Journal of Obstetrics, Gynecology and Cancer Research | ISSN: 2476-5848

Risk Mapping of the Management of a Dyspneic Parturient Suffering from COVID-19-Related Pneumopathy During Delivery in a Hospital in Morocco

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Article Info

10.30699/jogcr.8.6.587

Received: 2023/04/12;
Accepted: 2023/09/09;
Published Online: 11 Nov 2023;

Use your device to scan and read the article online

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ABSTRACT

Background & Objective: The safety of women during childbirth and personnel working in maternity care amidst the COVID-19 pandemic is a priority for the health system. Hence, good risk management practices need to be implemented to reduce the spread of infection between healthcare workers and pregnant women who have contracted COVID-19. Therefore, this study aimed to establish a risk map for managing dyspneic parturients suffering from COVID-19-related pneumopathy during delivery.

Materials & Methods: This study focuses on examining potential risks beforehand in the context of the management of a dyspneic parturient suffering from COVID-19-related pneumopathy during delivery, executed using the method FMECA (Failure Mode, Effects and Criticality Analysis); this was conducted from September to December 2021 in the maternity service of the Hospital Center ElJadida, Morocco.

Results: The risk analysis of a dyspneic parturient suffering from COVID-19-related pneumopathy during delivery revealed thirteen failure modes. Proposed are corrective measures aimed at addressing the failure modes of criticality class C3 whose vital risks are linked to the care of the dyspneic parturient suffering from COVID-19-related pneumopathy at the level of the reanimation service and the level of the neonatal intensive care unit.

Conclusion: Employing risk mapping is a fundamental instrument for the ongoing enhancement of quality to maximize the safety of the parturient care process by changing the organizational culture from a reactive to a preventive approach.

Keywords: COVID-19, Delivery, Dyspneic, Mapping, Parturient, Pneumopathy, Risk

Introduction

COVID-19, stemming from the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), initially emerged in Wuhan, Hubei Province, China. The virus swiftly disseminated worldwide and earned the classification of a pandemic by the World Health Organization (WHO) on March 11, 2020 (1). Across an increasing array of nations, this global pandemic has evolved into a widespread public health concern, placing countless individuals at risk **(2)**. The COVID-19 pandemic has spread in three months in the Eastern Mediterranean Region, including Morocco **(3)**.

Since the onset of the COVID-19 pandemic, the world has encountered significant challenges at all levels of life, particularly regarding health **(4)**. At different times during the pandemic, health systems were not able to respond in time to the needs of the population **(5)**. Consequently, the COVID-19 pandemic has affected primary health care with health programs such as the sexual and reproductive health program, including maternal and newborn health with pregnancy, childbirth and postpartum services **(6)**. Since the beginning of the pandemic, Morocco has put

in place a National Watch and Response Plan against COVID-19 **(6)**.

Pregnant women remain vulnerable due to changes in their bodies and immune systems as a result of the heightened detrimental impacts of the SARS-CoV-2 infection, putting them at risk of being severely affected by certain respiratory infections **(7, 8)**. Multifaceted factors, encompassing anatomical-physiological shifts, hormonal imbalances, changes in the immune system, and elevated expression of the angiotensin-converting enzyme (ACE2), are possibly linked to heightened COVID-19 severity in pregnancy **(9, 10)**. With a greater potential for negative birth results, specifically preterm delivery, COVID-19-positive pregnant women have shown an observed increase in cesarean section rates and perinatal mortality **(11, 12)**. In cases of hospitalized mothers with coronavirus infections, including COVID-19, with over 90% of them concurrently experiencing pneumonia, preterm birth emerged as the predominant adverse pregnancy outcome **(13)**. Regarding delivery, there is no definitive evidence on the optimal timing of delivery or handling pregnant women diagnosed with SARS-CoV-2 infection. It is discussed according to the clinical parameters of respiratory rate (RR) and oxygen saturation (SpO2) **(14)**. It is recommended that patients with oxygen-requiring hypoxemic lung disease be monitored in an inpatient setting when these clinical parameters are observed: SpO2<98% on room air and RF > 22/min, particularly if this condition is associated with co-morbidities (diabetes, cardiac, renal, respiratory, hepatic, immunosuppression, transplant, neoplasia) **(15)**. However, early delivery may be warranted if the pregnant woman is seriously ill with a risk of fetal distress **(16)**. In addition, decisions on the mode of delivery should be discussed between obstetricians and neonatologists. For analgesia during labor, early peri-medullary analgesia is preferred. In the case of a cesarean section, local anesthesia is preferred unless there are contraindications. Recourse to general anesthesia is indicated, especially in the most severe respiratory disorders, because of the risk of destabilizing the respiratory function in the case of failure to extend the epidural and also in the case of acute fetal distress **(17)**. In the case of general anesthesia, extubation may be delayed, exposing these women, who are vulnerable to secondary bacterial super infections, to prolonged mechanical ventilation with the risk of nosocomial pneumonia. In postpartum, women present a significant thrombotic risk.

