ISSN-e [2675-5602]

Global Academic Nursing Journal

ORIGINAL ARTICLE

Construction of an index of vaccine room operational adequacy

Elaboración de un índice para evaluar la adecuación del funcionamiento de la sala de vacunación

Construção de um índice de adequação do funcionamento da sala de vacina

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How to cite this article:
Forrester MSB, Andrade M, Prado GOAM, Souza DL, Di Giacomo TAC, Souza CSF, Lima NSS, Almeida FAL, Costa JF, Almeida VGL. Construction of an index of vaccine room operational adequacy. Glob Acad Nurs. 2023;4(4):e406. https://dx.doi.org/10.5935/2675-5602.20200406

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Submission: 09-02-2023
Approval: 10-28-2023

Abstract

The study aimed to analyze the standards and environment of vaccination rooms in a specific territory of the Municipality of Rio de Janeiro, develop an assessment index, and profile the practicing nurses. This was a descriptive, qualitative study with quantitative components, conducted across 13 vaccination rooms using on-site observation via a systematized environmental assessment checklist and semi-structured interviews. The Forrester Vaccination Room Adequacy Index (IFASV) was developed based on 53 items derived from ANVISA regulations. All 13 professionals were female; 69.2% held a specialization, yet only 7.7% considered their training in immunization sufficient, and 53.8% lacked certification in anaphylaxis management. Regarding infrastructure, 84.6% of the rooms had an area between 6 and 8 m², and 100% were equipped with cold storage units and air conditioning; main inadequacies involved the ceiling (23.1%), window paintwork (38.5%), and refrigerator placement (23.1%). The IFASV scores ranged from 86.8% to 100% (mean: 94.3%), classifying 76.9% of the rooms as having "very good" adequacy and 7.7% as having "perfect" adequacy. The IFASV proved to be a useful tool for measuring adequacy, capable of supporting supervision and quality control efforts, with a methodology that can be replicated for future comparative analyses.

Descriptors: Nursing Team; Vaccination; Vaccination Room; Immunization; Nursing Management.

Resumén

El objetivo fue analizar las normas y el entorno de la sala de vacunación en un territorio del Municipio de Río de Janeiro, desarrollar un índice de evaluación y delinear el perfil profesional de las enfermeras que trabajan allí. Se realizó un estudio descriptivo, cualitativo con datos cuantitativos en 13 salas de vacunación, con observación in situ utilizando una Lista de Verificación Ambiental Sistematizada y entrevistas semiestructuradas. El Índice Forrester de Adecuación de la Sala de Vacunación (IFASV) se construyó a partir de 53 ítems basados en los RDC de ANVISA. Los 13 profesionales eran mujeres, el 69,2% tenía una especialización, pero solo el 7,7% consideró suficiente su capacitación en inmunización y el 53,8% no tenía capacitación en anafilaxia. En cuanto a la infraestructura, el 84,6% de las salas tenía un área entre 6 y 8 m², el 100% tenía una cámara frigorífica y aire acondicionado; Principales deficiencias: techo (23,1%), pintura de ventanas (38,5%) y distancia de los refrigeradores (23,1%). El IFASV osciló entre el 86,8 % y el 100 %, con un promedio del 94,3 %, clasificando el 76,9 % de las habitaciones como muy buenas y el 7,7 % como perfectamente adecuadas. El IFASV demostró ser una herramienta útil para medir la adecuación y puede servir de apoyo a la supervisión y el control de calidad, con una metodología replicable para futuros análisis comparativos.

Descriptores: Equipo de Enfermería; Vacunación; Sala de Vacunación; Inmunización; Gestión de Enfermería.

