


RESEARCH PAPER (ORIGINAL) 

Family health strategy in Brazil: microbiological analysis in the vaccination room


Estratégia de saúde familiar no Brasil: análise microbiológica na sala de vacinação

Estrategia de salud familiar en Brasil: análisis microbiológico en la sala de vacunación


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Abstract

Background: The Family Health Strategy (FHS) units are a standard in primary health care to the populations, and vaccination rooms have the highest attendance of the service. It is important to highlight that inadequate hygiene of this environment is more likely to cause infections to patients.

Objective: To assess the association between the microbiological contamination and the assistance provided in the vaccination room of a Brazilian FHS unit.

Methodology: Descriptive and exploratory study with sampling for three surfaces in the vaccination room.

Results: The results showed 58 colony-forming units (CFU), for bacteria and fungi, in the vaccine needle, more than 300 CFU of bacteria in the samples from the fridge and table, and more than 300 CFU of fungi in the same locations.

Conclusion: In this study, an inadequate sanitization was observed in the vaccination room, as shown by the microbiological growth. This suggests that inadequate hygiene impacts the care provided, so strategies are necessary for the improvement of quality and safety in the vaccination room.

Keywords: family health strategy; nursing care; microbiological analysis; vaccination

Resumo

Enquadramento: As unidades de Estratégia Saúde da Família (ESF) são uma referência no atendimento primário à população, tendo as salas de vacinação como principal procura do serviço. É importante destacar que uma higienização inadequada desse ambiente, apresenta maior probabilidade de causar infeções aos pacientes.

Objetivo: Verificar a associação entre a contaminação microbiológica e a assistência prestada na sala de vacinação de uma ESF no Brasil.

Metodologia: Estudo descritivo e exploratório, com amostragem para 3 superfícies da sala de vacinação.

Resultados: Os resultados evidenciaram 58 unidades formadoras de colônias (UFC), para bactérias e fungos, na agulha de vacina, mais de 300 UFC de bactérias, nas amostras da geladeira e mesa, e mais de 300 UFC de fungos nos mesmos locais.

Conclusão: Neste estudo foi possível observar falhas da higienização na sala de vacinação, através do crescimento microbiológico, sugerindo que uma higienização inadequada influencia na assistência prestada, tornando necessárias ações estratégicas que visem a melhoria da qualidade e segurança na sala de vacinação.

Palavras-chave: estratégia saúde da família; cuidados de enfermagem; análise microbiológica; vacinação

Resumen

Marco contextual: Las unidades Estratégicas de Salud Familiar (ESF) son una referencia en la atención primaria a la población, y las salas de vacunación son la principal demanda del servicio. Es importante destacar que una higiene inadecuada de este entorno aumenta la probabilidad de causar infecciones a los pacientes.

Objetivo: Comprobar la asociación entre la contaminación microbiológica y la asistencia prestada en la sala de vacunación de una ESF en Brasil.

Metodología: Estudio descriptivo y exploratorio, con muestreo de 3 superficies de la sala de vacunación.

Resultados: Los resultados mostraron 58 unidades formadoras de colonias (UFC) de bacterias y hongos en la aguja de la vacuna, más de 300 UFC de bacterias en las muestras de la nevera y la mesa, y más de 300 UFC de hongos en los mismos lugares.

Conclusión: En este estudio se pudieron observar fallos en la higiene de la sala de vacunación, a través del crecimiento microbiológico, lo que sugiere que la higiene inadecuada influye en la asistencia prestada, por lo que es necesario adoptar medidas estratégicas para mejorar la calidad y la seguridad en la sala de vacunación.