Every expectant mother possesses the entitlement to appropriate care, such as prenatal care, safe delivery practices and newborn care, as well as, amidst the COVID-19 pandemic, focusing on the mother's psychological health **(16-18)**. Therefore, maternity services must address emerging needs during the pandemic and provide pregnant women with services in a safe and supportive environment **(6)**. Vigilant tracking of bodily indicators, utilization of precise diagnostic procedures, and swift intervention alongside preventive strategies collectively aid in minimizing COVID-19 transmission among pregnant women and averting COVID-19-related complications **(19)**. Alongside preventive actions, effective risk management strategies must be applied to reduce the potential for cross-infection among pregnant women with COVID-19, healthcare personnel, and newborns (20). The safety of women in childbirth and maternity staff is a priority for the health system **(6)**.

The maternity service of the ElJadida Provincial Hospital Center (PHC) has received parturients affected by Covid-19, which has influenced its internal structure by ensuring the uninterrupted provision of obstetrical care for non-COVID-19-affected parturients and concurrently managing COVID-19-affected parturients through the meticulous adherence to distinct protocols. These protocols aim to mitigate and diminish the risks associated with complications and the propagation of this pandemic.

This study aims to establish a risk map for managing a dyspneic parturient suffering from COVID-19-related pneumopathy during delivery with the intention of executing preventive and corrective actions using the FMECA method.

Methods

This study analyzes failure modes, their effects, and criticality (FMECA) carried out in the maternity service of the Provincial Hospital Center (PHC) El Jadida in Morocco over four months from September to December 2021. The FMECA method is an a priori quality tool based on the inductive approach. However, by making appropriate risk assessments and taking preventive measures where necessary, we can help mitigate these risks before they occur **(21)**. In our study, the FMECA method was used from a qualitative and quantitative point of view, facilitating risk assessment and prioritizing preventive and corrective actions **(21)**.

In our study, the operationalization of the FMECA method began with the formation of a multidisciplinary team working in the maternity service, the operating theater and the intensive care unit. The following stages were undergone by this method:

1. Explanation of the procedure

Initiating with outlining the management process, the FMECA method was set in motion for a dyspneic parturient suffering from COVID-19-related pneumopathy during delivery by listing all the steps taken from her arrival at the maternity service of the PHC ElJadida until her discharge.

2. Examination of the process

The process analysis relied on assessing the failures identified at each stage of the ECP process for these parturients. Utilizing the Ishikawa diagram and engaging in brainstorming sessions among team

members, potential causes of failure and their repercussions were explored. This approach was adopted by the team members in a logical sequence to potentially address the underlying causes.

a. Identification of failures

Through collaborative brainstorming, the working group pinpointed potential risks referred to as failure modes. These were identified by recognizing any improper actions or errors that could have arisen at each processing step.

b. Identification of underlying causes

Causation is performed using the Ishikawa Diagram based on the 5 M's (Method, Manpower, Material, and Environment) for the process of the management of a dyspneic parturient suffering from COVID-19-related pneumopathy during delivery.

c. Determination of potential outcomes

By projecting the consequences and impact of these failures, the potential effects were defined on the management process of dyspneic parturient suffering from COVID-19-related pneumopathy during delivery.

d. Risk assessment and prioritization

The risk rating was carried out in three dimensions:

- Frequency (F): How frequently does this risk manifest??
- Severity (S): How great is the risk to the parturient?
- Detectability (D): How simple or complex is it to identify when the risk has occurred??

Decisions were reached through a voting process within the working group, involving deliberation on varying evaluations to achieve a unanimous agreement. Each measurement dimension was assigned a score ranging from 1 to 4, subsequently utilized to compute the criticality (C) by multiplying the frequency, severity, and detectability – i.e., C = FxSxD – for each failure mode. This criticality was then visually represented through a criticality decision matrix (Table 1).

The arrangement and ordering of risks still rely on the computation of criticality (C), enabling us to classify the levels of risk as outlined below.

- Low criticality: Acceptable under control; C1 score (1 to 8).
- Moderate criticality: Considered bearable with oversight and necessitates correction; C2 score (9 to 16).
- High criticality: Deemed unacceptable and necessitating priority attention.C3 score (17 to 64).

Upon completing the comprehensive analysis, the assessment of criticality levels for various failure modes facilitated the formulation of a risk management plan. This plan prioritized the execution of recommended corrective actions, starting with the reduction of high-criticality failures, followed by addressing moderate-criticality failures.

Results

Infectious risk mapping of a dyspneic parturient with COVID-19-related pneumonia during delivery, from arrival to discharge, using the FMECA method, decomposed the parturient's management process comprising seven fundamental operations encompassing a total of 14 tasks (Figure 1).

The Ishikawa diagram illuminated the underlying causes of diverse failures, which resulted in the non-compliant management of dyspneic parturient suffering from COVID-19-related pneumopathy during delivery (Figure 2).

