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Impact of prenatal management of multiple pregnancies on perinatal outcomes: A single-center, five-year observational study.

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Abstract

Introduction: This study focused on prenatal care and its relationship with the perinatal outcomes of multiple pregnancies at the Gynecological, Obstetric, and Pediatric University Hospital of Guayaquil. A total of 266 multiple pregnancies that ended their gestation at the institution were analyzed out of 429 cases received between January 2017 and June 2021.

Methods: We developed a quantitative, nonexperimental, descriptive, correlational, retrospective investigation analyzing prenatal care for multiple pregnancies and its relationship with fetal, perinatal, and neonatal morbidity and mortality at the Gynecological, Obstetric, and Pediatric University Hospital of Guayaquil. We received 429 multiple pregnancies between January 2017 and June 2021. We studied only the 266 who ended their multiple gestations in the institution, regardless of chorionicity, identified in the statistics service, operating room, live birth certificates (REVIT), and room of births, excluding the 163 who did not terminate the pregnancy in the hospital.

Results: A total of 266 multiple pregnancies were analyzed, and 49.6% of the patients received a minimum of 5 prenatal consultations, 1.58 on average. In addition, a significant correlation (P=0.021) was observed between gestational age and having acquired or not prenatal care at the institution, evidencing that 58% of the preterm cases did not have any prenatal control, and maternal ages from 18 to 35 years were the most prone to prematurity (P=0.036). On the other hand, it was found that 78.7% of the cases in which chorionicity was not defined did not receive any ultrasound in the institution, and this was only diagnosed in 51.5% of the cases. Chorionicity did not show a statistically significant influence on admission or days in the neonatal intensive care unit or on mortality (P= 0.561, P =0.487, P =0.429). However, whether ultrasound scans were performed, admission, and days in the NICU presented a statistically significant relationship with the number of deaths (P =0.001) in all cases.

Conclusions: Patients with multiple pregnancies receive four times less prenatal care than established, associated with an insufficient prenatal ultrasound diagnosis, which allows contradictory perinatal management and higher rates of prematurity, admission, and mortality in neonatal intensive care.

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Introduction

Monochorionic twin pregnancies account for 20% of all pregnancies and are associated with high perinatal and neonatal morbidity and mortality [1]. Internationally, twin pregnancies represent 2 to 4% of all births [2]. In the last 30 years, the number of twins has increased by 70%, varying according to the geographical region. In France, for example, the rate of twin births in 2008 was 15.6 per 1,000 births, an increase of approximately 80% since the 1970s [3, 4]. In the United States, a significant increase in the number of pregnancies with multiple fetuses has been observed; between 1980 and 2009, the number of twin births increased by 76%, and in the following years, it decreased slightly to 32.6 per 1,000 births in 2018. The triplet and above pregnancy rate also increased in the 1980s and 1990s, peaking in 1998 and declining to 93.0 per 100,000 births in 2018, representing a decrease of 8% from 2017 and 52% compared to 1998 [5]. These pregnancies present significant complications and adverse outcomes, high morbidity and mortality, controversial pregnancies for obstetric care [6], and prenatal care being crucial. Even in developed countries such as the UK, there were challenges in providing adequate care for women with multiple pregnancies. In response, recommendations were published by two Royal College of Obstetricians and Gynecologists (RCOG) Scientific Study Groups, and the National Institute for Healthcare Excellence (NICE) established guidelines in 2019 [7]. NICE and the International Society for Ultrasound in Obstetrics and Gynecology (ISUOG) strive to make recommendations based on the best available evidence, expert clinical advice, and economic considerations [8]. Spontaneously, the incidence of multiple pregnancies is 2-4%; with the use of assisted reproduction techniques, it rises to 40-50%. We did not find national statistics beyond what was stated by Orozco-Quinga et al. [9] or specific guidelines for the prenatal and perinatal management of multiple pregnancies. In our environment, we believe that having unified protocols and suboptimal prenatal diagnoses and treatments directly impacts global maternal and perinatal morbidity, as in the rest of the world, with worse results in developing countries. It is common for multiple pregnancies to be excluded from research studies, with the presence in only 8% of fetal growth restriction (FGR), 17% of preeclampsia, and 2% of diabetes trials in the past seven years [10].

A study was carried out at the Gynecological, Obstetric, and Pediatric University Hospital of Guayaquil between January 2017 and June 2021, where 429 patients with multiple pregnancies were treated, of whom 266 (62%) were included due to termination in this hospital. A total of 536 newborns were obtained, of whom 96 were admitted to neonatal intensive care, and 22 died after staying more than 48 hours.

Materials and methods

Design of the investigation

This research was an observational, descriptive, cross-sectional study. The source is retrospective.

Scenery

The study was conducted at the Guayaquil Gynecological, Obstetric, and Pediatric University Hospital. The study period was from January 1, 2017, to June 30, 2021.

Universe

Patients with multiple pregnancies were taken as references for the present investigation.

Sample

The sample was a nonprobabilistic, census-type of all incident cases in the period.

Inclusion criteria

Patients with twin or triple pregnancies who came for control and finished their delivery at the institution were included in this research. Cases in which it was impossible to complete all the data required for the study were excluded.

Data Management and Analysis

A data collection form was prepared to record the information of cases identified through the hospital databases and the registry of live births (REVIT).

