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NEONATE OUTCOME AND RESPONSE TIME FOR EMERGENCY CESAREAN SECTION : A SCOPING REVIEW

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ABSTRAK

Waktu respon SC emergensi menurut NICE masih sulit diimplementasikan di berbagai negara dan hal tersebut menyebabkan luaran neonatus yang buruk seperti yang disebutkan pada beberapa penelitian terdahulu. Penelitian ini bertujuan untuk mengetahui hubungan waktu respon SC emergensi berdasarkan rekomendasi NICE dengan luaran neonatus pada negara-negara berpenghasilan menengah ke bawah. Scoping Review ini mengambil data dari beberapa database elektronik pada bulan Februari hingga Maret 2022 dengan metode PRISMA-ScR. Didapatkan 6 penelitian yang memenuhi kriteria inklusi dari 4.102 artikel yang dianalisa. Capaian waktu respon SC emergensi rata-rata studi < 20% , keterlambatan waktu respon tersebut tidak berhubungan signifikan dengan luaran neonatus yang buruk. Faktor-faktor yang berhubungan dengan keterlambatan waktu respon perlu diperbaiki.

Kata kunci: *sectio caesarea emergency, outcome neonatus*

ABSTRACT

Emergency CS response time guidelines by the National Institute for Health Care Excellence (NICE) were difficult to implement in many countries, and these constraints have led to poor neonate outcomes in several previous studies. The purpose of this study is to determine the affordability of emergency CS response time based on NICE recommendations, as well as its correlation to neonatal outcome in lower-middle income countries, as well as response time-related factors. This scoping review data was extracted from several electronic data bases, which were accessed in February–March 2022, applying the PRISMA–ScR approach. Six eligible studies that meet inclusion criteria from 4,102 articles were obtained and analyzed. The average DDI achievement percentage remained less than 20%, and worse neonate outcomes were not significantly related to delayed response time. Factors related to delayed response times need to be corrected.

Keywords: Emergency cesarean section, Crash cesarean section, Decision to delivery interval, Neonate outcome

1. Introduction

The neonatal mortality rate, which is still quite high in various parts of the world, deserves attention. WHO mentions that the ten countries with the highest neonatal mortality rates in the world are India, Nigeria, Pakistan, Ethiopia, the Democratic Republic of the Congo, China, Indonesia, Bangladesh, Afganistan, and the Republic of Tanzania.[1] For example, in our country, Indonesia, the neonatal mortality rate is still quite high compared to countries in Southeast Asia such as Thailand, although the level of the economy and resources in Thailand are not much different from those in Indonesia. The neonatal mortality rate recorded in Indonesia is 15 per 1,000 live births, compared to 7.7 per 1,000 live births in Thailand.[2]

Annually, as many as 4 million cases of neonatal death are reported due to birth asphyxia, 38% of which are the cause of death for children under the age of 5 years.[3] In 2019, deaths of children under the age of five were dominated by infant deaths in the first 24 hours of life, mostly due to prematurity and birth asphyxia as the cause, as reported by WHO.[4] The cause of neonatal death due to birth asphyxia has persisted for more than a decade, as reported by Lawn JE et al, who stated that 1.1 million cases of neonatal death and long-term neurological effects were caused by birth asphyxia.[5] A WHO survey conducted in 2005 stated that birth asphyxia was the leading cause of death in the first week of life. Twenty-three percent of cases of birth asphyxia are also mentioned as a cause of newborn death in developing countries.[4]

Emergency cesarean section is frequently used to reduce the long-term consequences of birth asphyxia, especially in cases of pregnancy with fetal distress. Cesarean section is an alternative when the delivery process still takes a long time and has the potential to cause fetal death in utero, so the response time for cesarean section considered has influence on neonatal outcome. The National Institute for Clinical Excellence (NICE), which was established in April 1999 by the United Kingdom's authority to promote clinical excellence in the health service, states that a cesarean section emergency guideline to improve maternal and neonatal outcomes, particularly for those at risk of causing immediate life threats, can be performed within 30 minutes. With the concept of a decision-to-delivery interval, the response time is counted from the time the cesarean section was decided until the baby is born.[6] Recommendations were issued considering the increased risk of birth asphyxia with a long response time for cesarean sections. However, issues with the health care system's structure and processes, such as limited resources and various preoperative preparation processes that must be prepared, made NICE recommendations difficult to meet by various midwifery units in lower-middle-income countries. Unfortunately, the inability to meet these response times was said to be associated with poor neonatal outcomes by some previous studies, although most other studies have found no significant associations.