Palabras clave: estrategia de salud familiar; cuidado de enfermería; análisis microbiológico; vacunación



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Introduction

Primary health care (PHC) is a care model that aims at the improvement of health conditions by offering a complete and functional health service to the community (Ministério da Saúde, 2014). According to Starfield (2002), PHC is defined as the primary level of care that acts as the point of entry of the patient in the healthcare system. It provides prevention, healing, and rehabilitation services, rationalizing all available resources for the promotion, maintenance, and improvement of health. Thus, the expansion of healthcare is facilitated, equity is promoted, and the population's access to health services, reducing the disparities in care, especially in small towns and in places of difficult access (Arantes, Eri-Shimizu, & Merchán-Hamann, 2016).

In Brazil, the Family Health Strategy (FHS) is the main consolidation mechanism of PHC because it is effective and ensures access to basic and specialized services. For this purpose, the FHS provides various services to the population according to local and regional needs and protocols of the Ministry of Health. Among the main actions performed, it is possible to highlight medical and nursing consultations, vaccination, wound treatment, neonatal screening tests (heel prick), suture removal, monitoring of people with hypertension and diabetes, prenatal care, among others. Within this context, vaccination stands out as one of the most sought after procedures in the service due to its degree of complexity, preparation and technical knowledge of the team for care (Ribeiro, Melo, & Tavares, 2018).

Over the years, Brazil gained a global spotlight in the control and eradication of vaccine-preventable diseases, either because of high coverage rates or the free offer of vaccines. The National Vaccination Program (NVP) was a successful experience, benefitting the population through free and adequate immunization since its creation in 1973 and regulation by Federal Law no. 6,259, of 30 October 1975, and by Decree no. 78,321, 12 August 1976. Associated with the NVP, the National System of Epidemiological Surveillance (SNVE) was created to define vaccination standards, goals, and results in the three spheres of government, contributing to the reduction of regional and social inequalities, ensuring access to vaccination for all Brazilians, taking into account the principles of the National Health System (Agência Nacional de Vigilância Sanitária [ANVISA], 2016, 2020).

Currently, the NVP has more than 36 thousand vaccination rooms, which administer 300 million vaccines per year (Ministério da Saúde, 2014). According to the Ministry of Health, the environment of the room vaccination is semicritical, intended solely for the administration of vaccines, and the responsibility of the nursing team (Ministério da Saúde, 2014). During the vaccination, the nursing team must comply with the recommendations of the Ministry of Health (Ministério da Saúde, 2014), observing some criteria and professional, structural and environmental specifications to ensure a proper functioning of the vaccination room, providing maximum safety and reducing the risk of contamination

(Duarte, Oliveira, Guimarães, & Viegas, 2019).

Furthermore, the microbial load associated with this environment is another important aspect that should be considered for proper operation. The microorganisms in the air and on the surfaces are easily carried from one place to another. The vaccination rooms receive patients and health professionals daily, promoting a rapid modification of microbial load on-site. The majority of the microbiota is harmless to the body, but there are pathological microorganisms with pathological potential, which can harm human health (Medeiros, Neto, Saraiva, Barbosa, & Santos, 2019). A recent study showed the importance of controlling the microbiological growth and adopting measures that prevent the spread of microorganisms, as the exacerbated growth can lead to the propagation of healthcare-associated infections (Ribeiro et al., 2019). The routine in vaccination rooms requires technical-scientific knowledge. However, the duties in this environment go far beyond the daily administration of vaccines, and the healthcare team must understand the cleaning procedures, which, when performed inadequately, have a high impact on the propagation of microbiological agents, with pathogenic capacity or not. Considering the above, this study aimed to analyze the association between the microbiological contamination and the care provided in the vaccination room of a Brazilian FHS unit.

Background

The sanitization of healthcare environments was initially considered a basic measure in the care provided to patients, according to the study conducted by Semmelweis (1888), that revealed that the dirt on the hands and the surrounding objects were an environmental source of transmission of microorganisms in hospitals.

In 2014 and 2015, the Centers for Disease Control and Prevention (CDC) published manuals listing the types of healthcare-associated infections and the main forms of prevention. These manuals have been used since then by the World Health Organization (WHO) and by national bodies such as the Ministry of Health and the ANVISA, serving as the basic protocols for the reduction of healthcare-associated infections (CDC, 2016).

