ORIGINAL ARTICLE

REVISTA ENFERMAGEM ATUAL IN DERME

VIRTUAL OBSERVATORY FOR CONTINUING EDUCATION WITH ON LOW-RISK PRENATAL CARE

OBSERVATORIO VIRTUAL DE EDUCACIÓN CONTINUA EN ATENCIÓN PRENATAL DE BAJO RIESGO

OBSERVATÓRIO VIRTUAL PARA EDUCAÇÃO PERMANENTE NO PRÉ-NATAL DE BAIXO RISCO

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ABSTRACT
Introduction: In Brazilian states and municipalities, surveillance of maternal mortality, women of childbearing age, and infant and fetal deaths is mandatory. The application of educational technologies favors access and interpretation of preventive information by managers and professionals in Primary Health Care. Thus, supporting the strategic management of maternal and child care, developing practical skills and stimulating decision-making in monitoring habitual risk in pregnant women. **Aim:** To develop a Virtual Observatory for continuing education in maternal and child health. **Method:** This is a methodological research with technology development that occurred in four distinct stages: 1) Definition; 2) Architecture; 3) Design; 4) Implementation. **Results:** An instructional website, called Maternal Care, was developed, with broad accessibility to content relevant to maternal mortality surveillance, focusing on the reality of the interior of Paraná. The platform provides professionals with tools to monitor low-risk prenatal care, integrating clinical practice, teaching and research, in addition to promoting preventive measures to reduce maternal and infant morbidity and mortality in the state and in the country. **Final considerations:** The use of technological resources improves health care. The product developed is replicable and contributes to Sustainable Development Goal 3, which aims to reduce maternal mortality and eradicate early neonatal death on a global scale. It is stated that education and health are interdependent social practices and essential for health care.
Keywords: Technology Applied to Health Care; Prenatal Care; Continuing Education

RESUMEN
Introducción: En los estados y municipios brasileños es obligatoria la vigilancia de la mortalidad materna, de las mujeres en edad fértil y de las muertes infantiles y fetales. La aplicación de tecnologías educativas favorece el acceso e interpretación de información preventiva, por parte de gestores y profesionales de la Atención Primaria de Salud, apoyando la gestión estratégica de la atención maternoinfantil, desarrollando habilidades prácticas y fomentando la toma de decisiones en la vigilancia del riesgo habitual en las gestantes. **Objetivo:** Desarrollar un Observatorio Virtual para la educación permanente en salud maternoinfantil. **Método:** Es una investigación metodológica con desarrollo tecnológico que se desarrolló en cuatro etapas distintas: 1) Definición; 2) Arquitectura; 3) Diseño; 4) Implementación. **Resultados:** Se desarrolló un sitio web instructivo, denominado Atención Materna, con amplia accesibilidad a contenidos relevantes para la vigilancia de la mortalidad materna, enfocado a la realidad del interior de Paraná. La plataforma equipa a profesionales para monitorear la atención prenatal de bajo riesgo, integrando la práctica clínica, la docencia y la investigación, además de promover medidas preventivas para reducir la morbilidad y mortalidad materna e infantil en el estado y el país. **Consideraciones finales:** El uso de recursos tecnológicos califica la atención en salud. El producto desarrollado es replicable y contribuye al Objetivo de Desarrollo Sostenible 3, que apunta a reducir la mortalidad materna y erradicar la muerte neonatal temprana a escala global. Se afirma que la educación y la salud son prácticas sociales interdependientes y esenciales para la atención de la salud.
Palabras clave: Tecnología para la Atención de la Salud; Atención Prenatal; Educación Permanente