Data sources/measurements

The source was indirect; an electronic form was filled out from the data of the institutional clinical history of the patients who entered the period. The information was treated confidentially; personal data that would allow the identification of the study subjects were not included.

Biases

The leading researcher always maintained the data with a guide and records approved in the research protocol to avoid possible interviewer, information, and memory biases. Observation and selection bias was avoided by applying the participant selection criteria. Two researchers independently analyzed each record in duplicate, and the variables were registered in the database once their agreement was verified.

Quantitative variables

Descriptive statistics were used. The results are expressed as frequencies and proportions. The following variables were recorded: gestational age, prenatal check-ups, emergency visits, obstetric ultrasound scans, cervicometry, mortality, admission to the neonatal intensive care unit (NICU), causes of access to the NICU, and days of hospitalization.

Statistical analysis

Noninferential statistics are used. For the descriptive analysis, measures of central tendency and dispersion were calculated according to the measurement scale of each variable. Qualitative variables are absolute numbers and percentages; quantitative variables are represented as the means and standard deviations. A univariate descriptive analysis was carried out, and the correlation was also determined to determine the relationship between the quantitative variables, considering the value of P <0.05 as a measure of significance and a confidence level of 95%.

The information collected was compiled in a worksheet using the Microsoft Excel Windows program. Then, the statistical analysis was executed in the IBM SPSS version 25 program (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.).

Results

Participants

Of 429 twin cases, 266 multiple pregnancies were analyzed, and 163 (38%) cases that did not end the pregnancy in the institution were excluded.

General characteristics of the sample

The general evaluation of the study shows that in 89 cases (33.4%), chorionicity was not reported; of the rest, 137 (51.5%) were monochorionic, and 40 (15%) were dichorionic. The mean maternal age was 27.6 years. The number of prenatal visits was an average of 1.58 per gestation, with an average of 1.88 and 2.30 in monochorionic and dichorionic pregnancies, respectively. The average number of emergency consultations was 1.43 per pregnancy. Of the 266 multiple pregnancies, 57.14% ended before 37 weeks, 34.96% ended between 34-36 weeks, and the rest (22.18%) were premature for less than 34 weeks (Table 1). No record of cervicometry was found in any of the medical records of the cases studied, nor was it described in the prenatal or emergency documents.

Prenatal checkups

Prenatal care received at the institution did not significantly reduce prematurity; however, reaching 37 weeks translated to zero NICU admission or neonatal mortality, $P < 0.05$ ($P = 0.021$).

In Table 2, we observe that 43 (35.2%) of the 114 (42.9%) full-term pregnancies do not register prenatal check-ups at our institution, and 71 (49.3%) do; of these, 64 received between 1 and 5 consultations.

Of the remaining seven full-term pregnancies, one received six and another 11 controls, and the remaining five registered seven prenatal care. We found 79 preterm cases (64.8%) who did not receive any prenatal consultation.

Table 1. Analysis general descriptive

Variables	Not defined (n=89)			Monochorionic (n=137)			Dichorionic (n=40)			Average (N=266)
	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	
Maternal age	17	46	28.54	17	46	27.36	17	42	26.97	27.62
Gestational age	11	40	34.1	18	40	35.2	30	39	36.0	35.02
Prenatal checkups	0	4	0.57	0	7	1.88	0	11	2.30	1.58
Emergency consultations	0	8	1.24	0	7	1.49	0	6	1.57	1.43
Obstetric ultrasound	0	4	0.35	0	11	1.82	0	5	1.45	1.21
Cervicometry	0	0	0	0	0	0	0	0	0	0
Mortality	17			35			5			19
Days in Neonatal ICU	0	42	2.12	0	68	3.58	0	39	2.88	2.86

NICU: Neonatal Intensive Care Unit.

Table 2. Relationship between receiving or not receiving prenatal care and gestational age.

Variables	Prenatal Controls		Total (N=266)	P value
	No (n=122) (45.8%)	Yes (n=144) (54.2%)		
< 28 weeks.	9	4	13	0.021
	7.4%	2.8%	4.9%	
28 and 31 weeks.	13	9	22	
	10.7%	6.3%	8.3%	
32 and 34 weeks.	27	18	45	
	22.1%	12.5%	16.9%	
35 and 36 weeks.	30	42	72	
	24.6%	29.2%	27.1%	
>/= at 37 weeks.	43	71	114	
	35.2%	49.3%	42.9%	

Of those who did receive at least one prenatal checkup, 73 (50.8%) were preterm; in 8 of them, 13 deaths occurred, all of them between 26 and 35 weeks of gestation, of which 6 were double pregnancies and two triples. In this last group, five monochorionic pregnancies were identified (1 monoamniotic, two diamniotic, and two triamniotic), 1 case of dichorionic diamniotic pregnancy, and neither chorionicity nor amnionicity was specified in two instances. All these cases went to the emergency room of our health center at least once, receiving between 1 and 4 emergency services in total, and together they received 15 consultations.

Table 3. Relationship between maternal age and gestational age.