Recently, ANVISA (2016) launched the National Program for the Prevention and Control of Healthcare-Associated Infections, bringing along studies related to the impact of bacteria and fungi transmission by the hands of healthcare professionals through direct contact with the patient or indirect contact with surrounding products and inanimate objects. Recent studies have also shown that infections caused by gram-negative bacteria were associated with a low adherence to hand hygiene practices. These studies listed a microbiological correlation with the limited number and high turnover of team professionals and stated that pathogenic microorganisms, from the simplest to the multidrug-resistant like *Staphylococcus aureus*, *Acinetobacter sp*, *Pseudomonas aeruginosa*, and *Enterococcus*, were present in inanimate objects, contam-

inating the surface of health settings (Cordeiro, Leandro, Vandesmet, Júnior, & Mendes, 2016; Mitchell et al., 2019).

Adequate hygiene provides patient, family, and professional safety and comfort to the service, in addition to the feeling of well-being in the FHS unit. The routine cleaning and disinfection of surfaces contribute, above all, to the environmental control of infections, making the FHS unit suitable for carrying out the health activities (ANVISA, 2016; Medeiros et al., 2019).

Cultures of microorganisms are conducted to provide scientific evidence of contamination in health services. They aim to investigate the potential risk of contamination within the health units so that the professionals learn about the current hygiene practices in health and the quality of the cleaning in the service (CDC, 2016).

Previous studies suggest that equipment and inanimate surfaces, frequently touched by professionals with no hand disinfection or severe environmental cleaning, have a high potential for contamination, transforming these locations in vessels for microorganisms that can cause infection and/or outbreaks in health services (Sales, Oliveira Gonçalves, & Melo, 2014).

Research hypothesis

The high staff turnover and the inadequate compliance with the basic hygiene procedures hinder the care provided in the vaccination room, contributing to the microbiological growth and propagation of infections.

Methodology

A descriptive and exploratory study was conducted in an FHS unit in the Brazilian countryside, from March to June 2019. The sample of this study was composed of equipment and furniture of higher contact between patients and professionals. Three locations were selected: vaccine vial with needle/syringe inserted throughout the workday, fridge, and preparation table for vaccine administration.

Analysis and approval were obtained from the Vice-Dean of Extension and Culture of the Federal University of Vales do Jequitinhonha and Mucuri (UFVJM), under the protocol number 333826.1864.334608.29052019, referring to the public notice Proex 003/2018, considering the general services of the FHS unit, as well as the guidelines and standards regulated by CNS Resolution 466/2012. The data collection was carried out in May 2019.

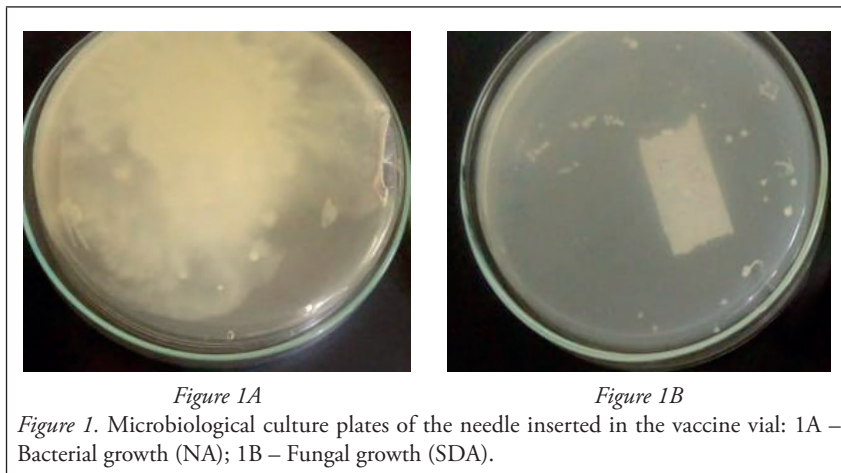
According to the CDC (2016), the harvest of environmental sampling should follow the aseptic technique, and surfaces must be visibly clean, but without