The difference in results in various studies raises the question of whether it is true that delayed response times for emergency cesarean sections in accordance with NICE recommendations are associated with higher neonatal morbidity and mortality, as previously stated. This study focuses on assessing the ability of midwifery units to conduct emergency CPR in lower-middle-income countries and determining the relationship between response times and neonatal outcome, as well as factors that play a role in response time.

2. Method

In compiling this scoping review, the Preferred Reporting Project for scoping review (PRISMA-ScR) guide was used,[7] while the formulation of the questions in this study used the PCC approach.[8]

Table 1. Population, concept, and context (PCC) strategy

Population (P)	Pregnant women undergoing emergency cesarean sections
Concept (C)	Decision to delivery interval (DDI) and neonates outcome
Context (C)	Lower-middle income countries

Started A secondary data search was carried out using the keywords from population, concept, and context (PCC) as seen in table 2. It started by gathering articles from the population using the phrase "emergency cesarean section" and its synonyms to develop a search, synonyms of each keyword in the population, and concepts and context we got through literature search. Synonim searched using MeSH but did not get the appropriate keywords. We combined the keywords using booleans "OR" and then continued using booleans "AND." Concepts and contexts were searched in the same way.[9] (Table 2) S1-S7 in Table 2 stand for searching, and the number that follows behind the letter S indicates the order in which the search is performed.

Table 2. Keywords , boolean, and searching history

PCC	Keywords, Boolean and searching history
Population (S1)	"TX ("emergency cesarean section" OR "immediately cesarean section" OR "crash cesarean section" OR "urgent cesarean section") OR AB ("emergency cesarean section" OR "immediately cesarean section" OR "crash cesarean section" OR "urgent cesarean section") OR TI ("emergency cesarean section" OR "immediately cesarean section" OR "crash cesarean section" OR "urgent cesarean section")
Concept	Because of two keyword in concept so there were two result seraching TX (Decision to delivery interval" OR DDI) OR AB ("Decision to delivery interval" OR DDI) OR TI ("Decision to delivery interval" OR DDI) à S2
(S2) AND (S3) → (S6)	"TX ("neonatal outcomes" OR 'neonate outcomes" OR "infant outcomes" OR "newborn outcomes") OR AB ("neonatal outcomes" OR 'neonate outcomes" OR "infant outcomes" OR "newborn outcomes") OR TI ("neonatal outcomes" OR 'neonate outcomes" OR "infant outcomes" OR "newborn outcomes") →S3 TX (Decision to delivery interval" OR DDI) OR AB ("Decision to delivery interval" OR DDI) OR TI ("Decision to delivery interval" OR DDI) **AND** "TX ("neonatal outcomes" OR 'neonate outcomes" OR "infant outcomes" OR "newborn outcomes") OR AB ("neonatal outcomes" OR 'neonate outcomes" OR "infant outcomes" OR "newborn outcomes") OR TI ("neonatal outcomes" OR 'neonate outcomes" OR "infant outcomes" OR "newborn outcomes") → S6
Context (S4)	"TX ((MM "Developing Countries") OR ""lower and middle income countries"") OR AB ((MM "Developing Countries") OR ""lower and middle income countries"") OR TI ((MM "Developing Countries") OR ""lower and middle income countries"") → S4
Population AND Context	Step 2 combining the search result from population (S1) and context (S4) using boolean AND TX ("emergency cesarean section" OR "immediately cesarean section" OR "crash cesarean section" OR "urgent cesarean section") OR AB ("emergency cesarean section" OR

