Implementation of Newborn Early Warning System in Government Hospital, United Arab Emirates

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Abstract

Significant morbidity and mortality might occur in neonates due to the absence of early warning system. The seriousness of this issue is due to the rapidity of neonates to become unwell if it is not recognized early. Although usefulness of early warning signs in adult and pediatric is well documented, there is paucity of information related to neonate, and in particular, in the Gulf region.

Aims:
The aim of this study is to discuss the implementation of newborn early warning system (NEWS) in government hospital, United Arab Emirates (UAE).

Settings and Design:
A quality improvement project was implemented. We used chart reviews and focus group feedbacks that were conducted in the neonatal intensive care unit (NICU) of one Government hospital in the UAE.

Subjects and Methods:
A 3-month retrospective and prospective chart reviews were conducted of babies admitted to the NICU by using an adapted tool (NEWS chart NHS Plymouth Hospitals). Statistical analysis was used mainly frequency and percentages and themes for qualitative data.

Results:
Out of 171 babies from a retrospective study, 104 (60.8%) had risk factors and 67 (39.2%) had no risk factors. A total of 50 babies from risk factors and 14 from no risk factors were admitted to the NICU. Out of 191 babies from a prospective study, 138 (72%) had risk factors and 53 (28%) had no risk factors. Overall, 73 babies from risk factors and 18 from no risk factors were admitted to the NICU.

Conclusions:
This new tool helped to identify babies at risk and with abnormal physiological parameters at an early stage. It also facilitates to intervene appropriately before complications occur.

Keywords:
Early warning tool, escalation system, neonate scoring tool, newborn warning tool

Introduction

Significant morbidity and mortality might occur in neonates due to the absence of early warning system. The seriousness of this issue is due to the rapidity of neonates to become unwell if it is not recognized early. The usefulness of early warning signs in adult and pediatric is well documented, however, there is paucity of information related to usage and effectiveness of neonate early warning signs, in particular, in the Gulf region. The aim of this study is to discuss the implementation of newborn early warning system (NEWS) in government hospitals in the United Arab Emirates (UAE). In 2018, Joint Commission accreditation addressed a gap in our hospital, due to the absence of newborn early warning and escalation system, mainly in the obstetric ward. This issue was recognized as a priority and need to be addressed urgently, especially the hospital is equipped of other warning systems for all groups, except for newborns such as Modified Early Warning Score used for adult patients and Pediatric Early Warning Score used for pediatric patients. The reason for not having NEWS in our hospital was due to the perception that majority of newborns are considered normal and no need to have tools in place, in contrary to the adult and pediatric population who are usually admitted as sick patients. Moreover, we have 24/7 in-house neonatal physician who covers different units such as maternity and obstetrics (OB) units and who intervene when the need arise. Despite giving all the explanations, we were given 3 months to make an action plan and to ensure that we have a system in place.
A multidisciplinary team was involved that included representative from the neonatal intensive care unit (NICU) and OB to address the issue and put a plan in place. The aim of this study is to discuss the implementation of NEWS in one of the Government hospitals in the UAE.