Variables	Risk age			Total No.=266	P value
	Yeah (<18) (n=10)	No (18 to 35) (n=219)	Yeah (> 35) (n=37)		
< 28 weeks.	2	10	1	13	0.036
	20.0%	4.6%	2.7%	4.9%	
28 and 31 weeks.	1	18	3	22	
	10.0%	8.2%	8.1%	8.3%	
32 and 34 weeks.	0	38	7	45	
	0.0%	17.4%	18.9%	16.9%	
35 and 36 weeks.	5	63	4	72	
	50.0%	28.8%	10.8%	27.1%	
>/= 37 weeks.	2	90	22	114	
	20.0%	41.1%	59.5%	42.9%	

Maternal age and gestational age

Table 3 shows the association between maternal age and prematurity in multiple pregnancies, with a *P value* =0.036. Of the total number of pregnant women under 18 and over 35, 23 were premature. Of the 219 pregnancies between 18 and 35, 129 were early, and 63 were late. In addition, there was a 1:5 ratio between patients younger than 18 and older than 35 who had preterm deliveries and patients between 18 and 35 with the same complication, with P = *0.036*.

Chorionicity

Table 4 shows that 38% (101 cases) had no obstetric ultrasound reports. A total of 78.7% of the cases without a definition of chorionicity did not receive ultrasound in the institution before delivery. Most patients who underwent ultrasound antepartum at the

institution were monochorionic (n=116, 84.7%), despite most multiple gestations usually being dichorionic. No ultrasound records exist for the remaining monochorionic patients (n=21, 15.3%).

Of the 116 patients who underwent an ultrasound, 67 had preterm deliveries. Of these pregnancies, 24 required the admission of at least one RN to the NICU, with 45 newborns admitted (46.8% of all multiple entries). There were 15 deaths (68% of neonatal mortality from newborns to multiples admitted to the NICU). Furthermore, maternal age was significantly related to prematurity in these multiple pregnancies.

Table 4. Relationship between the diagnosis of chorionicity and the obstetric ultrasounds performed.

obstetric ultrasound	Chorionicity Not defined (n=89)	mono-chorionic (n=137)	dichori-onic (n=40)	Total (N=266)	P value
No	70	twenty-one	10	101	0.0001
	78.7%	15.3%	25.0%	38.0%	
Yes	19	116	30	165	
	21.3%	84.7%	75.0%	62.0%	

NICU admission and mortality

Table 5 shows the relationship between chorionicity with admission and stay in the NICU and embryofoetal mortality. No statistically significant association was demonstrated between admission, days of access, and perinatal or neonatal mortality (*P* =0.561, *P* =0.487 and *P* =0.429). Of 58 cases, 21.7% resulted in at least one newborn admission to the neonatal intensive care unit (NICU), lasting from 1 to 68 days. The monochorionic patients had the most extended stay and the highest neonatal mortality, with 9 cases (64.3%) remaining 21 days or more in the NICU.

Monochorionic pregnancies showed higher rates of prematurity, perinatal complications, and mortality. The present study reported embryofoetal losses in 38 (14.2%) pregnancies, 35 monochorionic pregnancies (*P*=0.429), followed by 17 deaths with undefined chorionicity and only five deaths in dichorionic pregnancies, resulting in a total of 57 deaths.

We analyzed 536 newborns (NBs) of multiple pregnancies, mainly twins (262) and triples (4). Of them, 96 (17.9%) were admitted to the neonatal intensive care unit (NICU), and 22 deaths were registered after 48 hours of hospitalization, with an average stay in the NICU of 2.86 days/NB and a range of 0 to 68 days. NBs with undefined chorionicity had an average stay of 2.12 days, monochorionic NBs 3.58 days, and dichorionic NBs 2.88 days. All the deceased in the NICU were premature (100%), born between weeks 25 and 35. In the cases of quadruple pregnancies, mortality was observed in 2 patients, with 2 and 3 newborns dying in pregnancies of 35 and 28 weeks, respectively, both with monochorionic chorionicity.

Table 6 shows a statistically significant relationship (*P*=0.0001) between performing ultrasound controls and mortality; between 1-6 prenatal ultrasounds did not decrease the mortality rate, and it was even higher compared to patients who did not receive obstetric ultrasounds in the center. Of the 38 multiple pregnancies with at least one death, 92.1% (35 gestations) had received between 0 and 6 ultrasound scans, contributing to 91.2% of the embryo-fetal deaths. In cases with 7 to 11 ultrasounds, deaths only occurred in 3 pregnancies, and five additional deaths were added. In addition, the absence of admission or at least one admission to the NICU was significantly related (*P* =0.0001) to the highest number of deaths. This pattern was observed in 32 pregnancies, representing 56.1% of the total, resulting in 41 deaths (42.7%). In 185 pregnancies, there were no days of admission to the NICU or neonatal mortality. The days of stay in the NICU did not have a significant impact on mortality since in the cases with the most extended stay in the NICU (43 cases, 44.7%), no deaths were recorded; however, the highest mortality was recorded in patients who did not enter the NICU.

Table 5. Relationship between admission and days in the NICU, mortality with chorionicity.

