

Multilevel Approach to Avoid the Unnecessary Cesarean Deliveries

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Abstract

The rising trend of cesarean section rates worldwide against the natural vaginal deliveries is costly whether from maternal/child health perspective or economic wise. Here, we will discuss different action plans to limit the unnecessary surgical deliveries. Shared decision making requires providing women with full knowledge about the possible options with pros and cons of each. Eliminating the bias towards the profitable surgeries versus cheap deliveries sheds the light on the need to reform the health systems and the way health care providers can deliberately choose unnecessary procedures. After that, we will describe some real successful stories where replicating these measures is highly mandatory these days.

Keywords: Cesarean Section (CS); Natural Vaginal Deliveries; Maternal/Child Health

Background

Over the last century, the rates of cesarean section (CS) follow an increasing trend reaching 12.1% in 2000 then up to 21.1% of total deliveries in 2015. Many factors enhanced this pattern. The unnecessary CS including both the un-indicated ones and CS on maternal request have increased. Recommending CS for breech presentation soared everywhere after the initial results of the Term Breech Trial (TBT) in 2000 that demonstrated reduction in the perinatal mortality and composite neonatal morbidity, however the long-term results were not statistically significant in terms of perinatal mortality or neurodevelopment delay [1]. Betran, *et al.* expected that approximately two-thirds of births will be by cesarean in Eastern Asia region in 2030. Globally, the estimated CS rates would reach 28.5% [2]. In fact, these unnecessary cesarean deliveries are associated with long list of unwanted harm on both woman's and children health [3] plus unfair allocating of resources on un-indicated procedures leaving other health needs poorly funded [4]. Urgent actions are required to flatten the CS curve and bring down the rates to the acceptable threshold of 10 - 15%.

Women empowerment: Patient based recommendations

Knowledge is power

Pregnant women themselves should be well informed about indications and complications of cesarean births. A systematic review of 65 studies by Coates, *et al.* summarized the reasons of maternal preferences for CS as "(i) perceptions of safety; (ii) fear of pain; (iii)

previous birth experience; (iv) encouragement and dissuasion from health professionals; (v) social and cultural influences and (vi) access to information and educational levels” [5]. Torloni, *et al.* searched the literature between 2009 and 2017, looking for mass campaigns to educate women about unnecessary CS. He found only seven campaigns mainly in Latin America and conducted by the efforts of non-governmental organizations and activists [6]. In the presence of evidence between health literacy and better outcomes, a global health education program is required in the form of a course about childbirth and its complications administered to all pregnant women freely-online by national ministries of health in collaboration with the world health organization (WHO). This course is required to shed light on the short- and long-term complications of CS deliveries rather than promoting it as a completely safe and easy procedure. Randomized economic evaluations can be planned to conclude the exact cost-effectiveness benefits of such educational courses to reduce CS rates.

Psychological consultation for maternal fear of delivery

When maternal fear of vaginal birth is the reason for CS, well trained psychologists would be of great help to counsel women about complications of elective cesarean delivery and their future risk on the health of the woman herself in comparison with vaginal birth. Anxiety and fear are misleading, and women should be aware of the context of different birth scenarios to make safe decision. In a population based study comparing primigravid who had CS on request versus other primigravid giving birth in the same time period (2002 - 2004), mental health disorders were higher in women asking for CS (10% versus 3.5%, $P < 0.001$), including neurotic disorders, stress related problems and mood disorders [7]. Webb et conducted a systematic review of interventional studies done to treat the maternal fear. The included studies had heterogenous designs with poor methodological quality to make strong recommendation, but they agreed that interventions such as antenatal education, talking sessions, midwifery support and cognitive behavioral therapies can be effective. CS rates were 52% lower with talking therapies (OR 0.48, 95% CI 0.48 - 0.90) [8]. Further randomized trials are needed in this field, however meanwhile, psychological support must be provided to women who have fear of childbirth.

Health-system based recommendations

Medicine as business

What if we shift the doctor fees between the vaginal and cesarean deliveries, would this help reduce the numbers of unexplained surgeries? What if insurance companies pay for vaginal births some extra rate per hour, would doctors wait enough time before declaring that labor is obstructed? What if WHO in collaboration with health-ministries create a system of paying CS fees depending on its indication with the highest fees are for proper indication and lower fees for un-indicated ones? In one study evaluating the economic burden of high CS rates in Bangladesh, a low middle-income country, health expenditure on cesarean deliveries reached about 7% of total health expenditure in 2010, accounting for 66% of health expenditure on total deliveries, knowing that CS rates increased from 33% in 2000 to 63% in 2014 [9]. This means resources are allocated unfairly on unnecessary procedures in a country struggling to develop. Because doctors' preference is one of the reasons for unnecessary CS, there is a need to make schemes to “pay for quality and performance”. Bhatia, *et al.* compared the CS rates between private and public sectors in India. In 2015 - 2016, the CS rates were 11.9% in the public sector versus 40.9% in the private one. Bringing down the CS rates in the private sector to 15% is estimated to save about \$321 million. This should be the target of health policy makers to save money for unmet health needs.

