

## Weaknesses of vaccine storage in Primary Healthcare Centers

*Fragilidades da conservação de vacina nas Unidades de Atenção Primária à Saúde*  
*Debilidades de la conservación de vacuna en las Unidades de Atención Primária de Salud*

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### ABSTRACT

**Objective:** assessment through qualitative approach of vaccine storage in Primary Healthcare Centers. **Method:** assessment study of qualitative approach in which 30 interviews were conducted with nurses, nursing technicians or assistants and technical reference in immunization, in 12 vaccine rooms that had 100% of the structural criteria evaluated. Recorded testimonials of the subjects were organized and analyzed using thematic Content Analysis. **Results:** the assessment pointed to absence of knowledge on the parts of nurses and nursing technicians and assistants with respect to the effects of low temperature on vaccines. Barriers were also encountered in relation to the supervision of nurses in the vaccine room activities and in relation to the knowledge needed by workers to care for preservation of vaccines. **Conclusion:** vaccine storage is inadequate and may compromise the quality of the immunobiologicals dispensed to the populace.

**Key words:** Refrigeration; Vaccines; Health Services Evaluation; Qualitative Research; Public Health Nursing.

### RESUMO

**Objetivo:** avaliar por meio da abordagem qualitativa a conservação de vacinas nas Unidades de Atenção Primária à saúde. **Método:** pesquisa avaliativa, de abordagem qualitativa. Foram realizadas 30 entrevistas com enfermeiros, técnicos ou auxiliares de enfermagem e referência técnica em imunização, responsáveis pelas 12 salas de vacina que obtiveram 100% dos critérios estruturais avaliados. Os depoimentos dos sujeitos foram gravados, organizados e analisados por meio da Análise de Conteúdo, na modalidade temática. **Resultados:** a avaliação apontou um desconhecimento dos enfermeiros e técnicos ou auxiliares de enfermagem sobre os efeitos da baixa temperatura sobre as vacinas. Entraves também foram encontrados em relação à supervisão do enfermeiro nas atividades em sala de vacina e em relação ao conhecimento necessário dos trabalhadores para o cuidado com a sua conservação. **Conclusão:** a conservação de vacina não está adequada e pode comprometer a qualidade do imunobiológico dispensado à população.

**Descritores:** Refrigeração; Vacinas; Avaliação de Serviços de Saúde; Pesquisa Qualitativa; Enfermagem em Saúde Pública.

### RESUMEN

**Objetivo:** evaluar por medio de la abordaje cualitativa la conservación de vacunas en las Unidades de Atención Primária de Salud. **Método:** investigación evaluativa, de abordaje cualitativa en la cual fueron realizadas 30 entrevistas con el enfermero, el técnico/auxiliar de enfermería y el profesional referencia técnica en inmunización, responsables pelas 12 salas de vacina que obtuvieron el 100% de los criterios estructurales elegibles para la investigación. Los depoimentos gravados de los sujeitos fueron organizados y analisados a través de método de analisis temático de contenido. **Resultados:** el estudio apuntó un

desconocimiento de los enfermeros y técnicos/auxiliares de enfermería sobre los efectos de la baja temperatura sobre las vacunas. Entraves también fueron encontrados en relación a la supervisión del enfermero en las actividades en sala de vacuna y el conocimiento necesario de los trabajadores para el cuidado con su conservación. **Conclusión:** la conservación de vacuna no está adecuada y puede comprometer la calidad del inmunobiológico dispensado a la población.

**Palabras clave:** Refrigeración; Vacunas; Evaluación de Servicios de Salud; Investigación Cualitativa; Enfermería em Salud Pública.

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## INTRODUCTION

The National Immunization Program (NIP) has significantly reduced the incidence of various infectious diseases. However, for the control of such diseases, it is necessary to ensure the optimal potency of vaccines through a rigorous attention to storage, transportation and handling, from the national storage sphere until the application on health center users<sup>(1)</sup>.

Considering the importance of the vaccine preservation process, studies have been carried out to monitor and evaluate it, particularly at the municipal level. One of such studies was on the experience and update of the nursing team on knowledge of immunization. From this analysis, arose the need for training the professionals who operationalize the vaccine storage in Primary Healthcare Centers (UAPS – Unidades de Atenção Primária à Saúde), since the theoretical information provided by the vaccinators was not always in complete agreement with the practice observed<sup>(2)</sup>.

Another study to assess the implementation level of the immunization program identified that 22.5% of the family health teams did not keep vaccines under appropriate storage conditions. The most frequent failure was the malfunction of refrigerators and thermometers<sup>(3)</sup>.

