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## The significance of the maternal dashboard lies in its ability to improve the quality indicators of obstetric and gynecological teaching hospitals

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### Abstract

The well-being of the mother and her baby can be influenced by the quality of the care they receive during pregnancy, childbirth, and postpartum. It's crucial to ascertain the quality of healthcare to improve it. Therefore, utilizing a maternity dashboard is vital to measure key performance indicators (KPIs), improve the quality of care, and ensure high-quality care.

**Objectives:** To identify and determine the effectiveness of the maternity dashboard for KPIs development.

**Methods:** In this prospective observational study, applied research was conducted to identify and determine KPIs developing by implementing a maternity dashboard in Iraq for the first time, we employed a framework organized by the implementation of a maternity Dashboard (MDB) design by Excel program, which is a traffic light program (green, amber, red), Data were collected manually from the outpatient department, labor ward, neonatal intensive care unit registers, and electronic records from January 1 to November 30 /2023, in Obstetric and Gynecologic Teaching Hospital in Kerbala.

**Results:** 1<sup>st</sup> 6 months after implementation compared with the last 6 months after implementation, the audit and feedback program were associated with statistically significant decreases ( $p < 0.05$ , mean and SD) in the rates of NICU (from  $81.17 \pm 14.27$ ,  $60.33 \pm 14.15$ ) respectively, significant decreases in END (from  $9.7 \pm 2.9$ ,  $8.0 \pm 3.9$ ) respectively, statistically significant in increase NVD (from  $870 \pm 86$ ,  $940 \pm 30$ ), and statistically significant in decrease CS (from  $438.5 \pm 54.16$ ,  $372.5 \pm 47.42$ ).

**Conclusion:** Maternity dashboards were improving maternity care as appeared in the result of our study, and it was a way to assess effective management. These dashboards can provide valuable and practical information through KPIs, which serve as criteria for evaluating performance.

**Keywords:** Maternity dashboard, clinical dashboards, key performance indicators, clinical care, quality indicators

### 1. Introduction

The enhancement of the quality of patient care and clinical outcomes remains a primary duty and priority for healthcare organizations [1, 2]. The provision of excellent care is crucial during pregnancy and delivery, as well as in the early neonatal stage. The quality of care influences the well-being of a pregnant woman and the child she receives throughout her pregnancy, delivery, and postpartum period [3]. Ultimately, positive outcomes for both the mother and newborn result from the timely, appropriate, and high-quality care provided by prenatal care providers [4]. Ensuring favorable health outcomes and reducing maternal and infant mortality necessitate the improvement of the quality of care provided to expectant women and newborns [5, 6].

One of the first stages in raising the standard of care for expectant mothers and newborns is measuring the quality of healthcare [7]. The Royal College of Obstetricians and Gynecologists in Britain and Ireland advised the use of a maternity dashboard to enhance clinical treatment and continually track clinical outcomes in expectant women. Poor clinical performance may be measured and managed with the aid of the maternity dashboard [8]. Maternity dashboards are useful for precise and ongoing performance monitoring, implementing required service modifications, and enhancing patient care [9]. A maternity dashboard aims to ensure the implementation and maintenance of clinical governance principles in the daily performance of healthcare providers [8].

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Clinical governance serves as a framework by which healthcare organizations are expected to continuously enhance the quality of care and achieve a high standard of patient care. In addition, it ensures the maintenance of high care standards. The implementation of clinical governance principles and the identification of areas that require attention and actions to improve patient safety and satisfaction are facilitated by the maternity dashboard [9]. Acting as an effective tool for measuring the disparity between actual performance and planned objectives, the maternity dashboard may support managers in making well-informed and desirable decisions. As a result, implementing changes to enhance the performance of the hospital healthcare system becomes crucial [1]. The maternity dashboard offers valuable insights by providing a monthly summary of gynecology and obstetrics ward performance concerning predetermined key performance indicators (KPI) [10, 11]. The capacity of this dashboard to visually display deviations in performance and quality indicators through a coding system of red, amber, and green is beneficial in informing users of such deviations, thereby enhancing users' comprehension of service performance and quality [9, 12]. Consequently, the maternity dashboard proves to be an efficient and dynamic instrument for quality control, continuous service enhancement, and performance monitoring [8, 9].