The Failure Modes, Effects, and Criticality Analysis (FMECA) revealed a total of 13 failures in the management of dyspneic parturients suffering from COVID-19-related pneumopathy during delivery from her arrival to her discharge, including 7 failure modes that have been categorized under criticality class C3 (53.84%), four failure modes have been categorized within the criticality class C2 (30.76%) and two failure modes have been designated as belonging to criticality class C1 (15.38%).

(Figure 3) shows the comprehensive risk map, which displays the entirety of the risks. in the management of a dyspneic parturient suffering from COVID-19-related pneumopathy during delivery from arrival to discharge, focusing on 7 elementary processes, 14 tasks, and 13 failure modes categorized across 3 criticality levels. Failure modes with a criticality level of 3 are under the necessity of prompt corrective actions, which have been documented in the report (Table 2).

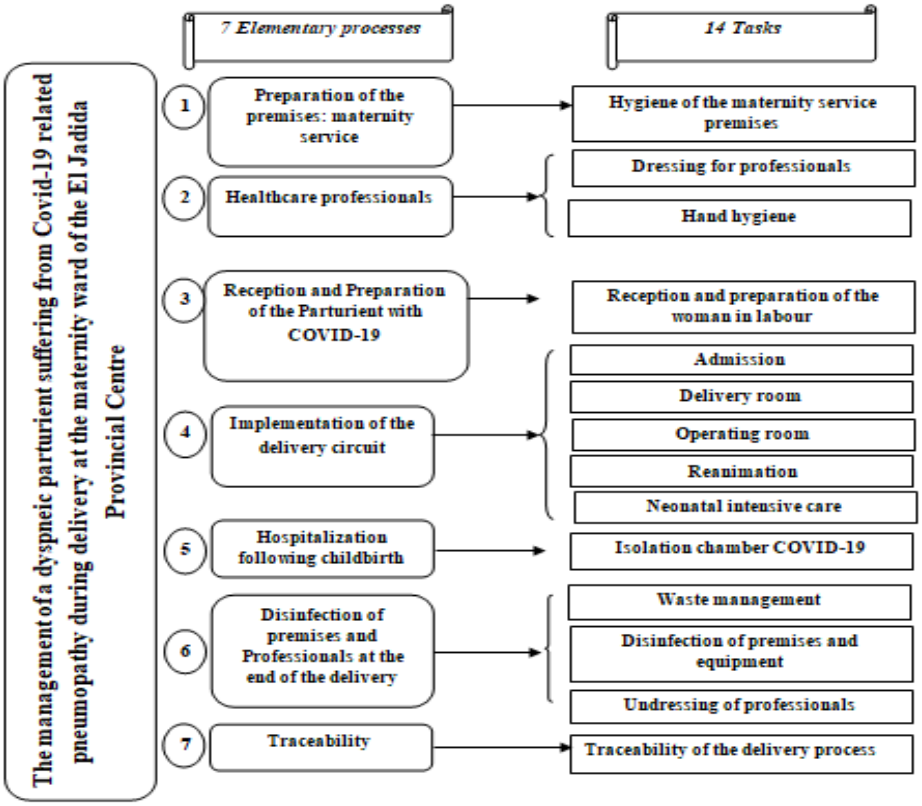
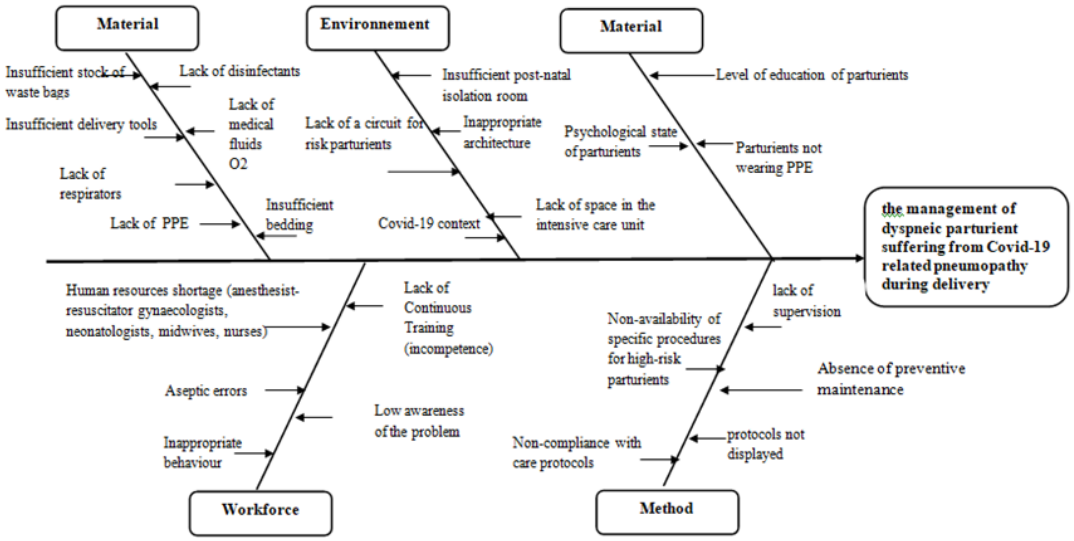


Figure 1.: Process of the management of a dyspneic parturient suffering from Covid-19 related pneumopathy during delivery

Figure 1.