RESUMO
Introdução: Nos estados e municípios brasileiros, a vigilância da mortalidade materna, das mulheres em idade fértil, e dos óbitos infantis e fetais tem caráter compulsório. A aplicação de tecnologias educacionais favorece o acesso e a interpretação das informações preventivas, por gestores e profissionais da Atenção Primária à Saúde. Apoiando a gestão estratégica do cuidado materno e infantil, desenvolvendo competências práticas e estimulando a tomada de decisões na vigilância do risco habitual em gestantes. **Objetivo:** Desenvolver um Observatório Virtual para educação permanente em saúde materno-infantil. **Método:** Trata-se de pesquisa metodológica com desenvolvimento de tecnologia que ocorreu em quatro etapas distintas: 1) Definição; 2) Arquitetura; 3) Design; 4) Implementação. **Resultados:** Desenvolveu-se um *website* instrucional, denominado *Maternal Care*, com ampla acessibilidade ao conteúdo pertinente à vigilância da mortalidade materna, com foco na realidade do interior do Paraná. A plataforma instrumentaliza profissionais no acompanhamento do pré-natal de baixo risco, integrando prática clínica, ensino e pesquisa, além de promover medidas preventivas para a redução da morbidade e mortalidade materna e infantil no estado e no país. **Considerações finais:** O uso de recursos tecnológicos qualifica o cuidado em saúde. O produto desenvolvido é replicável e contribui para o Objetivo de Desenvolvimento Sustentável 3, que visa reduzir a mortalidade materna e erradicar a morte neonatal precoce em escala global. Afirma-se que educação e saúde são práticas sociais interdependentes e essenciais para a assistência à saúde.
Palavras-chave: Tecnologia Aplicada à Assistência à Saúde; Cuidado Pré-Natal; Educação Permanente.

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INTRODUCTION

Reducing the maternal mortality ratio (MMR) has been a global goal of the maternal health community for decades. This commitment is reflected in over 30 years of international initiatives, strategies, priority research, and quality improvement activities integrated into diverse regional, national, and local maternal health programs worldwide[1]. In countries that direct their resources toward meeting the global goals of the 2030 Agenda and the Sustainable Development Goals (SDGS), long-term chronic conditions are often neglected. As a result, when women seek care for postpartum complications, health care providers are often inadequately prepared to address the conditions that present[2]. Although advances have been made in women's empowerment, education, employability, and reproductive planning in many countries, these advances have not been universal. The stagnation in the global reduction of MMR has become an urgent and urgent issue.

In 2020, an estimated 287,000 women died due to causes related to pregnancy, childbirth, and the postpartum period. This scenario not only represents a global failure, but also the avoidable loss of almost 3 million lives between 2010 and 2020, highlighting major health inequalities, both between and within countries[3].

Regarding Maternal Mortality, as a negative indicator of population health, it is estimated that approximately 90% of deaths are avoidable, which makes it one of the biggest public health problems and a serious violation of women's human rights, both in Brazil and in other countries with similar or worse indicators[4,5]. Quality prenatal care is essential to reduce maternal and infant morbidity and mortality, preventing negative outcomes during childbirth, the postpartum period, and neonatal care.

Poor quality prenatal care is often associated with negative outcomes during childbirth, the postpartum period, and for the newborn[6,7]. Health professionals play a crucial role in identifying and managing maternal vulnerabilities, recording weaknesses in care plans. The use of locally validated tools allows for an individualized approach, strengthening resilience and optimizing gestational outcomes[8].

The increasing use of information technology as an educational strategy has proven effective in supporting, promoting, and protecting health. By using available technological resources, nursing can efficiently and comprehensively disseminate the necessary knowledge to the target audience, promoting education for care for users of the health system[9], as well as family care and the society in which they are inserted. In this context, the authors proposed the development of a Virtual Observatory to organize relevant content on care

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for low-risk pregnant women within the scope of Primary Health Care.

A technological tool that gathers information in a didactic and objective way, favoring multidisciplinary qualification by integrating theory and practice, fostering intra and intersectoral debates, and supporting advocacy[10]. Investing in technological tools for continuing education (CE) in prenatal care benefits both health professionals, who expand their knowledge and techniques for more assertive practices, and pregnant women, who experience timely support with desirable more favorable outcomes for childbirth and the postpartum period[9].