	"immediately cesarean section" OR "crash cesarean section" OR "urgent cesarean section") OR TI ("emergency cesarean section" OR "immediately cesarean section" OR "crash cesarean section" OR "urgent cesarean section") **AND** "TX ((MM "Developing Countries") OR ""lower and middle income countries"") OR AB ((MM "Developing Countries") OR ""lower and middle income countries"") OR TI ((MM "Developing Countries") OR ""lower and middle income countries"") → S5
Population AND context AND Concept (S7)	Step 3 combining the search result from step 2 (S5) and result from concept (S6) TX ("emergency cesarean section" OR "immediately cesarean section" OR "crash cesarean section" OR "urgent cesarean section") OR AB ("emergency cesarean section" OR "immediately cesarean section" OR "crash cesarean section" OR "urgent cesarean section") OR TI ("emergency cesarean section" OR "immediately cesarean section" OR "crash cesarean section" OR "urgent cesarean section") **AND** "TX ((MM "Developing Countries") OR ""lower and middle income countries"") OR AB ((MM "Developing Countries") OR ""lower and middle income countries"") OR TI ((MM "Developing Countries") OR ""lower and middle income countries"" **AND** TX (Decision to delivery interval" OR DDI) OR AB ("Decision to delivery interval" OR DDI) OR TI ("Decision to delivery interval" OR DDI) AND "TX ("neonatal outcomes" OR 'neonate outcomes" OR "infant outcomes" OR "newborn outcomes") OR AB ("neonatal outcomes" OR 'neonate outcomes" OR "infant outcomes" OR "newborn outcomes") OR TI ("neonatal outcomes" OR 'neonate outcomes" OR "infant outcomes" OR "newborn outcomes") → S7

Data were extracted from the Medline (EBSCOhost), EMBASE, and Health Medical (Proquest) databases. The data search stage in this scoping review is carried out as described below:

- We used keywords and synonyms to search three e-databases for each population, concept, and context, and the boolean used was "OR."We also set the keywords for each field by adding "TX," "AB," and "TI" in each sub-search field. This is intended so that the number of articles obtained is greater. For example, in the first Medline database (EBSCOhost), we search for keywords and synonyms for the population we defined earlier, then enter keywords and synonyms using the boolean "OR." We do this for each lookup field. Where our first field puts "TX," our second field "AB," and our third field "TI," we then combine all three fields with the boolean "OR." So from there, we get 4 search results, consisting of 1 search result for population, 2 results for concepts (because we used 2 concepts, namely DDI and neonate outcome), and 1 search result for context.
- The next step was to conduct an advanced search on each search result, combining search results by population and context with the boolean "AND."While on concepts, we continued our search on both concepts with the boolean "OR." In both searches, we get 2 search results. The next step for both results was to perform further searches using the boolean "AND." In this last search, the number of articles that we get will be reduced in this way. The same steps were performed on the other two E-databases.
- After obtaining a number of articles from each E-database, the data was filtered based on the inclusion criteria, which were as follows: article journals published from 2016 to 2022; academic journals; full text available; setting in lower-middle

income countries; and in English.From these results, the articles that were irrelevant to the concept scoping review were removed by the system. An article is said to be eligible if it contains all the inclusion criteria and includes CS emergency response time as DDI and neonatal outcome.

From the search results We obtained 4,012 documents with the keywords "cesarean section" or "synonim" from the three E-databases.From a number of these articles, 1,393 are removed by the inclusion criteria and duplicated. Then, using two reviewers to screen the abstract and title, another 2.607 articles were removed for lack of relevance to the concept and context, leaving 12 articles to be retrieved.Six studies are removed because two articles didn't report neonatal outcomes, two articles only measure "decision to incision interval," and two articles have settings in developed countries, leaving six articles to be analyzed in this scoping review. The Prisma-ScR selection is shown in Figure 1 as the result. The decision to incision interval or incision to delivery interval, as well as the setting, are exclusion criteria in developed countries.