Variables	Indicator	chorionicity Not defined (n=89)	Monochorionic (n=137)	Bichorial (n=40)	Overall (N=266)	p Value
Admission to NICU	0	71 (79.8%)	105 (76.6%)	32 (80.0%)	208 (78.2%)	0.561
	1	9 (10.1%)	9 (6.6%)	5 (12.5%)	23 (8.6%)	
	2	8 (9.0%)	21 (15.3%)	3 (7.5%)	32 (12.0%)	
	3	1 (1.1%)	2 (1.5%)	0 (0%)	3 (1.1%)	
Days in NICU	0	71 (34.1%)	105 (50.5%)	32 (15.4%)	208 (100%)	0.487
	From 1 to 3	3 (21.4%)	10 (71.4%)	1 (7.1%)	14 (100%)	
	From 4 to 10	11 (47.8%)	8 (34.8%)	4 (17.4%)	23 (100%)	
	From 11 and 20	1 (14.3%)	5 (71.4%)	1 (14.3%)	7 (100%)	
	> 21	3 (21.4%)	9 (64.3%)	2 (14.3%)	14 (100%)	
Perinatal mortality	0	78 (34.2%)	115 (50.4%)	35 (15.4%)	228 (100%)	0.429
	1	5 (25.0%)	10 (50.0%)	5 (25.0%)	20 (100%)	
	2	6 (35.3%)	11 (64.7%)	0 (0%)	17 (100%)	
	3	0 (0%)	1 (100%)	0 (0%)	1 (100%)	

There were 52 admissions in pregnancies with 0 to 3 emergency visits, while only six pregnancies with more than three visits required neonatal intensive care (Table 7). A total of 84.6% of the cases without admission to the NICU had between 1 and 8 emergency consultations, and 160 pregnancies had 1 to 3 consultations; in 11 of these pregnancies, there were deaths, responsible for 17 of the total deaths in the study (29.8%, N=57). The more emergency and prenatal visits there are, the lower the perinatal and neonatal morbidity and mortality.

Table 8 relates mortality with the causes of admission to the NICU, where we found a statistically significant difference with *P*=0.001, in which the three leading causes of admission and mortality were ARDS-NR, prematurity, and neonatal sepsis in that order, with 14 deaths from these causes. However, in 23 pregnancies that account for 36 deaths, 37.5% were not admitted to the NICU, meaning that death occurred in the prenatal and perinatal periods.

Table 6. Relationship between obstetric ultrasound scans, admission, and stay.

Variables	Indicator	Number of deaths 0 (n=228)	1 (n=20)	2 (n=17)	3 (n=1)	Overall (N=266)	P value
Obstetric ultrasound	**0**	91 (90.1%)	6 (5.9%)	4 (4.0%)	0 (0%)	101	0.0001
	1 - 6	137 (84.6%)	13 (8.0%)	11 (6.8%)	1 (0.6%)	162	
	7 - 11	0 (0%)	1 (33.3%)	2 (66.7%)	0 (0%)	3	
Enter NICU	**0**	185 (88.9%)	10 (4.8%)	13 (6.3%)	0 (0%)	208	0.0001
	1	14 (60.9%)	7 (30.4%)	2 (8.7%)	0 (0%)	23	
	2	27 (84.4%)	3 (9.4%)	2 (6.3%)	0 (0%)	32	
	3	2 (66.7%)	0 (0%)	0 (0%)	1 (0.6%)	3	
		66.7%	0.0%	0.0%	33.3%	100%	
Days in NICU	**0**	185 (88.9%)	10 (4.8%)	13 (6.3%)	0 (0%)	208	0.0001
	1 - 3	10 (71.4%)	3 (21.4%)	0 (0%)	1 (7.1%)	14	
	4 - 10	19 (82.6%)	2 (8.7%)	21%)	0 (0%)	23	
	11 and 20	5 (71.4%)	1 (14.3%)	1 (14.3%)	0 (0%)	7	
	> 21	9 (64.3%)	4 (28.9%)	1 (7.1%)	0 (0%)	14	

Table 7. Relationship between emergency consultations and admission.

Indicator	NICU ADMISSION 0 (n=208)	1 (n=23)	2 (n=32)	3 (n=3)	Total No.=266	P value
0	32	2	5	1	40	0.0001
	80.0%	5.0%	12.5%	2.5%	100.0%	
1	114	12	fifteen	0	141	
	80.9%	8.5%	10.6%	0.0%	100.0%	
2	40	5	10	1	56	
	71.4%	8.9%	17.9%	1.8%	100.0%	
3	eleven	0	1	0	12	
	91.7%	0.0%	8.3%	00%	100.0%	
4	3	4	0	0	7	
	42.9%	57.1%	0.0%	0.0%	100.0%	
5	2	0	0	1	3	
	66.7%	0.0%	0.0%	33.3%	100.0%	
6	4	0	1	0	5	
	80.0%	0.0%	20.0%	0.0%	100.0%	
7	1	0	0	0	1	
	100.0%	0.0%	0.0%	0.0%	100.0%	
8	1	0	0	0	1	
	100.0%	0.0%	0.0%	0.0%	100.0%	

Table 8. Relationship between the reason for admission to the NICU and mortality

Indicator	Embryo-fetal and neonatal death 0n=208	1 n=23	2 n=32	3 n=3	Overall (N=266)	*P*- value
ARDS - RN	29	7	3	0	39	0.0001
	74.4%	17.9%	7.7%	0.0%	100.0%	
prematurity	6	0	0	0	6	
	100.0%	0.0%	0.0%	0.0%	100.0%	
Neonatal sepsis	4	1	0	0	5	
	80.0%	20.0%	0.0%	0.0%	100.0%	
Transient tach-ypnea	3	0	0	0	3	
	100.0%	0.0%	0.0%	0.0%	100.0%	
Not admitted to NICU	185	10	13	0	208	
	88.9%	4.8%	6.3%	0.0%	100.0%	
neonatal absti-nence syndrome	0	2	0	0	2	
	0.0%	100.0%	0.0%	0.0%	100.0%	
Others	1	0	1	1	3	
	33.3%	0.0%	33.3%	33.3%	100.0%	