PPE: Personel Protective Equipment

CT: Continuous training

Figure 2: Ishikawa diagram

Figure 2.

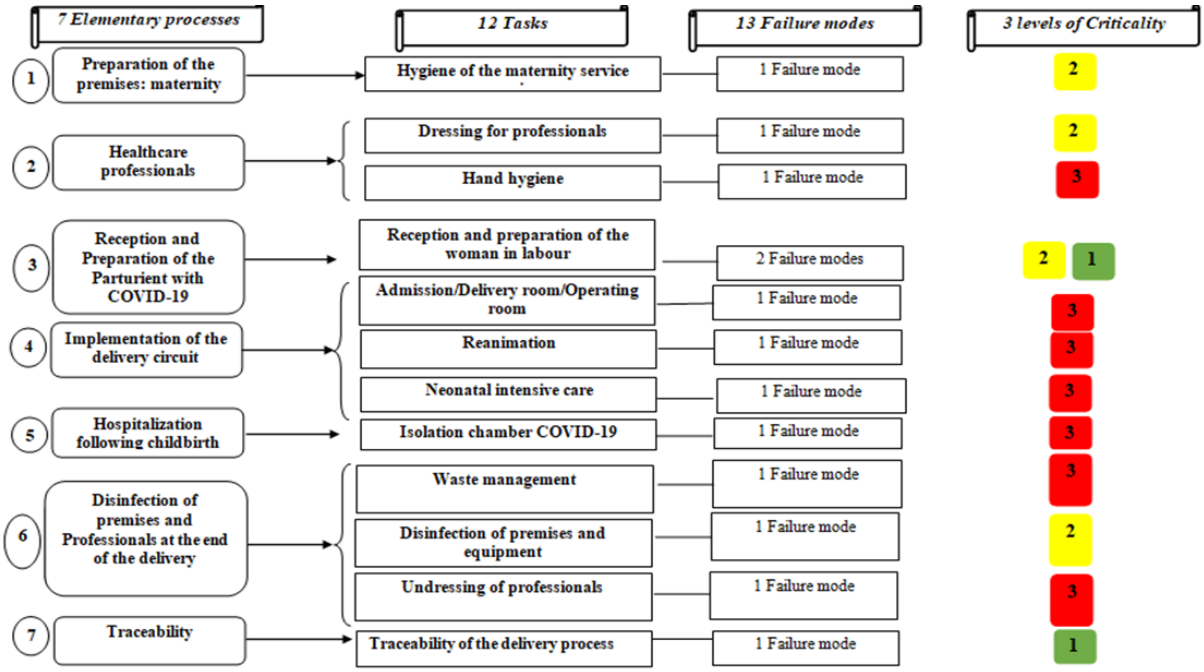


Figure 3 : Representation of the risk map of the entire process

Figure 3.

Table 1. **Criticality decision matrix**

		Severity				
		1	2	3	4	
Frequenc	1	1	2	3	4	1
	2	4	8	12	16	2
	3	9	18	27	36	3
	4	16	32	48	64	4

Detectability

Table 2. FMECA analysis

Elementary process	Tasks	Failures	Causes	Consequences	F	S	D	C	Corrections
1	Hygiene of the maternity service premises	Insufficient state of cleanliness	lack of disinfectants; lack of control of the surface Non-compliance with maintenance procedures	Infectious risks	3	2	2	12	Ensure sufficient availability of disinfectants Ensure control of surfaces Training and awareness of maintenance procedures
		Lack of proper	Non-compliance with	Infectious risks	2	3	2	12	Staff awareness of

Elementary process	Tasks	Failures	Causes	Consequences	F	S	D	C	Corrections
2	Hand hygiene	hand hygiene	hand-washing procedures	Professional risks					hand washing procedures
3	Dressing for professionals	Dressing techniques	Lack of continuous training; no training of staff on specific protocols for dressing in the COVID context 19	Infectious risks Professional risks	3	4	2	24	Ongoing training for ward staff on dressing rules for the care of a Covid-19 parturient Development of specific protocols for the management of a parturient with Covid 19
	Reception and preparation of the woman in labor	Poor hygiene of the parturient	Lack of hygiene of the parturient Non-use of personal protective equipment by parturient (surgical mask)	Infectious risks; Professional risks	2	4	2	16	raising awareness of the need to use personal protective equipment for women in labor
		Badly maintained bedding	Lack of linen change between two parturient with Covid-19;	Infectious risks; Organizational risk	2	3	1	6	Evaluation implemented, effective follow-up
4	Admission Delivery room Operating room	Lack of training on how to transmit of Covid-19	Context of the Covid-19 pandemic non-compliance with the circuit of the parturient infected with COVID 19 The scarcity of scientific studies	Infectious risks Professional risks Organizational risk. Thrombotic risk Risk of nosocomial pneumonia	3	3	2	18	Adapting care to current scientific developments

