



Breastfeeding for pain relief during vaccination in infants up to six months of age: Implementation experience at a public maternity hospital

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ABSTRACT

Introduction. Vaccination is an effective public health intervention, although it can be painful. Breastfeeding during vaccination reduces infants' pain perception, but vaccination services do not systematically incorporate this practice.

Objective. To describe the development, application, and results of a protocol for the implementation of nonpharmacological analgesia through breastfeeding during vaccination of infants up to six months of age in a public hospital.

Population and methods. We conducted an implementation study with a before-and-after evaluation based on the model developed by Grol and Wensing, carried out in both inpatient and vaccination settings. It included a diagnostic phase with surveys of mothers and interviews with vaccinators; planning and designation of a point person; awareness-raising activities; and active implementation with follow-up. Evaluations were conducted at one month and six months using surveys and interviews. Implementation indicators were analyzed.

Results. The project ran from April 2024 to November 2025. The diagnostic phase included 199 surveys, and 71 were included in each subsequent evaluation. The proportion of infants who were breastfed during vaccination was 15% at baseline, 78% at one month, and 68% at six months. Mothers and healthcare workers accepted the strategy well, and it became an institutional practice.

Conclusion. Using breastfeeding as a pain-relief strategy during vaccination proved to be a simple, feasible, and widely accepted intervention for both families and the healthcare team.

Keywords: *breastfeeding; analgesia; vaccination.*

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INTRODUCTION

Vaccination is one of the most effective public health interventions, although it can be a painful procedure.^{1,2} Repeated exposure to pain during the first months of life can lead to stress responses, resistance to medical care, and lower adherence to vaccination schedules.^{3,4}

Available evidence shows that breastfeeding during vaccination significantly reduces crying, pain expressions, and standardized pain scores. This may be due to multiple factors: sucking as a distraction, the sweet taste of milk that stimulates the release of endogenous opioids, and skin-to-skin contact that promotes oxytocin and the mother-child bond.^{5,6}

In 2015, the World Health Organization (WHO) recommended offering breastfeeding as a means of pain relief during childhood vaccinations; however, this practice is not part of official national recommendations, nor is it routinely offered at vaccination centers.⁷ In this context, an implementation project was developed at the Hospital Materno Infantil Ramón Sardá (HMIRS) to implement breastfeeding as a nonpharmacological pain relief strategy during

vaccination of infants up to six months of age, and to describe the process, the results, and the perceptions of mothers and vaccinators. The study aims to provide local evidence on the acceptability, feasibility, and sustainability of this practice, and to identify barriers and facilitators to its incorporation into daily practice.

POPULATION AND METHODS

An implementation study⁸ with a before-and-after evaluation was conducted to incorporate breastfeeding as a pain-relief strategy during vaccination.

The study was conducted at HMIRS, in rooming-in (RI) units and at the vaccination center.

The design followed GroI and Wensing's Model of Change 9 (*Table 1*).

The intervention promoted and standardized breastfeeding as a pain-relief strategy during vaccination, encouraging breastfeeding in the minutes before or during vaccine administration, in accordance with WHO recommendations.⁷

The study was conducted in three consecutive phases.

TABLE 1. Stages of the GroI and Wensing model and activities carried out in the implementation project

Study phase	Stage of the GroI and Wensing model	Objective of this stage	Activities conducted in the study
1	Problem identification	Describe current practice and the extent of the gap between evidence and clinical practice.	Structured surveys of mothers or caregivers following vaccination in RI units and at the vaccination center; description of the infant's position and the use of breastfeeding as a pain-relief measure.
	Analysis of barriers and facilitators	Identify individual, organizational, and contextual factors that influence implementation.	Semi-structured interviews with vaccinators; qualitative analysis of attitudes, knowledge, and perceptions; joint development of SWOT analyses with vaccination workers.
2	Designing the implementation strategy	Develop interventions tailored to the local context.	Working meetings with the vaccination team; designation of a project coordinator; creation of institutional posters and outreach materials.
	Implementation	Incorporate breastfeeding as a pain-relief method during vaccination into routine care.	Launch of the strategy on an agreed-upon date; weekly support from the research team; awareness-raising activities for staff and families.
3	Evaluation and monitoring	Measure the adoption, acceptability, and sustainability of the intervention.	Surveys conducted monthly and every six months; follow-up interviews with vaccinators; evaluation of implementation indicators.

