**Societal Valorization of New Knowledge to Improve Perinatal Health: Time to Act**

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**Manuscript wordcount:** 1514

Academics have responsibility and public duty to use their research to promote improvements in patient care and health. Here we argue that there is an imperative to translate recent compelling research demonstrating the importance of the periconceptional period in determining health of future generations into improvements in pregnancy-related care and perinatal health. Taking this action has the potential to interrupt cycles of deprivation and to reduce inequalities in health being one of the biggest challenges in health care today.

It has been known for three decades that maternal exposures and health impact fetal growth and development which are associated with health programming of the newborn.1 These effects also contribute to health and disease in later life and are even partly transgenerational in nature, as has been shown for undernutrition in the Dutch Hunger Winter. It has become increasingly apparent that maternal characteristics not only affect fetal growth but also gametogenesis and embryonic development with similar influences on health at birth and during childhood.2,3 There is also evidence of periconceptional paternal influences on gender-specific fetal growth and long-term health of the offspring.4,5 This makes the periconception period one of the most critical periods in the life course, initiating epigenetic processes determining perinatal health and well-being for generations to come.

Perinatal health outcomes differ widely between countries, but even within high-income countries large differences in perinatal health outcomes exist. Perinatal mortality - as tip of the iceberg of perinatal morbidity like fetal growth restriction and preterm birth – is an indicator of perinatal health. In cities like Rotterdam in the Netherlands perinatal mortality in neighborhoods ranges between 2-34 per 1000 births. Between 2006-2013 in Southampton in the UK perinatal mortality across electoral wards ranged from 3.9 to 12.8 ‰.6 An eight-fold difference is also observed in infant mortality rates across municipalities of Massachusetts, USA.7 Disparities in perinatal health outcomes are known to be related not only to differences in obstetric and medical risk factors but also to lifestyle, education, working conditions, experience of violence, geography and socio-economic status of copuples.8

Effects of poverty and deprivation on perinatal health are substantial and are seen across all immigrant and native European and US communities. Even after adjustment for determinants as socioeconomic status, age, parity, race and ethnicity there remain increased risks associated with living in deprived neighborhoods for perinatal mortality (20%), prematurity (16%) and fetal growth restriction (11%).9 Risk accumulation involving decreased literacy, lack of access to social facilities, health care and support, as well as exposure to urban environmental stressors including crime, noise, physical insecurity, inadequate housing, air pollution and unemployment may play a role.

This should motivate working towards new comprehensive pregnancy-related care.2,10 As long ago as 1963, WHO was calling for more attention to those aspects of personal and community life, which have an impact on child-bearing potential, habits and efficiency of a population and health and treatment of the individual woman, in particular her reproductive system. This shift requires general practitioners, obstetricians and community midwifes to include routine assessment of non-medical risks such as those related to poverty as part of the process of risk analysis already carried out at the booking. To maximize benefits there should be an equivalent mechanism for conducting such a risk assessment at some point prior to conception for couples. Analogous with the opportunity map of societal investment in health created by Fielding and Teutsch11 an implementation map for preconception care should be drawn, in which health at conception is defined as a combination of an individual’s biology with exposure to social and environmental exposures known to be determinants of health. Nowadays CDC does have preconception guidance at its website, and does also emphasize the male partner ([www.cdc.gov/preconception](http://www.cdc.gov/preconception)).

Provision of comprehensive preconception and antenatal care requires careful coordination and delivery of services to address all these medical and non-medical issues in particular in at-risk populations. Antenatal care pathways should be implemented in ways that provide support for this complex of inter-related issues, including content geared towards nutritional and lifestyle improvements. Such a holistic approach to antenatal care will involve reorganization and coordination of social and medical services so that they are coterminous across neighborhoods and communities, allowing for care to be provided in an integrated chain combining the expertise not only of community midwifes and obstetricians but also of public health-, social- and youth workers (Figure1).

One of the great challenges in generating evidence-based public health is in translating interventions of proven effectiveness into health care practice. Failing to do so, however, may cost lives. As has recently been observed, the complex nature of population-level interventions may make translation from evidence to practice more difficult than in some other areas of medicine, and the realities of health and social care systems have in the past led to the failure to implement effective interventions in community settings. The challenge for academic perinatal health researchers is to find ways to communicate the importance of preconception and antenatal health care to the general population and to specific communities. Universities are largely seen as ivory towers but medical faculties increasingly feel a responsibility for the health of the general population and have invested substantial capital in supporting major national initiatives to leverage existing academic health center infrastructure through clinical and translational awards.

