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Review Paper

The effectiveness of regionalization of perinatal care services - a systematic review

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ABSTRACT

Background: Several reports recommend the implementation of perinatal regionalization for improvements in maternal and neonatal outcomes, while research evidence on the effectiveness of perinatal regionalization has been limited. The interventional studies have been assessed for robust evidence on the effectiveness of perinatal regionalization on improving maternal and neonatal health outcomes.

Methods: Bibliographic databases of Medline, EMbase, EconLit, HMIC have been searched using sensitive search terms for interventional studies that reported important patient or process outcomes. At least two authors assessed eligibility for inclusion and the risk of biases and extracted data from the included studies. As meta-analysis was not possible, a narrative analysis as well as a 'vote-counting' analysis has been conducted for important outcomes.

Results: After initial screenings 53 full text papers were retrieved. Eight studies were included in the review from the USA, Canada and France. Studies varied in their designs, and in the specifications of the intervention and setting. Only three interrupted time series studies had a low risk of bias, of which only one study reported significant reductions in neonatal and infant mortality. Studies of higher risk of bias were more likely to report improvements in outcomes.

Conclusions: Implementing perinatal regionalization programs is correlated with improvements in perinatal outcomes, but it is not possible to establish a causal link. Despite several

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high profile policy statements, evidence of effect is weak. It is necessary to assess the effectiveness of perinatal regionalization using robust research designs in a more diverse range of countries.

Introduction

The Millennium Development Goals (MDGs) include targets for improving maternal and child health. MDGs 4 and 5 represent the United Nations member countries commitment to reduce child mortality rate by two thirds and maternal mortality by three quarters before 2015 as compared to 1990 baselines.[1] Based on trend analyses from 1990 to 2011, it has been estimated that out of 137 low and middle income countries, only 31 countries will achieve MDG 4 targets for reducing child mortality before 2015, and a further 11 countries will achieve them by 2020. Similarly only 11 and 15 low and middle income countries will achieve MDG 5 targets for reducing maternal mortality by 2015 and 2020 respectively. Only nine countries will achieve both targets by 2015.[2]

Different estimates demonstrate that a significant fraction of child mortality occurs very early after birth during the neonatal period (40–50% of all under-five mortality).[2] Consequently, interventions that effectively reduce neonatal mortality can have an important impact on achieving MDG 4 targets.

Evidence suggests[3] that improving access to perinatal care services in low and middle income countries may improve the chances of achieving MDG 4 and 5 targets. One major intervention that is aimed at improving access to cost-effective care, and has been widely implemented in high income countries in the last decades, is the 'regionalization' of perinatal services.

'Regionalization of health services' has been defined as 'the rational distribution of medical services across the territory, ensuring that services and facilities at all three levels (primary, secondary and tertiary) are located in such a way as to offer both easy access to the population and cost-effective care'.[4] Likewise, regionalization of perinatal services aims for improving equitable and efficient access to quality perinatal care across a territory.[4] WHO's Regional Office for Europe defined perinatal regionalization as 'a method that rationalizes existing health care services to ensure that each pregnant woman and newborn infant is cared for in an appropriate facility'.[5]

Developing an effective regionalization system involves organizing maternity care and neonatal facilities into at least three levels of care: for normal pregnancies and healthy babies, for pregnancies at moderate risk, and a regional referral center with a neonatal intensive care unit (WHO Europe 2010, USA, American Academy of Pediatrics 2004).[5,6] Such systems require effective organizational structures, early identification of high risk pregnancies, and deliveries, as well as a referral system that is actually in place.[7]

The origin of perinatal regionalization goes back to late 1960s, when it started in Canada, and during 1970s when the concept was developed and implemented in the USA (from 1971), UK (from 1972), and Australia (from 1978).[8] The publication of the 'toward improving the outcome of pregnancy' report, in 1976, by four major US academic associations was a turning point to emphasize the role that perinatal regionalization can play in improving maternal and neonatal outcomes.[9] Since then regionalization of perinatal care was implemented in different states of the USA, in a variety of shapes and formats, which generally followed the three levels of care explained above.[10] More recently, other countries have implemented perinatal regionalization programs. Examples include Finland, France, Japan, Norway, Portugal, and Sweden among high-income countries, Brazil, Iran, Libya and Sri Lanka among middle income-countries, and India among low-income countries.[11–20] However, each country, and in some cases regions in countries, have implemented different models of perinatal 'regionalization'.[10,18]

Several reports suggest that the implementation of perinatal regionalization programs are linked with improvements in maternal and neonatal outcomes[10,21–23] and several recommendations exist that promote establishment of perinatal regionalization for improving maternal and neonatal outcomes.[4,24,25] Although many studies in different countries have reported improvements in pregnancy outcomes after implementation of regionalized perinatal care systems, many of these studies suffer from methodological limitations that makes it difficult to establish the link between the 'regionalization' and the improvements in outcomes. As eloquently described by Mandell in 1986, 'due to limitations of the research designs employed in these studies, strong evidence concerning the impact of regionalization on perinatal outcomes is still lacking.'[26] Implementation of regionalization programs usually coincide with 'confounders' such as improvements in population socio-economic status, development of novel treatments and medicines, and other investments in health systems. Therefore, it is important to evaluate the effects of perinatal regionalization so that the effects of the program are not confounded by other potential sources of biases. Such biases are addressed only if the effects of regionalization are assessed using robust research methodologies (e.g. randomized controlled trials – which may not be practical, or interrupted times series designs).[27] Systematic reviews are viable approaches to document whether such studies are conducted, the quality of the relevant studies, and the effects of regionalization on different outcomes if all relevant studies are collated together.[28] To the best of the authors knowledge, and despite Mandell's call in 1986 for robust research studies,[26] there is no published systematic review of evidence assessing the effectiveness of perinatal regionalization programs. A previously published study conducted a meta-analysis of the effects of certain elements of a regionalization program on patient outcomes.[29] They did not, however, assess the effectiveness of regionalization programs as a whole.