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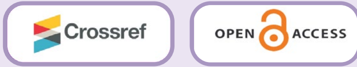

Original Article

Implementation of Delayed Cord Clamping in a Tertiary care Hospital: A Quality Improvement Project

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Abstract

Introduction: Delayed cord clamping (DCC) is defined as the delay in the clamping of the umbilical cord for more than 60 seconds or when the umbilical cord pulsations have stopped. It has numerous benefits to the infants like increased circulating volume, increased hemoglobin / haematocrit levels, elevated iron stores, and decreased need for red blood cell transfusions. Despite evidence-based recommendation, delayed cord clamping is not practiced routine in some medical settings.

Methods: This quality improvement project (QI Project) was conducted to implement delayed cord clamping in one of the tertiary care hospital through Plan-Do-Study-Act (PDSA) cycles. We wanted to improve practice of delayed cord clamping from baseline to 70% in babies delivered by Cesarean section in a tertiary care hospital at Lalitpur. We included term and preterm vigorous newborns delivered by uncomplicated lower segment cesarean section (LSCS). After orientation to the Department of Paediatrics and Obstetrics, project was carried out between August 2021 to October 2021. Data was compiled every two weeks and obstacles and shortcomings were discussed and multiple interventions were done accordingly.

Results: Out of 916 deliveries via LSCS, after exclusion 805 eligible cases were assessed in three months. The percentage of Delayed cord clamping (DCC) among uncomplicated LSCS increased to 70% in the month of October.

Conclusions: QI project was helpful in improving the compliance of Delayed cord clamping (DCC) in the clinical practice by addressing the problems encountered among the study population.

Introduction

Umbilical cord clamping is done to separate the newborn from the placenta. The World Health Organization (WHO) defines early cord clamping (ECC) as the clamping of the umbilical cord within the first 60 seconds of birth and DCC as the clamping of the cord within one to three minutes of birth, or when the umbilical cord pulsations have stopped.[1] Exact duration of DCC is variable ranging from 30 seconds to five minutes or until cord pulsation has stopped.[2,3] DCC has numerous benefits to neonate for smooth cardiorespiratory transition like increased circulating blood volume, increased haemoglobin / haematocrit levels, elevated iron stores, and decreased need for red blood cell transfusions. Approximately 30% more blood volume is transfused into the newborn via umbilical cord during DCC; which can provide upto 75mg of iron, which corresponds to infant's more than three

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months requirement.[4] DCC, can thus increase the iron stores of young infants by over 50% at six months and reduce the rate of anaemia requiring blood transfusion by 61%.[1] DCC has also shown to decrease the incidence of high grade intraventricular hemorrhage (IVH), necrotizing enterocolitis (NEC) and improvement in neurodevelopmental outcome in early years.[5] The WHO guidelines on maternal, newborn, child and adolescent health has recommended DCC for improved maternal and infant health and nutritional outcomes.[1] American college of obstetrics and gynecology (ACOG) committee opinion has also recommended for cord clamping at least 30 - 60 seconds after birth.[2] Similarly, participants module comprehensive newborn training package issued by Ministry of Health of Nepal Government clearly mentions clamping of the cord two to three minutes after birth if the newborn doesn't require resuscitation.[6]

Despite documented benefits, there is little evidence that DCC is routinely practiced in hospitals.[6] DCC was implemented only in 48% babies delivered by spontaneous vaginal delivery in a study done by Nelin et al[7] at tertiary maternity hospital in Kathmandu. Though DCC is encouraged at Patan Hospital, implementation is poor. Poor implementation might be because of adherence to usual practice, which is to clamp, and cut the umbilical cord immediately so that the baby can be passed to the mother. Moreover, polycythemia, hyperbilirubinemia and increased need of phototherapy among babies with DCC might be concerning to some clinicians.[8,9] Preliminary observational study at Patan Hospital showed DCC was not practiced in the deliveries via lower segment caesarean section (LSCS).

Hence, we planned for quality improvement (QI) project to improve practice of delayed cord clamping among babies delivered via LSCS from baseline to 70% in three months.

Methods

The QI project was conducted in the Patan Hospital, a tertiary care university teaching hospital for Patan Academy of Health Sciences (PAHS), located in Lalitpur, Nepal. The hospital conducts approximately 7000 deliveries every year. Term and preterm vigorous newborns delivered by uncomplicated LSCS were enrolled in the study. Any newborns delivered by LSCS but requiring resuscitation, mono-chorionic mono-amniotic twins, complete placenta previa, abruption placenta or any maternal conditions requiring immediate attention were excluded from the study. Very low birth weight (VLBW) and extremely low birth weight babies (ELBW) were also excluded from the study. We planned to conduct the study among LSCS deliveries only because as per hospital protocol all spontaneous vaginal deliveries (SVD) are not attended by paediatric doctors. QI team was formulated which consisted of paediatric residents (2nd year), medical officers and nurses working at OT. Pilot study was conducted for the period of two weeks from 1st to 14th of July 2012 and 44 LSCS were observed. Median time of cord clamping in deliveries in LSCS was 7.4 seconds. Range of time of cord clamping in deliveries via LSCS was 5 - 20 seconds. Faculties, residents, medical officers, and nurses working in paediatric and obstetric departments were oriented regarding our project during perinatal audit. Paediatric doctor receiving the neonate recorded the time of cord clamping. After the delivery of the neonate from the uterus, the clamping of the umbilical cord was delayed for at least 60 seconds. During those 60 seconds, the neonate was wrapped in a warm, dry, sterile towel and placed on the mother's abdomen. The circulating nurse announced the time of the delivery. Neonatal care provider verbally announced 30 seconds intervals. At 60 seconds, the cord was clamped, cut and placed on mother's abdomen. Apgar score was reported from the time of delivery, not from the timing of cord clamping. Root cause analysis was done using fish bone diagram. (Fig 1) Impatience, hastiness along with the tendency of following usual practice regarding cord management and absence of standard operating procedure (SOP) are among the common cause identified for poor implementation of DCC.