Elementary process	Tasks	Failures	Causes	Consequences	F	S	D	C	Corrections
	Reanimation	Lack of medical fluids (O2) Inadequate care for post-partum women	O2 supply disruption during the pandemic Lack of standardized management protocol Lack of receivers Lack of space in the intensive care unit	Risk of neonatal distress Risk of complications related to prematurity	3	3	2	18	Appropriate supply of medical fluids (O2) (oxygen concentrators) Availability of respirators • Increase the number of beds in the intensive care unit while trying to maintain pre-pandemic standards. Elaboration of specific protocols for the management of a dyspneic parturient suffering from covid-19 related pneumopathy during delivery
	Neonatal intensive care	Inadequate management of neonatal distress Inadequate management of preterm infants	Lack of training Shortage of human resources (anesthetist-resuscitator) Insufficient material and equipment (incubators, respirators, CPAP...)		4	3	2	24	Ongoing training for staff in neonatal intensive care Availability of incubators and equipment
5	Isolation chamber COVID-19	Inappropriate isolation of the parturient	Inappropriate isolation room Lack of appropriate procedure	Infectious risks Professional risks Organizational risk	3	3	2	18	Proposal to provide appropriate isolation rooms in the maternity ward
		The poor manageme	Insufficient stock of waste bags	Infectious risks	3	3	3	27	Establishing a solid system with

Elementary process	Tasks	Failures	Causes	Consequences	F	S	D	C	Corrections
6	Waste management	nt of waste from health care activities with infectious risks	Absence of a central waste management room in the maternity service						clearly defined roles and responsibilities for collecting, treating and disposing of COVID-19 waste.
	Disinfection of premises and equipment	Inappropriate disinfection of premises	Poor quality of disinfectants lack of training of professionals in disinfection measures in the context of the pandemic Covid-19	Infectious risks Professional risks	2	3	2	12	Training of professionals in disinfection measures in the context of the pandemic Covid-19
	Undressing of professionals	Undressing technique not mastered	Lack of personal protective equipment Non-compliance with the protocol for undressing after contact with a Covid-19 positive parturient	Infectious risks Professional risks	2	3	3	18	staff training on the protocol for undressing after contact with a Covid-19 positive parturient
7	Traceability	Data entry error	Workload	Organizational risk	1	2	2	4	Evaluation implemented, effective follow-up

Discussion

According to the literature, this is the first risk-mapping study of managing a dyspneic parturient with COVID-19-related pneumopathy during delivery. Applying the FMECA method to managing a dyspneic parturient suffering from COVID-19-related pneumopathy during delivery, from her arrival until her discharge, enabled us to map the risks for this parturient by highlighting 13 failure modes likely to affect the quality of this management. The assessment of the degree of risk acceptability has highlighted seven failure modes of unacceptable criticality (C3) that must be addressed as a priority.

The FMECA enabled us to highlight the different stages of managing dyspneic parturients suffering from COVID-19-related pneumopathy during delivery, from her arrival to her discharge, and the failures linked to any of the steps of the process, based on two components. On the one side, the qualitative part of the FMECA clarified the failure modes related to any task at each stage of the process by dissecting its causes using the Ishikawa diagram (Figure 2) and its consequences using a brainstorming session (Table 2). Conversely, the quantitative aspect of this approach assessed the criticality of each failure mode by employing scales for frequency, severity, and

detectability. This process categorized the criticality of all failures and facilitated the prioritization of corrective measures (refer to Table 2). The identified failures and their corresponding outcomes (as shown in Table 2) were stratified into three levels of criticality:

1. Risks that are deemed acceptable and well-managed

By applying the FMECA, we identified two failure modes with acceptable risk in the different steps of the management process of a dyspneic-parturient suffering from COVID-19-related pneumopathy during delivery, from her arrival to her discharge, with a low and easily detectable frequency.

- Poorly maintained bedding, primarily attributed to the unavailability of bedding, resulting in the lack of bedding change between two individuals experiencing COVID-19 during childbirth. Contamination may occur at the laundry or healthcare facility level (22).
- Data entry errors at the end of the process, due to context and work overload, which are global and often combined with the increased societal burden caused by public health measures, risking increased staff burnout (23).

It's essential to effectively manage these two risks classified as C1 criticality to prevent their escalation into higher criticality levels (C2 or C3). Addressing them should involve training professionals, enhancing their awareness, and establishing standardized management procedures and protocols.