Similarly, a study to identify the knowledge and compliance with technical recommendations of the National Immunization Program for the preservation of immunobiologicals found that the conditioning of the recyclable icepack was not part of the routine of workers in the vaccine room<sup>(4)</sup>. This procedure exposes the immunobiologicals to the risk of freezing, which can lead to their inactivation.

Almost always, the inactivation of vaccines is not detectable by observing changes in their physical characteristics. The major concern of public health is that failures in the cold chain during storage and transport can lead to the administration of vaccines with reduced potency<sup>(5)</sup>.

As an example, a study carried out in the United States called the attention to the importance of vaccines storage in the control of vaccine-preventable diseases, since it raised the hypothesis that failures in the storage of vaccines at local health units could be contributing to the recent increase in pertussis morbidity rates in the country<sup>(6)</sup>.

The National Immunization Program is an international reference due to its advances regarding prevention, control and elimination of vaccine-preventable diseases. However, as the operationalization of activities happens locally, it is necessary to maintain the quality of immunobiological material administered to the population. In this sense, the present study is justified by the need to assess the vaccine preservation at the

local level, seeking to know the daily routine of vaccine rooms in the experience of the nursing team, and understand the irregularities involved in this process.

In this sense, given the importance of vaccine preservation for the quality of immunization, and the scarcity of qualitative studies in the area, the aim of this study was to evaluate the preservation of vaccines in Primary Healthcare Centers.

## METHOD

This is an assessment study with qualitative approach developed in 12 vaccine rooms of the Extended western region of the state of Minas Gerais.

The selection of study settings and participants started from the evaluation of the structural dimension of vaccine rooms in the Extended western region. The region is formed by the union of 55 municipalities grouped into six micro-regions and estimated population of 1,254,944 inhabitants in 2014, according to the Brazilian Institute of Geography and Statistics (IBGE)<sup>(7)</sup>. It also has 261 vaccine rooms distributed in Primary Healthcare Centers<sup>(8)</sup>.

The selection of vaccine rooms object of this research began from a preliminary study with quantitative approach carried out in 261 rooms that met the following criteria: the exclusivity of the refrigerator, the existence of a maximum and minimum temperature thermometer, the presence of recyclable ice packs in the freezer, the drip tray of water, the bottom of the refrigerator with bottled water, the absence of objects in the inside panel, the existence of a corrective or preventive maintenance program for the refrigerator and training for vaccine room professionals. From these criteria, were selected 12 vaccine rooms that met 100% of the criteria<sup>(9)</sup>.

In order to allow proper assessment and fully cover the object of study, were interviewed the nurses, nursing technicians or nursing assistants, and the technical reference in immunization who performed work activities in these rooms, totaling 30 interviews. Only a nursing technician did not accept to participate in the study and a technical reference was on vacation at the time of data collection. Three different scripts of semistructured interviews were used because the professional categories perform different functions in relation to the preservation of vaccines.

The interviews were conducted from August to October 2011 by the researcher and were audio recorded after consent from participants. They were then transcribed verbatim, maintaining information reliability. The statements were organized and analyzed using content analysis. The excerpts were identified with codes of letters as follows: N for nurses, NT for nursing technicians, and TR for technical reference in

immunization, and sequenced by numbers (N1..., NT2..., TR1...) for confidentiality of participants' identity and complying with the ethical standards of resolution No. 466/2012 of the National Health Council.

The development of the study met the national and international standards of ethics in research involving human subjects with prior approval of the Research Ethics Committee of the Hospital São João de Deus under number 38/2011.

## RESULTS

The participants were 12 nurses, five technical references in immunization and 13 nursing technicians or nursing assistants. All the technical references in immunization were nurses.

Regarding the nursing technicians, 92.3% were women. The age of participants ranged from 25 to 57 years, and the training time from 3 to 25 years.

Among the nurses participating in the study, 94.1% were female with ages ranging from 25 to 43 years. Working time in the primary care network ranged from 18 months to 13 years.

Based on the analysis of the collected statements, the results were organized into the following categories:

### **The lack of knowledge on the technical standards of the National Immunization Program (NIP) in the routine of vaccine rooms**

In most municipalities selected for the interviews, the correct maximum and minimum reading of the thermometer was verified as one of the barriers to ensure proper preservation of immunobiologicals.