The effective deployment of a dashboard depends heavily on the use of Key Performance Indicators (KPIs) that align with objectives [1, 12, 13]. The selection of KPIs within the dashboard facilitates the measurement of the quality of care and services provided [14, 15]. Key performance indicators play a vital role in the evaluation process by aiding in the identification and assessment of performance levels. These metrics also assist in identifying and comparing

performance levels among related services. The ultimate goal of finding appropriate KPIs is to support the provision of high-quality services [16, 17].

## 2. Methodology

### 2.1 Selection of subjects

A prospective Observational study was used, the study population included all hospital deliveries taking place in the Obstetric and Gynaecologic Teaching Hospital in Kerbala, between January 1 to December 30, 2023.

### 2.2 Key Performance Indicators

We chose 4 KPIs; Normal Vaginal Delivery (NVD), Caesarian secession (CS), Neonatal Intensive Care Unit (NICU) admission, and Early Neonatal Death (END), we obtain the data as two sets from the 1<sup>st</sup> 6 months and last 6 months of the study period. Data quality assessments in both data sets indicate that the data are of good quality overall, and data quality is comparable between the two data sets, we used the data sets to calculate clinical performance indicator rates.

### 2.3 Maternity Dashboard

The Dashboard audit and feedback intervention to allow for increased awareness and uptake of the Dashboard. We employed a framework organized by the implementation of a maternity Dashboard (MDB) design by Excel program. Goals were set for each of these, along with upper and lower to the stander goals of WHO. The traffic light approach was used to grade performance. Parameters in “green” were considered as a gold standard, and “amber” and “red” parameters depicted areas of weakness and warranted immediate corrective measures. All the parameters that were analyzed were noted on the dashboard as in Figure (1).

		Maternity Dashboard															
Activities	International incidence	Goal	Red	yellow	Green	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 Total deliveries			>1350/month	1350-1300 /month	<1300/month	1506	1334	1392	1226	1256	1173	1326	1313	1319	1425	1256	1324
2 OPD appointment		<4000/month	> 5000	5000-4000	< 4000	7031	6100	2967	2304	6218	6129	5938	5950	3640	3700	2311	5942
3 Total NVD	0.99	> 90 %	< 75 %	75-85 %	> 85 %	66%	68%	65%	63%	63%	70%	69%	69%	73%	69%	75%	73%
4 Total CS	18.60% %	< 20 %	> 30%	20-30 %	< 20 %	33%	31%	34%	37%	36%	29%	30%	31%	26%	30%	24%	26%
<b>Maternity</b>																	
1 Midwife/patient ratio		90.00%	25.00%	33%	50%	1%	2%	1%	1%	2%	2%	2%	2%	2%	1%	2%	2%
2 Specialist/midwife ratio		90%	< 80 %	90%-80 %	>90%	86%	86%	90%	89%	79%	81%	90%	80%	81%	90%	95%	81%
2 Episiotomy	10%	20%	>30%	30-25%	<25%	33%	24%	24%	40%	35%	23%	19%	18%	31%	34%	26%	36%
3 3 <sup>rd</sup> & 4 <sup>th</sup> degree tear	0-8%(ROG)/5/month UK	< 3/month	> 7/month	7-4/month	< 4/month	0	2	6	0	3	2	0	2	2	2	2	1
4 PPH	0.3-1.8 %	< 10/month	> 30/month	30-20/month	< 20/month	30	40	36	39	43	30	35	46	34	48	19	40
5 ICU admission	< 1 %	< 3/month	> 7/month	7-4 /month	< 4/month	0	0	0	0	0	0	0	0	0	0	0	0
6 Postpartum hysterectomy	0.2-8.7/1000	2/year	4/year	3/year	< 2/year	0	0	0	0	0	0	0	0	0	0	0	0
7 Maternal death	< 70/100000, < 1 %	1/year	> 2%	2%-1%	< 1%	0	0	0	1	0	1	0	0	0	0	0	0
<b>Neonatal outcomes</b>																	
1 <7 Apgar score at 5m	7/1000	< 3 /month	> 4/month	3-4/month	< 4/month	2	0	0	0	0	0	0	0	0	0	0	0
2 Meconium aspiration	0.7-5%/1000	2/month	5/month	4/month	3/month	2	1	0	0	0	1	0	0	0	1	1	0
3 Birth asphyxia	1-2/1000	4 /month	>10/month	10-6 /month	< 6/month	5	7	8	7	10	3	8	11	12	10	13	3
4 Stillbirth	3-5/1000	10 /month	> 15/month	15-11/month	< 11/month	15	12	8	8	15	11	16	10	14	14	13	12
5 END	< 12/1000	10/month	> 12 /month	12-10 /month	< 10/month	12	9	8	14	6	9	7	6	15	10	4	6
6 NICU	< 18/1000	25/month	> 50/month	50-30/month	< 30/month	77	74	82	97	97	60	69	74	62	69	36	52
6 Birth weight <2500 g	14.7%,14-15/1000	30/month	> 40/month	40-35/month	< 35/month	45	42	53	50	69	79	21	19	29	27	16	17