Diagnostic phase

Survey of mothers or caregivers

The research team designed an ad hoc structured survey (*Supplementary material*) to assess how vaccinations were typically administered, what pain-relief measures were offered, the infant's position, and the mother's perception of pain and breastfeeding. The research team developed the questionnaire, and three external professionals reviewed it to assess content and face validity; the team also pilot-tested it with 20 mothers to verify comprehension and readability.¹⁰ The surveys were administered in person to mothers selected consecutively after the vaccination, during the times when the research team was available.

We estimated the initial sample size based on conservative assumptions because prior information was limited. After the study began (36 surveys had been completed), we recalculated the sample size. For a proportion of 3% of breastfed children at the time of vaccination, a margin of error of $\pm 5\%$, and a 95% confidence level, it was estimated that 74 surveys were needed in the RI and 125 at the vaccination center.

Interviews with vaccination staff

We conducted individual semi-structured interviews guided by a questionnaire based on another study¹¹ (*Supplementary material*). The interviews explored attitudes, knowledge, barriers, and facilitators regarding breastfeeding as a form of pain relief. A researcher from outside the department conducted them to minimize bias. The responses were recorded in written notes.

Planning and implementation phase

The diagnostic phase results were presented during two working meetings with the entire vaccination team and the researchers. Following Komaroff,¹² they developed key areas and strategies for implementation, adapted to the local context.

The planning period lasted 30 days. The research team then began active implementation, with weekly support and monitoring.

Evaluation phase

We conducted two post-implementation evaluations: one month and six months after implementation. In each instance, we repeated the mothers' survey under conditions identical to the baseline survey.

We calculated the sample size for these

assessments based on the proportion of children who were breastfed at the time of vaccination during the diagnostic phase and the goal of detecting at least a 30% difference between that stage and subsequent assessments, with 80% power and an alpha of 0.05. We estimated a sample size of 30 for the vaccination center and 41 for the RI.

Six months after the intervention, we conducted additional interviews with vaccination staff about their implementation experience (*Supplementary material*).

We evaluated the following implementation indicators: acceptability, appropriateness, feasibility, fidelity, cost, coverage, and sustainability¹³ (*Table 2*).

Data analysis

For the survey data, we described quantitative variables using the mean and standard deviation or the median and interquartile range, depending on the distribution. We expressed qualitative variables as absolute and relative frequencies. We assessed differences between phases using the chi-square test ($p < 0.05$).

We processed and analyzed the data using Microsoft Excel.

We analyzed the interviews using thematic content analysis, based on manual segmentation and content categorization.¹⁴ A SWOT analysis was conducted using the data from the initial surveys.

Ethical considerations

The HMIRS Ethics Committee approved the study (February 29, 2024—PRIISA.BA N.° 11380), and it was conducted in accordance with fundamental ethical principles and current regulations. The study obtained informed consent from participating mothers and vaccinators.

RESULTS

Diagnostic phase

During the diagnostic period, from April 17, 2024, to February 6, 2025, we administered 199 surveys to mothers of vaccinated infants (*Table 3*).

After completing the surveys, we interviewed the hospital's five vaccinators. The median age was 35 years (range 27-57), and their vaccination experience ranged from 3 to 10 years. At this stage, all vaccinators expressed initial doubts about the feasibility of breastfeeding during vaccination, mainly related to the procedure's