2. Risks that are acceptable within the bounds of supervision

Four failure modes have been recognized concerning the acceptable risks across various stages of the care process of a dyspneic parturient suffering from COVID-19-related pneumopathy during delivery, from arrival to discharge, and likely to promote infectious and occupational risks:

- Inadequate disinfection of premises owing to the scarcity of disinfectants and the lack of protocols regarding disinfecting premises amidst the COVID-19 pandemic;
- Inappropriate disinfection of equipment due to the poor quality of disinfectants as well as the lack of training of professionals in disinfection measures in the context of the pandemic COVID-19;
- Lack of hand hygiene among professionals due to non-compliance and non-display of handwashing protocols.
- Subpar hygiene of the parturient resulting from the failure to adhere to hygiene guidelines by the individual and the lack of utilization of personal protective equipment (PPE);

Addressing these four deficiencies should be guaranteed through the training and information provided to professionals, as well as by the age and likely to promote infectious and occupational risks supply of disinfection products, and on the other hand, by raising the awareness of parturients in terms of hygiene with careful handwashing and disinfection with hydroalcoholic gel and the need to use personal protective equipment (PPE) during childbirth and the stay in the maternity hospital **(24, 25)**.

3. Unacceptable risks to be addressed as a priority

A total of seven failure modes have been elucidated for unacceptable risks at various stages of the care process of a parturient with dyspnea lung disease affected by Covid-19 during childbirth, from arrival to discharge, and should be given priority attention due to their criticality and impact:

- The inadequate dressing and undressing practices among professionals during this Emergency care procedure (ECP) stemmed from insufficient training, the absence of protocols for these procedures, and the challenging implementation of said techniques. As a consequence, there was a spread of infectious and occupational risks. The necessary corrective measures entail focused practical training for professionals in proper dressing techniques, along with the formulation of protocols for Emergency care procedures involving COVID-19-infected parturients **(26)**.

-The absence of comprehensive understanding regarding the transmission modes of COVID-19, particularly in light of the novel circumstances posed by the pandemic, coupled with the limited availability of scientific studies, has led to a heightened potential for infectious risks to arise. However, adapting the ECP to current scientific knowledge, evidence and Ministry of Health guidelines would considerably reduce this risk.

- The inappropriate isolation of COVID-19 due to the nonexistence of an isolation room within the maternity ward facility contributes to the potential spread of infectious risks. Indeed, the reception and management of COVID-19 parturients within the same structures as non-COVID-19 parturients, with healthcare staff providing the COVID and non-COVID sectors, exposes a significant infectious risk, with the risk of cross-viral transmission. The creation of isolation rooms or cubicles is a priority to deal with this risk and to avoid cross-contamination at the time of labor and delivery and for the nursing staff. Indeed, the creation of a specific circuit with premises and personnel dedicated to parturients at risk of contracting SARS-CoV-2 infection or being infected by the virus has been

the cornerstone of the reorganization of maternity care in many countries, where at least one birthing room, one operating theater and one neonatal resuscitation station have been dedicated to these cases, with disinfectant cleaning of the premises daily **(26, 27)**.

-Inappropriate DASRI management at the end of childbirth Because of the unavailability of DASRI (Dangerous and Infectious Healthcare Waste) bags, the lack of a central waste management room in the maternity ward, and the absence of DASRI management training within the Covid-19 context, there is an increased risk of SARS-CoV-2 infection. Nevertheless, rectifying this risk involves providing professionals with training in DASRI management and ensuring an adequate supply of DASRI bags.

- Inadequate management in the ICU due to a lack of medical fluids, standardized protocols and sufficient human resources requires:

o Implement an appropriate medical fluid supply strategy (O2) **(28)**. Indeed, pregnant women may present severe cases of COVID pneumonia19, requiring multidisciplinary management and respiratory assistance **(29)**. Cardiovascular changes make these pregnant women less tolerant of hypoxia, complicating their management.

o Develop specific protocols for the management of a parturient with COVID-19 dyspnea.

o Provide ongoing training for staff in the intensive care of the newborn as the risk of prematurity and intrauterine growth retardation is increased in severe forms, exposing the newborn to the morbidity associated with these two conditions **(30)**.

Conclusion

In conclusion, the continuation of monitoring and management activities has meant that patients and their children have had to be assured of a constant quality of care while minimizing the risk of viral contamination, and the safety of patients and staff has been guaranteed to the greatest extent possible. The FMECA risk analysis method plays a vital role in proactively identifying potential risks that could impact the process of caring for a parturient with dyspnea pneumonia affected by COVID-19 during childbirth, from her arrival to her discharge, by drawing up a risk map. The primary objective of utilizing the FMECA risk analysis method is to enhance patient safety during this care process, optimize care quality, and meet the needs of the population. However, it's important to note that this method does have certain limitations. Notably, the selection of failures and the assessment of criticality are subject to the judgment of the labor team, introducing potential bias and variability.

Ethics

This study was approved by the Ethics Committee for Biomedical Research of the Faculty of Medicine and Pharmacy of Rabat Mohammed V University (M/105).

Acknowledgments

None.