In view of this, the present study aimed to develop a Virtual Observatory for continuing education in maternal and child health.

METHODS

This is a methodological study focused on educational technological innovation, which resulted in the production of an instructional website called Maternal Care. The platform was created to improve the qualifications of Primary Health Care (PHC) professionals in the management of low-risk prenatal care.

Methodological research aims to systematically use existing knowledge to develop new interventions, improve existing ones, or create and refine instruments, devices, or measurement methods. The objective of this type of study is to develop reliable, accurate, and functional tools through a rigorous process of data collection, organization, and research[11].

Public Health Observatories are distinguished by their intermediate position between management, health service provision, and academia, acting as a strategic link between these sectors. These observatories assist in the formulation of evidence-based policies and generate applied knowledge, strengthening the integration between theory and practice. The information architecture, by structuring the data made available, provides a clear and efficient conceptual representation, facilitating the understanding of the observatory under development[12].

The research was developed during the course of a Postgraduate Program in Healthcare Practice, in the professional master's degree modality, at the Federal University of Paraná, within the scope of the goals of the Center for Teaching, Research and Extension in Health (NEPES). From March 2022 to May 2023. The production of technology was conceived by nurses and involved interprofessional work that included Information Technology (IT), Design and Visual Programming. The material was planned and created by professors who are researchers on the subject, postgraduate students and Nursing students at the Federal University of Paraná.

Based on the principles of methodological research on technological production, from the perspective of the method proposed by Vicentini and Mileck[13], the

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construction of the website followed four consecutive phases: 1) Definition; 2) Architecture; 3) Design; and 4) Implementation.

In the first stage, ***Definition***, three meetings were held with the IT professional. The researchers presented the objective and expectations of the Maternal Care Observatory (MCO); the target audience and location for its implementation were defined; and a schedule of activities was established. Documentary research was conducted to explore the scope of the topic in technical materials for assisting women during pregnancy and childbirth, as well as in legislation concerning the maternity process.

The name Maternal Care Observatory was chosen based on the international platform of the World Health Organization (WHO), which works to contribute to the reduction of Maternal Mortality by increasing research evidence, providing clinical and programmatic guidance based on evidence, establishing global standards, and providing technical support to countries[14].

To demonstrate the maternal and child health scenario in Brazil, Paraná, and the municipality of Fazenda Rio Grande, the coefficients corresponding to the main maternal and child health indicators for the years 2022/2024 were presented, based on data collected from the TABNET–SESA Platform, after organizing the data in Excel® spreadsheets. The graphs are displayed on the WTO "Indicators" page, with the conceptualization, interpretation and data source of the respective indicators at the bottom. This allows for the monitoring and evaluation of health, the identification of health care problems in this area, and the guidance of Health Promotion strategies. The prototype of the website was thus created, containing initial design and navigation elements.

In the second stage, ***Architecture***, the initial image, screen layouts, navigation menus, and basic functions for each screen were defined, adopting the following language developments: Personal Home Page (PHP), Javascript, HTML 5, and MySQL. The information was organized into sections, according to their educational and informational axes: 1-Base Material, 2-Indicators, 3-Legislation, and 4-News.

The "Base Material", "Indicators," and "Legislation" sections were structured using materials from the collection created in Stage 1. The base materials for maternal and child care, consisting of protocols, notebooks, guides, and the like, are essential for the foundation of care. They provide clear, evidence-based guidelines that facilitate appropriate conduct, thus assisting in the management of low-risk prenatal care and in the prevention of common complications during pregnancy, childbirth and the postpartum period, as well as during the child's first year of life.