TABLE 2. Implementation process indicators

Diagnostic indicators		
Outcome	Definition	Data source
Acceptability	Stakeholders (physicians, patients, administrative staff, policymakers, and managers) perceive an intervention as acceptable within the system in which it was implemented.	Questions 14, 15, and 16 from the first survey of mothers.
Appropriateness	Stakeholders' perception that the intervention is appropriate for a specific setting, group, and context. Appropriateness reflects the intervention's relevance and compatibility with the context in which it is used.	Questions 12 and 13 from the first interview with vaccinators.
Indicators during follow-up (6 months)		
Feasibility	This refers to the possibility of implementing the intervention in a specific setting, with a specific group, and within a specific context. It reflects the implementation in real-world practice.	Percentage of children who are breastfed among those vaccinated six months after implementation. Questions 7 and 8 from the second interview with vaccinators.
Fidelity	It reflects the quality of the implementation program's execution and the program's ability to maintain its objective of putting evidence-based actions into practice.	Percentage of implementation steps identified during the planning phase that are completed on time and in accordance with requirements.
Cost	This is the additional amount that must be paid to execute the strategy. The total cost of implementation includes the cost of the implementation process and the cost of the intervention itself.	There is no additional charge for execution. The cost of implementation is determined by the work involved in continuous improvement, which is part of the service's responsibilities.
Coverage	This refers to the intervention's reach. It is the proportion of the population (or the intervention's target group) that receives the intervention. It involves the reach and access to services; that is, it is a defining characteristic of actual coverage, considering the people who need it and whether the intervention meets the expected quality standards, thereby ensuring consistency and integration into a service.	Percentage of vaccinated patients who receive breastfeeding as a non-pharmacological form of pain relief during vaccination.
Sustainability	The degree to which an intervention is institutionalized or sustained over time. It involves durability and maintenance of the intervention in a real-world setting.	Immediate assessment and assessment 6 months after implementation began.

^a Adapted from Suárez-Obando F, Gómez-Restrepo C, Castro-Díaz M. *Implementation science: from evidence to practice*. Acta Médica Colombiana, vol. 43, 2018: 207-216, 2018.

duration and their perception that it could interfere with the vaccination process. Three reported being aware of breastfeeding's analgesic effect. All five agreed they could offer it conditionally, depending on time constraints, available space at the vaccination center, the children's characteristics, and the mother's clinical condition, for RI. *Figure 1* presents the SWOT analysis from these interviews.

Implementation phase

During this phase, the research team held two meetings with vaccinators and breastfeeding-specialist nurses to share the assessment results, define strategies, and train vaccinators on breastfeeding and its benefits.

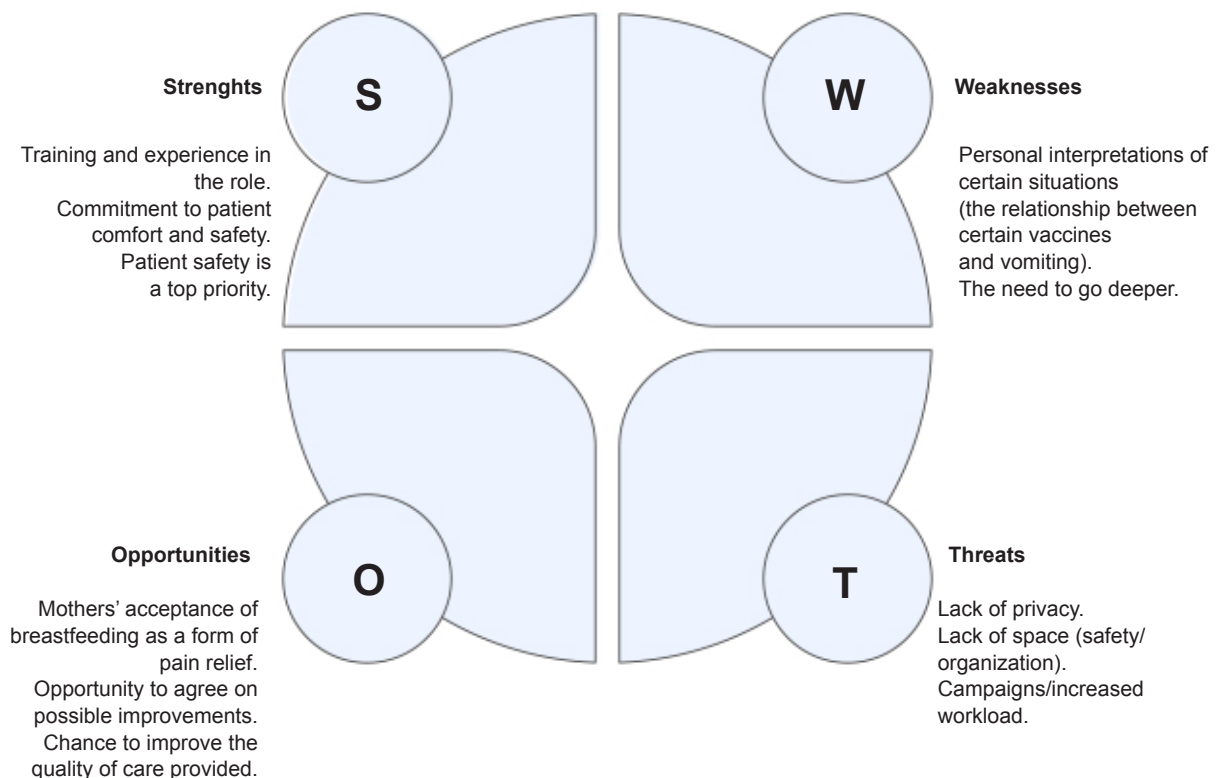
The team developed an activity schedule in collaboration with each department's leaders. The vaccination team identified a coordinator for this