Methods

A quality improvement project was used which included 3-month retrospective chart review of babies admitted to the NICU by using an adapted tool (NEWS chart NHS Plymouth Hospitals) to confirm whether the preidentified trigger criteria would have prompted earlier medical review. Prospective study was conducted for 3 months to assess the effectiveness of the tool identifying deteriorating babies and to intervene early, as well as focus a group of nurses in OB to provide feedback about the feasibility and effectiveness of the tool. Chart review and data collection included vital signs, diagnosis, and escalation protocol, as based on the tool. Ethical clearance was obtained from the hospital ethical committee. Inclusion criteria included all babies above 35 weeks, and exclusion criteria included babies <35 weeks and or any newborn <2 kg or any baby admitted to the NICU. This study was conducted at a level 3 NICU that has 28 beds in one of the Government hospitals in the UAE. The hospital follows baby-friendly concepts, in which all newborn babies are kept with mothers. After delivery, normal babies are observed and taking care of at maternal postnatal ward. They are observed by OB nurse, with oversight by a neonatal specialist. If it is an instrumental delivery or some risk factors identified antenatally, neonatal specialists and neonatal nurses attend these deliveries and observe them in the delivery room till they are stable and can be sent to the postnatal ward with mothers. Only premature and sick babies were admitted to the NICU. A multidisciplinary team was formed including physicians, unit managers, clinical resource nurses, and staff nurses from each of the unit mentioned. A literature review was conducted for NEWS tool, and NEWS chart NHS Plymouth Hospitals was identified, permission was obtained to use and adapt the tool, and minimal changes were made in regard to vital sign where the values were made in range value instead of independent values, for example, 150, 155, 160 to To assess the tool effectiveness in detecting unwell/deteriorating newborns, a retrospective review of charts was conducted for 3 months on 171 babies who were admitted to the NICU to compare with NEWS tool and to determine whether the assessment against NEWS criteria would have resulted in early identification and admission of newborns to the NICU, as well as a prospective study on 191 babies who met the inclusion criteria. Educational instructions were given to the staff on how to assess the newborn, which were based on structured criteria and explained to them how to fill the forms. The filled forms were kept in folder in a secured cabinet. Based on the results of the retrospective audit, the NEWS chart was modified to include all newborn babies and to keep high-risk criteria as another filter depending upon the babies' condition. The NEWS tool included different colors (green, yellow, orange, and red) with trigger values, intervention criteria, and escalation process. For example, the green color indicates Score 0, staff nurse needs to assess baby every 6 h, escalation based on the clinical judgment of charge nurse and needs to notify the NICU physician. However, Score 1 (color yellow) interventions should be started and continued every 30 min for 1 h. If baby is not settled within 1 h, the baby needs admission to the NICU, after confirmation with the physician. A focus group was used to interview eight staff nurses, including education link nurses, managers, and few staff nurse representatives from each unit who were involved in the process. A statistical analysis was used mainly the frequency and percentages and themes for qualitative data.

Results

A retrospective study was done from January 2018 to March 2018 [Table 1]. In these data, there were 259 deliveries and 171 met the inclusion criteria. Out of 171 babies, 104 (60.8%) had risk factors and 67 (39.2%) had no risk factors. A total of 50 babies from risk factors and 14 from no risk factors were admitted to the NICU. The breakdown of 104 patients with risk factors is as follows: 61 babies have Score 0, 31 babies have Score 1, 6 babies have Score 2, and another 6 babies have Score 3. From Score 0, we have 17 babies admitted to NICU (after 3–4 h of observation, 2 babies became stable and sent back to mother) and 44 babies kept with the mother in OB. In Score 1, we have 21 admitted to the NICU (after 3–4 h of observation, five babies became stable and sent back to mother), and ten babies kept with mother in OB. In Score 2 and Score 3, a total of 12 babies were admitted to the NICU. In the 67 babies with no risk factors, we found the following: 41 babies have Score 0, 23 Score 1, one Score 1, and 2 babies scored ≥3. From Score 0, two babies were admitted to the NICU, and the rest were kept with mothers. In Score 1, nine babies were admitted to the NICU and two babies admitted to the NICU scored ≥3. Based on these findings of retrospective chart review, we decided to include the tool to all babies for the prospective study. The data were collected from July 2018 to September 2018 [Table 2] and included 286 deliveries, and 191 met the inclusion criteria. Out of 191 babies, 138 (72%) had risk factors as per the tool and 53 (28%) had no risk factors. Overall, 73 babies from risk factors and 18 from no risk factors were admitted to NICU. The breakdown of 138 babies with risk factors is as follows: 79 had scored 0, 32 scored 1, 22 scored 2, and five scored above 3. From babies who scored 0, 25 babies were admitted to the NICU, and the rest 54 were stable enough to be kept with the mother. Thirty-two babies had scored 1, and 21 were admitted to the NICU and 11 were stable and kept with the mother. Twenty-two babies had scored 2 and all were admitted to the NICU and 5 scored ≥3 were admitted to the NICU. Of those five babies, on three, we had called rapid response team (RRT). Among 53 babies who had no risk, data showed the following: thirty-two (60%) of babies had Score 0, ten babies had Score 1, seven babies had Score 2, and four babies had score ≥3. From babies who scored 0, four babies were admitted to the NICU, those who scored 1, three babies were admitted to the NICU. All babies who scored 2 and ≥3 (11) were admitted to the NICU. Of all those babies who were admitted to the NICU, four babies, we had called RRT. The OB staff focus group feedback on the use of NEWS tool, the following themes were generated:

