

# Maternal Dash Board Role in Entrance to Neonatal Intensive Care Unit

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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. Therefore, utilizing a maternity dashboard is a visual tool to measure Quality indicators (QIs), improve the quality, and ensure high-quality care. Our study aims to identify and determine effective QIs for developing a maternity dashboard. This prospective observational study research was conducted to identify and determine QIs for developing a maternity dashboard in Iraq, we employed a framework organized by the implementation of the Dashboard (MDB) design, data collection, and implementation from January 1 to November 30 in the Obstetric and Gynecologic Teaching Hospital in Kerbala. The results of our study included all deliveries of 1 year before compared with 1 year after implementation, the audit and feedback program showed statistically significant decreases ( $p < 0.05$ , mean and SD) in the rates of stillbirth (from  $16 \pm 5$  to  $12 \pm 3$ ) respectively, significant reductions in NICU admission (from  $96 \pm 14$  to  $71 \pm 17$ ) respectively, also significant decreases in END (from  $12 \pm 5$  to  $9 \pm 3$ ) respectively. Maternity dashboards are vital instruments for delivering effective maternity care. These dashboards can provide valuable and practical information through QIs, which serve as criteria for evaluating performance.

**Keywords:** Maternity Dashboard, Clinical Dashboards, Quality Indicators, Neonatal Intensive Care, Still Birth.

## 1. Introduction

Enhancing patient care quality and clinical outcomes remains a paramount obligation and focus for healthcare establishments [1, 2]. Optimal care and the initial neonatal period are imperative throughout the gestation and parturition phases. The level of care provided to a pregnant individual during pregnancy, labor, and the postnatal phase impacts the well-being of both the mother and her offspring [3]. Favorable maternal and neonatal results are fundamentally the consequence of prompt, suitable, and top-notch care administered to women and infants, as evidenced by the proficiency of prenatal healthcare providers [4]. Improving the caliber of care extended to pregnant individuals and

newborns is essential in ensuring advantageous health outcomes and diminishing maternal and infant fatality rates [5, 6]. One of the primary steps in elevating the quality of care for expecting mothers and newborns is assessing the healthcare quality [7].

The recommendation of utilizing a maternity dashboard has been put forth by the Royal College of Obstetricians and Gynecologists in Britain and Ireland as a means to optimize clinical treatment and continuously monitor clinical outcomes in pregnant individuals. The utilization of a maternity dashboard can assist in the identification and supervision of substandard clinical practices [8]. Maternity dashboards play a significant role in the precise and continual monitoring of performance, as well as in the implementation of necessary adjustments to services and the improvement of patient care [9]. The primary goal of a maternity dashboard is to guarantee the integration and perpetuation of clinical governance principles in the day-to-day operations of healthcare professionals [9]. Clinical governance is a structured framework within which healthcare institutions are mandated to perpetually enhance care quality and attain superior patient care standards, all while upholding elevated levels of care. The utilization of the maternity dashboard aids in the application of clinical governance principles, pinpointing specific areas necessitating attention and interventions to ameliorate patient safety and contentment [10]. Managers may benefit from the maternity dashboard as it enables informed decision-making, serving as a potent instrument for gauging the variance between real-time performance and predetermined objectives. Consequently, it becomes imperative to introduce modifications aimed at augmenting the efficacy of hospital healthcare operations [11]. Providing a monthly synopsis of the performance within gynecology and obstetrics wards concerning established Quality Indicators (QI), the maternity dashboard proves to be invaluable [11, 12]. Through a color-coded system of red, amber, and green, this dashboard effectively illustrates deviations in performance and quality indicators, facilitating a comprehensive of service quality and performance for users [13]. Hence, the maternity dashboard emerges as a powerful and dynamic mechanism for quality assurance, continual service enhancement, and performance oversight [8,14].

## 2. Objectives of the Study

To identify and determine effective QIs for developing a maternity dashboard, and to provide regular formative and summative information to feed into services to help them improve care. Developing a local vision for improved maternity services and outcomes.