Discussion

The Maternal and Newborn Health Registry of the Global Network for Women's and Children's Health Research conducted a prospective multicenter study in several countries, including Kenya, Zambia, Pakistan, Guatemala, Argentina, and India, which found results similar to those of the observed study in terms of average maternal age. It is essential to highlight that, contrary to usual behavior, chorionicity was not adequately defined in our series. In those that were recorded, a majority of monochorionic pregnancies were obtained when the general incidence of these pregnancies was 1/250 pregnancies, constituting only 1/3 of multiples [13, 14]; the remaining 2/3 parts were generally dizygotic, all dichorionic, and included 60-80% of multiple pregnancies [15]. Although chorionicity is an independent risk factor in multiple pregnancies and defines the specific protocol for diagnosis and prenatal care, detailed prenatal control in this regard was not observed. Mortality is always higher in pregnancies with a monochorionic component, and this was the case in this study, presenting unique perinatal and neonatal complications in obstetrics [16, 17]. These patients may develop twin-twin transfusion syndrome, polycythemia fetal anemia sequence (TAPS), or other uncommon complications, with a high risk of developing permanent cardiovascular and neurological sequelae in 40-80% of cases. However, this does not lead to more detailed prenatal control in that group. It is crucial to have interventions that reduce the risk of preterm birth, impaired fetal growth, and neurological or cardiovascular complications in multiple pregnancies [18].

In our environment, prenatal care for uncomplicated and low-risk pregnancies requires at least five consultations following WHO guidelines. In high-risk pregnancies, the frequency of prenatal consultations should be determined individually by health professionals. The obstetric risk will always be high in multiple pregnancies without other comorbidities [12]. It is vital to use established protocols, or failing that, a common strategy based on proven scientific evidence [11]. In this study, neither of the two could be determined since no national regulation guides the management of multiple pregnancies. Although the Ministry of Public Health of the Republic of Ecuador establishes potential risks associated with multiple pregnancies, we did not find references in the perinatal medical records that indicate the protocol or monitoring plan used for prenatal care of numerous pregnancies. Adequate prenatal care and follow-up should be established for multiple

pregnancies to prevent complications and improve maternal-fetal outcomes. These pregnancies impose an interdisciplinary prenatal approach and specialized teams in managing these pregnancies. This is important to ensure proper care and prevent complications. High-risk prenatal follow-up is essential in these cases [5, 19].

According to Gil Guevara, "The early diagnosis of chorionicity and amnionicity forms the basis of the modern approach to multiple pregnancy. Without knowing these basic parameters, it is virtually impossible to manage multiple gestations adequately"[20]. The standardized use of ultrasonography has improved the diagnosis of multiple pregnancies and their complications and is considered the safest and most reliable method in gynecology and obstetrics. This is crucial to establish the prenatal care plan for the entire pregnancy, establish maternal-fetal care, and plan the ideal time and route of delivery according to international evidence and the protocol used [20]. Taking global recommendations into account, monochorionic pregnancies receive between 9 and 11 basic obstetric ultrasound scans, depending on the region and the capacity of each institution [8, 13, 21-23]. Additionally, particular cases require neuroecography, fetal echocardiography, or other advanced fetal imaging studies, such as fetal nuclear magnetic resonance; some require intrauterine treatment, ranging from intrauterine fetal blood transfusion [24] to open or fetoscopic fetal surgery. The clinical care team for women with multiple pregnancies should comprise professionals from various disciplines, including obstetrics and gynecology, perinatology or maternal-fetal medicine, neonatology or pediatrics, psychology, nutritionists, and social work [25].

The literature shows different prenatal care schemes in multiple pregnancies, but all agree that the risk approach is more significant in these cases. The Anglo-Saxons and Europeans clarify the aspects of prenatal care applicable to our environment. For example, monochorionic pregnancies must have at least nine prenatal check-ups with clinical evaluations and obstetric ultrasounds at weeks 16, 18, 20, 22, 24, 28, 32, 34, and 36, while in the case of a dichorionic pregnancy, six are suggested. In the case of dichorionics, after initial uptake and ultrasound to determine chorionicity, it is recommended to carry out obstetric controls and ultrasound at weeks 20, 24, 28, 32, 34, and 36 [19].

The 2019 NICE guidelines for managing multiple pregnancies provide updated recommendations (2019-2020) to improve surveillance in pregnancies at high risk of antenatal complications and new offers to ensure safe perinatal outcomes during delivery. When published in 2020, these guidelines suggest early recruitment of pregnant women with multiples, planning the definition of gestational age, fetal order number, chorionicity/amnionicity, fetal anatomical ultrasound, and screening for chromosomal abnormalities in all patients between the ages of 11 and 13+6/7 days. Successive prenatal visits may vary in number but indicate a baseline OB ultrasound number of 6 for dichorionic diamniotic pregnancies (11-13.6, 20, 24, 28, 32, 36 weeks), at least 11 for any double or triple pregnancy with a monoamniotic component (11-13.6; 16 and then every two weeks until 34 weeks), and eight ultrasound scans for dichorionic/diamniotic pregnancies (11-13.6, 16 and then every two weeks until 32 weeks) [5]. All monoamniotic pregnancies should have nine basic ultrasound scans before their completion at 32 weeks [8].