- Time-consuming "NEWS tool (in paper documentation) takes approximately 5–7 min to complete the tool; we need more time for scoring and auditing"
- Redundancy of documentation: "we document vital signs in paper and in Cerner (electronic record)"
- Confusing scoring: "we got confused in scoring, initially, we were instructed to use the tool which was based on the colour coding, later on, the tool was modified to number to match with Cerner escalation process"
- Consuming resources: "we increased the use of color printing, paper usage, and photocopying."

Table 1: New-born early warning system retrospective data from January 2018 to March 2018

Scores	Risk factors		Total
	Admitted to NICU	Post-natal care	
Score 0	17	44	61
Score 1	21	10	31
score 2	6	0	6
Score ≥ 3	6	0	6
Total	50	54	104
	No risk factors		
Score 0	2	39	41
Score 1	9	14	23
score 2	1	0	1
Score ≥3	2	0	2
Total	14	53	67
Total babies with risk and no risk factors	64	107	171

Table 2: New-born early warning system prospective data from July 2018 to September, 2018

Scores	Risk factors		Total
	Admitted to NICU	Post-natal care	
Score 0	25	54	79
Score 1	21	11	32
Score 2	22	0	22
Score ≥ 3	5	0	5
total	73	65	138
	No risk factors		
Score 0	4	28	32
Score 1	3	7	10
score 2	7	0	7
Score ≥3	4	0	4
Total	18	35	53
Total babies with risk and no risk factors	91	100	191

Discussion

The purpose of this study is to discuss the implementation of NEWS by identifying unwell or deteriorating newborn babies and to initiate the proper interventions based on the NEWS tool. Through the retrospective and prospective chart review which was done over 3 months, we identified a majority of the babies had risk factors, and even those babies who had no risk factors, some of them had abnormal vital signs. This result was consistent with that of Roland et al.'s study.[6] Healthy babies who need intervention highlighted that all babies be assessed by the NEWS criteria so that appropriate intervention can be made and to prevent any complication. The reason that majority of babies are at risk could be related to the maternal complication, not timely addressed due to the lack of antenatal care follow-up due to various reasons. The implementation of NEWS in OB unit was able to identify unwell baby and intervene accordingly, although we have standard of care to routinely assess all newborn vital sign by the OB staff within 30 min after birth and then every 6 hourly until discharge. The tool was able to make further layers of assessment, which resulted in individualized intervention based on each case. Interestingly, majority of those babies who have risk factors did not require any intervention. However, those babies with no risk had required interventions (four cases resulted in activating the RRT in the prospective study). This showed that it is a priority not to miss those babies who have no risk factors. The reason for this issue is that some newborns fail to make proper transition to extra-uterine life.[7] Moreover, we believe that all neonates need to be screened, as in Holme et al.'s[8] study, as neonates can be deteriorated rapidly, and postnatal wards are not designed to look after unwell infants.[8] Early detection will prompt effective management. Therefore, we believe the importance of screening all neonates by a valid and robust tool. Moreover, as caregivers and families have a right to expect and receive the best medical care,[9] with added layers of safety and screening. Although we have more than half of neonate admitted in the NICU were full term (consistent with Parshuram et al.'s[5] study, as cited in Holme et al.[8]), with the help of the tool we were able to reduce unnecessary admission to the NICU as indicated in our retrospective study, this also has supported the literature.[9] We found 9 (9%) babies who were admitted to the NICU stayed for a few hours and then were transferred back to mother. Based on these findings, the tool helped to admit only unwell babies to NICU.