*The last time S. was there, she took a professional when she asked to read the analog max/min thermometer (known as 'capela' thermometer) and at that time, he couldn't do it. The greatest difficulty is reading the analog max/min thermometer. (N4)*

*I cannot read the analog max/min thermometer. I told S, until today, the analog max/min thermometer gives me a hard time. (NT1)*

*It is the matter of reading the thermometer, of being able to do the reading. I've realized that validating a change is a thing they do only when the change is very striking. There was a situation in which the reading was +0.5°C for the whole month. The reading was +1°C and it was not reported, and when the reading was -1°C, it was reported. When we asked for the log map, throughout the whole month the reading was below 2°C. (TR3)*

The reports reveal misconduct in relation to the organization of vaccines inside the refrigerator.

*The vaccines we can freeze are hepatitis, DTP and adult Td, which are vaccines that don't lose their effect if frozen. (NT2)*

*Can be frozen? The yellow fever, rotavirus, polio, H1N1 and MMR can. Because, well, that's how I learned in the*

*course, in theory, and the practice is something else. (NT6)*

In the statements was identified a professional who only considers a vaccine was subjected to a temperature lower than recommended if it is visibly frozen.

*Let me tell you the truth, if it isn't frozen, I don't remove it. It's not the law, but I ask to look, only if it's frozen I remove it. (TR1)*

*It was not necessary because it was not frozen. But well, concerning this matter, there was never a problem, the loss was only at the time when there was a power cut. (NT3)*

### **Supervision in the vaccine rooms**

The lack of supervision was one of the most mentioned hindering aspects in the nurses' statements.

*In my view, the supervision has failures, we see there are many items he cannot keep up with, when we discuss something about vaccines he cannot follow. (N1)*

It was also identified that the supervisory activity is delegated to mid-level staff, as shown in the following remarks.

*The vaccine room is monitored, accompanied, administered by a nursing technician, she is held responsible for this room, she is the one who organizes it. Nurse V and I get to monitor and administer the vaccines and the newborn screening, also in the afternoon, when she's not here. Or then, she's on vacation and there is nobody to organize [...]. (N2)*

*In the countryside, too, we don't have the nurse all the time in the units, and the nursing technicians end up with the responsibility, and they leave a bit to be desired. (N10)*

The multiplicity of activities and duties is pointed out by nurses as a complicating aspect in the supervision process.

*Then, there are days when I get here and there are 30 people waiting for the screening. So it's like, I count on R (nursing assistant) a lot, she has a lot of experience, she is very competent in the vaccine room. (N11)*

*So I used to feel that many days I had no time to get into the vaccine room, 'cause I had so many people to see and you're often alone in the unit. So I had no time, I spent the whole morning, late in the morning I wow... I wonder what is the temperature, I wonder how is the vaccine room. (N3)*

### **Human resources training for vaccine room work**

It was found that trainings for vaccine room workers are neither systematic nor continuous.

*Now the memorandum, those things, we get to the meeting and give it for her, so she'll read it and if there are any changes, if the needle changes, we'll give it for her, she'll read it and file it. We have a folder for it. (N2)*

*It comes from the health department, the health center itself does not get trained. So far, it has not happened yet. Of the health center organizing itself ... Because they could, for example... the health agents could mobilize themselves. There is no such proactivity, it's always in charge of the reference center to organize it. (TR1)*

*[...] So, I try to stay updated as much as possible, because there aren't many courses here. Then, whenever it is offered, the immunization coordinator here in the city, whenever he offers, I'm always available. (NT9)*

On the other hand, the statements reinforce the use of strategies such as retraining for the education of workers in their Health Centers.

*The other nurse and I, we organize an annual training program. Usually we do a retraining [...] in a month I speak of ethics, the other month I speak, we speak about filing, how to file. So, once a month, it's twelve themes in total, and the vaccination room is included in one of these themes. (N8)*

*Normally, as I'm from the afternoon shift, I sit with employees of the afternoon shift and pass all modifications and guidelines we receive. The nurse of the morning shift passes it to the girls of the morning shift. Because it is difficult to gather everyone at the same time, you know. (N12)*

## DISCUSSION

The study has limitations because it was performed only in rooms that met 100% of the structural criteria, not allowing the identification of problems in vaccine rooms that did not meet the criteria defined in the study and had different obstacles. On the other hand, the study results corroborate the knowledge of vaccine preservation in Brazil and other countries, and progress by bringing important discussions on a little studied subject, but relevant to the nursing area.

Thus, this assessment can stimulate reflection and support the discussion of the nurses' working process in vaccine rooms with a view that immunization is a nursing activity in Brazil. In addition, it can be a tool for the reorganization of the cold chain of the Central West Region of Minas Gerais. This study shows how essential is the strict control of vaccines storage conditions to ensure the quality and effectiveness of immunization. Moreover, the use of a qualitative approach in the evaluation of health services is appropriate because it considers the expectations and symbolic universe of the actors involved in the production of practices process, as well as their subjective demands, values, feelings and desires<sup>(10)</sup>.