Fig 1: Maternal Dashboard.

### 2.4 Ethical Approval

The study proposal was approved by the ethics committee at the University of Al-Mustanserya College of Medicine, located in the

Baghdad. Before collecting samples, the public of Health in Kerbala and the Master of Obstetrics and Gynecology Teaching Hospital were contacted for permission to start the study.

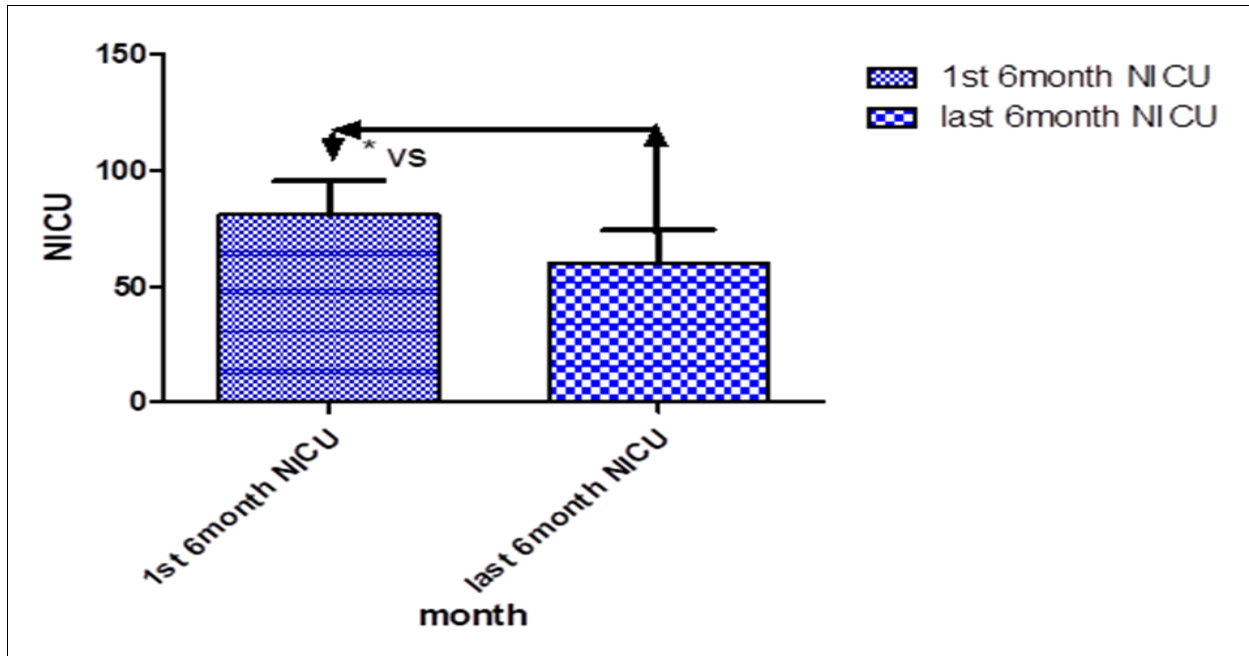
**2.5 Statistical Analysis**

SPSS vs. 26 was used to do statistical analysis. The participant's data were described using mean and SD Chi-square and t-tests were used to examine the relationship between KPIs. For statistical significance, a p-value of less than 0.05 was considered