The news page was composed of information from official public websites and other news websites related to maternal and child health, after analyzing the veracity of the source of its origin, which was consulted by the authors prior to its inclusion in the MCO. A page was

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also designed with an Interactive Forum, a space dedicated to sharing ideas and initiatives. A channel for sending messages was made available on each page, enabling communication between users and MCO managers.

To evaluate the interface resources, the Watir platform was used, as it is an open-source tool that provides ease of creation and maintenance of scripts and automated test suites, in addition to supporting multiple browsers on different platforms. For interactivity and navigation tests, the Ranorex Studio application was used, which allows the creation of complete test scripts to access the functionality of a software system.

In the third stage, ***Design***, the layout of the Observatory was defined in terms of text type and font. The logo was designed by the authors, who considered the psychology of colors when choosing the tones, so that they would connect with health and care for women. The colors pink and green were chosen, seeking to convey feelings of comfort, calm, harmony and tranquility. The images in PNG, JPEG and TIFF formats were created by a professional web designer to categorize the observatory. Some images were obtained with Creative Commons licenses. The files were sent using the FireFTP protocol, which allows transfer between client and server.

As determined by the last stage, Website ***Implementation***, the authors are responsible for monthly maintenance and updating the content every 3 months, while the IT professional takes care of network updates. The domain <https://www.observatoriomaternalcare.com/> was registered with RegistroBr and the website was registered with INPI, receiving the number BR512023001082-0, for copyright protection. The MCO is integrated with the official website of the City Hall of Fazenda Rio Grande/PR, ensuring the sustainability of the platform.

Since this is research that uses public databases, whose information is provided without the possibility of individual identification, this study was not submitted to the Research Ethics Committee, therefore respecting the other ethical aspects of research according to Resolution 510/2016, of the National Health Council.

RESULTS

The Maternal Care instructional website (Figure 1) is accessible on computers, tablets and smartphones. It is hosted as a domain linked to the official website of the City of Fazenda Rio Grande/PR and is updated quarterly by the main researcher.

The content is open to the public and can be used by health professionals, academics and anyone interested, who will navigate by following the labels on the main menu. An Internet connection is required, and there is no need to use a login or password. Its structure is organized into a main menu composed of eight categories: home page, indicators, reference

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materials, legislation, news, forum, references and credits.

Figure 1 – Home Page and Indicators Page

Source: Prepared by the authors (2025).

The website's "Home Page" provides a concise and engaging presentation of the MCO, highlighting its contents, objectives, target audience and the structure that guides navigation through the different sections. This page plays a key role as it serves as the gateway for users, offering a clear and accessible overview of the observatory's purpose and functionalities.

By clicking on the "Indicators" axis, the user is redirected to an interactive page composed of maps and graphs that illustrate the main maternal and child health indicators. Each graph is accompanied by detailed explanations, facilitating the understanding of the data presented and its relevance to the context of Primary Health Care. These indicators cover several aspects, such as maternal mortality rates, neonatal mortality, and prenatal indicators, providing a comprehensive and up-to-date view of the health situation. Just below the maps, the page presents other complementary graphs, which deepen the analysis of trends and patterns important for monitoring and evaluating maternal and child care. These charts are constantly updated to reflect the latest data, enabling healthcare professionals to make informed decisions based on up-to-date evidence (Figure 1). On the "Legislation" page, in addition to facilitating access to key documents related to the maternity process, the MCO organizes these

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materials in a clear and intuitive way, ensuring that users can quickly locate the necessary information. Each document is associated with a specific icon that, when clicked, offers the option to download in PDF format, allowing managers, healthcare professionals and even the general public to consult the legislation whenever necessary.

Among the available documents, essential legislation stands out for the protection of women's rights during pregnancy and childbirth and in the workplace. Examples include Law No. 11,770, which institutes the Citizen Company Program, designed to promote the extension of maternity leave, and Law No. 12,873, which guarantees maternity pay, among other legal provisions that support pregnant and breastfeeding women. In addition to these standards, the page includes the Consolidation of Labor Laws (CLL), such as Article 396, which guarantees breaks for breastfeeding. These documents not only serve to inform, but also reinforce the importance of legal protection to guarantee rights and improve the quality of life of working mothers, directly contributing to maternal and child health. The “News” section features a rotating banner with the main news stories and their introductions; news on maternal and child health provides relevant information in real time.

