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REVIEW

Nursing Care for Pregnant Women with COVID-19: A Characterization Based on Narrative Review

Cuidado de enfermería en gestantes con COVID-19: caracterización desde una revisión narrativa

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ABSTRACT

Introduction: the COVID-19 pandemic represented a global health emergency with particular implications for pregnant women, who were considered a vulnerable population due to associated clinical and psychosocial risks. In this context, nursing professionals played a key role in direct care, facing challenges related to the novelty of the virus, resource limitations, and the need to adapt protocols in real time.
Objective: to characterize nursing care for pregnant women with COVID-19.
Method: a narrative literature review was conducted in April 2023. Scientific articles and technical documents published in English, Spanish, or Portuguese over the past five years were included, focusing on nursing interventions in pregnant women diagnosed with COVID-19 in outpatient or primary care settings. The search was carried out in databases such as PubMed, ScienceDirect, ResearchGate, Dialnet, and SciELO, using descriptors in three languages. From a total of 1030 records, 16 studies were selected for qualitative synthesis.
Results: identified interventions included clinical actions such as oxygen saturation monitoring, postural changes, and non-pharmacological therapies, as well as psychosocial support, effective communication, and health education. Institutional barriers, social inequalities, and psychological impacts on both pregnant women and healthcare personnel were documented. Strategies varied by geographic context, highlighting hybrid care models and the need for humanized approaches.
Conclusions: nursing care for pregnant women with COVID-19 was characterized by an integrative approach combining clinical and psychosocial actions, within a complex environment marked by structural limitations and continuous adaptation.

Keywords: Pregnant Women; COVID-19; Nursing; Care; Primary Health Care; Interventions; Pandemic; Maternal Health.

RESUMEN

Introducción: la pandemia por COVID-19 representó una emergencia sanitaria global con implicaciones particulares para las mujeres gestantes, quienes fueron consideradas población vulnerable debido a los riesgos clínicos y psicosociales asociados. En este contexto, el personal de enfermería desempeñó un rol esencial en la atención directa, enfrentando desafíos relacionados con la novedad del virus, la escasez de recursos y la necesidad de adaptar protocolos en tiempo real.
Objetivo: caracterizar los cuidados de enfermería en mujeres gestantes con COVID-19.
Método: se realizó una revisión narrativa de literatura durante abril de 2023. Se incluyeron artículos

científicos y documentos técnicos publicados en inglés, español o portugués en los últimos cinco años, centrados en intervenciones de enfermería en gestantes con diagnóstico de COVID-19 en contextos ambulatorios o de atención primaria. La búsqueda se efectuó en bases de datos como PubMed, ScienceDirect, ResearchGate, Dialnet y SciELO, utilizando descriptores en tres idiomas. De un total de 1030 registros, se seleccionaron 16 estudios para el análisis cualitativo.

Resultados: se identificaron intervenciones clínicas comunes como la vigilancia de la saturación de oxígeno, cambios posturales y terapias no farmacológicas, así como acciones orientadas al apoyo emocional, la comunicación efectiva y la educación sanitaria. Se evidenciaron barreras institucionales, desigualdades sociales y afectaciones psicológicas tanto en gestantes como en el personal de salud. Las estrategias de atención variaron según el contexto geográfico, destacándose la implementación de modelos híbridos y la necesidad de cuidados humanizados.

Conclusiones: los cuidados de enfermería en gestantes con COVID-19 se caracterizaron por una atención integral que combinó acciones clínicas y psicosociales, enmarcadas en un entorno de alta complejidad, limitaciones estructurales y necesidad de adaptación continua.

Palabras clave: Gestantes; COVID-19; Enfermería; Cuidados; Atención Primaria; Intervenciones; Pandemia; Salud Materna.