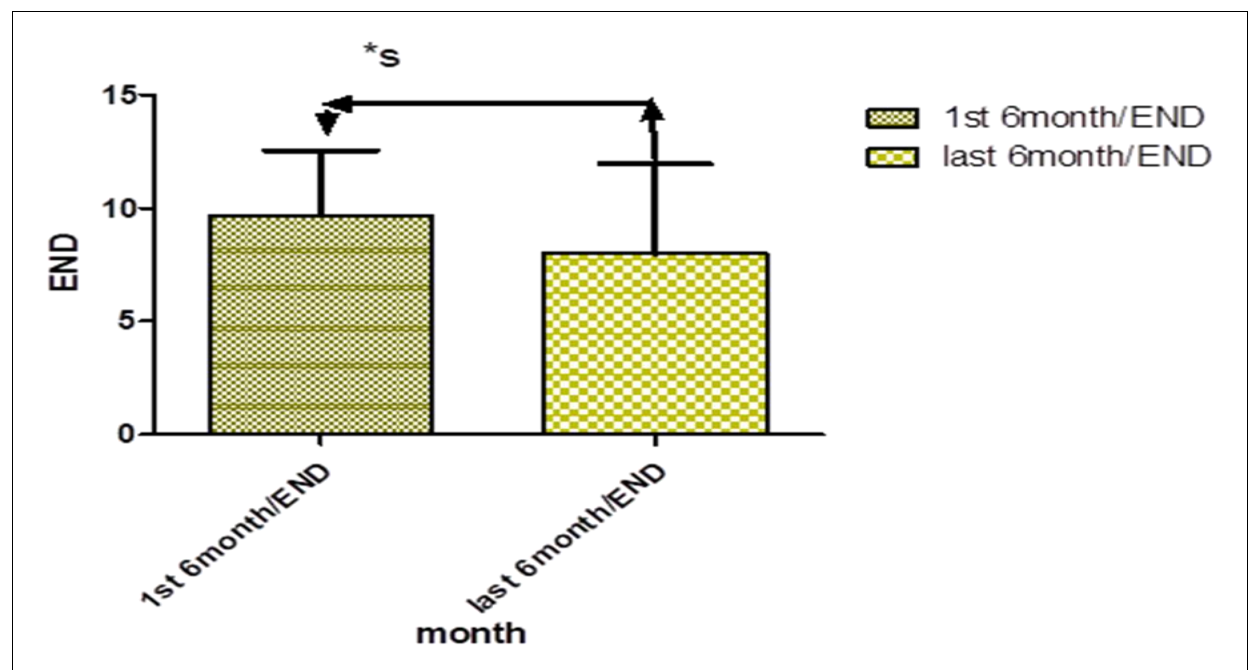
**3. Results**

Overall, statistically significant improvements due to the Dashboard were observed for most indicators that appear in our result between the 1st 6 months and the last 6 months after implementation of MDB.

