ORIGINAL RESEARCH PAPER

Neonatology

KEY WORDS: Clinical audit, Neonates, NICU protocol

CLINICAL AUDIT OF NEONATAL CARE IN A RURAL TEACHING HOSPITAL, INDIA

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ABSTRACT

Background: The current study aims to audit the current care of newborns in the NICU in comparison with the previous year(treating consultant discretion versus Unit-protocol based approach).
Methods: The current study was carried out at NRI medical college, in the period from May 2016 to April 2017 (treating consultant discretion) and May 2017 to April 2018(Unit protocol based approach).In the present work all data was collected retrospectively through the clinical records for May 2016 to April 2017 and prospectively between May 2017 to April 2018.
Results: Triage, antibiotic stewardship and outcomes improved with predefined protocols.
Conclusions: Application of unified protocol is important for optimum care in NICU. Conducting such audits, help identify areas that have improved and could be improved, to improve outcomes in NICU.

INTRODUCTION

The authors of the Cochrane Review defines clinical audit as, "The provision of any summary of clinical performance over a specified period of time"(1). Medical care of neonates in NICU has undergone rapid changes over past few years. One of the purposes being, to decrease the excess of interventions performed on a newborn. There are evidences that most of the performed interventions are unnecessary, and some may even be harmful(2,3).

Variations in practices used in NICUs have been addressed in different situations, with different impacts on their health. Published data reports huge discrepancies between the existing scientific evidences and the medical practices.

The current study aims to audit unified Unit based protocols versus treating physicians' discretion in improving care and outcomes of neonates in NICU.

METHODS

The current study was a clinical audit carried out between May 2016 to April 2018 in NRI medical college, Guntur. The data from May 2016 to April 2017 was collected retrospectively from hospital records and prospectively from May 2017 to April 2018. The study included all neonates both inborn and outborn admitted to NICU at NRI medical college.

NRI Medical Ethical Review Board approved the study.

Statistical analysis

All data were analyzed using SPSS software Chicago, IL, USA, version 21. Categorical variables in both groups were presented as frequency and percentage.To test the association between categorical variables chi- square test was performed. Continuous variables were presented as mean and standard deviation. To test the difference between the two mean values t-test was used. A p-value of ≤ 0.05 is considered significant.

Table 1 shows the baseline criteria of the study participants.

		May 2016-April 2017	May 2017-April 2018	P-value
1.	TOTAL NUMBER OF DELIVERIES(LIVE+STILL BIRTH)	2029	2896	
2.	TOTAL NUMBER OF LIVE BIRTHS	1994	2848	
3	TOTAL NUMBER OF NICU ADMISSIONS : DIRECT NICU ADMISSIONS : Inborn Outborn	919 532 493 39	739 427 351 76	0.0001 0.0001
4	TOTAL NUMBER OF NICU ADMISSION FROM WARD:	387	312	0.0001
5	WEIGHT OF THE BABY: 500-800gm: 801-1000gm: 1001-1500gm: 1501-2000gm: 2001-2500gm: 2501-3500gm: >3501gm: GESTATIONAL AGE OF THE BABY: 25-27+6weeks : 28-31+6weeks : 32-34+6weeks : 35-36+6weeks : 37-41+6weeks : >42weeks	1 3 37 103 265 483 47 1 15 70 118 682 1	6 14 89 164 144 297 25 9 43 108 140 410 19	
6	TOTAL NUMBER OF VENTILATOR HOURS: TOTAL NUMBER OF VENTILATED CASES	1825 hours 26	1165hours 34	0.0001 0.05
7	TOTAL NUMBER OF CPAP HOURS: TOTAL NUMBER OF CPAP CASES:	1411 hours 32	6027 hours 94	0.0001 0.0001
8	TOTAL NUMBER OF CULTURE POSITIVE SEPSIS	20	23	
9	TOTAL NUMBER OF CLINICAL SEPSIS – a)EARLY ONSET SEPSIS: b)LATE ONSET SEPSIS	147 46	41 27	