TABLE 3. Population characteristics and results of the diagnostic phase

Variable	Rooming-in (n = 74)	Vaccination center (n = 125)	Total (n = 199)
Maternal age (years), median (min-max)	27 (16–42)	28 (15–47)	28 (15–47)
Place of origin			
CABA	28 (38)	53 (42)	81 (41)
Buenos Aires province	46 (62)	72 (58)	118 (59)
Mother's educational level			
Incomplete elementary	6 (8)	11 (9)	17 (9)
Complete elementary	2 (3)	4 (83)	6 (83)
Incomplete secondary	16 (22)	29 (23)	45 (23)
Complete secondary	41 (55)	65 (52)	106 (53)
Incomplete tertiary/university	5 (7)	6 (85)	11 (86)
Complete tertiary/university	4 (5)	10 (8)	14 (7)
Infant age	2 days (0–7)	3 months (0–6)	NA
Male sex, n (%)	42 (57)	67 (54)	109 (55)
Gestational age (weeks), median (min-max)	39 (36–41)	39 (26–42)	39 (26–42)
Birth weight (g), median (SD)	3,350 (808)	2,852 (1,180)	3,038 (1,082)
Lactation			
Breastfeeding exclusively	71 (96)	86 (69)	157 (79)
Mixed	1 (1)	32 (26)	33 (17)
Formula	2 (3)	7 (5)	9 (5)
Reason for vaccination			
As indicated by the doctor	23 (31)	53 (42)	76 (38)2
It is important for their health	74 (100)	109 (87)	[183 (92)]
Pain management			
Holds the baby close	34 (46)	74 (59)	108 (54)
Talks/sings to the baby	38 (51)	65 (52)	103 (52)
Places the baby at the breast	37 (50)	80 (64)	117 (59)
Places a pacifier in the baby's mouth	0 (0)	7 (6)	7 (4)
Position during vaccination			
On the examination table/in the crib	44 (59)	110 (88)	154 (77)
In her arms while breastfeeding	18 (24)	11 (9)	29 (15)
In her arms	10 (14)	3 (2)	13 (7)
Who determined the position?			
The vaccinator	29 (39)	113 (91)	142 (71)
Standard practice	2 (3)	8 (6)	10 (5)
I think it is the best	8 (11)	4 (3)	12 (6)
I was already in that position	25 (34)	0 (0)	25 (13)
Pain perception			
Not painful	14 (19)	4 (3)	18 (9)
Somewhat painful	42 (57)	60 (48)	102 (51)
Very painful	18 (24)	61 (49)	79 (40)
Previous experience			
Yes	3 (4)	29 (23)	32 (16)
No	69 (93)	89 (71)	158 (79)
Cannot remember	2 (3)	7 (6)	9 (5)
Future plans			
Yes	66 (89)	102 (82)	168 (84)
No	4 (5)	9 (7)	13 (7)
Does not know	4 (5)	14 (11)	18 (9)

CABA: Autonomous City of Buenos Aires, SD: standard deviation, NA: not applicable.

