respondents mentioned at least one of the recommendations on the use of medicines in symptom management protocols (Table 4):

"I know the basics, dipyrone and paracetamol, alternated every four hours and homemade rehydration solution or hydrating pack. There is a set procedure for doctors, who give these amounts and this pre-established treatment" (pharmacist 13)

"I believe it's only symptomatic, because as it's a virus, it's only the time it takes to stop. For headaches, fever, you use analgesics. Hydration. For nausea and vomiting, you use antiemetics. And when there are complications you go back to the doctor" (pharmacist 36)

It is worth highlighting that 9.5% of the professionals gave

incorrect information, mentioning medicines that are not indicated for ZIKV infection:

"The main thing is hydration. Analgesics and antipyretics in the case of pain and fever, and I think corticosteroids as well, I'm not sure" (pharmacist 3)

In addition, 19% of the pharmacists did not know the treatment recommendations and one reported that nothing should be indicated:

"I don't know if it's the same as dengue" (pharmacist 20)

"I don't know...nothing specific I think it's more symptomatic. But in the case of pregnant women, I don't know if it might cause problems to the fetus" (pharmacist 39)

The majority of the respondents (88%) did not participate in institutional groups and committees and only five (12%) reported being part of a multiprofessional team, working with prenatal care.

DISCUSSION

The large number of professionals with few years of experience may be due to the municipality having held a competitive selection process to recruit pharmacy professionals for permanent positions.[14] This type of employment contract provides more security for both staff and services, as permanent staff tend to remain longer in public service. Given the current context of temporary contracts and precarious employment in the country's public health care system, the Sistema Único de Saúde (SUS) or Unified Health System, the stability provided by permanent employment contracts, in conjunction with practical learning, can lead to improved health worker performance in health emergencies or outbreaks.[15]

The number of professionals with postgraduate qualifications – also related to the competitive selection process, in which points are allocated for qualifications in the final ranking of candidates – would seem to be an advantage. However, the qualifications reported by the respondents do not necessarily mean that these professionals have the knowledge, skills, and abilities needed for work in primary care. In this regard, it is known that SUS professionals show a relative lack of preparedness for effectively meeting community health needs.[14] The findings show that only two of the pharmacists had specialist training in public health, which is the most suitable type of complementary training for this practice setting. It is worth highlighting that postgraduate training is readily available in the municipality, with courses provided by the Oswaldo Cruz Foundation in Mato Grosso do Sul and the Federal University of Mato Grosso do Sul with support

Table 4. Treatment recommendations mentioned by the respondents (N=42)		
Recommendations (subcategory)	N	%
Complete (analgesics, antipyretics, hydration, antihistamines, situations where NSAIDs and ASA should be avoided)	0	0
Incomplete (mentioned at least 1 of the above recommendations)	29	69.0
Incorrect (at least one incorrect recommendation)	4	9.5
Was aware of the treatment recommendations	8	19.0
Didn't want to answer	1	2.3
Total	42	100.0

from the Mato Grosso do Sul State Department of Health.[16,17] This may suggest that the professionals did not have the initial intention of working in PHC.

Within the context of PHC, pharmacists play a key role in ensuring the provision of comprehensive care, one of the founding principles of this level of health care and of the SUS as a whole. They may work in primary care centers and in referral teams in family health support centers. Pharmacists' responsibilities encompass health promotion, disease prevention and care, including the rational use of medicines. In health systems, pharmacists play an important role in ensuring the quality of pharmaceutical services and promoting the efficient management of human and physical resources.[18]

At the international level, recent experiences show that, in addition to their involvement in PHC, pharmacists are engaged in responses to epidemics and pandemics in both clinical and managerial capacity, and through their expanding role in public health. Pharmacy professionals contribute in a variety of ways, including health promotion, patient education and counseling, medication reconciliation, surveillance, screening, and emergency management.[19]

The proportion of professionals who admitted not being aware of the signs and symptoms or gave incorrect information was relatively high. Zika is distinct from other arboviruses treated in PHC because of its effects on unborn babies. Although pharmacists are not directly involved in case diagnosis, they play a specific role in PHC, focusing primarily on health promotion, disease prevention and care.[18,19] The gaps in basic knowledge about ZIKV infection are particularly concerning, especially when it comes to patient counseling.