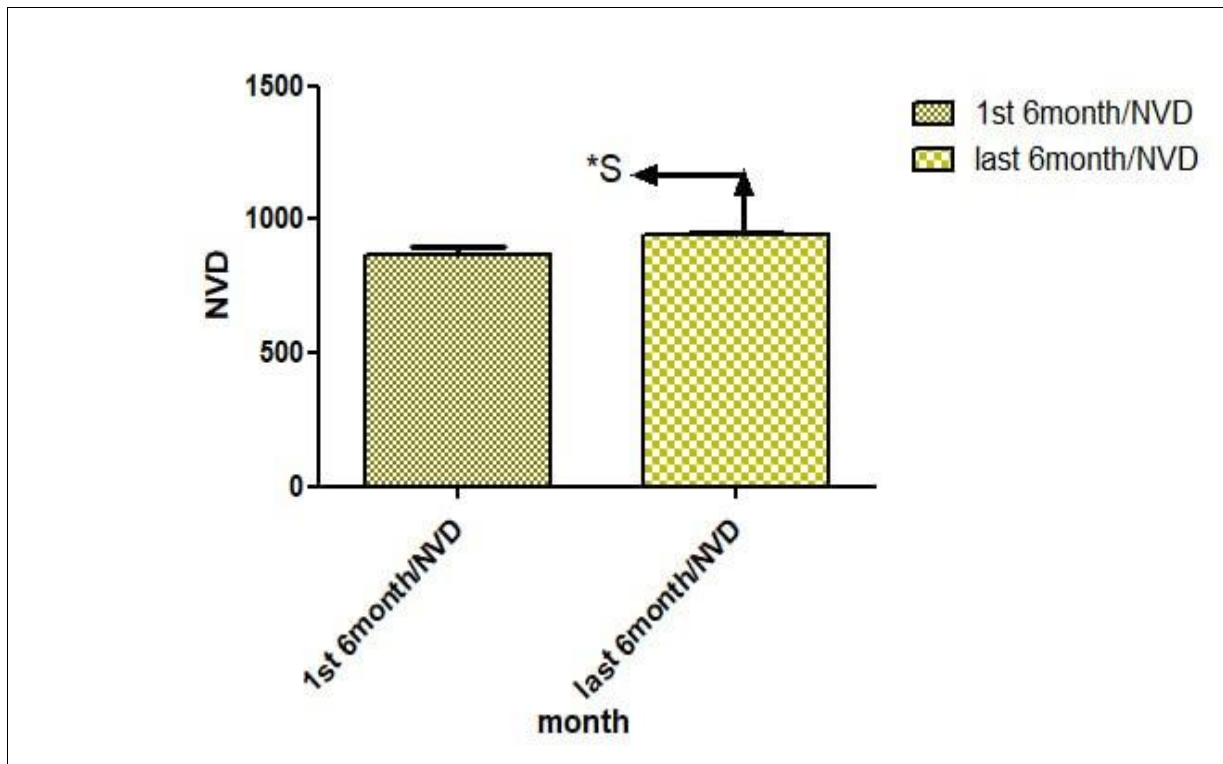
It shows there was a significant decrease ( $p = 0.0254$ ) in NICU admission between the 1st 6 months and the last 6 months of the study period ( $81.17 \pm 14.27$ ,  $60.33 \pm 14.15$ ) respectively as in figure (2), there was a significant decrease ( $p = 0.042$ ) in END between the 1st 6 months and last 6 months of the study period ( $9.7 \pm 2.9$ ,  $8.0 \pm 3.9$ ) respectively as in figure (3), there was a significant increase ( $p = 0.038$ ) in NVD between the 1st 6 months and last 6 months of the study period ( $870 \pm 86$ ,  $940 \pm 30$ ) respectively as in figure (4) and there was a significant decrease ( $p = 0.048$ ) in CS between the 1st 6 months and last 6 months of the study period ( $438.5 \pm 54.16$ ,  $372.5 \pm 47.42$ ) respectively as in figure (5).



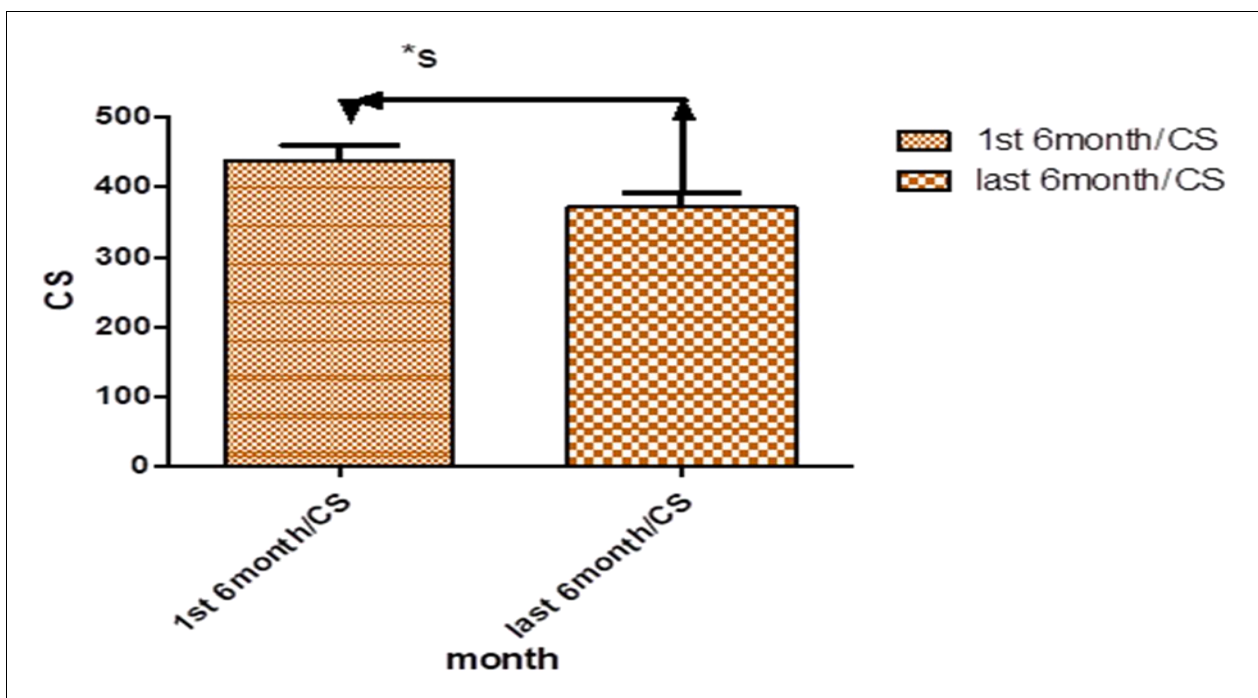
**Fig 2:** Mean NICU for 1st 6 months and last 6 months after implementation of MDB. The number of asterisks (\*) corresponds to the level of statistical significance ( $* p < 0.05$ ). All values refer to mean ±SD.