Resumo

Objetivou-se analisar as normas e o ambiente da sala de vacina de um Território do Município do Rio de Janeiro, desenvolver um índice de avaliação e traçar o perfil profissional dos enfermeiros atuantes. Estudo descritivo, qualitativo, com cortes quantitativos, realizado em 13 salas de vacinação, com observação in loco por Roteiro Sistematizado de Ambiência e entrevistas semiestruturadas. Construiu-se o Índice Forrester de Adequação de uma Sala de Vacina (IFASV) a partir de 53 itens baseados nas RDCs da ANVISA. As 13 profissionais eram do sexo feminino, 69,2% com especialização, mas apenas 7,7% consideravam sua formação em imunização suficiente e 53,8% não possuíam habilitação em anafilaxia. Sobre infraestrutura, 84,6% das salas tinham área entre 6 e 8 m², 100% dispunham de câmara fria e ar-condicionado; inadequações principais: teto (23,1%), pintura das janelas (38,5%) e distância dos refrigeradores (23,1%). O IFASV variou de 86,8% a 100%, média de 94,3%, classificando 76,9% das salas com adequação muito boa e 7,7% com adequação perfeita. O IFASV mostrou-se ferramenta útil para mensurar a adequação, podendo subsidiar supervisões e controle de qualidade, com metodologia replicável para futuras análises comparativas.

Descritores: Equipe de Enfermagem; Vacinação; Sala de Vacina; Imunização; Gestão em Enfermagem.

Introduction

Vaccination is grounded in the principle that the act of vaccinating fosters immunity without causing harm to the vaccine recipients, their families, or healthcare personnel. These goals can only be achieved by investing in the theoretical and practical knowledge as well as the up-to-date, innovative skills of professionals, thereby triggering a series of safe processes that address the full complexity inherent in the act of vaccination. Multifactorial issues contribute to the success of both the National Immunization Program (PNI) and health promotion efforts on a broader scale. Some of these objectives can be met through best practices, such as respecting and adhering to proper techniques for the storage, handling, preparation, distribution, transport, and administration of vaccines. In other words, best practices apply throughout the entire process, from vaccine formulation to delivery to the patient, who, ultimately, possesses a unique and individual immune response[1].

Vaccination is grounded in a collective approach and entails requirements that demand constant updating and the assimilation of scientific knowledge by the entire team. This knowledge encompasses everything from immunological aspects to matters rooted in the political-administrative definitions of health promotion. The impact of the protection achieved through reduced incidence and mortality from vaccine-preventable diseases is well-established, paving the way for ongoing innovative initiatives in the field.

In this context, new possibilities and alternatives must be considered considering technological advances in molecular biology and immunology. High expectations within the scientific community, driven by the goal of benefiting the population, surround these developments, ideally grounded in standards of safety and transparency. The field of vaccinology must remain resilient in the face of setbacks, issues regarding efficacy, severe adverse reactions, and persistent anti-vaccine resistance. Progress must continue[2].

Concepts of good practices regarding vaccination are gaining prominence due to the need to implement high-performance, quality health actions in the services covered by ANVISA's Collegiate Board Resolution (RDC) No. 63 of November 25, 2011, under which good practices guide safety and quality in professional care[3].

The vaccination room is the final link in the cold chain and specifically carries out vaccination activities and procedures, including intensified efforts, routine operations, containment measures, and campaigns[4]. While vaccines enable the prevention, control, elimination, and eradication of vaccine-preventable diseases, ensuring the success of this process requires that immunization activities be conducted with great care, adopting appropriate procedures before, during, and after the administration of immunobiologicals.

Given the above, the objectives were to analyze the standards and environment of vaccination rooms within a specific territory of the Municipality of Rio de Janeiro; to create a systematized tool to describe these standards and the environment in accordance with established guidelines regarding physical infrastructure, human resources, and management; to develop and define, based on this tool, an index for evaluating vaccination rooms across the domains of physical infrastructure, human resources, and management; to evaluate the vaccination rooms in the territory under analysis using these indices; and to outline the professional profile of the nurses working in these rooms.

Methodology

This research is a descriptive, qualitative study with quantitative elements, conducted by completing a Systematized Environment Assessment Tool (RSA) based on observations of 13 vaccination rooms in a specific territory of the Municipality of Rio de Janeiro, and through semi-structured interviews with the nurses technically responsible for them or their substitutes.