prior sanitization. Based on this, in a stage prior to the collection, the culture media in Petri dishes and sterile swabs were prepared in the Laboratory of Microbiology of the UFVJM. Six plates were prepared, with a 1-ml depth for nutrient agar (NA) and saboraud agar (SDA), suitable for bacterial and fungal growth. Triplicate plating was used, three plates of NA and three of SDA for each of the following locations: needle/syringe inserted in the vaccine vial secured in the cool box, fridge for vaccines, and table where vaccination materials are stored. All materials used for cell culture were sterilized, as well as the personal protective equipment (PPE), to avoid any propensity for contamination by the handler, ensuring the accuracy and safety of the samples.

Cleaning was carried out only in the early morning, around 7:30 a.m., when the workday started. Cleaning products with bactericide and fungicide properties were used. The samples were collected in the day period, at 4:00 p.m., after a day of service in the vaccination room. There had been no cleaning and furniture disinfection, and the needle/syringe had remained inside the vaccine vial for the whole day, without notice. After the sample collection, the swabs were inserted in the SDA and NA plates for the dissemination, identification, conservation, and transportation of the collected material. The three plates containing the NA half remained 72 hours at room temperature ($\pm 20^{\circ}\text{C}$), and the other three, containing the SDA half, were incubated at 35°C for 96 hours. After the incubation period, the growth on the plates was analyzed. For this purpose, it was necessary to understand that the microbial cells, both bacteria and fungi, grow while developing colonies through groupings (Sales et al., 2014), which were counted according to their morphological aspect. It was not possible to identify the microbial species present as contaminants in the sampling locations of the vaccination room. In this way, a total arithmetic counting of the colonies that grew in NA and SDA was performed, and the results were indicated in colony-forming units (CFU) for bacteria (NA) or fungi (SDA; Langoni, Guimarães, Costa, Joaquim, & Menozzi, 2015).

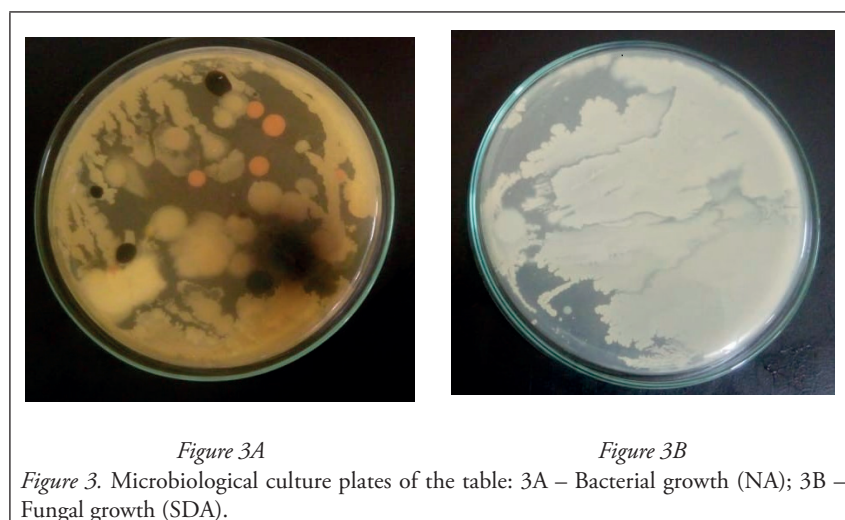
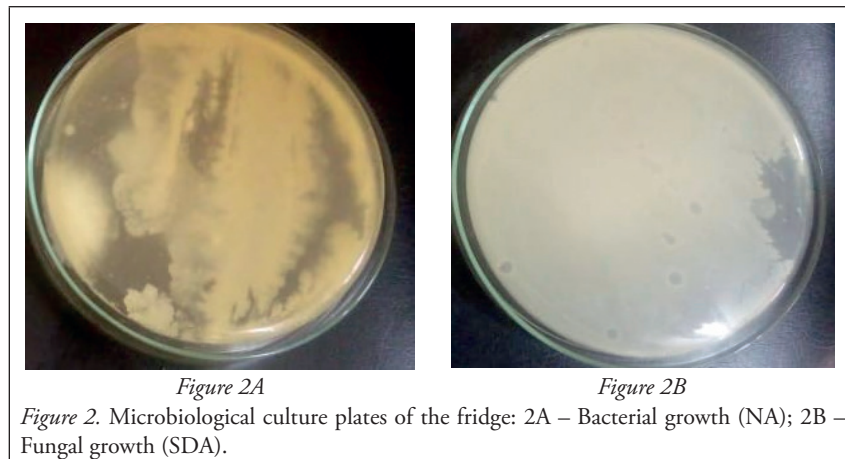
Results