## 3. Materials and Methods

Our investigation focused on all deliveries that occurred at the Obstetric and Gynecologic Teaching Hospital in Kerbala, including 3 quality indicators;( NICU; neonatal intensive care unit, END; early neonatal death, SB; Stillbirth), encompassing all births between January 1 and December

31, 2023, with additional data collected from the preceding year. In this prospective observational study, developing a maternity dashboard in Iraq for the first time, we employed a framework organized by implementation of the Dashboard (MDB) design by Excel program. Evaluation of data quality in both datasets demonstrates an overall high level of quality, with comparable standards observed between the two sets. From January 1, 2022, to December 30, 2022, we relied on the historical dataset to compute provincial rates related to specific clinical performance metrics. Subsequently, between January 1, 2023, and December 31, 2023, we utilized the new birth registry datasets to calculate rates for clinical performance indicators trends that were assessed both pre-and post-intervention. A comparison was made between the pre-intervention trend and the post-intervention trend, the implementation of the Dashboard audit, and feedback intervention to allow for increased awareness and uptake of the Dashboard. Goals were set for each of these, along with upper and lower thresholds. 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 NVVD	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	50.00%	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%	>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%(RCOG),5/month UK	< 3/month	> 7/month	7-4/month	< 4/month	0	2	6	0	3	2	0	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 %	> 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	
7	Maternal death	< 70/100000, < 1 %	1/year	> 2%	2%-1%	< 1%	0	0	0	1	0	1	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	
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	ENND	< 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

Figure (1): Maternal Dashboard.

#### 4. Results

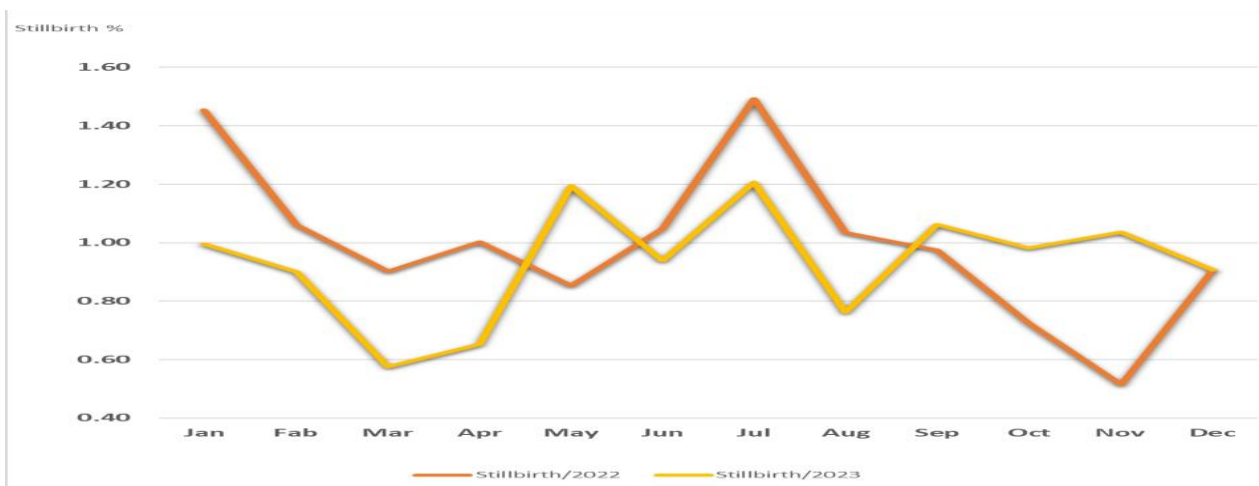
According to the indicators results of our study, the total baby birth in 2023 was 15638, while in 2022 it was 18603 so there is a high significance difference (p < 0.05) in these indicators as in table 1.