Variables with multiple possible responses (reasons for vaccination and pain management behaviors) are presented in dichotomous categories (present/absent), so the percentages may not total 100%.

FIGURE 1. SWOT analysis based on interviews with vaccinators

initiative to facilitate coordination and held weekly meetings. The team created institutional posters for display in various areas of the hospital, along with promotional materials for official social media accounts. To raise awareness, the team held five meetings with staff from the institution's various departments (volunteers, nurses from the prenatal preparation course, inpatient ward nurses, and nurses from the breastfeeding support team). This topic was included in the informational talks that volunteers give to mothers daily in waiting rooms. Inpatient ward nurses began preparing and explaining the new strategy to mothers before vaccinators arrived in the room. Finally, May 19, 2025, was set as the implementation date.

Evaluation phase

One month after the implementation phase began, the first evaluation was conducted through a survey of mothers. A total of 71 surveys were completed: 30 (42%) at the vaccination clinic and 41 (58%) at the RI. The sociodemographic characteristics of the respondents were similar to those in the diagnostic phase. Seventy-eight percent (55/71) of the infants were vaccinated while being breastfed (30/41 at the RI and 25/30

at the vaccination center).

Six months after implementation, a new evaluation used 71 mother surveys and found that 68% (48/71) of the patients were vaccinated while being held by their mothers during breastfeeding (18/41 in the RI and 30/30 at the vaccination center) (*Table 4*).

Interviews with vaccinators showed high satisfaction with the implemented strategy. They said they felt comfortable and confident with the practice ("I felt good because we're all doing the same thing and we feel it's better for the patient"). They viewed the benefits observed in both the children and the mothers positively. They mentioned that the infants seemed to cry less and were calmer, and that families had a better experience: "Later we saw that the baby calmed down more and that the mother was more relaxed; that helped a lot." Institutional support, signage, outreach by professionals from other services, and social media were also highlighted: "Mothers already come prepared. The topic is well established."

Table 5 presents the indicators for evaluating implementation after six months.

The practice was formally incorporated into

TABLE 4. Patients breastfeeding at the time of vaccination

Patients breastfeeding at the time of vaccination	Baseline	One month after implementation	p-value*	Six months after implementation	p-value**
Total, n/n (%)	29/199 (15)	55/71 (77)	<0.05	48/71 (68)	<0.05
Rooming-in, n/n (%)	18/74 (24)	30/41 (73)	<0.05	18/41 (44)	<0.05
Vaccination center, n/n (%)	11/125 (9)	25/30 (83)	<0.05	30/71 (43)	<0.05

*Comparison between the month and the diagnostic phase.

**Comparison between six months and the diagnostic phase.

TABLE 5. Indicators six months after implementation

Feasibility (Six-month survey and final interview with vaccinators)	Percentage of children who are breastfed among those who are vaccinated: 68% (48/71). Lack of space and the need to respect mothers' privacy were factors that were identified as challenges encountered during the experience. However, all the vaccinators agreed that these obstacles were resolved through a few changes related to organizational matters and team activity planning. The interviews also showed that the team's actions as a whole, combined with the mothers' awareness and understanding of the issue, helped establish the practice. In turn, the vaccinators gradually gained the confidence to offer it to all children receiving vaccinations.
Adherence	Awareness-raising, the development of written policies, the design and publication of posters, and outreach on social media were carried out according to the schedule the team established at the end of the diagnostic phase.
Cost	There is no additional charge for implementation. Implementation costs come from the work involved in continuous improvement, which is part of the service's responsibilities.
Coverage	Percentage of vaccinated patients who received breastfeeding as a non pharmacological analgesic during vaccination: 68% (48/71).
Sustainability	Percentage of patients who were breastfed during vaccination following the intervention: • At one month: 55/71 (77%) • At six months: 48/71 (68%)

the agency's internal policy and established as an institutional recommendation. During the study period, no adverse events were reported at the time of vaccination, and there were no delays in patient care.