Midwifery system

In a cohort study of 23,100 births in low risk population, midwifery based care was associated with 30% and 40% reduction in cesarean rates in nulliparous and multiparous women respectively in comparison with obstetrics based care [10]. Using health data from 2018, Kennedy, *et al.* compared the delivery outcomes in four high income countries. Netherlands had a CS rate of 16.6% with almost 70% of total births delivered by midwives, in comparison with 32% CS rate in the US with only 10% midwife-based deliveries. In total, all

parameters of perinatal mortality, fetal death and maternal mortality were lower in Netherlands [11]. This comparison did not match for any confounding factor but in general the higher rates of CS did not improve health outcomes. On the other hand, lower CS rates were associated with saved lives. In May 2021, the WHO published a report requesting the countries to invest in midwives where at least there is a profound shortage of midwives and nurses globally [12,13]. So, the work market should be updated and students in high school should be informed. Nursing and Midwifery schools should be supported. Words in reports should have louder voice in social and educational platforms to transform knowledge into actions.

Artificial intelligence (AI)

In fact, the machine intelligence is well employed in different sectors to come up with genius solutions. In obstetrics, predictive models are required to know which primigravid will successfully have normal vaginal delivery rather than failure to progress in labor or failure of the head to descend in second stage of labor. Also, highly sensitive models are needed to make safe VBACs and safe vaginal breech deliveries when external cephalic version fails to rotate the fetal head downwards. So far, there are many models that developed such as the “impact learning” machine learning method by Kowsher, *et al.* with accuracy of 0.89 and F1 value of 0.88 [14]. In a systematic review, Islam, *et al.* identified 26 studies aimed to determine pregnancy outcomes using the machine learning models. Out of these studies, four were designed to determine mode of delivery using different models [15].

Healthcare providers based recommendations

External cephalic version, vaginal breech or cesarean for breech

To shift the trend from higher rates of surgical birth over natural vaginal birth again, health care professionals should abide by the clinical guidelines. Many updated studies answered lots of queries about CS indications. Breech deliveries constitute around 3 - 4% of total deliveries. The long-term results of TBT were not statistically significant [1], so elective CS for breech has to be reversed by encouraging external cephalic version and allowing vaginal breech deliveries. A Cochrane review of eight randomized controlled trials showed that CS rates for breech can be reduced by 43% with external cephalic version [16]. Training of new healthcare providers especially obstetricians and midwives should stress on empowering the required skills for this goal. This stated clearly in current guidelines by different medical societies in Obstetrics and gynecology [17-19].

VBAC or cesarean delivery

The second clinical strategy would include encouraging vaginal birth after cesarean (VBAC) especially when the first CS is done for fetal reasons such as abnormal lie or fetal distress. In general, success rate of VBAC is 72 - 75%. If the woman has previous vaginal birth, success rate of VBAC would reach 90%. To avoid complications in VBAC, VBAC score can be implemented with local protocols to plan such deliveries where the pregnant woman is fully informed about what to expect [20].

Early or late induction of labor

The ARRIVE trial (2018) was a large trial to evaluate the effect of induction of labor between 39 weeks and 39 weeks and 6 days. The results showed significant reduction in CS rates in low-risk women from 22% to 18.6% [21]. Criticism of this trial was based mainly about the excessive costs. Also, it was noted that about only one fourth of invited women accept to participate in this trial. On the other hand, this early induction was associated with lower rates of still birth and lower perinatal morbidities. So, shared information with women, using effective sweeping at 39 weeks (one fourth would have spontaneous labor after sweeping) and allowing induction at 40 weeks would help in total replicating to some extent “The ARRIVE trial” while guarding against increased costs of induction, knowing that the later should be re-addressed in terms of neonatal morbidities and mortalities with late induction.

Success stories

Two-opinion-decision

In December 1988, Myers, *et al.* published a successful initiative to decrease cesarean section (CS) rates in a local hospital from 17.5% to 11.5%. The program was based on rigorous criteria to review the indication of any cesarean delivery whether primary or repeat [22].

Quality improvement schemes

A quality improvement collaboration among most of the birthing centers in State of Maryland succeeded to implement standards in induction of labor and identifying pathological fetal heart rate patterns requiring cesarean deliveries. These interventions were good enough to reduce the CS rate by 4.8% in primigravid low risk women between 2016 (36.1%) and 2019 (31.3%) [23].

Another maternal quality care collaboration was implemented an initiative to reduce the Cs in many centers in state of California. The main interventions were education of healthcare providers (physicians and nurses), support of women in labor, standardizing labor management and openness of physician level cesarean rates. Comparing centers with successful interventions and no interventions, CS rates dropped from 26% to 22% between 2014 and 2019 [24].

Nordic countries management of birth

While most countries are struggling to optimize maternal and child health, hazards from unnecessary cesarean deliveries are increasing but the great successful system is present in Nordic countries who managed to keep a low CS rates and similarly a lower maternal and infant morbidities and mortalities [25].

Conclusion

The ultimate goal of the cesarean deliveries is having optimized healthy and safe option of childbirth. However, the unnecessary cesarean sections have more hazards than benefits. That's why the medical authorities are requested to consider taking immediate measures to save women's lives and flatten the rising curve of surgical childbirth deliveries.

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