The prenatal approach in multiple pregnancies should include the diagnosis of risk factors, early detection of maternal and fetal complications, and planning for termination of pregnancy according to chorionicity, amnionicity, and maternal-fetal complications. The Fetal Medicine Foundation has suggested specific strategies for prenatal care in multiple pregnancies. It is essential to reduce the risks and guarantee adequate care in these complex cases [20, 26, 27], with a much stricter scheme in any multiple gestation with a monochorionic component, always with a high risk of cardiovascular or neurological sequelae in survivors [27].

In these cases, it is recommended to visit every two weeks after the ultrasound of the first trimester until week 34. Subsequently, a weekly visit is recommended until the end of the pregnancy, determined by chorionicity. For uncomplicated monochorionic diamniotic pregnancies, termination of pregnancy can be considered between 36 and 37 weeks, while for uncomplicated monochorionic monoamniotic pregnancies, termination can be considered between 32 and 32.6 weeks of gestation [28]. For an

uncomplicated triple gestation, they recommend visits every four weeks after the first-trimester ultrasound until week 24, then visits every two weeks until week 32, and finally, weekly visits until delivery. In triplet gestations with a monochorionic component, check-ups should be biweekly from the beginning to week 32 and then weekly visits until the end of the pregnancy, between weeks 34 and 35. In particular, it is suggested that in trichorionic gestations, the term is at 35 weeks. In those with a monochorionic component, it is at 34 weeks, as long as no complications are associated with monochorionicity [26].

As we can see in the practices suggested in the Social Security Institutes of Mexico and Guatemala [23, 25], the update of the 2019 NICE Guidelines published in 2020 [24], as well as the visit scheme of the Fetal Medicine Foundation of the Hospital Clínic de Barcelona [26] and the specialized literature on the matter, prenatal care, whether in consultation or ultrasound studies, presents a higher and differentiated requirement in multiple pregnancies. Contrasting these international suggestions with our results, where the almost identical means of antenatal and emergency visits were low, we can see how exceptional antenatal care for multiple pregnancies can be in patients referred to our center. The total number of ultrasound scans, exclusively assuming dating, chorionicity, early aneuploidy markers, early anatomical studies, Doppler studies, biometrics, cervicometry, and amniotic fluid evaluations, should not be less than 7, 12, and 9 for dichorionic and monochorionic pregnancies and triplet pregnancies (without a monochorionic component), respectively, without maternal-fetal complications [26].

The International Society for Ultrasound in Obstetrics and Gynecology (ISUOG) recommends an ultrasound follow-up routine similar to that of other organizations. In their clinical practice guidelines for ultrasound monitoring multiple pregnancies, Khalil et al. recommend performing at least six dichorionic tests and 12 uncomplicated monochorionic tests [29].

The fundamental limitation in our setting is not having regulations from the Ministry of Public Health approved explicitly for managing multiple pregnancies. There are also no specialized units for the management of these particular pregnancies in any public medical center in the city, as there is in the city of Quito at the Nueva Aurora Luz Elena de Arismendi Hospital of the Ministry of Public Health itself, where it is located. The National Center for Maternal-Fetal Medicine is under construction, and it is the only Maternal-Fetal Medicine Unit that takes on complex cases and performs intrauterine fetal therapy from the public entity [30].

The study found deficiencies in prenatal care in multiple pregnancies, such as the lack of information on chorionicity, a low number of prenatal consultations, and the lack of registration of cervicometry. A high percentage of multiple pregnancies ended prematurely. It was noted that a higher number of emergency visits did not always correlate with a higher number of NICU admissions, but reaching 37 weeks did significantly reduce neonatal NICU admissions and mortality rates. A significant proportion of pregnancies do not receive sufficient prenatal care, which increases the risk of perinatal complications and death in preterm infants. The lack of information on chorionicity in some cases is also noted. Despite receiving a similar average number of emergency care visits as prenatal visits, multiple pregnancies in the sample had a higher risk of perinatal death before admission to the NICU.

Maternal age is significantly related to prematurity in multiple pregnancies. There is a higher incidence of preterm birth in women under 18 years of age and over 35 years of age than in the population between 18 and 35 years of age, which suggests the need for specialized prenatal care in higher-risk groups. Improving prenatal care in all population groups is essential to minimize maternal-fetal morbidity and mortality in multiple pregnancies and prevent newborn complications.

Perinatal findings highlight the importance of monitoring and appropriate management in multiple pregnancies. We observed that chorionicity is related to neonatal intensive care unit (NICU) stay and embryofoetal mortality. Monochorionic pregnancies had a more extended NICU stay and higher neonatal mortality than dichorionic pregnancies. In addition, a significant association was found between maternal age and prematurity in multiple pregnancies. It is essential to perform obstetric ultrasound scans regularly during pregnancy to detect possible complications and provide adequate follow-up. However, it was observed that a more significant number of ultrasound scans was not associated with a decrease in perinatal or neonatal mortality. This highlights the importance of implementing specialized prenatal care strategies in multiple

pregnancies, especially in young women and women older than 35 years who were identified as higher-risk groups.