DISCUSSION

This study observed an increase in the proportion of infants breastfed during vaccination, and mothers and healthcare providers received this practice well.

Evidence supports this pain-relief strategy: infants breastfed during vaccination experience less pain and cry for a shorter duration than those who receive a placebo or no intervention.¹⁵⁻¹⁷ In fact, breastfeeding is as effective as or more effective than other nonpharmacological strategies, such as sweetened solutions or topical anesthetics.^{18,19}

Implementing strategies to alleviate pain

during vaccination could have positive effects beyond infants' immediate well-being. They could also reduce parents' anxiety and reluctance and improve vaccine acceptance and vaccination coverage. This is particularly important in a context where trust in immunization programs must be continually reinforced.^{20,21}

Furthermore, in a hospital certified as a "breastfeeding-friendly hospital," this intervention aligns with the initiative's guiding principles, which aim to promote appropriate and continuous breastfeeding care from pregnancy through the postpartum period while removing institutional barriers that hinder full implementation.²²

Despite the above, the diagnostic phase showed that only a minority of infants were being breastfed at the time of vaccination, consistent with reports from other settings.^{11,23-25} This low use of analgesic measures has been attributed to barriers related to knowledge, beliefs, and

healthcare personnel's work organization; furthermore, although professionals recognize the pain associated with vaccination, they do not always have practical tools or institutional support to modify their behavior.^{11,23,24}

The results indicate that both mothers of vaccinated infants and healthcare workers responded well to the strategy. Breastfeeding increased significantly during vaccination at both one month and six months after implementation; once vaccinators were trained and supported, they integrated this practice into their daily work. This suggests that, in this case, barriers could be addressed through structured strategies adapted to the local context, as shown by experiences implementing clinical guidelines on pain management during vaccination, where staff training and formalizing the practice as institutional policy proved decisive for adoption.^{11,12}

However, differences were observed between the RI and the vaccination center at the six-month mark, even though the same vaccinators were used. These differences could be explained by factors such as the infants' age, the clinical context of the postpartum period, and the vaccination procedure or route of administration. Therefore, optimal implementation may require specific adjustments depending on the healthcare setting and the developmental stage of the mother-child relationship.

In terms of viability and sustainability, the study showed that this practice is feasible within the institutional context. It does not require infrastructure changes or additional human resources, making it a cost-effective, accessible option that can be adapted to different care settings. Its universal and equitable nature—as it is a resource available anytime and anywhere—reinforces its potential as an intervention with broad public health impact.²⁵

As for limitations, the study was conducted at a single center with conditions favorable to implementing the practice—such as the presence of a Breastfeeding Committee and certification as a “mother and child-friendly hospital”—which could limit the generalizability of the results to other institutional contexts. Including participants based on the research team's availability may have introduced selection bias. The study should also consider potential bias from staff awareness of the ongoing implementation.²⁶ Finally, the lack of a longer-term evaluation prevents an assessment of the practice's adherence and sustainability over time.

On the other hand, the study's main strength is that it involved a simple, low-cost, and feasible intervention that required coordinated efforts among professionals from different sectors. This interdisciplinary approach improved care quality and promoted the incorporation of evidence-based practice into routine care. The results of this study could help other vaccination centers adopt similar practices and expand the use of breastfeeding as a pain-relief strategy for other procedures within the hospital setting, improving the experience for families and the quality of care.

In conclusion, the use of breastfeeding as a pain-relief strategy during vaccination proved to be a simple and widely accepted intervention, both by families and by the healthcare team. ■

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The supplementary material provided with this article is presented as submitted by the authors. It is available at: https://www.sap.org.ar/docs/publicaciones/archivosarg/2027/11132_AO_Rapaport_Anexo.pdf

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