Based on ANVISA RDCs No. 197 of 2017 and No. 50 of 2002, which "[...] set forth the minimum requirements for the operation of human vaccination services"[5] and regarding the technical standards for "[...] planning, programming, development, and evaluation of physical projects for healthcare facilities"[6], respectively, the Systematized Ambience Checklist (RSA) was developed to evaluate the vaccination rooms. The RSA was completed based on the researcher's observations within the room itself. The first stage of the intervention involved reading and signing the Informed Consent Form.

Data collection was carried out through semi-structured interviews with the nurses responsible for the 13 vaccination rooms in the studied programmatic area of the Municipality of Rio de Janeiro, using a basic interview guide developed by the researcher herself.

Managers of the health units and the Primary Health Care (PHC) superintendent for the municipality of Rio de Janeiro signed a letter of authorization, which was submitted to the Research Ethics Committee (REC) of the Fluminense Federal University (UFF). Confidentiality is maintained for the Planning Area (CAP) health coordination office, the health units, and the interviewed professionals. The sample size corresponds to one person in charge per vaccination room; thus, the sample consists of 13 individuals (13 rooms, each with one person in charge). Professionals were invited to participate voluntarily and were informed that they could decline to answer any question or withdraw from the interview at any time. Interviews were recorded to ensure transparency and the closest possible access to the actual data provided by the interviewees. Inclusion criteria for the study required professionals to be the nurses technically responsible for, or their designated substitutes in, the vaccination rooms within the territory selected for the research; participants could be male or female, provided they were over 18 years of age and held the relevant position. Exclusion criteria applied to any professionals other than the nurses technically responsible for, or their substitutes in, the vaccination rooms of the territory selected for the research.

Following the interviews, the content provided by the interviewees was analyzed, and the RSA data were tabulated

and analyzed. The provided content was categorized to organize the participants' insights and generate statistics, considering similarities and differences in meaning-making and linking these findings to a review of the relevant theory and documentation.

Data collected via the research instruments were entered into an Excel spreadsheet, thereby creating the study's database. Microsoft Excel was used to generate certain descriptive charts. Any further statistical analysis was performed using IBM SPSS (Statistical Package for the Social Sciences) software, version 22.0. Descriptive analysis aimed to characterize the profiles of the professionals and the vaccination rooms; this was conducted through the creation of charts and frequency distributions, as well as the calculation of descriptive statistics (proportions of interest for all variables, and minimum, maximum, mean, median, standard deviation (SD), and coefficient of variation (CV) for quantitative variables). The variability of a quantitative variable's distribution was considered low if CV < 0.20, moderate if 0.20 ≤ CV < 0.40, and high if CV ≥ 0.40.

Based on the professionals' responses, the calculation of an index, named the "Forrester Vaccine Room Adequacy Index" (IFASV), was defined and proposed; this index assesses the extent to which a vaccine room is suitable for optimal operation. The questions used to construct the index are listed below.

1. Is there a nurse in charge?
2. Is the nurse's role in the vaccination room solely managerial?
3. Is there a nurse providing direct patient care in the vaccination room?
4. Is there a nurse providing direct patient care during all shifts?
5. Are there nursing technicians providing care during all shifts?
6. Does the vaccination room have an area of 6 m² or larger?
7. Is there a refrigerator?
8. Is the refrigerator checked twice a day?
9. Are the floors smooth, seamless, and washable?
10. Are the floors free of cracks or gaps?
11. Are the walls smooth, seamless, and washable?
12. Are the walls free of cracks or gaps?
13. Does the ceiling have a wash-resistant finish?
14. Are the windows painted with washable paint?
15. Is there adequate natural lighting?
16. Is there adequate artificial lighting?
17. Is the natural temperature adequate?
18. Is there adequate artificial ventilation?
19. Is there a sink made of non-porous material?
20. Is there an automatic faucet?
21. Is there a liquid soap dispenser near the sink and countertop?
22. Is there a paper towel dispenser near the sink and countertop?
23. Is there a pedal-operated trash bin near the sink and countertop?
24. Is the trash can pedal working?
25. Is there a container made of suitable material for sharps disposal near the sink and countertop?
26. Is the countertop made of non-porous material?
27. Is the furniture (table, cabinets, and chairs) organized?
28. Are there containers for the proper disposal of syringes and needles?
29. Is the air conditioning adequate?
30. Is the internal refrigerator a cold storage unit?
31. Is a thermal box available for use?
32. Is the thermal box used daily?
33. Are there reusable ice packs?
34. Is there sufficient liquid soap in the dispenser/bottle?
35. Are there suitable, easy-to-clean, rigid containers for 70% alcohol?
36. Are paper towels available in the holder?
37. Are there suitable, easy-to-clean, rigid containers with lids for syringes and needles?
38. Are there suitable, easy-to-clean, rigid containers for cotton wool?
39. Is there a container made of suitable material for general waste?
40. Is there a container made of suitable material for infectious waste?
41. Are there vaccination cards for adults?
42. Are there vaccination cards for adolescents?
43. Are there vaccination cards for children?
44. Is there a daily log of administered doses?
45. Is there a monthly stock control log?
46. Is there a monthly log of wasted doses?
47. Is there a form for reporting and investigating adverse events following immunization?
48. Is there dedicated equipment for storing immunobiologicals?
49. Is the equipment positioned 20 cm away from the wall?
50. Is the equipment kept away from direct sunlight?
51. Is the equipment kept away from heat sources?
52. Does the equipment have a dedicated electrical outlet?
53. Does the equipment have a temperature monitoring chart?