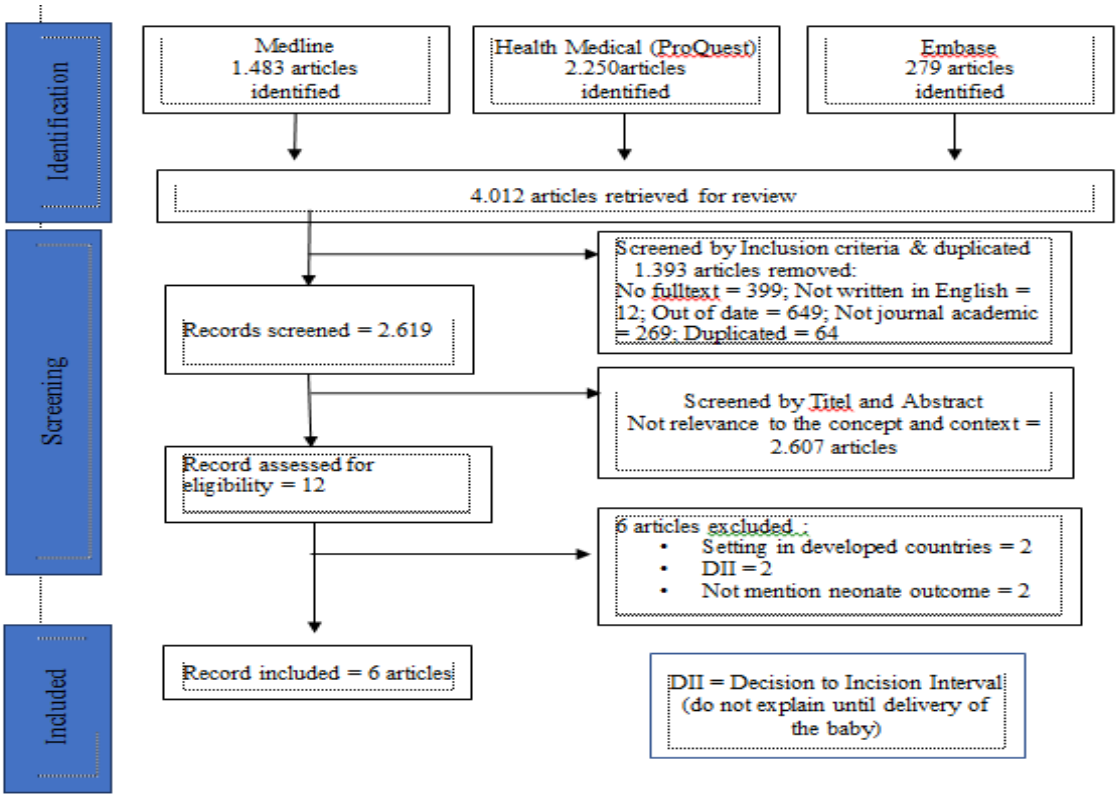

Figure 1. PRISMA-ScR research diagram

3. Result

Six eligible studies from 4,012 publications were included in this study, and an analysis of the characteristics of the research was conducted. From the analysis, we found two cross-sectional studies with one retrospective cross-sectional study and four cohort designs with three prospective cohort studies. The articles included in this study came from 5 countries, of which 2 (33.2%) were Asian

countries and the other 4 (66.7%) were countries on the African continent.[10,11,12,13,14] The number of participants included in each of these ScR studies is quite large. The lowest number of participants in Kitaw's study was 182, while the highest number was in Hirani's study with 598 participants (seen in Table 3).

Table 3. Characteristics of The Studies

Place	Percentage
Thailand	1 (16.6%)
Tanzania	1 (16.6%)
India	1 (16.6%)
Uganda	1 (16.6%)
Ethiopia	2 (33.3%)
Method	
Cross sectional (primary data)	1 (16.6%)
Cross sectional Retrospective	1 (16.6%)
Cohort Prospective	3 (50%)
Cohort Retrospective	1 (16.6%)
Participant	
100 – 200	1 (16.6%)
200 – 300	1 (16.6%)
300 – 400	1 (16.6%)
400 – 500	1 (16.6%)
➢ 500	2 (33.3%)
Year of publication	
2016	1 (16.6%)
2017	2 (33.3%)
2020	1 (16.6%)
2021	2 (33.3%)

All studies included subjects with singleton pregnancies, and sampling in all studies used a consecutive sampling technique where all pregnant women who underwent emergency caesarean sections during the study period and met the inclusion criteria were included in the study.