An analysis of the microbiological culture plates was performed to understand the sanitization in the vaccination room of a Brazilian FHS unit. The results showed that 58 CFU, a value above the expected for bacteria and fungi, were present in the needle/syringe inserted in the vaccine vial to be aspirated (Figure 1 - 1A, 1B). It is worth noting the relevance of this result because, at the time of collection, the vaccine was at a -8°C temperature inside the cool box. These thermal storage conditions could not reveal this type of contamination.



Moreover, the results found in the samples collected in the fridge showed values above 300 CFU for bacteria and fungi (Figure 2 - 2A, 2B). Similar results were also

found in the table samples, presenting a growth higher than 300 CFU, for both bacteria and fungi (Figure 3 - 3A, 3B).



As shown in Table 1, it was possible to prove that the sanitization in this vaccination room was inadequate in relation to the recommendations of the health agencies, revealing a highly dirty environment. Fungal and bacterial growth was also observed in large quantities in the three inanimate surfaces where the samples were harvested in the room vaccination: needle/syringe inserted in the

vaccine vial; fridge; table of preparation for vaccine administration to patients. This suggests that inadequate hygiene hinders the healthcare service in the healthcare environment, mainly in the vaccination room, contributing to the increase of microorganism colonies and the possible propagation of infections.

Table 1
Microbiological analysis in three locations in the vaccination room of an FHS unit

Type of microbiological growth	Harvest locations		
	Needle inserted in the vial	Fridge	Table
Bacterial (NA)	> 58 CFU	> 300 CFU	> 300 CFU
Fungal (SDA)	> 58 CFU	> 300 CFU	> 300 CFU

Note. NA = Nutrient Agar; SDA = Sabouraud agar; CFU = Colony-forming units.

Discussion

The results of this study allow inferring, initially, that the cleaning performed at three locations in the vaccination room did not comply with the recommended guides, as shown by the high amount of bacteria and fungi. It is known that the cleaning procedures in healthcare environments must be thorough to prevent the propagation of microbiological organisms. In a recent study, Ribeiro et al. (2019) showed that the surfaces of equipment in direct contact with patients in an intensive care unit were the main neglected areas during the cleaning procedures by the health team, leading to a higher proliferation of microorganisms causing infection.

The high growth of microorganisms is related to failures in the service, regarding cleaning, maintenance, processing, and organization of procedures by the nursing team in the vaccination room. Fontoura, Gonçalves, and Soares (2016) state that there is a series of errors, from cleaning, disinfecting, hygiene, time/temperature to even a correlation of all these circumstances. In studies carried out in the vaccination room of an FHS unit, in Brazil, similar failures were reported in the cities of Marília - SP (2008-2009), in the state of Pernambuco - EC (2011), and in Montes Claros - MG (2015), revealing poor environmental cleaning, inadequate vaccine conservation, as well as a physical structure unfit for the functioning of the health service. In general, the hygiene procedures of the three locations were inconsistent with the good health practices, possibly associated with the lack of compliance with clinical protocols by the health team in the vaccination room (Vasconcelos, Rocha, & Ayres, 2012). According to Siqueira et al. (2017), the inconsistencies in the sanitization are due to the high staff turnover and the unfamiliarity with the clinical protocols governing the health services. Within this context, the non-implementation of the appropriate techniques, such as handwashing, preparation and administration of vaccines, may