Generally, viral infections are diagnosed by detecting viral genetic material in potentially infected individuals and, at a later stage, a test is performed to detect IgM and IgG antibodies.[20] At the time of the study, rapid Zika tests were still not widely available in healthcare facilities, with tests being done in referral laboratories. Although the respondents were not directly involved in disease diagnosis, it would be expected that the professionals would be aware of this process and therefore capable of counseling potentially infected patients.[19]

Study findings are consistent with another investigating the role of pharmacists in a pandemic that found that half of the participants thought they had limited training in emergency response.[19] The lack of these skills can adversely affect professionals' perception of their role – which can be inferred from the comparison made with the work of community health workers, who do not have a degree, but have experience in working with the community.

A study in Malaysia found that primary care pharmacists perceived that they were lacking in preparedness and unable to respond efficiently to a potential Zika outbreak.[20] Our findings suggest that, as a whole, the respondents do not see themselves as playing an active role in the Zika epidemic. It could also be said that, to a certain extent, the health system also fails to recognize this role, insofar as

senior levels of management failed to provide necessary training in this area.

However, when asked about preventive measures, it was found that all respondents had some degree of knowledge on the topic, although the range and depth of knowledge varied across the group (Table 2). With regard to individual measures, the mention of awareness of the need to avoid contact with the vector (use of insect repellent, wearing long-sleeved shirts and trousers, and window mosquito netting) was frequent. Only one of the professionals mentioned the need to use condoms, despite that three respondents reported being aware of the possibility of transmission through semen.[21]

A study in Campo Grande investigating the spatial distribution of *Aedes aegypti* reported that the vector was present in all areas of the city, with no significant differences being found between socioeconomically advantaged and disadvantaged areas.[22] This may be explained by the urban structure, with vacant land being found across the city, including in high-income neighborhoods. Mato Grosso do Sul has witnessed major outbreaks of dengue in recent years, resulting in a high number of infections.[22] Dengue is therefore ever present in primary care services, probably meaning that the information reported above is considered a priority by the pharmacists.

It is recommended that suspected cases of ZIKV-related microcephaly are recorded on the public health events notification form. When asked about this recommendation, 88% of the pharmacists reported that they were unaware of the procedure. Moreover, when those who were aware of the procedure were asked how to notify a case, only two (4.7% of all respondents) responded correctly. These findings point to a considerable lack of knowledge about the role of the pharmacist, which undermines the performance of the health system and can jeopardize pharmaceutical services in PHC.[18,24]

Health surveillance is a long-standing and well-established field within the Brazilian health system that precedes the SUS itself. The National Epidemiological Surveillance System informs evidence-based decision making in relation to the control of notifiable diseases.[25] Zika is classified as a notifiable disease because, as with other infections transmitted by *Aedes aegypti*, it can reach epidemic proportions. However, the generation of reliable data depends on the health care professionals that feed the system.

The respondents who reported lack of information for health professionals failed to show that they were proactive with information seeking. In this regard, it is important to highlight that a number of the pharmacists had specialist or postgraduate qualifications. One wonders what justifies this type of complacency in relation to updating professional knowledge on emerging health issues. It appears that this behavior is not restricted to Brazil. In the context of the COVID-19 epidemic in India, around 60% of pharmacists who updated their knowledge used the media.[18] This passive approach to updating knowledge was also reported by other studies addressing

the role of pharmacists in emergency preparedness and response.[4,5,26]