It is worth noting here that the outcome of retrospective and prospective chart review indicated that standard of care system was effective in identifying a deteriorating newborn, however, by including NEWS, it helped us to identify them in a timely manner and intervene early. Moreover, it has a step-wise escalation system which we did not have. We also identified the admission of deteriorating babies has increased, prospective data 92 (48%) has more admission to NICU (since there is no transitional nursery, any baby who fall in the yellow or red zone in the NEWS, they are transferred to the NICU for further observation and care) than retrospective 64 (37%), but on the other hand had reduced unnecessary admission. The staff perception about the tool was similar to the literature review in regard to workload[10] redundancy of documentation, workload, and time-consuming, to fill the form Isaacs et al.[11,12] and to do the auditing. The authors believe that the NEWS tool has the ability to detect unwell newborn babies during the early stages of their lives. This study helped to develop an escalation protocol [Figure 2] NEWS guidelines developed and interventions were included in the study. The tool now will be included in our Cerner (electronic medical record) and system will trigger scores on babies who are unwell according to the criteria. The authors recommend to have a prospective study, using a larger sample size to assess NEWS simplicity and accuracy.

Conclusion

Identifying deteriorating healthy babies in a timely manner is our priority, and it can be prevented by using appropriate escalation system. This study has provided evidence that NEWS is an effective tool to ensure newborn safety is met. We strongly recommend implementing this tool as an early warning system in all newborns, as well as to use the tool in step-down units and for those babies who are admitted in the pediatric ward but <28 days of age.

References

1. Skaletzky SM, Raszynski A, Totapally BR. Validation of a modified Paediatric Early Warning System Score: A retrospective case-control study. Clin Pediatr 2012;51:431-5.
2. Duncan H, Hutchison J, Parshuram C. The Paediatric Early Warning System Score: A severity of illness score to predict urgent medical need in hospitalized children. J Crit Care 2006;21:271-8.
3. Gold DL, Mihalov LK, Cohen DM. Evaluating the Paediatric Early Warning (PEWS) system for admitted patients in the paediatric emergency department. Acad Emerg Med 2014; 21:1249-56.
4. Sheikh S, Qureshi R, Nausheen S, Sikandar R. Implementation of warning tool to improve maternal newborn health outcomes in a developing country. J Pak Med Assoc 2017;67:111-5.
5. Parshuram CS, Duncan HP, Joffe AR, Farrell CA, Lacroix JR, Middaugh KL, et al. Multicentre validation of the bedside Paediatric Early Warning System Score: A severity of illness score to detect evolving critical illness in hospitalised children. Crit Care 2011;15:R184.
6. Roland D, Madar J, Connolly G. The new-born earlywarning (NEW) system: Development of an at-risk infant intervention system. Infant 2010;6:116-20.
7. Paliwoda M, New K. Early warning tools in maternity and neonatal settings: A literature review. Neonatal Paediatr Child Health Nurs 2015;18:19-23.
8. Holme H, Bhatt R, Koumettou M, Griffin M, Winckworth L. Retrospective evaluation of a new neonatal trigger score, PEDS 2013:131:837-42. 9. Ahmed M, Phillips I, Karupaih A, Kamireddy H, Manzoor A. Newborn observation track and trigger (NOTT) chart. J Coll Physicians Surg Pak 2016;26:234-7.
10. Mitchell I, McKay H, van Leuvan C, Berry R, McCutcheon C, Avard B, et al. A prospective controlled trial of the effect of a multifaceted intervention on early recognition and intervention in deteriorating hospital patients. Resuscit 2010;81:658-66.
11. Isaacs RA, Wee MY, Bick DE, Beake S, Sheppard ZA, Thomas S, et al. A national survey of obstetric early warning systems in the United Kingdom: Five years on. Anaesthesia 2014;69:687-92.
12. Mackintosh N, Watson K, Rance S, Sandall J. Value of a modified early obstetric warning system (MEOWS) in managing maternal complications in the peripartum period: An ethnographic study. BMJ Qual Saf 2014;23:26-34.