10	DURATION OF ANTIBIOTIC THERAPY: Total number of babies on antibiotics: Antibiotics given for 0-3days: 0- 5days: 0-7days: >7days:	 193 4 49 117 23	 98 41 18 16 23	 0.0001
11	TOTAL NUMBER OF BABIES WITH UMBILICAL LINES INSERTION : Umbilical Artery Catheterisation: Umbilical Vein Catheterisation:	 0 6	 31 63	
12	TOTAL NUMBER OF BABIES WITH CHEST DRAINS :	1	3	
13	TOTAL NUMBER OF HOURS OF PHOTOTHERAPY :	46440	29952	
14	TOTAL NUMBER OF BABIES WITH EXCHANGE TRANSFUSIONS DONE:	11	2	
15	OUTCOME : a) DAMA: b)Discharged: c)Death :	 36 870 13	 19 706 14	 0.128 0.419 0.443
16	TOTAL NUMBER OF BABIES WITH CENTRAL LINE ASSOCIATED BLOOD STREAM INFECTION :	No central line usage during the period	Nil	
17	TOTAL NUMBER OF BABIES WITH THERAPEUTIC HYPOTHERMIA:	Not done	23	
18	TOTAL NUMBER OF BABIES WITH VENTILATOR ASSOCIATED PNEUMONIA	2	Nil	
19	TOTAL NUMBER OF BABIES WHO RECEIVED BLOOD TRANSFUSIONS:	41	27	

RESULTS

1)NICU admissions

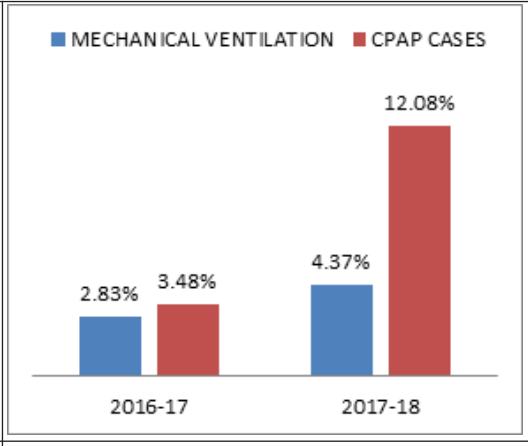
There is a statistically significant drop in total NICU admissions from 2016-17 to 2017-18 with a P value of 0.0001. Admission and triage criteria were in place from 2017-18 and all post graduates received advanced NRP training before starting their NICU posting.

Table 2:NICU admissions

	2016-17	2017-18
Total NICU admissions	919(46%)	739(26%)
Direct NICU admissions	532(26.68%)	427(15%)
NICU admissions from postnatal ward	387(10.95%)	312(19.41%)
Inborn	493	351
outborn	39	76

2)Mechanical ventilation versus Non-invasive ventilation

Table 3:Mechanical ventilation versus CPAP



	2016-17	2017-18	Mean ±SD
Total number of ventilated cases	26	34	
Total ventilated hours	1825 hours	1165 hours	2016-17-70.19±43.244 2017-18-34.26±22.210
Total number of CPAP cases	32	94	
Total CPAP hours	1411 hours	6027 hours	2016-17-44.09±24.557 2017-18-64.12±27.434

We have seen a rise in CPAP hours(p=0.0001) in 2017-18 due to short ,gentle ventilation strategies, strict surfactant administration protocols as INSURE and MIST and the Unit's inclination towards non-invasive ventilation strategy.

3)Antibiotic stewardship

Table 4:Antibiotic stewardship

	2016-17	2017-18	P- value
Total number of babies on antibiotics	193(21%)	98(12.60%)	0.0001
Antibiotics given for 0-3 days	4	41	
Antibiotics given for 0-5 days	49	18	
Antibiotics given for 0-7days	117	16	
Antibiotics given for >7days	23	23	

After following strict antibiotic stewardship, antibiotic usage has been streamlined.

4)Outcome

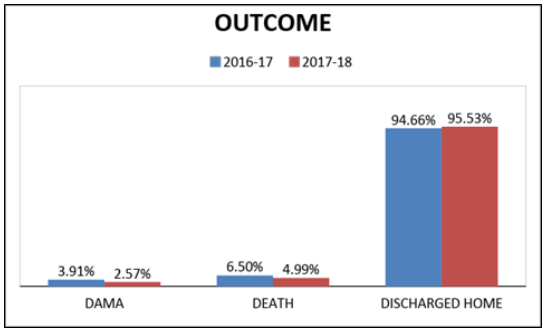


Figure 1 :outcome

There is no statistical significance(p=0.13) in the outcome between 2016-17 and 2017-18,but referral to higher centre(DAMA) has clinically decreased and even with sicker and preterm babies, there is no increase in mortality.