One of the great advantages of translating the science of preconception health care into public health practice is that the health of young parents and babies are subject of obvious appeal to both the public and policymakers. Interdisciplinary networks are needed in which academic knowledge is curated and combined in ways to support innovation and initiatives designed to meet specific needs of communities. Professional development, including education programs, training and leadership building, is also important for maternal and child health professionals. Transfer of knowledge is essential, not only from within the university to outside, but also within and across fields of science, curative care and public health and between different societal organizations, multiple stakeholders and governmental bodies. In doing so, there should be mutual respect of differences in vision, strategies and approaches to how challenges are addressed. Genuine partnership and communication are essential if health improvements are going to result from increases in scientific knowledge. This has not been a strength in academic medicine, but gives impetus to the importance of the emerging area of implementation science. In the US, programs as the annual CityMatCH Maternal and Child Health Urban Leadership Conference serve as a platform for promoting leadership activities, workforce development, and dissemination of innovations in epidemiologic, policy and health services research to stakeholders in scientific and non-scientific arenas.

Local and national governmental bodies can also direct valorization processes by determining the content and by subsidizing them. In the Netherlands the municipality of Rotterdam finances the local program ‘Ready for a Baby’ and the Ministry of Health, Welfare and Sport funded the national program ‘Healthy Pregnancy for All’ in 14 other Dutch cities.12 Analysis of public health data by academics had illuminated large differences in perinatal health between neighborhoods in the city. Sharing this new information with policy makers in a number of different ways, using city maps showing the distribution of perinatal health outcomes, was sufficient to convince them that action was needed. Essential components of these Dutch programs are enhanced pre- and interconceptional care, careful risk assessment at pregnancy booking -addressing non-medical risks tailored to individual- and early involvement of youth care during pregnancy in the case of vulnerable families. The Special Supplemental Nutrition Program for Women, Infants and Children (WIC) is a nice example from the USA which provides steadily available food from the food groups essential for physical and cognitive development. It has had strong positive improvements in maternal and child nutrition quality, physical and cognitive development of children.13 The US national “Healthy Start Program” was designed to eliminate disparities in infant mortality and other adverse birth outcomes through the implementation of required program components within the context of the community. Program components included outreach, case management, interconceptional care, local health system action plan and sustainability planning. Collectively the interventions were intended to help improve access to care and birth outcomes by enhancing health literacy, promoting healthy behaviors and mobilizing the community to improve perinatal health by ensuring the delivery of social and medical services to support pregnant and interconceptional women and their infants.14 In the Omaha Healthy Start Program, early analyses of the social and economic impact of community-based prenatal care designed to reduce perinatal health disparities documented a 31% cost savings in average hospital expenditure for participants, as compared with nonparticipants.15

Reaching out to the most vulnerable families in society is one of the most challenging tasks facing health care systems but also one with the greatest possible impact. Women in these families also have high rates of unplanned and undesired pregnancies, helping to perpetuate the negative cycle of events associated with disparities in economic and health outcomes. We conclude that, there is convincing evidence that improving perinatal health can reduce inequalities in health and to make this happen societal valorization programs should be initiated and supported by both universities and governmental bodies.

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**Acknowledgements**

This work was made possible by the department of Obstetrics and Gynecology of the Erasmus Medical Center, Erasmus University Rotterdam, the Netherlands, the MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, United Kingdom and the Department of Epidemiology, Harvard T.H. Chan School of Public Health, Boston, USA.

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Eric A.P. Steegers initiated the concept, wrote the first version and revised the commentary according to the suggestions of all co-authors. Mary E. Barker provided input from a psychological perspective and from the public health setting in England and contributed to all revisions. Régine P.M. Steegers-Theunissen provided input on the concept of networking valorization and contributed to all revisions. Michelle A. Williams contributed to the public health aspects of this commentary in the USA and co-authored all revisions.

**Conflict of interest**

All authors declare that they have no conflicts of interest.

**Legend**

Figure 1. Holistic Approach Crossing Medical and Social Domains