INTRODUCTION

On March 11, 2020, the World Health Organization (WHO) recognized the widespread global transmission of COVID-19. It declared it a pandemic, constituting a global emergency with a significant impact on public health,[1] particularly for vulnerable population groups, such as pregnant women. The data available at the time reported that pregnant women were a more vulnerable group than those who were not pregnant.[2] Until now, it has been considered a disease with a high social cost, not only because it has become a pandemic, but also because it requires a high degree of technical complexity in its management and treatment, which represents a significant commitment on the part of nursing professionals.[3]

Although the Pan American Health Organization and the WHO have concluded that the virus does not cross the placental barrier or transmit through breastfeeding, adverse effects for the mother and newborn can occur if prevention, control, and management measures based on the best and most up-to-date scientific evidence available are not implemented.

Nursing staff played a key role during the peak of the COVID-19 pandemic, as they were in direct contact with patients during their care. This meant that, as this was a new disease and protocols for dealing with it were developed on the fly, pregnant women often did not receive quality care.

The nursing care process is a tool used to diagnose patients' needs and plan actions to address them. Jean Watson defines this process as the systematic use of creative problem-solving in the care process, stating that the systematization of processes should not impede the research, study, and development of skills to deal with new situations.[4] In the authors' opinion, the initial assessment of a patient by nursing staff and the diagnosis of her needs ensures the quality of care received, prevents complications, and improves care outcomes.

It is worth clarifying that the management of hospitalized pregnant women is not substantially different from that of non-pregnant individuals. Changes in the route of delivery or labor management are not routinely recommended for pregnant patients with COVID-19.[4,5] However, the need for pregnant women to require intensive care due to COVID-19 infection was slightly higher than that of non-pregnant women of childbearing age, at no more than 4,2 %.[6]

Some evidence suggests that most pregnant women may experience mild or asymptomatic disease, and that clinical, laboratory, and radiological manifestations do not differ from those seen in the rest of the population. However, they do have a higher risk of becoming severely ill, requiring intensive care, and mechanical ventilation.[7,8] However, the impact of the pandemic has gradually decreased following the introduction of vaccines.

Although the transmission of COVID-19 does not currently constitute a health problem with the same negative impact as it did five years ago, it is considered necessary to compile the experiences of nursing care reported in recent years and to clarify the role that nurses play in the care and treatment of pregnant women with COVID-19.

In response to this, the present study was conducted to characterize nursing care for pregnant women with COVID-19.

METHOD

A narrative literature review was conducted during April 2023. Data were collected from various selected bibliographic sources on the topic of nursing care for pregnant women with COVID-19.

The following inclusion criteria were established:

- Studies conducted on pregnant women diagnosed with COVID-19. Nursing interventions.
- The results of these studies established criteria, parameters, guidelines, recommendations, and activities.
- Articles published in English, Spanish, or Portuguese, in the form of technical documents or scientific articles, published in the last five years.
- Conducted in an outpatient or primary health care setting.

Articles from websites, blogs, or social media, which are non-academic in nature, were not selected.

The search was conducted in the following databases: PubMed, Scopus, ResearchGate, Dialnet, and Scielo. The process was carried out gradually, applying the criteria provided in each database and advancing the sampling until the final sample was obtained. The following keywords were used in the corresponding language:

- Pregnant women, COVID-19, Nursing role, Pandemic, Pregnancy, Interventions, Complications, Nursing care.
- Pregnant, COVID-19, Nurse's role, Pandemic, Interventions, Complications, Nursing Care.
- Pregnant women, COVID-19, Role of the Nursing Professional, Pandemic, Pregnancy, Interventions, Complications, Nursing Care.

Thus, the universe initially consisted of a total of 1 030 articles; after applying the established criteria, a sample of 16 articles was formed, the details of which are shown in figure 1.

The analyzed articles are available online, and the authors' intentions and central ideas were respected throughout the analysis of the information.