For each of the 53 questions mentioned above, 1 point was assigned for a "Yes" answer and "0" for the opposite; that is, for each i-th question, the quantity P_i is defined as given by:

$$P_i = \begin{cases} 1 & \text{if the answer to the i-th question = "Yes"} \\ 0 & \text{c.c} \end{cases}$$

The IFASV is defined as follows: the sum of the points obtained by the respondent on questions 1 through 53, divided by 53.

$$IFASV = \frac{\sum_{i=1}^{53} P_i}{53} . 100$$

Chart 1. Classification of vaccine room suitability based on its IFASV score. Niterói, RJ, Brazil, 2019

Forrester Vaccine Room Suitability Index	Vaccine Room Suitability Classification
IFASV = 0,0	No suitability
0,0 < IFASV ≤ 25%	Very poor suitability
25% < IFASV ≤ 50%	Poor suitability
50% < IFASV ≤ 75%	Moderate suitability
75% < IFASV ≤ 95%	Good suitability
95% < IFASV < 100%	Very good suitability
IFASV = 100%	Perfect suitability

The IFASV is expressed as a percentage, ranging from 0% to 100%. It is a measure that assesses the adequacy of the vaccine room being evaluated. The classification of a vaccine room's adequacy based on its IFASV score is determined according to the relationship shown in Chart 1. All 53 items were selected because they are cited as important for a vaccine room in the following references: ANVISA RDC No. 50 of February 21, 2002[6]; ANVISA RDC No. 307 of November 14, 2002 (updating RDC No. 50/2002)[7]; ANVISA RDC No. 197 of December 26, 2017[5]; requirements for the opening, inclusion, and operation of vaccine rooms and cold chain systems within municipal and regional health departments; and ANVISA Public Consultation No. 328 of April 24, 2017[8].

The defined IFASV index is a relative index that indicates, on a scale of 0% to 100%, the percentage of the 53 items considered ideal for the operation of a vaccination room. As an important measurement tool, the index proved to be an appropriate measure for characterizing the vaccination room, satisfying the mathematical properties of a scale[9].

Results

Thirteen professionals responsible for vaccination rooms were interviewed; all were female and held nursing qualifications. All professionals in the sample held qualifications beyond their undergraduate nursing degree, with the majority (69.2%) being specialists. The most common duration since graduation was less than 10 years (46.1%); 61.5% had prior experience in other areas, with 53.8% having worked in those roles for 3 to 10 years. Furthermore, all interviewees expressed a desire to work in this field. Hiring methods included a selection process (69.2%), a public civil service exam (15.4%), direct invitation (7.7%), and transfer from another unit (7.7%).