**Fig 3:** Mean END for 1st 6 months and last 6 months after implementation of MDB. The number of asterisks (\*) corresponds to the level of statistical significance ( $* p < 0.05$ ). All values refer to mean ±SD.



**Fig 4:** Mean NVD for 1st 6 months and last 6 months after implementation of MDB. The number of asterisks (\*) corresponds to the level of statistical significance (\*  $p < 0.05$ ). All values refer to mean  $\pm$ SD.



**Fig 5:** Mean CS for 1st 6 months and last 6 months after implementation of MDB. The number of asterisks (\*) corresponds to the level of statistical significance (\*  $p < 0.05$ ). All values refer to mean  $\pm$ SD.

**4. Discussion**

Changes were initiated based on the insights provided by the dashboards. They enabled the team members at the Obstetric and Gynecologic Teaching Hospital, in Kerbala to review outcomes pinpoint areas needing enhancement, and suggest improvements during the training meetings kick-off sessions. Moreover, the dashboards allowed the team to focus their training efforts on aspects associated with indicators frequently appearing as flags. These areas included things like (i) admissions, to the special care baby

unit; (ii) END, (iii) NVD, and (iv) CS. As a result, the training sessions, in the area covered topics such as resuscitating newborns and monitoring the condition of the fetus during childbirth to improve outcomes [18, 19]. The data on the dashboards, in particular, showed how many babies were admitted to the special care unit, which sparked conversations among staff members and an investigation into the underlying causes [20]. According to the study's findings, the introduction of MDB significantly reduced the CS rate, increased the rate of NVD

in pregnancies, and improved the CS rate overall. Although there was no significant difference in perinatal outcomes between the pre-intervention and post-intervention periods, pregnant women experienced an increase in the average duration from admission to birth following the MDB's introduction. CS is currently the most common surgical treatment performed on women. It is a vital technique that saves the lives of mothers and fetuses when natural vaginal birth is no longer the safest alternative<sup>[21]</sup>. However, from the standpoint of public health, doing CSs for low-risk pregnancies puts moms and fetuses at greater risk for both short- and long-term health problems<sup>[22]</sup>. As a result, the CS rate throughout pregnancies is regarded as a crucial obstetric care quality indicator<sup>[23]</sup>. The results of the present study are consistent with those of other studies, indicating that increasing the adherence of healthcare workers to the criteria for arrest of labor significantly reduced the rate of CS delivery and increased the rate of NVD after MDB intervention was implemented in the labor and delivery unit of a maternity hospital in Kerbala.

### 5. Recommendation

- a. Finding cutting-edge and workable labor and delivery care approaches that promote a natural birth and lower the proportion of needless cesarean procedures.
- b. To prevent major obstetrical problems, women with a history of C/S, chronic medical disorders, no ANC, young or old primiparous, and multigravida need extra attention from their families and healthcare providers
- c. Ensuring all cases of Preterm Infants and NICU admission infants are registered, ensuring health before the discharge of the case.

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### 7. Conflicts of interest: None

### 8. Authors' contribution

The authors contributed equally to this work, from the implementation and design of the research to the analysis of the results and the writing of the manuscript.

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