However, it is noted that the Internet, although it can offer evidence-based information, can also disseminate inadequate and low-quality content. The analysis of websites on similar topics revealed a lack of quality information, in addition to confusing and difficult-to-access pages, which hinders learning and compromises the achievement of the proposed objectives. The section also functions as an access point for critical reflections and contemporary debates on the challenges and advances in this field. The news is presented in an objective and clear manner, with links to full articles, promoting agile and efficient reading, without compromising the depth of the content.

On the "Discussion Forum" page, in addition to the three main buttons — Categories, All Posts and My Posts —, the environment was carefully planned to promote interaction and the exchange of experiences among MCO users. Each discussion category addresses specific topics, such as "Prenatal Care", "Child Health", "Public Policies" and "Experiences of Pregnant Women", allowing participants to choose topics of interest and share their questions, experiences and knowledge with other health professionals and pregnant women.

On the "References" page, the main scientific and documentary publications that supported the creation of the observatory are listed, ensuring the transparency and reliability of the information provided. Easy access to these references allows users to delve deeper into recommended readings, whether for a more detailed study or for use in research and professional practices.

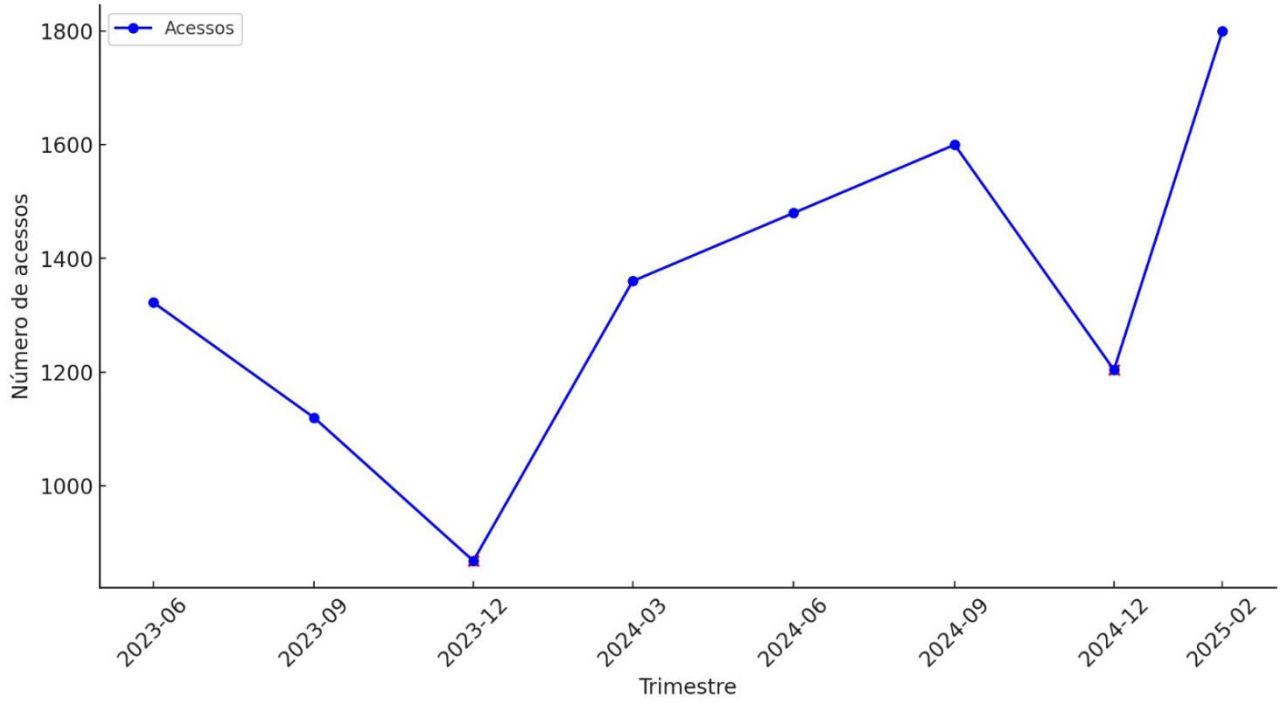
The “Credits” section clearly and objectively presents the names of the author and