Conclusions

The present study reveals significant associations between emergency visits, neonatal intensive care unit (NICU) admission, and perinatal and neonatal mortality. We observed that more emergency visits were associated with fewer NICU admissions, suggesting that more frequent and timely prenatal care may contribute to better maternal and child health. In addition, we found that perinatal and neonatal morbidity and mortality were more frequent in pregnancies with fewer emergency and prenatal visits. It is essential to highlight that the leading causes of admission and mortality in the NICU were acute respiratory distress syndrome in newborns, prematurity, and neonatal sepsis. However, cases were also identified in which death occurred in the prenatal and perinatal periods without admission to the NICU, emphasizing the importance of comprehensive surveillance and care throughout the pregnancy. These results highlight the need to promote early, accessible, and quality prenatal care to prevent and reduce morbidity and mortality in the perinatal period and underscore the importance of identifying and adequately managing the leading causes of admission and mortality in the NICU. They emphasize the need for a comprehensive and personalized approach to perinatal care to optimize maternal-infant outcomes in multiple pregnancies.

Abbreviations

NICU: Neonatal intensive care unit.
RN: Newborn.

Supplementary information

No supplementary materials are declared.

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Author contributions

Adriel Sarduy Sieres: Conceptualization, data curation, formal analysis, funding acquisition, research, writing - original draft.
Cecilia Gabriela Pillasagua Cedeño: Methodology, project administration, resources, software, supervision, validation, visualization, writing - review and editing.
Alina Isabel Villacreses Cobo: Methodology, project administration, resources, software, supervision, validation, visualization.
All the authors have read and approved the final version of the manuscript.

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Publication Consent

Not required when patient-specific images, X-rays, and studies are not published.

Conflicts of interest

The authors declare they have no conflicts of interest.

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References

1. Meng X, Yuan P, Gong L, Wang X, Wu T, Wei Y, et al. Forty-five consecutive cases of complicated monochorionic multiple pregnancy treated with microwave ablation: A single-center experience. Prenat Diagn. 2019;39(4):293-8.
https://doi.org/10.1002/pd.5423
PMid:30677152

2. Glinianaia S V., Rankin J, Khalil A, Binder J, Waring G, Sturgiss SN, et al. Prevalence, antenatal management and perinatal outcome of monochorionic monoamniotic twin pregnancy: a collaborative multicenter study in England, 2000-2013. Ultrasound Obstet Gynecol. 2019;53(2):184-92.
https://doi.org/10.1002/uog.19114
PMid:29900612

3. Vayssière C, Benoist G, Blondel B, Deruelle P, Favre R, Gallot D, et al. Twin pregnancies: Guidelines for clinical practice from the French College of Gy-naecologists and Obstetricians (CNGOF). Eur J Obstet Gynecol Reprod Biol. 2011;156(1):12-7.

https://doi.org/10.1016/j.ejogrb.2010.12.045
PMid:21277672

4. Vayssière C, Sentilhes L, Ego A, Bernard C, Cambourieu D, Flamant C, et al. Fetal growth restriction and intrauterine growth restriction: Guidelines for clinical practice from the French College of Gynecologists and Obstetricians. Eur J Obstet Gynecol Reprod Biol. 2015;193:10-8.
https://doi.org/10.1016/j.ejogrb.2015.06.021
PMid:26207980

5. American College of Obstetricians and Gynecologists' Committee on Practice Bulletins-Obstetrics S for M-FM. Multifetal Gestations: Twin, Triplet, and Higher-Order Multifetal Pregnancies: ACOG Practice Bulletin, Number 231. Obstet Gynecol. 2021 Jun;137(6):e145-62.
https://doi.org/10.1097/AOG.0000000000004397
PMid:34011891

6. Khalil A, Liu B. Controversies in the management of twin pregnancy. Ultrasound Obstet Gynecol Off J Int Soc Ultrasound Obstet Gynecol. 2021 Jun;57(6):888-902.
https://doi.org/10.1002/uog.22181
PMid:32799348

7. National Institute for Health and Care Excellence (NICE). Twin and triplet pregnancy. NICE Guidel (NG 137). 2019;(September):1-61.

8. Gibson JL, Castleman JS, Meher S, Kilby MD. Updated guidance for the management of twin and triplet pregnancies from the National Institute for Health and Care Excellence guidance, UK: What's new that may improve perinatal outcomes? Acta Obstet Gynecol Scand. 2020;99(2):147-52.
https://doi.org/10.1111/aogs.13785
PMid:31799724

9. Orozco-Quinga X, González-Andrade F. Maternal and Perinatal Factors Associated With Twin Pregnancies in Ecuador. Twin Res Hum Genet. 2021;1-7.
https://doi.org/10.1017/thg.2021.12
PMid:33752776

10. Khalil A, Liu B. Controversies in the management of twin pregnancy. Ultrasound Obstet Gynecol. 2021 Jun;57(6):888-902. doi: 10.1002/uog.22181. Epub 2021 May 21. PMID: 32799348.