The most common tenure in the role of vaccination room supervisor was 3 to 10 years (61.5%). Regarding these professionals, it is noteworthy that 69.2% had completed an immunization course, 53.8% stated they lacked sufficient training, 53.8% were not qualified to manage anaphylaxis, and at least 61.5% stated they lacked sufficient training to handle anaphylaxis.

Chart 2. Positive aspects cited by those responsible for the vaccination room. Niterói, RJ, Brazil, 2019

• The scope of the National Immunization Program (PNI), and its borderless nature, along with the program's strategic importance and its impact on reducing morbidity and mortality from vaccine-preventable diseases.
• Trust in the service; the PNI's well-structured framework and protocols.
• Teamwork; enjoying working with children.
• Access for underserved populations.
• Empowerment of the population.
• Stability, guaranteed service delivery, a welcoming approach, and care for others.
• Comprehensive care.
• Vaccination coverage exceeding 80%, follow-up starting from the prenatal period, and strong ties with the community.
• The technical staff in the vaccination room; these are long-serving professionals who demonstrate proper technique and a deep commitment to the unit and the patients. Furthermore, we work daily to ensure truly open access so that no vaccination opportunities are missed. We have a suitable, relatively spacious room, as well as satisfactory materials and equipment.
• Understanding the area's epidemiological profile, disease prevention, and the improvement of health indicators.
• The scope of the PNI.
• Disease prevention and health promotion.
• Humanized care; exchange of information and clinical approaches with health teams.

Chart 3. Negative points cited by those responsible for the vaccination room. Niterói, RJ, Brazil, 2019

• Infrastructure could be better.
• Network (referral service for transfers, ethical conduct of the professional interacting with the user).
• The information and IT system needs improvements.
• High staff turnover.
• Dismantling of the SUS (Unified Health System).
• Several entrenched professionals, a challenging population, and constant staff turnover.
• Changes in management and salary delays.
• Negative factors include the low HDI and poor socioeconomic conditions that hinder processes.
• A negative point is the difficulty of data entry into the SIPNI system, sometimes due to connectivity issues, and at other times due to a lack of initial registration during patient intake and practical difficulties technicians face in using computers. Room organization is not necessarily a negative point, but it requires constant attention and tidiness.
• Improve the physical facilities.
• Need for ongoing training.
• Human resources.
• Improve infrastructure.

The professionals were asked to identify the positive and negative aspects of their work in the vaccination room. As detailed in Chart 2, the positive aspects highlighted include their role in health promotion, disease prevention,

and patient empowerment practices, as well as the use of health indicators and structured protocols, and the opportunity to work within a multidisciplinary team. Negative aspects mentioned included infrastructure issues, delayed salary payments, and staff turnover (Chart 3).

When asked if they had anything else to consider, four (30.8%) professionals had no additional points. The remaining professionals mentioned the need for professional development, as detailed in Chart 4.

Based on observations of the vaccination rooms and statements from the professionals, the IFASV was calculated for each room and is presented in Table 1. The results show that 15.4% of the vaccination rooms demonstrated good adequacy, 76.9% showed very good adequacy, and one room (7.7%) showed perfect adequacy.

Chart 4. Other points for vaccine room professionals to consider. Niterói, RJ, Brazil, 2019

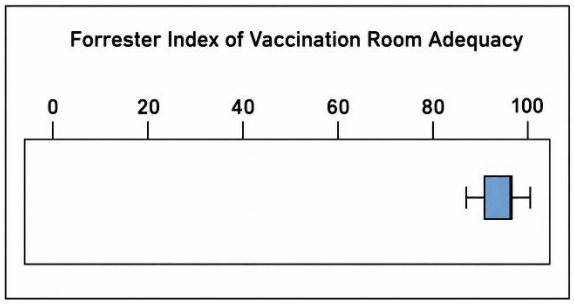
- Training, due to the complexities of production and variables.
- Professional commitment, service organization, professional training.
- Adverse events, yellow fever vaccine.
- Anaphylaxis.
- Procedure, handling, storage, technique, adverse events.
- Epidemiological profile, anaphylaxis, AEFI (Adverse Events Following Immunization), techniques.
- All current developments in this field of practice.
- Adverse events and post-vaccination.
- Continuous training is required for professionals across all categories within the Family Health Strategy (ESF).