collaborators who contributed to the development of the MCO, recognizing the joint work and effort of each one in the construction of this important resource. This transparency is essential in academic and research projects, ensuring due recognition of the professionals involved.

The evolution of the number of accesses to the MCO can be analyzed in Figure 2, with quarterly data between June 2023 and February 2025. In the first quarter (2023-06), access exceeded 1,300. However, in subsequent quarters, there was a progressive reduction, reaching its lowest value at the end of 2023, with approximately 900 accesses.

From the first quarter of 2024, there was a recovery in the number of accesses, followed by constant growth in subsequent quarters, reaching approximately 1,600 accesses. Finally, in January 2025, the number of accesses reaches its highest peak, exceeding 1,800 accesses.

Figure 2 – Accesses to the Maternal Care Observatory



Source: Prepared by the authors (2025).

DISCUSSION

In the health area, the use of websites as communication and information dissemination tools has proven to be a resource for promoting scientific knowledge and supporting the CE of professionals. The MCO offers an interactive virtual environment that facilitates the exchange of experiences, technical training and the dissemination of evidence-based guidelines. This resource is essential for the construction of new thoughts, the acquisition of skills and the

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strengthening of health surveillance, by integrating complementary content that offers a comprehensive view of maternal and child care[15,16]. Virtual environments allow the parallel integration of different content that complements and interrelates to the same topic. The MCO is a tool to facilitate the active and reflective participation of health professionals in the work process. The concept transcends the implementation of guidelines or protocols; it involves critically analyzing how these resources meet the needs of the population, respecting the specificities of each territory and its social, cultural, economic and political dynamics. Technologies that value "live work" are essential in this context, complementing rigid and informational technologies[17].

Networking, the central axis of the MCO, intensifies the exchange of experiences and speeds up the dissemination of methods and results, driving the evolution of collective work and digital scientific communication. A literature review, examining 40 studies on the state of the art of health observatories, highlights that this network articulation has the potential to revitalize democracy by transforming interpersonal relationships through digital platforms, providing faster and more efficient access to knowledge generated by research[18].

In the context of monitoring habitual risk in pregnant women in PHC, this type of CE has a minimal financial cost compared to the benefits it provides. In addition to the potential to improve the quality and effectiveness of care, this approach broadens the vision of professionals, who may be limited by the lack of continuity in training[19].

The MCO has an intuitive and user-friendly interface, facilitating interaction between professionals and the platform, making it more accessible. It stands out as a political-pedagogical strategy that integrates teaching, health care and system management, in addition to demystifying the use of computers for professionals with little technological familiarity[20]. Francisco and Arriaga point out that an intuitive approach and adequate support can reduce perceived barriers, encouraging the adoption of new technologies by these professionals. In addition, the MCO promotes social participation and meets the demands of daily health work, consolidating itself as a tool to support the continuous improvement of professional practice[21].

Scientific advances are expected to contribute to the ongoing improvement of care, improving the quality of care and promoting better levels of health for the population. Technology facilitates the exchange of knowledge, driving the generation of ideas and the development of processes, while the Internet improves the efficiency of the distribution of health services. In addition, Information Technology improves the quality of services, reduces costs, increases patient satisfaction and meets the need for constant updating of health practices[22].