DISCUSSION

Total number of deliveries and total number of live births increased from 2016-17 to 2017-18.All postgraduates were trained in Neonatal resuscitation program (NRP) during first six months of admission into their postgraduation resulting in effective neonatal resuscitation in labour room. This translated to decreased need for NICU admissions (p=0.0001).

More preterm and needy babies were admitted in NICU in 2017-18 compared to 2016-17.Nursing staff and post graduates posted in NICU were periodically trained regarding hand hygiene and asepsis thus decreasing sepsis and improving outcomes similar to J Janota et al(4).

Following a unified Unit protocol for admission criteria(5) which is more of an objective based rather than subjective, so unnecessary admissions were avoided.

Total number of admissions from post natal wards increased in 2017-18(p=0.0001) compared to 2016-17, due to mandatory 72 hour/ pre discharge screening for neonatal jaundice and needy babies are shifted to NICU based on NICE guidelines and charts(6).With this, it has also improved triage due to strict admission criteria (5) and better utilisation of resources.

There is significant decrease in duration of phototherapy hours noticed in 2017-18 compared to 2016-17 and so were exchange transfusions. This has decreased the economic and psychological burden on the parents.

As the unit started taking sicker and more preterm babies, there is a significant increase in number of ventilated (p=0.05) and CPAP cases (p=0.0001). In contrast, there is a significant decrease in number of total ventilation hours(P=0.0001) and increase in total CPAP (non-invasive ventilation) hours(p=0.0001), suggesting lung protective strategies in NICU (7,8). For Surfactant administration, we have followed INSURE (9,10) or MIST(11) , with this aproach we did not come across any ventilator associated pneumonias.

Strict criteria(12) for the diagnosis of sepsis had been followed in 2017-18 and for all suspected sepsis cases, septic screen (12) was done and antibiotics were started and cultures were followed up .

There is no change in the number of culture positive sepsis cases but a significant drop in clinical sepsis cases from 2016-17 to 2017-18, this might be due to adherence to strict admission criteria .Counselling of postnatal mothers regarding aseptic precautions like hand wash in handling of newborns had also played a critical role in decreasing the rates of late onset sepsis from 2016-17 to 2017-18 which was statistically significant(p=0.0001).

Antibiotics were given for 3days in cases which have shown negative sepsis screen and given for 5-7 days in cases with sepsis screen positive and blood culture negative and >7days in cases with blood culture positive which was even followed by Makri v et al(24) and shown improvement in antibiotic stewardship similar to the present study.

There is increase in total number of umbilical artery and vein catheterisations from 2016-17.Strict aseptic protocols(14) were followed for insertion of central lines, total number of days for in-situ catheters and use of catheter for blood sampling or drugs, which in turn decreased peripheral venous insertions thereby decreasing nociception (15), frequent blood sampling and infection in very sick babies.

All postgraduates were trained in umbilical line insertion and were supervised by Assistant professor on call(16). With increase in central lines but no increase in CLABSI similar to Shahid s et al(17), our protocols helped in controlling infection.

Small increase in the number of chest drain insertions (pneumothorax) were observed but so were the number of admission of sick neonates to NICU . We are auditing and trying to decrease pneumothorax by leaning towards gentle ventilation.

Though there is an increase in preterm admissions, we had lower blood transfusion rates in 2017-18 due to frugal blood transfusion protocols(18) and with aggressive enteral feeding and supplementation (18).

We have started cooling with cold saline bottles initially for babies who were fitting in TOBY criteria(19) and showed improvement in HIE outcomes (20). Hence, during the last quarter of 2017-18, institution had bought miracradle (21,22) for therapeutic hypothermia which also has decreased DAMA or referral to higher centre and has been a cost effective method.

With decreased DAMA, referral to a higher center and improved neonatal care, mortality rate is within national acceptable limits(23) and way below the mortality rates of other Indian studies(25,26).

CONCLUSION

Although being a pilot study, application of a unified guideline for handling of neonates is crucial for their optimum care. This study observed an improvement in triage for admission, survival of preterm babies. Ongoing training, surveillance, and vigilance and strengthening of care bundle approach is associated with significant reductions in not only CLABSIs but also of antibiotics significantly. Evidence based strategies for unified unit practice requires considerable commitment of time and expertise, which in turn reduce practice style variations and will benefit patients, parents and trainees. These changes will be evaluated over a period of 5 years to evaluate the efficacy of unified protocols.

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