The knowledge reported by the professionals, particularly that related to vector control, reproduces common sense information and lacks sound scientific basis, and it appears that the pharmacists' passive stance towards information seeking exacerbates this situation. National studies have criticized health communication strategies, suggesting they are often prescriptive in relation to control actions, oversimplify scientific concepts, and are detached from practice, thus leading citizens to assume co-responsibility in combating epidemics.[27,28]

Pharmacists are important health professionals in the fight against epidemics, chiefly because they are a source of accurate and reliable information to the public and other health professionals, helping to halt the spread of misinformation, as exemplified in the COVID-19 pandemic. The role they play in providing evidence-based advice to the community is a vital part of the response to health emergencies.[29]

In addition to communicating disease risks, pharmacists' priority activities include therapy management and participation in groups and committees and multiprofessional teams.

At the beginning of the Zika epidemic, there were numerous uncertainties surrounding the characteristics, signs and symptoms, management, and consequences of the disease. Within this context, the general public and health professionals alike were likely to have misconceptions about the ZIKV, which were gradually undone with the development of scientific evidence.[30]

As part of a multiprofessional team, the pharmacist should provide accurate information about the disease tailored to the local needs of the target audience in a timely fashion and engage in social communication and mobilization, encouraging changes in individual and collective behaviors to enhance prevention and control measures.[18,31]

Although this advice is undoubtedly important, as previously discussed, vector control programs incorporating these measures have been shown to be insufficient in the past. In this regard, a study examining Ministry of Health recommendations on the control of Aedes aegypti conducted by Rodrigues and Grizotti (2019) identified a number of problems, including lack of standardization of information provided to the public. For example, inconsistencies or lack of clarity about the type and color of protective clothing and the use of repellent (whether to use it on parts of the body left exposed or on clothing) and uncertainty as to the safety of repellent for pregnant women.[32] With regard to the present study, our findings also suggest that the primary care pharmacists in Campo Grande do not use standardized information.

The findings show that the information provided by the pharmacists was very general and nonspecific, reflecting the pharmacists' knowledge about the topic. Although Mato Grosso do Sul was not one of the states most affected by microcephaly, at the time of the study, the harmful effects of ZIKV infection on the fetus, including microcephaly, were already known.[23]

The lack of information on ZIKV disease provided to pregnant women in this study is notable. Drug management for pregnant women in the Brazilian Health System has shown shortcomings in drug information sources and interpretation.[33]

The lack of standardization of information on the sexual transmission of the virus and regarding women's autonomy in deciding to get pregnant and in reproductive planning, also examined by Rodrigues and Grizzoti (2019), is evident in the advice provided by the pharmacists.[32] Recommendations on the need to avoid pregnancy were released at the beginning of the epidemic. The World Health Organization positioned itself, recommending that couples living in regions with high circulation of the virus avoid conception. For those who had visited endemic areas, the organization recommended eight-week abstinence or safer sex practices after return.[34] This recommendation was criticized in Brazil because not only Zika, but also an array of other health problems can lead to complications during pregnancy. It was argued that recommendations should be based on infection prevention measures, such as those mentioned by the majority of the pharmacists. Nevertheless, the number of live births in Brazil fell between 2015 and 2016.[35]

Although women's autonomy over their own body and reproductive rights are issues that have been widely discussed, not all women have the necessary information to exercise their rights and exert autonomy.[36] Pharmacists who work in primary care services, which develop community-based women's health actions, play an important role in counseling on reproductive planning within multiprofessional teams.[37] In a country like Brazil, with gaping inequalities and different levels of access to health care, preference should be given to less intrusive measures that enable successful disease control and individual and collective risk reduction, lessen the burden on the health system, and reduce permanent damage.[38]

In a study in Recife, Sobral and Sobral (2019) found that the collection of increased volumes of garbage was related to a reduction in the number of cases of dengue, corroborating the information provided by pharmacists, as dengue and zika are transmitted by the same vector.[39] This strategy should be combined with the provision of guidance by the media and health services to promote the proper storage and disposal of household waste.[39,40]