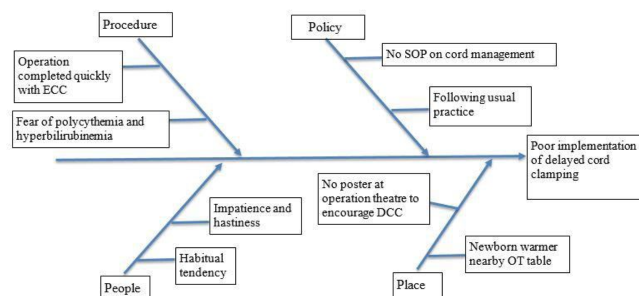

Figure 1: Fishbone bone diagram.

Study was commenced from August 2021 to October 2021. Five PDSA cycles were conducted to test and adapt possible solutions to the contributing factors for poor implementation of DCC. Details of PDSA is shown in table 1.

1st PDSA cycle: Doctors working at gynecology-obstetric department and nurses working at OT were educated about DCC and its benefit through a power point presentation during perinatal audit.

2nd PDSA cycle: Poster / pamphlet regrading DCC was pasted on the wall of all operation theatre and waiting room to remind regarding DCC.

3rd PDSA cycle: To discourage hastiness, doctors receiving

baby shouted "Delayed cord clamping" once baby is delivered. Further, the same doctor announced time to clamp cord once 60 seconds are passed in a stopwatch.

4th PDSA cycle: Information regarding DCC and its benefits was communicated through once a daily message to concerned doctors and nurses through online messaging applications like messenger and all the concerns are addressed through the same.

5th PDSA cycle: Inter departmental meeting to incorporate DCC in Obsetritics protocol and creation SOP regarding cord management.

Table 1: Details of PDSA cycle

PDSA	Duration	Plan	Do	Study	Act
1st PDSA	1st to 14th of Bhadra	Education of doctors and nursing staff	Power point presentation on DCC and it's benefits Sharing recent evidence on DCC	DCC increased from baseline to 20%	Adopt PDSA cycle and continue with it
2nd PDSA	15th to 28th of Bhadra	Reinforce for the adoption of DCC	Poster/pamphlet regrading DCC was pasted on the wall of all operation theatre and waiting room	DCC increased from 20% to 30%	Adopt PDSA cycle and continue with it
3rd PDSA	29th of Bhadra to 12th of Asoj	Counter habitual tendency and hastiness;	Doctors receiving the baby would shout "Delayed cord clamping" once baby is delivered	DCC increased from 30% to 45%	Adopt PDSA cycle and continue with it
4th PDSA	13th of Asoj to 27th of Asoj	Development of positive attitude towards DCC	Addressing all the concerns through online messaging applications.	DCC increased from 45% to 55%	Adopt PDSA cycle and continue with it
5th PDSA	28th of Asoj to 12th of Kartik	Development of protocol and SOP	Regular interdepartmental meetings.	DCC increased from 55% to 70%	Adopt PDSA cycle and continue with it

Results

Table 2 shows the monthly data of DCC implemented. We observed 311, 319 and 286 LSCS deliveries respectively in August, September and October. After considering inclusion and exclusion criteria 269, 286 and 243 newborns were eligible for DCC; among which DCC was conducted on 81, 158 and 175 babies.

Table 2: Total number of eligible newborns and percentage of DDC carried out.

Month	August	September	October
Total CS deliveries (live born)	311	319	286
Exclusion			
VLBW/ELBW	20	13	15
Requiring Resuscitation (excluding VLBW/ELBW)	8	11	9
Maternal complications	9	6	7
Twin deliveries	5	3	5
Eligible newborns	269	286	250
Intervention done (DCC)	81	158	175
Newborns receiving DCC (% of eligible)	30%	55%	70%

Percentage of DCC after each PDSA cycle is shown in figure 2.