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As the volume and quality of evidence in health education continues to grow, the need to synthesize this evidence will become increasingly important[22]. Thus, the website provides support for low-risk prenatal care in PHC, presenting significant potential to contribute to the reduction of complications resulting from inadequate or non-provided care. The use of available tools equips professionals with essential technical skills to ensure quality care.

After the implementation of the observatory, the website registered 1,326 hits in the first 60 days, reflecting the initial phase of adaptation and dissemination. However, growth was observed from 2024 onwards, interrupted only by a slight drop in November and December of the same year. In January 2025, the observatory reached its peak, with approximately 1,800 accesses, evidencing the growing relevance of the content and its suitability to the demands of the services. The continuous increase demonstrates the impact of the platform in the dissemination of information and in the promotion of differentiated and accessible learning through technological means.

Among the MCO modules used by visitors, low adherence to the 'Forum' was observed. This low engagement can be compared to other CE platforms, where forums also tend to be underused. Pires and Veloso found that, in a distance specialization course, forums had lower participation compared to video classes and reading materials[23]. Similarly, another study indicates that, although forums have the potential to promote meaningful interactions, participants prefer interactive activities and audiovisual resources[24] .

This phenomenon may be related to users' preference for more dynamic means of communication, such as social networks and instant messaging applications, in addition to the limited time health professionals have to actively participate in asynchronous discussions[23].

Observatories and platforms face similar challenges and have adopted strategies to increase participation. In a study, Wander, Gomes and Pinto pointed out that the structure of the forum, effective dissemination and the active presence of moderators are essential for user adherence in virtual environments. Similarly, other initiatives have shown that active mediation, personalized notifications and gamification can stimulate interactions, suggesting that the Virtual Observatory can benefit from these approaches to strengthen the collective construction of knowledge[25].

This study proposes a model for implementing health observatories, promoting the qualified dissemination of information. It also enables periodic evaluations and updates of the products developed, adapting them to the needs of each institution and health service. By integrating these tools into work processes, the study reinforces their role as continuous support for surveillance of low-risk prenatal care in PHC. Furthermore, it highlights the importance of creating spaces for innovation, ensuring that

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technology evolves as a permanent resource for professional qualification and improvement of maternal and child health care.

Among the limitations of the study, the Observatory's dissemination strategy stands out. Although the platform was designed for virtual access, its effectiveness could be increased with greater integration into the teaching and learning processes in health and education institutions, strengthening its role in the qualified dissemination of information. In addition, the platform was implemented and used, with informal validation through use and access, but it did not undergo a systematic evaluation or formal validation within the scope of this study, which prevents a detailed analysis of its usability, pedagogical suitability, and impact on professional qualification.

It was also not possible to measure its influence on the practice of health professionals or on low-risk prenatal outcomes, limiting the understanding of its effectiveness as a PE tool. Therefore, it is recommended that future studies carry out a formal evaluation of the platform, using validation methodologies to measure its performance, usability, and impact on clinical practice.

FINAL CONSIDERATIONS

This study enabled the creation of an educational technology focused on qualifying prenatal care for low-risk infants in PHC, and is the result of interprofessional work that brought together health, nursing, information technology, design, and visual programming. The robust research into scientific literature and epidemiological indicators resulted in the organization of educational and informational axes aligned with the needs of professionals and the institution. The website developed improves multidisciplinary practices, benefiting the quality of maternal and child care and promoting changes in health management and practices.

The experience demonstrated the importance of multidisciplinary collaboration to create effective and comprehensive solutions. Technological innovations in health, such as the observatory, facilitate the application of technical and scientific knowledge, expanding the benefits of global and local innovations to strengthen systems and promote health. Furthermore, the Maternal Care Observatory, although produced with a focus on the reality of a municipality in the metropolitan region of a state in the South of Brazil, has national applicability, as well as the possibility of replication to other scenarios, based on local realities.

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"Nothing to declare"

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