Kitaw et al. (2021) have conducted a study prospectively in Ethiopia in May–July that showed there was no emergency care system that could meet these response time standards. The results of this study were the same as other study results in different countries, such as Thailand by Boriboonhirunsarn, Watananirun K, and Sompagdee N, 2016 that were also found in this search. It proves that the DDI standard recommended by NICE is challenging to implement, especially in developing countries. Although all of the research covered in this scoping review is hospital-based.[14]

Meanwhile, from other studies, the response time for emergency cesarean sections was also below the standard. Hospital capability to perform emergency CPR was noted to be below 20%, except in one study conducted by Gupta et al., with DDI 30 minutes achievement in 42.4%, as seen in table 4.[10]

The hospital's inability to meet these standards was known to be influenced by various factors related to the health care system, including lack of human resources, anesthesia factors, transfer time to the operating room, time when CS decisions are made by doctors, surgeon factors, etc.[15,16]

From all the studies, the longest mean DDI was recorded in research conducted by Hughes et al. in Uganda, with a DDI of 5.5 hours. We observed a delay in meeting the recommendation of 30 minutes based on the time that the CS decision was made. From the research, it was found that emergency CS decisions made at night (00:00–08:00) experienced a waiting time of 2 hours longer than other hours, but surprisingly, there was no association between the decision-to-delivery interval and adverse perinatal outcomes in this study.[12]

The most widely reported neonate outcomes were low APGAR scores, NICU care, and even neonatal deaths. However, from statistical analysis, there was no correlation between the poor neonate outcome and the delay in CS response time. As shown in Hughes' and other studies in our scoping review, which are consistent with the results of the statistical analysis previously stated.[10,11,12,14,17]

The DDI time span is longer; it is neither seen in African countries, such as in Hughes's study, nor in other countries in Asia. A prolonged delivery interval will result in a poor neonatal outcome.[12] Even though we only found one study that showed a negative effect of CS response time delay on neonate outcome, it is worth considering.

In our research, some of the studies obtained came from countries on the African continent, but this does not mean that problems are only experienced there; constraints in other countries can't be assessed due to the limitations of the research made and published. However, we can conclude that the problem of delayed CS response time is more prevalent in developing countries than in developed countries.[18,19] The result is showed in table 4.

Table 4. Selected studies regarding the DDI, neonate outcome and factors related to decision to delivery Interval (DDI)

No	Research title/ author/ year	Study location	Study design	Main result	Influencing factors	Indication of CS
1	Decision-to-delivery interval in pregnant women with intrapartum non-reassuring fetal heart rate patterns.[20]	Thailand	cross-sectional retrospective study	DDI achievement in 30 minutes 6.6% Mean DDI 56 minutes Neonatal outcomes Not significant related to delayed DDI comparable among different DDI categories.	"Time decision" was taken, whereas DDI in office hours has a longer time than after office hours.	Non reassuring fetal heart rate

2	Evaluation of decision-to-delivery interval in emergency cesarean section: A 1-year prospective audit in a tertiary care hospital.[10]	India	Cohort prospective	DDI achievement in 30 minutes 42.4% Mean DDI of 36.3 ± 17.2 min for Category 1 CS and 38.1 ± 17.7 min for Category 2 CS (P > 0.05) Neonate outcome: low APGAR score; NICU care; however, there is no significant relationship with response time	Anesthesia factors, obstetrician factors, patient-related factors, lack of resources or staff	Unknown etiology, fetal distress, cord prolapse, uterine rupture, obstructed labor, antepartum hemorrhage, abruption placenta, placenta previa
3	The decision delivery interval in emergency cesarean section and its associated maternal and fetal outcomes at a referral hospital in northern Tanzania: a crosssectional study. [11]	Tanzania	Cross sectio- nal study	DDI achievement in 30 minutes 12% Median DDI interval: 60 minutes (IQR 40–120) Prolonged hospital stays; NICU care; Fetal death	co-morbidities in the mother; anesthesia problems	Fetal distress; umbilical cord prolapse; antepartum hemmorhage ; failed induction; pre-eclampsia; threatened uterine rupture
4	Decision-to-delivery interval of emergencyces arean section in Uganda: a retrospective cohort study.[12]	Uganda	A retrospectiv e cohort study	DDI achievement in 30 minutes 0 % Mean DDI was 5.5 hours The risk of perinatal death was higher in neonates where the decision to deliver was made between 20:00 and 02:00 compared to 08:00 and 12:00 (p0.01).	Time of cesarean section was decided	Previous cs, APH, pre eclampsia, premature rupture of membrane