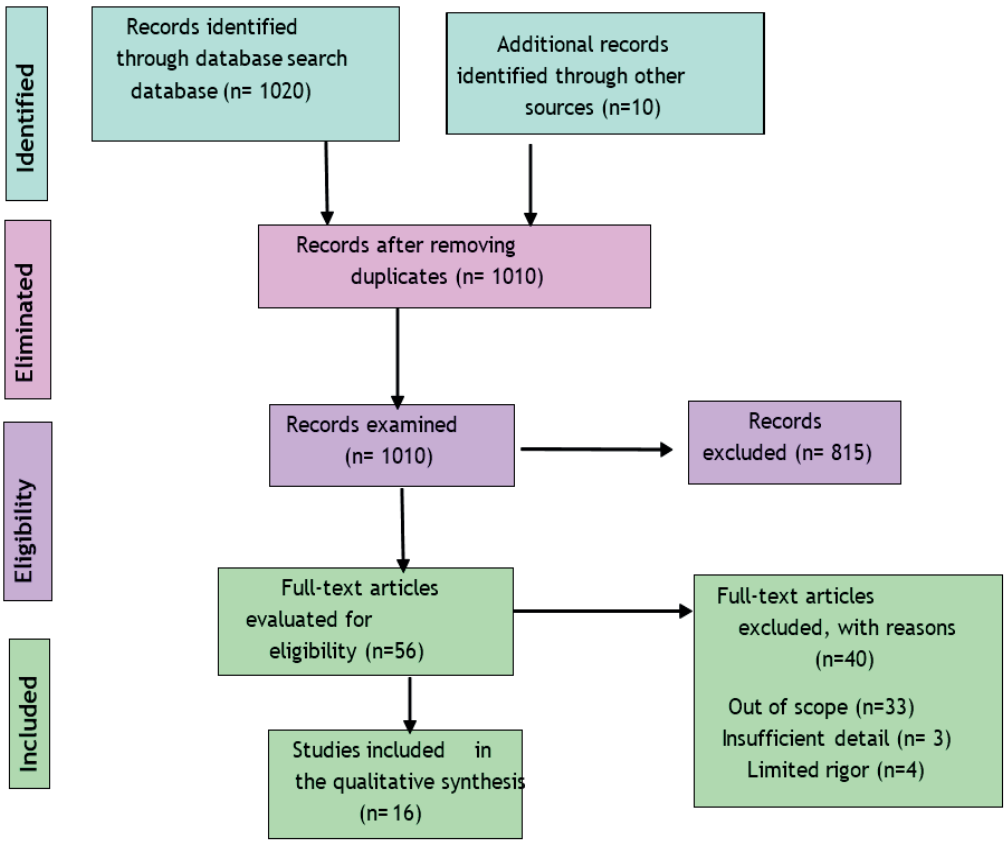

Figure 1. Flow chart of article search and selection.

RESULTS

A series of articles was identified that focused on the care provided to pregnant women during the pandemic, including monitoring oxygen saturation, changing position, managing non-pharmacological therapy, and using inhalers, which was the same care provided to other patients with COVID-19.[9] Similarly, Marjory Gordon's model was taken into account,[10] which described the impact on respiratory patterns and the nursing care and interventions that could be implemented from the NANDA taxonomy for the care and attention of pregnant women infected with COVID-19.[11,12]

One of the articles found describes the barriers imposed by some health centers in China, where patients were not provided with timely interventions and there was insufficient support from healthcare personnel.[13]

In Australia, maternity care strategies to reduce the transmission of COVID-19 were found to restrict women's access to the usual support for pregnancy and increase their psychological morbidity, given that they were not allowed access to other health services such as psychology or social work.[14]

Most studies indicate that nurses, in their role, are responsible for guiding the community, at-risk populations, pregnant women, and even hospital staff on health promotion, disease prevention, and management, as well as seeking to reduce COVID-19 infections during pregnancy.[15]

A peculiar fact was that, in China, informal caregivers experienced greater physical and psychological burdens. New strategies were therefore implemented to improve care, such as adopting a program of less frequent prenatal visits, which allowed them to invest their time in recreational activities or spend more time with their families.[16]