11. Ministerio de Salud Publica. Ecuador. Control prenatal. Guia de practica clinica. Dirección. Quito, Ecuador.

12. Publica M de S. Manual de evaluacion y categorizacion del riesgo obstetrico en el control prenatal. Quito, Ecuador.: Direccion Nacional de Normatizacion. Plataforma Gubernamental de Desarrollo Social.; 2019. p. 50.

13. Sociedad Española de Ginecología y Obstetricia. Guía de Asistencia Práctica* Embarazo gemelar bicorial. Prog Obs Ginecol. 2016;59(2004):43-57.

14. Obstetricia. SE de G y. Sociedad Española de Ginecología y Obstetricia. Gestación monocorial. Prog Obs Ginecol. 2020;63(2):123-45.

15. Auqui-Carangui DA, Narvaez-Rueda AM, Sanchez-Centeno PR, Quiroz-Proaño MB. Embarazo Gemelar Biamniótico Bicoriónico con Restricción del Crecimiento Intrauterino Grado III G1. Reporte de un caso. Medicina (B Aires). 2020;6:12.

16. Chen H, Wan Y, Xi H, Su W, Cheng J, Zhu C, et al. Obstetric and perinatal outcomes of dizygotic twin pregnancies resulting from in vitro fertilization versus spontaneous conception: A retrospective study. PeerJ. 2019;2019(4):1-11.
https://doi.org/10.7717/peerj.6638
PMid:30972247 PMCid:PMC6448552

17. Chen Wu X. Gestación múltiple. Rev Medica Sinerg. 2018;3(5):14-9.
https://doi.org/10.31434/rms.v3i5.122

18. Townsend R, Khalil A. Ultrasound screening for complications in twin pregnancy. Semin Fetal Neonatal Med [Internet]. 2018;23(2):133-41. Availa-ble from:
https://doi.org/10.1016/j.siny.2017.11.008
PMid:29467101

19. Townsend R, Khalil A. Ultrasound screening for complications in twin pregnancy. Semin Fetal Neonatal Med [Internet]. 2018;23(2):133-41. Availa-ble from: https://doi.org/10.1016/j.siny.2017.11.008
PMid:29467101

20. Guevara EDG. Diagnóstico ecográfico de la corionicidad y amnionicidad en el embarazo múltiple. Rev Peru Investig Matern Perinat. 2019;4(1):46-50. https://doi.org/10.33421/inmp.21543

21. CENETEC, Secretaría de Salud C. Evidencias y Recomendaciones. Catálogo Maest CENETEC [Internet]. 2016;1:1-41. Available from: http://www.cenetec.salud.gob.mx/descar-gas/gpc/CatalogoMaestro/007_GPC_Circula-cionArtPerif/IMSS_007_08_EyR.pdf%0A

22. CENETEC. GPC Evidencias y Recomendaciones. Cenetec [Inter-net]. 2009;59. Available from: http://www.cenetec.salud.gob.mx/descargas/gpc/CatalogoMaes-tro/141_GPC_HEMOFILIA_PEDIATRICA/Imss_ER.pdf

23. Recolecta UA de. Instituto Guatemalteco de Seguridad Social. Inst Guatem Segur Soc [Internet]. 2018;47:1. Available from: https://uardigital.cl/courses/course-v1:UAR+LPQV01+2020_1S/about

24. Leanne Bricker, MB.BCh, MRCOG C in F and MM. Optimal an-tena-tal care for twin and triplet pregnancy: The evidence base. Best Pract Res Clin Obstet Gynecol [Internet]. 2014;28(2):305-17. Availa-ble from: http://dx.doi.org/10.1016/j.bpobgyn.2013.12.006

https://doi.org/10.1016/j.bpobgyn.2013.12.006
PMid:24412490

25. Instituto Mexicano del seguro social. Diagnóstico y manejo del Embarazo múltiple. 2013;14.

26. Goncé A, Boguña J, Muñoz M, Montse P, Bennasar M, Crovetto F. Asistencia al embarazo y parto de gestaciones múltiples. Hosp Clínic,Hospital St Joan Déu, Univ Barcelona. 2015;(Dc):1-23.

27. Berceanu C, Mehedințu C, Berceanu S, Voicu NL, Brătilă E, Is-trate-Ofițeru AM, Navolan DB, Niculescu M, Szasz FA, Căpitănescu RG, Văduva CC. Morphological and ultrasound findings in multiple pregnancy placentation. Rom J Morphol Embryol. 2018;59(2):435-453. PMID: 30173248.

28. Gynecologists, Royal College of Obstetricians and GG. Manage-ment of Monochorionic Twin Pregnancy: Green-top Guideline No. 51. BJOG An Int J Obstet Gynecol. 2017;124(1):e1-45. https://doi.org/10.1111/1471-0528.14188
PMid:27862859

29. Khalil A, Rodgers M, Baschat A, Bhide A, Gratacos E, Hecher K, et al. ISUOG Practice Guidelines: Role of ultrasound in twin preg-nancy. Ultrasound Obstet Gynecol. 2016;47(2):247-63. https://doi.org/10.1002/uog.15821
PMid:26577371

30. Ortiz C, Mendoza Cl. Ministerio de Salud Pública Viceministerio de Atención Integral en Salud Subsecretaría de Atención de Salud Móvil, Hospitalaria y Centros Especializados. 2023;2-5.

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