5	Effect of decision to delivery interval on perinatal outcomes during emergency cesarean deliveries in Ethiopia: A prospective cohort study [14]	Bahir Dar City and Debre Markos, Ethiopia	A prospective cohort study	DDI achievement in 30 minutes 0% Mean DDI was 43.73 ±10.55 minutes The prolonged decision to delivery interval had a statistically significant association with composite adverse perinatal outcomes (odds ratio [OR] = 1.8, 95% CI	Anesthesia time and category emergency cesarean section	Cord prolapse, antepartum hemorrhage, non reassuring fetal heart rate, CPD, failed induction, failed VBAC, breech, protracted labour
6	Decision to delivery interval, fetal outcomes and its Factors among emergency cesarean section deliveries at South Gondar Zone Hospitals, Northwest Ethiopia: Retrospective cross-sectional study.[17]	Debre Tabor, Ethiopia	Retrospec-tive cross-sectional	DDI Achievement in 30 minutes 17.5% IQR = 48 – 80 Minutes Neonatal Outcomes: low APGAR score; NICU care; However, there is no significant relationship with response time	Anesthesia method; anesthetic induction time; competence of surgeons and anesthesiolo g ists; section execution time	CPD, induction failure, malpresentat i on, placenta previa, placental abruption, prolonged labour, previous CS 2x, RUI

4. Discussion

DDI and Neonate Outcome

From the six eligible articles, we get the information that the proportion of CS response time that has been successfully achieved is still low. Even in the two studies conducted by Huhges and Kitaw, none of the CS emergencies managed to meet NICE's recommendation. while others reported the response time was about 6.6%–42.4% (table 5). Five of the six studies concluded that there was no link between delayed CS response time and poor neonatal outcome.[14] Kitaw's study included 3 stillbirths, 46 infants with apgar scores of 7 in the first minute, 32 neonates with an apgar score of 7 in the fifth minute, 49 of whom needed to be cared for in the NICU, and 2 early neonatal deaths. After an analysis, it was concluded that the inability to meet the DDI standard of 30 minutes risked causing a poor perinatal outcome of 1.8 times. [14]

Interestingly, based on observation from Table 4, there are two studies with a recorded percentage of DDI of zero percent,

namely, those from Hughes and Kitaw. Even the study conducted by Hughes recorded a mean DDI of 5.5 hours, much longer than Kitaw's 43.7310.55 minutes. But the study from Hughes statistically showed that there was no association between delayed response time and neonate outcome, while Kitaw stated the opposite results.

Table 5. Percentage of decision to delivery Interval (DDI) achievement in various study

No	Author	DDI Achievement
1	Borinbunhirunsan et al, 2016	6.6%
2	Gupta et al, 2017	42.4%
3	Hirani et al, 2017	12%
4	Hughes et al, 2020	0%
5	Kitaw et al, 2021	0%
6	Ayele et al, 2021	17.5%

Researchers looked further at what differences were found in the two studies that caused the results of the two studies to cross paths. indications of CS emergencies in Kitaw's research, more precarious than in Hughes's research. Kitaw noted indications of emergency CS in his study as cord prolapse, antepartum hemorrhage, non-reassuring fetal heart rate, CPD, failed induction, failed VBAC, breech presentation, and protracted labor, while the indications for Hughes are APH, pre-eclampsia, and premature rupture of membranes; these indications are based solely on maternal indications without any preoperative fetal distress.[12,21] Poor outcomes are mostly seen with symptoms of asphyxia soon after birth.[22,11,16]