In Colombia, midwives faced significant challenges during the pandemic, given the high demand for patients and the shortage of clinical supplies. To address this, they had to prioritize maintaining good communication, emotional support, and stress management to provide woman-centered care.[15]

In Singapore, pregnant women, midwives, and nurses experienced negative psychological responses during epidemics and pandemics; the fear, anxiety, and uncertainty they felt toward COVID-19 caused this group of people to have a negative experience during the months of lockdown.[17]

In the United States, changes in the system had disparate impacts on marginalized communities, leading to racially biased care. Meaning that healthcare for pregnant women who belonged to another ethnicity, community, or religion, or whose skin color differed from the white stereotype imposed by some social classes, resulted in poor healthcare, which became a risk factor and led to an increase in maternal and neonatal morbidity and mortality.[18]

On the other hand, in Korea, healthcare personnel chose to restrict contact with pregnant women and newborns, separating them from their families and acquaintances, believing that this would ensure greater safety and lower risk of infection. However, this measure caused stress, anxiety, and fear in patients, which in turn increased stress levels among nursing staff.[19]

Finally, in Colombia, the implementation of measures such as the correct use of biosafety equipment and maternal care during pregnancy facilitated the work of doctors and nurses in preventing maternal complications associated with COVID-19 infection, resulting in a significant reduction in maternal and neonatal morbidity and mortality rates related to COVID-19 infection.[20]

Table 1 summarizes the main lessons from nursing interventions regarding the care of pregnant women with COVID-19 in outpatient and primary healthcare settings.

Table 1. Lessons learned from nursing care for COVID-19-positive pregnant women

No.	Parameter	Lesson learned
	Anxiety and fear	Importance of using personal protective equipment.[20] Receiving help from professionals in other disciplines such as psychology and social work.[21] Importance of following safety protocols inside and outside the hospital area.[20]
	Clinical interventions	Nursing care was implemented, such as monitoring oxygen saturation, changing positions, managing non-pharmacological therapy, and using inhalers.[9] A care plan based on Maryory Gordon's model was implemented, taking into account mainly the respiratory pattern.[11]
	Interventions applied to nursing staff	Nursing staff was responsible for implementing good communication, emotional support, and stress management for all healthcare personnel.[20]
	Nursing functions	Provide guidance to the community, at-risk populations, pregnant women, and even healthcare personnel.[16]
	Risk factors in pregnant women	Stress, depression, and anxiety, which increased mental health-related morbidity.[21] Complications associated with COVID-19 infection during pregnancy and childbirth.[9] Lack of exercise, poor eating habits, and lack of PPE.[20]
	Maternal and child care	Difficulty in the prevention and early detection of child abuse and neglect.[22]
	Factors of discrimination	Race, skin color, ethnicity, religion, and foreignness were some of the reasons many pregnant women experienced rejection during the pandemic.[18]
	Psychological factors	Anxiety, depression, and fear among nurses, midwives, and pregnant women of contracting COVID-19.[23] Physical burdens, which led to the implementation of programs to improve individual care.[16] Anxiety about entering hospital environments.[24]

Nursing interventions	Use of personal protective equipment, respiratory hygiene, prevention of needle stick injuries, cleaning of medical supplies, treatment of medical waste, disinfection of air and surfaces, and management of pregnant women with COVID-19.[25] Performing isolation due to microdroplets and contact.[25]
Postpartum care	Collected breast milk can be sterilized by pasteurization, ultraviolet disinfection, high-pressure sterilization, and other sterilization methods.[25] Midwives and nurses should monitor for the onset of postpartum complications. This should include checking vital signs, estimating the amount of postpartum bleeding, and maintaining wound care.[25]

DISCUSSION

Nursing staff reported varying experiences in writing some articles and narratives. It is important to note that there is a lack of solid evidence to support many of the recommendations for pregnant women regarding COVID-19. As this is a special population, studies with greater methodological soundness present ethical conflicts when applied to this group.