AUTHOR CONTRIBUTIONS

Conceptualization: EL Hiyani M, Thimou Izgua A, Ahizoune S, Benlenda O, Alaoui mdaghri A. Data curation: EL Hiyani M, Thimou Izgua A. Formal analysis EL Hiyani M, Thimou Izgua A. Ahizoune S Funding acquisition: None. Validation: EL Hiyani M ,Thimou Izgua A, Benlenda O, SG. Writing - original draft: EL Hiyani M, Thimou Izgua A Writing - review & editing: EL Hiyani M ,Thimou Izgua A ,Ahizoune S, Benlenda O, Alaoui mdaghri A.

Conflict of Interest

The authors declare no competing interests.

Funding/Support

This research did not receive any specific grants from funding agencies in the public, commercial, or not-for-profit sectors.

References

1. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019. New Eng J Med. 2020;382(8):727-33. [PMID] [PMCID] [DOI:10.1056/NEJMoa2001017]
2. Majumder J, Minko T. Recent developments on therapeutic and diagnostic approaches for COVID-19. AAPS J. 2021;23:1-22. [PMCID] [DOI:10.1208/s12248-020-00532-2] [PMID]
3. Razavi D, Noorulhuda M, Velez M, Kapiriri L, Collaboration G. The role of priority setting in pandemic preparedness and response: a comparative analysis of COVID-19 pandemic plans in 12 countries in the Eastern Mediterranean region. Health Policy OPEN. 2022;3:100084. [PMID] [PMCID] [DOI:10.1016/j.hpopen.2022.100084]
4. Ahizoune S, Alaoui AM, Belrhiti Z. La résilience des hôpitaux pendant Covid-19 : une seule étude de cas à méthodes mixtes au Maroc. Kinésithérapie, la Revue. 2023;23(258):3-10. [DOI:10.1016/j.kine.2022.09.007] [PMCID]

5. Semenova Y, Pivina L, Khismetova Z, Auyezova A, Nurbakyt A, Kauysheva A, et al. Anticipating the Need for Healthcare Resources Following the Escalation of the COVID-19 Outbreak in the Republic of Kazakhstan. J Prev Med Public Health. 2020;53(6):387-96. [DOI:10.3961/jpmph.20.395] [PMID] [PMCID]
6. Organisation et prise en charge de la grossesse. de l'accouchement et du post-partum durant la période de pandémie COVID-19. 2020.
7. Parag Goyal JJC. C or re sp ondence Clinical Characteristics of Covid-19 in China. Clinical Characteristics of Covid-19 in China2020. p. 1-3.
8. Ellington S, Strid P, Tong VT, Woodworth K, Galang RR, Zambrano LD, et al. Characteristics of Women of Reproductive Age with Laboratory-Confirmed SARS-CoV-2 Infection by Pregnancy Status - United States, January 22-June 7, 2020. Morb Mortal Wkly Rep. 2020;69(25):769-75. [DOI:10.15585/mmwr.mm6925a1] [PMID] [PMCID]
9. Schwartz DA. Being pregnant during the Kivu Ebola virus outbreak in DR Congo: the rVSV-ZEBOV vaccine and its accessibility by mothers and infants during humanitarian crises and in conflict areas. Vaccines. 2020;8(1):38. [PMCID] [DOI:10.3390/vaccines8010038] [PMID]
10. Kazemi Aski S, Alizadeh S, Ghafourian Abadi S, Yaseri Gilvaei F, Kiai SM. Awareness of Coronavirus Disease and Perceived Stress in Pregnant Women. J Obstet Gynecol Cancer Res. 2022;7(3):235-42. [DOI:10.30699/jogcr.7.3.235]
11. Yang R, Mei H, Zheng T, Fu Q, Zhang Y, Buka S, et al. Pregnant women with COVID-19 and risk of adverse birth outcomes and maternal-fetal vertical transmission: a population-based cohort study in Wuhan, China. BMC Med. 2020;18(1): 1-7. [DOI:10.1186/s12916-020-01798-1] [PMID] [PMCID]
12. Mendoza M, Garcia-Ruiz I, Maiz N, Rodo C, Garcia-Manau P, Serrano B, et al. Pre-eclampsia-like syndrome induced by severe COVID-19: a prospective observational study. Int J Obstet Gynaecol. 2020;127(11):1374-80. [PMCID] [DOI:10.1111/1471-0528.16339] [PMID]
13. Di Mascio D, Khalil A, Saccone G, Rizzo G, Buca D, Liberati M, et al. Outcome of coronavirus spectrum infections (SARS, MERS, COVID-19) during pregnancy: a systematic review and meta-analysis. Am J Obstet Gynecol MFM. 2020;2(2):100107. [PMID] [PMCID] [DOI:10.1016/j.ajogmf.2020.100107]
14. Morau E, Bouvet L, Dewandre PY, Vial F, Bonnin M, Chassard D, et al. COVID-19, pregnancy, anaesthesia and intensive care: Report and prospect. Prat Anesth Reanim. 2022; 26(2):63-6.
15. Peyronnet V, Sibiude J, Deruelle P, Huissoud C, Lescure X, Lucet JC, et al. Infection par le SARS-CoV-2 chez les femmes enceintes: état des connaissances et proposition de prise en charge par CNGOF. Gynecol Obstet Fertil Senol. 2020; 48(5):436-43. [DOI:10.1016/j.gofs.2020.03.014] [DOI:10.1016/j.gofs.2020.10.001]
16. Goyal M, Singh P, Melana N. Review of care and management of pregnant women during COVID-19 pandemic. Taiwan J Obstet Gynecol. 2020; 59(6):791-4. [DOI:10.1016/j.tjog.2020.09.001] [PMID] [PMCID]
17. Ung N, Bonnet MP. Obstetric anaesthesia during the COVID-19 pandemic. Prat Anesth Reanim. 2020;24(4):196-201. [PMID] [PMCID] [DOI:10.1016/j.pratan.2020.07.005]
18. El Hiyani M, Ahizoune S, Mdaghri Alaoui A, Thimou Izgua A. Factors Associated with Neonatal Mortality in the Neonatology Department of the Regional Hospital Center, AGADIR, MOROCCO. Iran J Neonatol. 2023; 14(1):18-25.
19. Kumar R, Meurah C, Asri N, Masand R. Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. 2020.
20. Poon LC, Yang H, Lee JCS, Copel JA, Leung TY, Zhang Y, et al. ISUOG Interim Guidance on 2019 novel coronavirus infection during pregnancy and puerperium: information for healthcare professionals. Ultrasound Obstet Gynecol. 2020;55(5):700-8. [DOI:10.1002/uog.22013] [PMID] [PMCID]
21. Lipol LS, Haq J. Risk analysis method: FMEA/FMECA in the organizations. Int j Basic Appl Sci. 2011;11(5):74-82.
22. Glowicz J, Benowitz I, Arduino MJ, Li R, Wu K, Jordan A, et al. Keeping health care linens clean: Underrecognized hazards and critical control points to avoid contamination of laundered health care textiles. Am J Infect Control. 2022;50(10): 1178-81. [DOI:10.1016/j.ajic.2022.06.026] [PMID] [PMCID]
23. Müller MM, Baillès E, Blanch J, Torres X, Rousaud A, Cañizares S, et al. Burnout among hospital staff during the COVID-19 pandemic: Longitudinal results from the international Cope-Corona survey study. J Psychosom Res. 2023; 164:111102. [PMID] [PMCID] [DOI:10.1016/j.jpsychores.2022.111102]
24. Rousseau A, Dubel-Jam M, Schantz C, Gaucher L. Barrier measures implemented in French maternity hospitals during the COVID-19