The incidence of birth asphyxia in most developed countries accounts for less than 0.1%, or about 1-4 per 1000 live births. However, this is not the case in developing countries, such as in Thailand, India, Tanzania, and some other countries in the Asian and African region, where the incidence of birth asphyxia ranges from 4.6 per 1000 to 7–26 per 1000 live births, and more than 25% of newborn deaths occur in Africa. Of these, birth asphyxia accounted for 20% of the 20 countries that accounted for the highest neonatal mortality, and 75% occurred in Africa. Birth asphyxia, infection, and complications of premature birth together account for 88% of newborn deaths in Africa.[10,13,16]

Igwe et al. mentioned that the implementation and benefits of the recommended DDI within 30 minutes are not supported by strong evidence; even their study of DDI longer than 75 minutes didn‘t find a worse neonatal outcome.[23] As with the five studies in this ScR that stated there was no statistical correlation between poor neonate outcome and the inability to meet the emergency CS response time in 30 minutes. However, we have a different opinion from the NICE recommendation regarding emergency CS within 30 minutes with emergency indications for the mother and fetus that directly threaten the life of the baby, the mother, or both. Meanwhile, several studies have shown that the

indications for emergency CS in their studies do not always match the indications for NICE, so it can be understood that different results will be obtained. Some indications of an emergency cesarean section are seen in Table 4.

Nowadays, intrapartum monitoring has been running properly so that when signs of intrauterine fetal distress were found, resuscitation had been carried out while waiting for surgery preparations, as stated by Igwe in their study.[23]

Subjects with gestational ages less than 37 weeks were included in these studies based on general characteristics, whereas others made the inclusion criteria for term gestational ages, so fetal outcomes in two other studies, Hughes and Hirani, may be biased due to maternal gestational age factors that affect outcome and postnatal care.[11,12]

Prematurity may affect the neonatal outcome. Such disorders are due to the imperfect maturity of the brain and central nervous system. Some experts say that brain damage in premature babies is not fully understood, whether due to maturity factors or due to other factors such as hypoxia, infection, or other events.[4,24]

Factors affecting the response time for emergency cesarean section

The poor health care system and limited resources were cited as contributing factors to the delay in emergency CS response time, as seen in Table 4. It can be seen that several factors that affect response time are in the "structure" and "process," which indicate the weakness of the health care system, and there is still poor behavior and understanding from the community.[23]

Four out of six studies in ScR were conducted in African countries. It is well known that the health care system in Africa is not working well; the WHO even mentioned that access and quality of maternal and neonatal care in African countries have not been met. Biadgo et al. (2021) conducted research about the quality of maternal and newborn health care in Ethiopia. They explained that many efforts have been made to increase maternal and child health facilities in Ethiopia, but that this has not improved the health of mothers and children in the country; it is even mentioned that the maternal and child mortality rates are still high and that most of the causes were preventable. The cause is attributed to the underutilization of health-care facilities during pregnancy and childbirth. It can be seen from the percentage of antenatal care, postnatal control, and childbirth by skilled health workers that the overall mean score is still low at 48%.[6,25]

Poor health care systems are also occurring in Uganda and Tanzania. As mentioned by Vogel et al. (2016), even though there are differences in priorities and the context of guidelines, the barriers identified across countries are often similar. Health system-level factors, including shortages of health workers and the need for the procurement of strengthened drugs and equipment, distribution systems, and management, are consistently highlighted as limiting the capacity of providers to provide high-quality care.[26]

According to most research, the problem is a lack of hospital management due to inadequate infrastructure and lengthy "processes" such as operating rooms that are busy during working hours and do not have special operating rooms for emergency situations; the problem of blood availability that is difficult to meet in a short time; the availability of tools and materials for operational purposes is difficult to meet in some low-resource countries; the pre-operative and lack of human resources. [6,17,23,24,27,28]

Meanwhile, external problems come from the patient, such as the difficulty of getting informed consent quickly. The main

reason is that the family is not there when immediate action is needed; the patient waits for approval from extended family or people who are considered influential in the family so that the patient or husband cannot make decisions on their own. As stated by Tashfeen, a woman who has a husband is more obedient to the decisions of her in-laws. Besides the fact that Omani culture tends to support a large number of family members, they believe the cesarean section will limit the number of family members resulting from a marriage. As a result, the informed consent procedure has become quite difficult in Oman.[29]