Table 1. Frequency distribution of the IFASV. Niterói, RJ, Brazil, 2019

Forrester Vaccine Room Suitability Index	Vaccine Room Suitability Classification	Global n=13	
		F	%
IFASV = 0,0	No suitability	0	0.0%
0,0 < IFASV ≤ 25%	Very poor suitability	0	0.0%
25% < IFASV ≤ 50%	Poor suitability	0	0.0%
50% < IFASV ≤ 75%	Moderate suitability	0	0.0%
75% < IFASV ≤ 90%	Good suitability	2	15.4%
90% < IFASV < 100%	**Very Good Suitability**	**10**	**76.9%**
IFASV = 100%	Perfect Fit	1	7.7%

Based on the key statistics for the IFASV distribution in this sample, the boxplot of the IFASV distribution is shown in Figure 3. According to the descriptive statistics, the IFASV ranged from 86.8% to 100.0%, with a median of 96.2%, a mean of 94.3% (corresponding to "very good" adequacy), and a standard deviation of 4.3%; this resulted in a coefficient of variation of 0.05, indicating low variability of the index within the study population. The boxplot displays a distribution highly concentrated around the median, with no outliers observed for the IFASV. It is concluded that the vaccination rooms exhibit good adequacy and high concentration, with low variability regarding mean parameters, in terms of both mean and median values.

Figure 1. Boxplot of the IFASV distribution. Niterói, RJ, Brazil, 2019



Discussion

The research was conducted with 13 nurses responsible for vaccination rooms in a territory of Rio de Janeiro, all female and with nursing training, of whom 69.2% held a specialist title. The entirely female presence in the sample reflects a historical issue that places women at the center of notions of care, a phenomenon that, according to the study[10], stems from the generational transmission of the notion of care as an art and a gift, which also shapes stereotypes regarding nursing practice in social, political,

and technical terms. Beyond gender issues, nursing practice is directly linked to the technical knowledge generated through the relationships established among concepts, spaces, and people, a fact that explains why professionals in the field are concerned with technical training[11].

The most common duration of professional training was less than 10 years (46.1%), and the majority obtained the position through a selection process under a standard formal employment contract (CLT) (69.2%); for 61.5%, this was not their first job. The most frequent length of service was 3 to 10 years (53.8%), a range that also predominated regarding responsibility for immunization (61.5%). However, extensive experience does not guarantee adequate performance, as there is a need for supervision and ongoing training[12]. Regarding courses, 69.2% received supplementary training in immunization, but only one professional (7.7%) considered it sufficient; regarding anaphylaxis, 53.8% are not qualified and, of those who are, only two (15.4%) consider the training sufficient. Studies in Minas Gerais[13] have yielded similar results, highlighting the role of Continuing Education in Health, which stems from everyday needs[14], although broad training programs may dilute specific knowledge. The Ministry of Health and the Brazilian Society of Immunization provide training materials, yet the traditional hierarchical transmission of information, lacking critical engagement, contributes little to daily practice, and supervision often occurs in a fragmented manner[12,14-16]. Work overload, a shortage of professionals, the nurse's detachment from the vaccination room, and a lack of support from higher levels of management are also cited as factors that undermine a positive self-perception of the training received[13].

In the qualitative analysis of the interviews, the main positive aspects highlighted were the scope and impact of the National Immunization Program (PNI) on the control of vaccine-preventable diseases and the trust placed in the program; the value placed on teamwork and community engagement, fostering a sense of stability, a welcoming atmosphere, and care for others; and a commitment to humanized care, disease prevention, and health promotion. Since its inception in the 1970s, the PNI has established Brazil as a benchmark in immunization. Valuing multiprofessional teamwork facilitates the exchange of knowledge, while continuous professional development is vital for operations in the vaccination room, a setting that demands organization, management, and adherence to PNI guidelines, with nurses bearing responsibility for patient reception and the execution of procedures[17-19].