A pregnant woman with COVID-19 should be evaluated and treated as a priority in different health centers due to her condition. Therefore, all pregnant women confirmed to be carriers of the virus or suspected of being carriers have the right to quality care before, during, and after their pregnancy, as well as proper postpartum follow-up and thorough assessment of the newborn.[26]

The literature consulted [9,10,11] describes a set of nursing interventions aimed at pregnant women with COVID-19, including monitoring oxygen saturation, postural changes, non-pharmacological therapies, and the use of inhalers. However, these suggestions are often affected by a lack of supplies, caregivers, an overload of informal caregivers, and discrimination.

The convergence in basic interventions indicates that essential clinical management does not differ substantially between pregnant and non-pregnant women; the novelty lies in the need to adapt care plans to integrate fetal monitoring and simultaneous obstetric considerations. The explicit promotion of nursing models reflects an attempt to systematize care in contexts where emerging protocols and limited evidence prevail.[10,11,12]

The reviewed literature suggests that nursing played a dual role: maintaining essential clinical care and providing psychosocial support; however, the effectiveness of this role was conditioned by inputs, institutional policies, and social factors.

Several studies,[14,17,21,22] reported increased anxiety, stress, and depression in pregnant women, midwives, and nurses; restrictions on support services (psychology, social work); and reduced routine support during maternity in some systems. The authors found that rigid health protocols reduced infectious risks but generated a high psychosocial cost; the literature documents a tension between biosanitary measures and the need for humanized support. Nursing emerges as a key mediator in mitigating the psychological impact through communication, emotional support, and stress management;[3,20,27] however, response capabilities are conditioned by local resources and policies.

The meaning that pregnant women with COVID-19 attach to nursing care reveals the importance of more humanized care. Nursing intervention must transcend institutional academic protocol and avoid treating the pregnant woman as an isolated clinical case. It is essential to recognize her as a future mother who is going through a crucial moment in her life and who requires comprehensive support.[3]

To enhance the experience of pregnant women, greater humanization is necessary in the care provided by healthcare personnel. Studies argue that anxiety and stress in pregnant women during the pandemic increased, in part, due to the rigidity of medical protocols.[3] Reducing unnecessary interventions and promoting empathetic care can contribute to improving their emotional well-being and reducing risks for both mother and baby.

Studies analyzed make recommendations on care models;[16,22] however, hybrid models (fewer in-person visits, telemonitoring) were forced, which reduced exposure and redistributed the burden of care, but posed risks of underdetection of psychosocial problems and child abuse; technological solutions helped, but did not completely replace in-person assessment of risk factors.

In terms of specific treatment, the WHO promotes vaginal delivery as a means of terminating pregnancy even in cases of confirmed COVID-19 infection and recommends that a cesarean section be performed when medically justified and preferably with epidural anesthesia. It is also essential to obtain and ensure a detailed medical and epidemiological history.[26,28]

In the United States, unequal impacts were documented in marginalized communities, with care biased by race, ethnicity, and immigration status, contributing to higher maternal and neonatal morbidity and mortality in certain groups.[17] This highlighted pre-existing biases that were amplified by the crisis; nursing interventions had to contend with structural barriers that limited the effectiveness of woman-centered care. Explicit equity approaches should be integrated into protocols to minimize discrimination and clinical biases during future

crises.

A persistent gap was observed in high-quality quantitative evidence on the direct impact of specific nursing interventions on maternal-neonatal outcomes; the research community should prioritize multicenter observational designs and implementation studies that respect ethical standards in pregnant women.[3,26] The authors assert that the humanization of care, reduction of unnecessary interventions, and empathetic communication are of paramount importance. These emerge as unresolved priorities and constitute low-cost, high-impact strategies that nursing staff could lead.

Healthcare providers and policymakers need to listen to the collective voices of women during pregnancy regarding how COVID-19 affected their birth and infant feeding plans, as well as their perceptions of changes in prenatal care.[22]

Among the possible limitations of this study are that reviews, qualitative studies, and local theses predominated; controlled trials or robust cohorts specifically targeting nursing interventions with quantitative maternal and neonatal outcomes were scarce. The absence of studies with experimental designs reflects ethical and logistical restrictions on pregnant women during pandemics, but limits the ability to establish causality between nursing interventions and clinical outcomes.