**Table 1: Show the Indicators results of our study as mean and SD.**

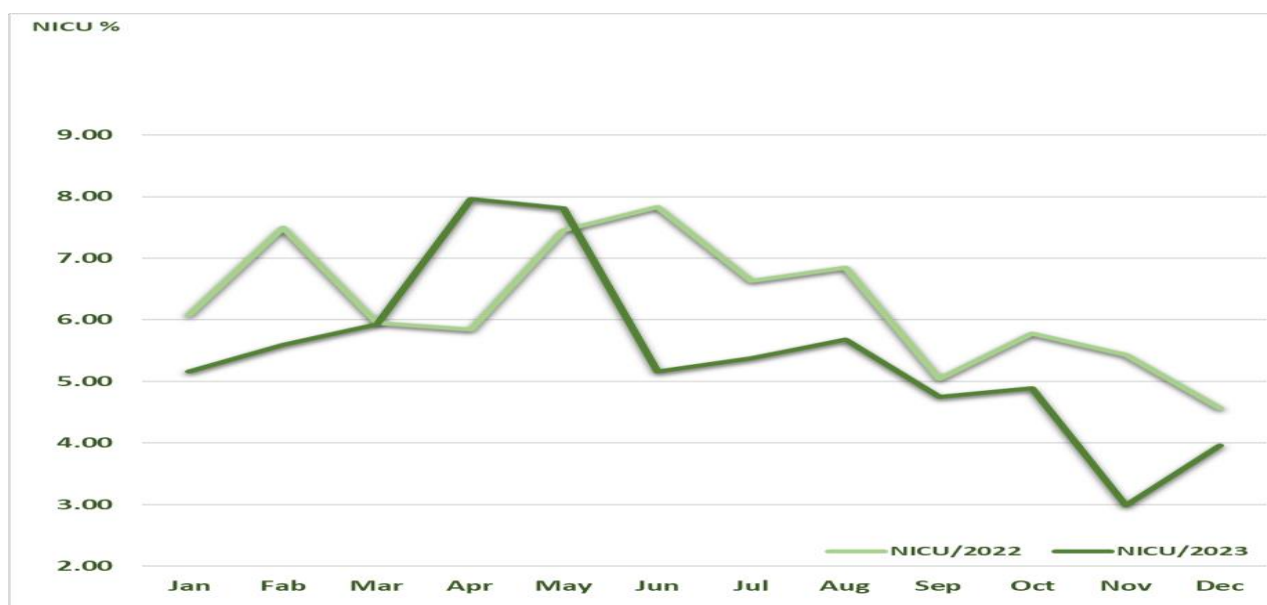
Indicators	mean	SD	95% confidence interval
Total baby delivered/2022	1566	143.3	1475-1657
Total baby delivered/2023	1321	90.32	1263-1378
Total live birth /2022	1550	141.2	1461-1640
Total live birth /2023	1303	92.75	1244-1362
Still Birth /2022	15.67	4.83	12.60-18.74
Still Birth /2023	12.33	2.67	10.63-14.03
Neonatal Intensive Care Unit/2022	96.25	14.18	87.24-105.3
Neonatal Intensive Care Unit/2023	70.75	17.38	59.71-81.79
Early neonatal death/2022	11.50	4.54	8.61-14.39
Early neonatal death/2023	8.833	3.40	6.66-11.00

NICU; neonatal intensive care unit, END; early neonatal death.

According to our results, there is a highly significant difference ( $p = 0.0483$ ) in the stillbirth trend between 2022 and 2023 after the implementation of the MDB program as in Figure 2.

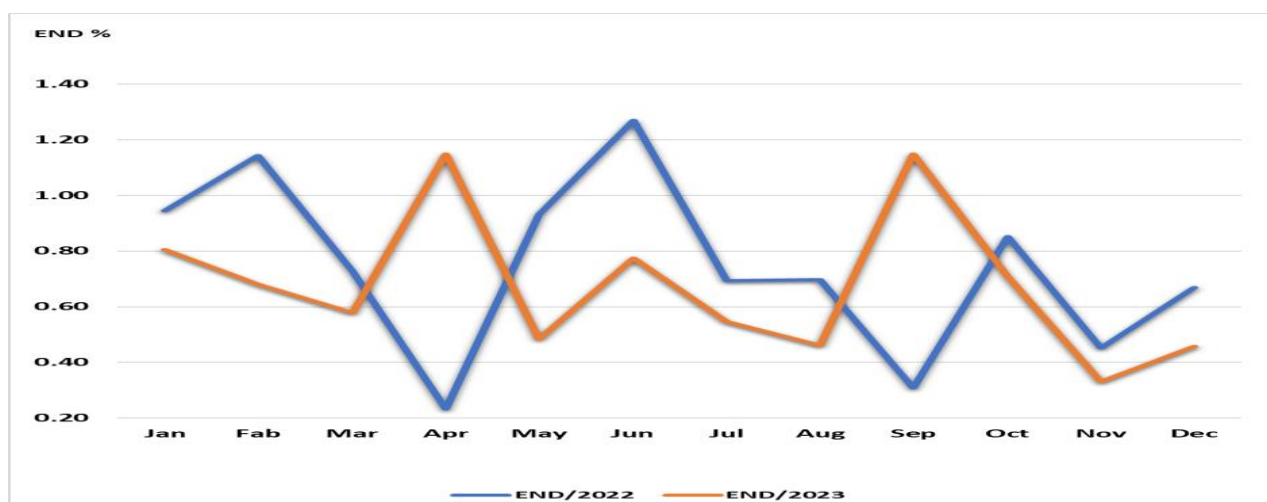
**Figur2: show the trend of stillbirth numbers through 12 months in 2022 and 2023.**