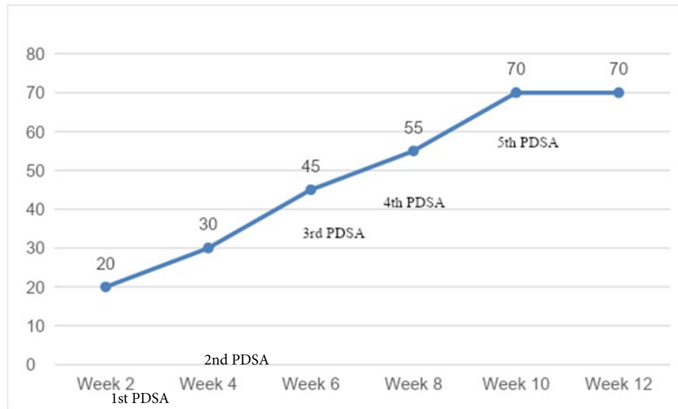

Figure 2: Time series chart

We were able to achieve our target of 70% after the 5th PDSA cycle which lasted in 12th week during which no active intervention was carried out.

Discussion

We successfully conducted a QI project to improve the compliance of DCC in our center. We conducted five PDSA cycles every two weeks for achieving the desired target. We believe DCC will be established as a routine practice after the project.

Study done by Nelin et al[7] at tertiary maternity hospital in Kathmandu recommended the need to identify potential barriers in the use of DCC. In our study we found that unawareness and hesitance of this new evidence based practice as one of the most important hindrance in implementing DCC. Educational sessions and frequent emphasis regarding the benefit of DCC to newborn as well as mother can help overcome this hindrance. Increased workload and inadequate staff is another contributing factor whereas some obstetrician are in hurry and in habit of ECC. This problem can also be mitigated by imparting information that DCC is a normal recommended procedure and doesn't require additional skills, efforts, equipment or manpower. Information should be circulated that it is only a matter of waiting for a few more minutes before clamping the cord. Moreover, DCC should be incorporated in the hospital protocol under cord management as many health personnel has tendency to stick with the hospital protocols and guidelines.

We experienced that obstetric residents and nurses working in the operation theatre had opinion that ECC is a part of active management of third stage of labour (AMTSL) and reduced the incidence of postpartum hemorrhage (PPH). However, with the growing support for DCC; ECC has been withdrawn as a part of AMTSL from some guidelines.[10] A randomized controlled trial done by O Andersson et al[11] showed that there is no difference between DCC and ECC groups with regard to PPH.

Many obstetricians and residents also showed concern regarding hyperbilirubinemia and need of phototherapy that may result from DCC. Studies haven't shown increased incidence of neonatal hyperbilirubinemia following DCC. In a study done by Rana et al[12] at Paropakar Maternity and Women's Hospital, Kathmandu, 22 out of 261 (8.4%) in ECC and 25 out of 263 (9.5%) in DCC group with ($P = 0.76$) were at high risk of hyperbilirubinemia based on transcutaneous bilirubin at discharge. During four weeks follow up, out of 253 babies that responded in ECC only 13 babies and out of 253 babies in DCC that responded only 17 babies reported jaundice ($P = 0.57$). Similarly, three and one baby out of 253 each in ECC and DCC required phototherapy ($P = 0.62$). Similar was the findings in other studies.[13,14] We did not look for hyperbilirubinemia among babies with DCC, which is out of scope of our project however; we didn't experience the increased incidence of hyperbilirubinemia requiring phototherapy after implementation of DCC. It would have been otherwise evident in perinatal and children ward audits. Based on the available literature, obstetricians and nurses working in the operation theatre were reassured that disadvantage of DCC is minimal when compared to its benefits. This education session done after second meetings has helped gain the confidence of residents and medical officers along with obstetricians involved in cesarean section regarding DCC.

Despite documented evidence of benefits of DCC on neonatal outcomes, obstetricians' beliefs about the appropriate timing for cord clamping are not consistent. Reluctance in adopting new procedures is a major hindrance in poor implementation of DCC. Study done by Rana et al[12] regarding delivery care staff's perception and attitudes towards changes in practice in two tertiary hospital in Kathmandu showed habitual practice, lack of coherence, need to bring uniformity, informal learning as the major problems in implementing DCC which are similar to obstacles seen in our study. Similar was the finding in a study done by Jelin AC et al[15] in the USA and prospective audit done at six different hospitals of low middle income countries by Mitchell EJ et al.[16]

We couldn't find any quality improvement project regarding DCC to make a comparison. We collected data of two weeks only to look if the improvement is sustained. There are concerns if there would be de-escalation in DCC once the project ended.

Furthermore, two weeks is insufficient to consider if DCC was accepted as the routine practice. Inclusion of SVD would have also given more information. As this QI project was carried as the part of academic requirement for completion of MD Paediatrics degree at Patan Academy of Health Sciences, Lalitpur Nepal; time constraints and change in rotations had to be taken care of too. Nevertheless, QI project to implement DCC among babies delivered via SVD is currently ongoing at Patan Hospital.

QI studies identify gaps in patient care leading to efficient use of available resources to address such gaps ultimately leading to improvement in patients outcomes. We learned that the small efforts could ultimately have a huge and positive impact of delivery of health service and patient outcome from the study we conducted.

Conclusions

Though ECC is a deeply rooted practice, a quality improvement projects may be helpful to bridge the knowledge-practice gap and encourage DCC among the health care providers. QI project was very helpful in successful implementation of DCC in our study population.

Conflict of Interest: None

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