CONCLUSIONS

The nursing care provided to pregnant women with COVID-19 during the pandemic was characterized by comprehensive care that combined essential clinical interventions with actions aimed at psychosocial well-being, in a context marked by structural challenges, institutional limitations, and ethical tensions. Nursing practice highlighted the need to humanize care, facilitated the adaptation of care models, mitigated emotional impacts, and promoted equity in care.

REFERENCES

1. Garcés Ginarte MJ, Alonso Triana L, Sarabia Águila EC, Fernández Tirado G, Quintero Álvarez PE. Fatiga pandémica como secuela psicológica de la COVID-19 en la provincia Matanzas, Cuba. Rev Cubana Salud Pública. 2022;48.

2. Ambriz-Espinosa E, Gónzalez-Guerrero J, Gutiérrez-Pérez D, Muñoz-Carreón G, Gallegos V, Medina de la Cruz O. Plan de cuidados de enfermería para la paciente grávida con diagnóstico de COVID-19. 2022.

3. Delgado M. Significado que le otorgan las pacientes embarazadas contagiadas de COVID-19 al cuidado de enfermería en Ecuador. Ciencia Latina Rev Cient Multidiscip. 2025;9:1619–30. https://doi.org/10.37811/cl_rcm.v9i1.15925.

4. Osorio Larumbe R de L. Proceso atención de enfermería a paciente embarazada con COVID-19. 2021.

5. Bueno Huamán RN, Villanueva Sánchez CDP, Vivanco Hilario SD. Nursing care in threatened preterm labor in the obstetrics and gynecology department of a national hospital. Salud Integral y Comunitaria. 2023;1:8. https://doi.org/10.62486/sic20238.

6. Martinez-Santander C, Romero M, Rosales E, Espín D, Flores C. Impacto del COVID-19 durante el embarazo. Mediciencias UTA. 2022;6:2–8. https://doi.org/10.31243/mdc.uta.v6i4.1821.2022.

7. Córdoba-Vives S, Fonseca-Peñaranda G. COVID-19 y embarazo. Rev Méd Costa Rica. 2020;85:22–9.

8. Gámez Gámez LN, Gámez Borges LN, José Sorrillo L, Matos Quiala HA. Influencia de la COVID-19 en el embarazo desde la perspectiva de los cuidados intensivos. Rev Inf Cient. 2021;100.

9. Saritma D. Cuidados de enfermería en pacientes gestantes con COVID-19 del Hospital General IESS Machala [tesis de licenciatura]. Universidad Técnica de Machala; 2021.

10. Osorio-Castaño JH, García-Uribe JC, Arteaga-Noriega AV. Patrón sueño-descanso de Marjory Gordon. Proceso para su valoración. Index Enferm. 2024;33.

11. Elizalde Gavilanes TE. Cuidados de enfermería en la embarazada COVID-19 con complicaciones atendida en el área de ginecología del Hospital IESS Latacunga [tesis de maestría]. Universidad Uniandes; 2022.

12. Gómez M. Rol del personal de enfermería en paciente gestante con COVID-19: una revisión bibliográfica

[trabajo de fin de grado]. Universidad de Ciencias Aplicadas y Ambientales; 2022.

13. Young Joo J, F Liu M. Antenatal care experiences of uninfected pregnant women during the COVID-19 pandemic: a qualitative systematic review. Nurse Outlook. 2023;71:101964. https://doi.org/10.1016/j.outlook.2023.101964.

14. Davids D, Sheehy A, Nightingale H, de Vitry-Smith S, Taylor S, Cummins AI. Anxiety, stress, and depression in Australian pregnant women during the COVID-19 pandemic: a cross-sectional study. Midwifery. 2023;119:103619. https://doi.org/10.1016/j.midw.2023.103619.