According to NICU, there is a highly significant difference ( $p = 0.0007$ ) in NICU trend between 2022 and 2023 after the implementation of the MDB program as in Figure 3.



**Figure 3:** shows the trend of NICU numbers through 12 months in 2022 and 2023.

According to END, there is a highly significant difference ( $p = 0.0173$ ) in NICU trend between 2022 and 2023 after the implementation of the MDB program as in Figure 4.



**Figure 4:** shows the trend of END numbers through 12 months in 2022 and 2023.

## 5. Discussion

The alteration was instigated by the dashboards, enabling personnel at the Obstetric and Gynecologic Teaching Hospital in Kerbala to evaluate clinical outcomes, pinpoint areas necessitating enhancement, and propose modifications during the initial phases of the monthly meetings. Furthermore, the dashboards permitted the staff to focus their education on aspects linked to indicators frequently displaying red flags. These indicators encompassed, among others, (a) admissions to the special care baby unit; (b) an Apgar score below 7, correlating with an escalated risk of cerebral palsy; and (c) stillbirths transpiring during labor or delivery, termed fresh stillbirths. As a result, the local

training encompassed instructions on neonatal resuscitation as in [16,17], and monitoring the fetus's condition during labor to optimize these outcomes. Specifically, the dashboards illustrated the number of newborns being admitted to the Neonatal Intensive Care Unit, prompting a staff discussion and an inquiry to ascertain the reasons behind this. It was revealed that a specific practice had emerged: a midwife in the labor ward could solely ensure that neonates received appropriate care from a pediatrician by admitting them to the special care baby unit in situations where pediatric junior doctors were unavailable to evaluate them before transfer, as mandated by local regulations. The employees were mindful of the fact that [18,19]. Ensuring the appropriate care for the correct neonate in an overwhelmed special care infant unit proved to be challenging. Additionally, as indicated in [20,21], needlessly separating newborns from their mothers heightens risks for both groups and impedes nursing and bonding, a scenario exacerbated when healthy infants are in contact with unwell neonates. Following the enforcement of the MDB protocol, the hospital's obstetrician, midwife, and chief pediatrician began emphasizing the necessity for newborns to undergo a physician's assessment in the labor ward before relocation to the special care infant unit. Analogous to 2022, significant reductions in NICU admission (from  $96\pm 14$  to  $71\pm 17$ ) respectively, also significant decreases in END (from  $12\pm 5$  to  $9\pm 3$ ) respectively as in [20,21]. Monitoring this trend enabled hospital management to arrange for enhanced staff availability and training in October and November 2023, notwithstanding the possibility that it might merely reflect a standard fluctuation. [23,24].

The implementation of MDB by healthcare professionals at the Obstetric and Gynecologic Teaching Hospital proved to be a successful aspect of our initiative. By recognizing the immense value of clinical data in enhancing patient safety and improving departmental outcomes, they proactively and expeditiously embraced a grassroots methodology. Notably, this patient safety initiative was not imposed by executive directives but rather was a self-initiated action.[25].

## 6. Conclusions

Provide real-time data on key maternity metrics, such as several births, maternal and infant outcomes, and utilization of services. Include visualizations and graphs to understand trends and patterns in maternity care easily. Provide training and support for healthcare providers to effectively use and interpret the dashboard.

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