Even though several approaches and education have been provided by health workers or social workers. The delay due to delayed consent was reported to be quite dominant; Tashfeen reported 38.3%; Igwe reported 12.8%; and Ayeni reported the mean time required for informed consent to be36.90±62.15 minutes.[6,23,29] Other problems for patients arise because they are not financially able to pay the cost of treatment, so they have to ask for help from relatives or other families. This condition also extends the response time. Health financing is a health care system problem experienced by many poor and developing countries. For example, the limited supply of drugs and other materials needed for surgery in some countries forces the patient's family to buy them. According to Lawani et al. (2016), the lack of a payment system also extends response time.[23,29]

Economic status clearly affects the health care system in a country when we compare the capabilities of developed countries with those of poor and developing countries. Developed countries have adequate resources so that the recommendation response time can be fulfilled properly. as seen in a study by Brandt JA et al., 2020 in Germany. They stated that 98.7% of cases met the recommended response time, with a mean DDI of 7.66 minutes. Brandt also stated that there was no significant poor neonatal outcome associated with the inability to meet the emergency cesarean delivery time in their country because they have an advanced facility to treat the newborn. However, this is not the case in countries with limited resources, as in this scoping review.[30]

Rashid, as stated in Kathoon et al., 2021, mentioned that NICE‘s recommendations are very difficult to achieve. It is further said that imposing a fast CS response time is not impossible, but it should be borne in mind that the speed of action will raise a serious risk to the mother and neonate due to complications of the procedure for which they are not well prepared.[24]

From various previous studies, most of the problems occurred due to structural and process problems, especially related to the hospital's ability to fulfill infrastructure and human resources. Interestingly, all studies reviewed were from teaching hospitals, which typically have more human resources and better infrastructure than other hospitals. But in reality, the problems faced are not much different. One thing that may be of interest but is not discussed in many studies in teaching hospitals is the lengthy process that often goes on there before a decision is made. The length of reporting procedures that must be carried out at the teaching hospital may be the cause of the delay in response time.[17,27,28]

As it is known, doctors who first receive patients in the ER or outpatient ward are junior residents, so in terms of their decision-making ability, they are not capable and still require consideration from the resident. Senior resident, then the senior resident must re-evaluate the junior resident's examination, and it is reported to the consultant on duty; this occurs as part of the hospital's resident learning process, but its

implementation can actually lengthen the emergency section response time. Unfortunately, this problem is not mentioned in all studies conducted in teaching hospitals. It is necessary to conduct in-depth interviews and focus group discussions to find out more and determine the best strategy to overcome all the problems in the teaching hospital. As a result, many researchers and health practitioners question NICE's recommendations because most previous studies found no significant relationship between postponing an emergency cesarean section response time and poor neonatal outcome, leading them to conclude that NICE's recommendations were not based on evidence strong enough to apply globally, particularly in lower-middle income countries with a poor health care system.[24,30]

5. Conclusion

Most lower-middle-income countries are unable to meet NICE's recommendation to conduct an emergency CS within 30 minutes in cases that directly threaten the lives of the mother and her baby. This inability is affected by the poor health care system and poor health financing. Some of the obstacles encountered are in the structure and processes of the health care system. However, the inability to meet NICE standards was not significantly associated with neonatal outcomes. Even so, the right strategy is needed by all parties to improve the response time, including the government as a policy maker in the health sector, so that the quality of maternal and neonatal health services will be better and maternal and neonatal mortality rates can be reduced as much as possible according to the factors that can be avoided.

Abbreviations

CS: Cesarean Section; DDI: Decision to Delivery Interval; NICE: National Institute for Health Care Excellence; ScR: Scoping Review

Ethics Approval and Consent to Participate

Not Applicable

Competing Interest

The author declares that there are no competing professional or personal interests that might have affected the presentation of the work described in this manuscript.

Availability of Data and Materials

All the data listed in this scoping review can be accessed on the internet.

Authors' Contribution

DMM is the main author of this scoping review, who design, prepared initial draft and searched articles through e-databases but in further the processing and analysis the data was assisted by the second author, while AN and AW acts as a reviewer who helps correct the grammar and accuracy of the steps in implementing the scoping review method.

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