15. González-Timoneda A, Hernández Hernández V, Pardo Moya S, Alfaro Blázquez R. Experiences and attitudes of midwives during the birth of a pregnant woman with COVID-19 infection: a qualitative study. Women Birth. 2021;34:465–72. https://doi.org/10.1016/j.wombi.2020.12.001.

16. Zuo Y, Luo BR, Wang LN, Cheng BC, Hu XL. Exploring lived experiences of informal caregivers for pregnant women seeking scheduled antenatal care during the COVID-19 lockdown in China: a phenomenological study. Midwifery. 2022;109:103316. https://doi.org/10.1016/j.midw.2022.103316.

17. Shorey S, Chan V. Lessons from past epidemics and pandemics and a way forward for pregnant women, midwives and nurses during COVID-19 and beyond: a meta-synthesis. Midwifery. 2020;90:102821. https://doi.org/10.1016/j.midw.2020.102821.

18. Altman MR, Gavin AR, Eagen-Torkko MK, Kantrowitz-Gordon I, Khosa RM, Mohammed SA. Where the system failed: the COVID-19 pandemic's impact on pregnancy and birth care. Glob Qual Nurs Res. 2021;8:23333936211006397. https://doi.org/10.1177/23333936211006397.

19. Kang HS, Son Y, Kim MJ, Chae SM. Experiences of nurses caring for perinatal women and newborns during the COVID-19 pandemic: a descriptive qualitative study. Nurs Open. 2021;8:3358–65. https://doi.org/10.1002/nop2.881.

20. González-de la Torre H, Rodríguez-Rodríguez R, Martín-Martínez A. Recommendations and practical management of pregnant women with COVID-19: a scoping review. Enferm Clin (Engl Ed). 2021;31:S100–6. https://doi.org/10.1016/j.enfcli.2020.05.009.

21. Domínguez Mejías M, Culsán Fernández R, Ortigosa Arrabal A. Impacto de la pandemia por COVID-19 durante el embarazo. Alteraciones psicológicas. SANUM Rev Cient Sanit. 2020;5:20–30.

22. Burgess A, Blankstein R, Bradley D, Papá S, Bürcher P. Informes de mujeres embarazadas sobre el impacto del COVID-19 en el embarazo, la atención prenatal y los planes de alimentación infantil. MCN Am J Enferm Matern Infant. 2020;46.

23. Stampini V, Monzani A, Caristia S, Ferrante G, Gerbino M, De Pedrini A, et al. The perception of Italian pregnant women and new mothers about their psychological wellbeing, lifestyle, delivery, and neonatal management experience during the COVID-19 pandemic lockdown: a web-based survey. BMC Pregnancy Childbirth. 2021;21:473. https://doi.org/10.1186/s12884-021-03904-4.

24. Goyal M, Singh P, Melana N. Review of care and management of pregnant women during COVID-19 pandemic. Taiwan J Obstet Gynecol. 2020;59:791–4. https://doi.org/10.1016/j.tjog.2020.09.001.

25. Liu J, Cao Y, Xu C, Zhou C, Wei W, Yuan J, et al. Midwifery and nursing strategies to protect against COVID-19 during the third trimester of pregnancy. Midwifery. 2021;92:102876. https://doi.org/10.1016/j.midw.2020.102876.

26. Hidalgo Arias JA. Cuidados de enfermería en gestantes con COVID-19. 2023.

27. Mosquera Escobar KA, Quezada Guanuchi ME, Enríquez Jácome MÁ, Chávez-Arizala JF. Quality of nursing care for patients. Salud Integral y Comunitaria. 2025;3:100. https://doi.org/10.62486/sic2025100.

28. Britez Britez OI, Santander EB, Oria Saavedra M, Rojas Ruiz GC, Espinosa Aguilar A. Professional role

during nursing care for the postpartum woman with a risk approach. Salud Integral y Comunitaria. 2025;3:213. https://doi.org/10.62486/sic2025213.

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CONFLICT OF INTEREST

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