constitute a high risk to patients' health, increasingly promoting the appearance of microorganisms. It is known that the nursing team knows about the importance of hand hygiene, but it is often dismissed because it is such a simple procedure. Thus, it can be suggested that the microbial loads found in the needle/syringe inserted in the vaccine vial, fridge door, and table can be directly associated with soiled hands, the main vehicle of microorganism transmission, which may cause individual and collective contamination. These findings are corroborated by the study of Rosado and Silva (2016), who showed that nursing professionals are the elements of the hospital health team that most frequently follow the guides on proper hand washing. After the implementation of care protocols, including hand sanitization, there was a 70-80% reduction of the microorganisms in the equipment surrounding the patients.

In addition to the high hand-related risk, the majority of technicians and nurses in the Brazilian countryside still performed the preparation and administration of vaccines poorly. The professionals had acquired the habit of keeping the needle/syringe inside the vaccine vial during all the workhours as a way of optimizing the vaccinations and avoiding queues of patients. However, this practice goes against the recommendations of the Ministry of Health (Ministério da Saúde, 2014) in the healthcare environment. Vaccine administration should strictly follow the rules on conservation, cleaning, and aspiration, ensuring vaccination quality. According to the Regional Nursing Council of Sao Paulo (Coren, 2015), the nursing team has the responsibility of giving special attention to the vaccine aspiration technique of vaccines. The exchange of the needle/syringe is recommended for multidose vials after each dose aspiration and withdrawal, and the perforation of the protective rubber should occur at different locations for each dose withdrawal, always avoiding the center of the vial lid. This recommendation aims at the quality of the healthcare environment, to

reduce skin irritation, contamination of needles/syringes, changes in the vaccine composition, and, mainly, to reduce the occurrence of infections, which would be defined as post-vaccination adverse events (Medeiros et al., 2019).

The inadequate technical practice in the vaccination procedures, combined with this environment's inadequate hygiene, is regarded by some authors as high-risk events for patients (Bisetto & Ciosak, 2017; Medeiros et al., 2019). The microbiological contamination demonstrated in this study, caused by errors in the sanitization processes of the FHS unit, allows confirming that bacteria and fungi are organisms capable of disrupting the microbiota of the environment and objects and the effectiveness of vaccination, directly influencing the service provided due to health risks to patients.

Although this analysis has shown an initial scenario that could contribute to a more secure vaccination, this study encountered limitations in the convenience sampling method and did not carry out the phenotyping of bacteria and fungi to understand the types of microorganisms and the risks to health. Therefore, further studies are needed to focus on the FHS units, to clarify the types of contamination of these inanimate surfaces, the responsibility of each health team member in the propagation of infections, and check for improvements in the quality of care provided to patients.

Conclusion

In this study, it was possible to observe errors in the sanitization of inanimate surfaces in the vaccination room, using microbiological analysis, which showed a high quantity of bacteria and fungi colonies in the vaccine needle, fridge, and table. The high growth of microorganisms in these locations, especially in the needle inserted in the vaccine administered to patients, hinders the care service provided in that FHS unit, increasing the probability of cross-infection through contact with these objects and surfaces, compromising the safety of patients.

It can be concluded that the microbiological contamination and the potential risk of infection, resulting from improper hygiene in the FHS unit, alert to the importance of developing strategic actions, like training these professionals, and improving the microbial monitoring, employing health policies focused on minimizing the risk of infection. Thus, professionals can advance their knowledge about the quality and safety of care provided in this FHS unit.

Author Contributions

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 Writing - review & editing: Rodrigues, C. M.
 Supervision: Rodrigues, C. M.
 Project administration: Rodrigues, C. M.

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