It is worth highlighting that therapy management for the treatment of Zika does not involve the use of new medicines or complex medication regimens, and all medicines used to manage the symptoms belong to the list of essential medicines used by primary care services such as i) analgesics and antipyretics (paracetamol and, in cases of very high fever, dipyrone), ii) oral antihistamines and calamine lotion to relieve skin rashes.[41] Nonsteroidal anti-inflammatory drugs (NSAIDs) should not be used unless dengue can be ruled out, or in pregnant women after 30 weeks of gestation, and the use of acetylsalicylic acid (ASA) should be avoided in children aged under 12 years.[12]

It would therefore be expected that pharmacists would have adequate knowledge of therapy management, especially since medication dispensing is one of the last

opportunities for the patient to gain entry into the health care system. The pharmacist scope of practice is wider than that of most other health professionals because activities encompass both stages related to the individual health-disease process (from promotion and prevention through treatment) and those involving medicines (from production to use). These activities are set out in a diverse range of regulatory instruments, including the Code of Ethics for Pharmacists (CFF No. 596/2014), Decree 85.878/1981, Law 13021/2014, Resolutions 04/2009, 296/1996, 499/2008, 509/2009 and 585/2013, and Resolutions of the Collegiate Board 44/2009 and 17/2010.[42-51] Thus, the pharmacist should be prepared to ensure adequate dispensing and provide counseling on the rational use of medicines.

The multiprofessional team is one of the cornerstones of PHC services. Pharmacists play a key role in these teams, participating in home visits and interprofessional consultations along with other team members. Multiprofessional teamwork is an interactive way of improving collaboration and thus enhancing health care and has a positive impact on the quality and safety of care. According to Reeves *et al*. (2011), patients and service users frequently have multi-causal conditions and therefore require multiple treatments provided by a range of professionals with different skills and competences.[52] It is well known that ZIKV infection can have devastating consequences for pregnant women and children, thus justifying this approach.

Expectations were that the qualitative design would result in more in-depth responses from the pharmacists; however, it was not possible to obtain a more comprehensive and detailed picture. One explanation may be the interviewing process, which was partially conducted in the professionals' workplace. Another reason may be the lack of knowledge demonstrated by the professionals. If the responses had been more comprehensive it would have been possible to indicate new directions for future research and good practices for emergencies.

CONCLUSIONS

Findings show that the pharmacists' knowledge of the topics covered by this study was sometimes incomplete or flawed and that their involvement in the response to the ZIKV is timid or lacking. The professionals failed to recognize their role in health promotion and disease prevention, including actions aimed at combating the spread of the ZIKV. The fieldwork was conducted in summer and with the rainy season approaching, when conditions are conducive to the proliferation of Aedes aegypti. It would be expected that the experiences of the

state of Mato Grosso do Sul with arboviruses, similar to those of other Brazilian states and municipalities, would have left the state capital's primary care pharmacists better prepared to effectively respond to the Zika epidemic. More intense prevention efforts would be expected during this period, since it is well known that arboviruses are highly seasonal. Considering that the central aim of PHC is the delivery of quality comprehensive care tailored to the specific health needs of individuals and families in the community, it was expected that the PHC pharmacists in Campo Grande would have shown greater engagement in this level of care.

It is possible that our field work prompted the respondents to reflect upon their role in the epidemic. Our findings complement this reflection by highlighting the deficiencies of these professionals and emphasizing that the council's health care managers need to take measures to increase the involvement of primary care pharmacists in health care and promotion, beginning with the provision of specific training in arboviruses focusing on Zika.

Our observations of the role played by Brazilian primary care pharmacists in the Zika epidemic, which may be similar to that in countries with a similar context, highlight the need to increase the involvement of these professionals in community-based actions, the communication and reduction of health risks, and emergency preparedness and response.

CONFLICT OF INTEREST

None.

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