pandemic: A cross-sectional survey. Midwifery. 2023;118:103600. [PMID] [PMCID] [DOI:10.1016/j.midw.2023.103600]

25. Chan C, Kong J, Babata K, Mazzarella K, Adhikari E, Yeo K. Optimal delivery management for the prevention of early neonatal SARS-CoV-2 infection. 2021. [PMCID] [DOI:10.1002/14651858.CD013689.pub2]
26. Hascoët JM. [Adaptation of Health Care Organization in a level III Maternity Hospital during the COVID-19 pandemic]. Bull Acad Natl Med. 2021;205(8):981-4.
27. Vial F, Mortier L, Rouche J, de Malartic CM, Herbain D, Gauchotte E, et al. Feedback on COVID-19 outbreak in a French tertiary maternity. Ann Fr Med Urgence. 2020;10(4): 251-60. [DOI:10.3166/afmu-2020-0271]
28. Sezen GY, Ersoy Ö, Yorulmaz İS, İSkender A. Experıences Of Duzce Unıversıty Department Of Anesthesıology And Reanımatıon In Covid-19 Pandemıc. Konuralp Med J. 2020;12(S1):364-8. [DOI:10.18521/ktd.758026]
29. San-Juan R, Barbero P, Fernandez-Ruiz M, Lopez-Medrano F, Lizasoain M, Hernandez-Jimenez P, et al. Incidence and clinical profiles of COVID-19 pneumonia in pregnant women: A single-centre cohort study from Spain. EClinicalMedicine. 2020;23:100407. [PMCID] [DOI:10.1016/j.eclinm.2020.100407] [PMID]
30. Kayem G, Lecarpentier E, Deruelle P, Bretelle F, Azria E, Blanc J, et al. A snapshot of the Covid-19 pandemic among pregnant women in France. J Gynecol Obstet Hum Reprod. 2020;49(7): 101826. [DOI:10.1016/j.jogoh.2020.101826] [PMID] [PMCID]

How to Cite This Article:

EL hiyani, M., Ahizoune, S., Mdaghri Alaoui, A., Benlenda, O., Thimou Izgua, A. Risk Mapping of the Management of a Dyspneic Parturient Suffering from COVID-19-Related Pneumopathy During Delivery in a Hospital in Morocco. J Obstet Gynecol Cancer Res. 2023; 8(6):587-98.

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