Currently, studies show that the freezing of vaccines is a global issue affecting both developed and developing countries, and there is a lack of professionals' knowledge in relation to vaccines that cannot be frozen<sup>(5-6,8,11)</sup>. It is difficult to determine the exact interval at which vaccines are subjected to temperature changes and determine changes in their appearance by conventional temperature control methods. In

addition, many of these changes may occur at night or on weekends, when the health team is not present. The only reference of the problem is the record of the constant minimum temperature on the thermometer, but there is no way to affirm if the vaccine has been frozen or not.

Therefore, the lack of workers' knowledge on reading the thermometer is visible, as well as about the effect of freezing on the inactivation of some vaccines, which compromises the quality of the vaccine and hence its final action of immunization. The damage caused by temperature changes are cumulative, so, constant monitoring is essential to prevent the ineffectiveness of vaccines used in the population<sup>(5)</sup>. Moreover, there are some vaccines that even without being frozen, if stored and administered at temperatures below +2°C, may be more reactogenic, particularly those containing tetanus toxoid<sup>(12)</sup>.

Thus, the nurses who are directly responsible for the nursing team must include the following in their routine: the supervision of the planned vaccine room, organized in ascending way, and not imposed; the ability to expand the understanding that supervision is an important action in the educational process; and identify the training demands of workers in order to develop their potential and improve the skills of the nursing team<sup>(13)</sup>. A more effective participation of nurses in the daily supervision of the vaccine room is necessary, since the management of immunobiologicals is a complex action<sup>(14)</sup>. In the routine of nurses, it must be taken into consideration that activities related to the care of disease processes already installed (curative actions), overlap with activities related to preventive actions, represented here by activities in the vaccine room.

In general, the reports suggest that supervision is not carried out systematically by nurses. The nursing technicians or assistants perform their activities in the vaccine room routinely, using the knowledge gained from their experience in the service and their professional experience. The experience of nursing technicians or assistants cannot be disregarded, but the contrary, it is necessary for teamwork aiming at quality of care. However, care management in the vaccine room is part of the nurses' role, as well as the exercise of leadership in the workplace, nursing care planning, education and training of staff and especially, the promotion of nursing staff development through constant evaluations of the activities developed by them, identifying needs of guidance and improvement, in order to prevent damage to healthcare services users<sup>(15-16)</sup>. If nurses are far from the activities of the vaccine room, they cannot notice the education demands of their health team. This distance from care actions is one of the consequences of accumulating roles and responsibilities, which compromises the planning of care, supervision and team orientation with the perspective of monitoring and continuing education<sup>(17)</sup>.

Changes in the vaccination schedule and introduction of new immunobiologicals are frequent, as well as the modernization of equipment in the vaccine room, requiring original and specific knowledge from professionals<sup>(14)</sup>. This requires continuous updating of knowledge and a more open professional profile with ability to adapt to changes, equipped and motivated to continue learning throughout their working lives.

The lack of workers' knowledge in vaccine rooms may be related to lack of updates on this knowledge. Therefore, nurses must

transcend the mere transfer of information and transform these rooms in a space of education in the nursing routine, in order that health professionals can discuss, problematize and be updated to offer a quality immunization service for the population.

The remaining challenges are to rethink the work process in the vaccine room remains and find alternatives by combining care and administrative activities from the perspective of integration, of changes in training and of building care management in the daily work of Primary Healthcare Centers<sup>(18)</sup>.

It is necessary to carry out studies to analyze the training process of nurses for care management in vaccine rooms, as well as studies for accurately identifying the stability of temperatures during storage and transport through continuous monitoring of the equipment used.

## FINAL CONSIDERATIONS

The study showed failures in the structure of vaccine rooms, deficiency in the supervisory process, lack of technical

knowledge on NIP technical standards and lack of training for workers.

The nurses' involvement in various functions and the weak organization of their work process end up hindering the exercise of the primary role of Primary Healthcare Center nurses, which is the management of care, represented here by the vaccine room care. The study also showed that, with respect to vaccine room, the nurses have not undertaken educational activities for mid-level workers. In most cases, the training activities for the health teams are under the responsibility of municipal central teams or state health departments.

The assessment provides essential elements for the health manager, and is an indispensable support instrument for the management because of its ability to improve the quality of decision-making. Thus, it is expected that the study will support the development of diagnostic and activities of surveillance, monitoring and evaluation, directing and guiding the decision of future interventions to improve levels of efficiency, efficacy and effectiveness in the preservation of vaccines.

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