The humanized care mentioned by the interviewees aligns with the principles of the PNI and the National Humanization Policy, through attentive listening and respect for the user's active role[20]. Negative aspects centered on infrastructure and the computerized system, with complaints regarding the dismantling of the SUS, the need for ongoing training that was not always available, high staff turnover and personnel shortages, frequent changes in management, and delayed wages. The difficulty of working in an environment where professionals are undervalued is highlighted—a fact corroborated by the study data, given that over 30% of the professionals lack formal employment contracts (CLT). The dismantling of the SUS is linked to Constitutional Amendment No. 95; driven by a neoliberal rationale, this amendment weakens the public health system while strengthening the private sector, thereby affecting the work processes of Primary Care teams, leading to more precarious employment arrangements and cost-cutting measures, while reverting to a biomedical model and diminishing the quality of service[12,21].

Additionally, nine professionals highlighted the need for continuous training regarding adverse events, anaphylaxis, procedures, handling, storage, techniques, post-vaccination care, yellow fever, and current developments. This reaffirms the concern for technical training to minimize errors and post-vaccination adverse events, goals achievable through study, epidemiological observation, and the adoption of new technologies, underscoring the vital importance of professionals receiving constant updates on the services and skills relevant to their practice[22-25].

Regarding infrastructure and human resources, the majority of the centers operate from 8:00 AM to 6:00 PM (84.6%), which is also the operating schedule for most of the vaccination rooms (69.2%); all have a nurse with exclusively managerial duties, only three units (23.1%) have a nurse for direct patient care, and only one (7.78%) has a nurse present during all shifts; all have nursing technicians on duty during every shift, with the most common staffing level being two technicians per shift (53.8%). Infrastructure must be considered alongside health conditions, socioeconomic status, and service organization, as these factors impact vaccination coverage and the reduction of morbidity and mortality associated with vaccine-preventable diseases[13]. All rooms have a minimum area of 6 m² (84.6% between 6 and 8 m²), appropriate cold storage and air conditioning (100%), and undergo refrigerator checks at the start and end of the workday (92.3% at 8:00 AM and 61.5% at 6:00 PM). Staff knowledge regarding their capabilities, activities, and employment arrangements aids in process management and error correction. Regarding physical conditions, three items were not present in 100% of the rooms: three rooms (23.1%) lacked ceilings with a washable finish; five (38.5%) did not have windows painted with washable paint; and three (38.5%) had only partially organized furniture, noting that cleaning must follow specific protocols[12,26].

Regarding materials and supplies, the only inadequate item was the liquid soap in the dispenser, found to be only partially sufficient in three rooms (23.1%), even though restocking it and washing hands are essential for safe care[27]. Regarding the refrigerators, the only non-compliant item was the required 20 cm distance from the wall, a standard not met in three rooms (23.1%) according to the vaccination standards manual. Boxplot results indicate that the rooms demonstrate good compliance with low variability in terms of both mean and median values: 15.4% showed good compliance, 76.9% very good compliance, and 7.7% perfect compliance. Refrigeration is essential for maintaining the cold chain and the quality of immunobiological products; therefore, temperature

monitoring must be carried out during all shifts, particularly at the start and end of the workday[4,28].

Conclusion

This study aimed to analyze the standards and environment of a vaccination room within a specific territory of the Municipality of Rio de Janeiro, as well as to assess its infrastructural organization against current regulations. To this end, the Forrester Vaccination Room Adequacy Index (IFASV) was developed, representing the study's primary contribution. This index measures the extent to which a vaccination room meets ideal operational standards, thereby streamlining and guiding supervision and quality control activities. It is applicable across various geographic locations and timeframes, and the resulting data can support strategic studies, comparative analyses, and historical monitoring. It is worth noting that the IFASV, like any index, is open to refinement and updates as the scientific community identifies new items as essential for these settings. However, it must be emphasized that practices such as the adoption of false contraindications to vaccination, based on outdated concepts, persist, resulting in missed immunization opportunities and compromised childhood vaccination coverage. A limitation of the study is that it focused on a single territory; consequently, results may differ in other local contexts. Nevertheless, the IFASV provides the methodology required to replicate the research in diverse settings, enabling validation and comparability in future studies.

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