The First Thousand Days of Life

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ABSTRACT: The first thousand days of life, composing the 270 days of pregnancy and the first two years (730 days) of life, is at once a critical and vulnerable time for human development. It is a time in which the human person is to a large extent "embodied," becoming the integrated mind-brain-body-spirit that defines every human being. This embodiment is set in motion at fertilization and continues with the unfolding development of the embryo. By six weeks in utero, the brain is forming via ongoing neurogenesis, neuronal migration, synaptogenesis, and myelination. By the age of two the brain will be 80 percent of its adult size. As the brain develops, it connects to other developing body systems including the immune, endocrine, metabolic, gastrointestinal, cardiovascular and musculoskeletal systems. In this process of interconnection, a human being is shaped by both internal and external environments, both at the stage of the fetus and the stage of the infant. Human well-being and flourishing depends upon making these first thousand days as safe, secure, and healthy as possible. Physician practices, local health policy, and global health advocacy should focus on optimizing the first thousand days. This should include pre-conception care, pregnancy, safe birth, infant nutrition and fostering secure emotional and relational attachments.

Introduction

From a pro-life perspective, elective abortion is the most visible, direct and lethal assault on human persons within the first thousand days of life. Not only does it kill or, in some cases, harm a developing human being, it abandons women to a utilitarian ethos that validates taking human life as a solution to social, relational or medical problems. As egregious as elective abortion is, there are many other factors that compromise patient and societal well-being within the first thousand days.

These factors include pre-conception health (for both mother and father), the intrauterine environment (the "womb") and the extra-uterine environment (the "home").

The science of the first thousand days demonstrates how these factors are relayed and biologically embedded in the developing child.[1] This process of embedment operates through multiple pathways and demonstrates how "nurture" interfaces with "nature" in human development.

- "Epigenetics define the heritage changes in gene expression that are independent from changes in DNA sequencing such as mutation." As such, they do not alter the DNA sequence, but instead affect how cells read and transcribe the DNA sequence. By way of example, "maternal nutritional status may affect early epigenetic reprogramming processes as well as early establishment of the gut microbiome in the fetus, resulting in gene expression that increases susceptibility to adipogenesis, obesity and obesity-related metabolic disease in adult life."[2]
- Developmental plasticity is the process by which later life traits are shaped by the early life environment. Specifically, it refers to the process according to which a single genotype (i.e., genetic makeup of an organism) leads to distinct and lasting phenotypes (i.e., outward biological and psychological manifestations) under alterations of environmental interactions.[3]
- Telomeres are the "tips" of non-nucleated DNA that protect the double helix DNA strands, just as the plastic tips of a shoelace protect the cloth lace. With shortened or fragmented telomeres, the DNA is more vulnerable damage, thereby expressing the genetic code in a faulty manner. Telomere length is affected by both nature and nurture. Telomere length can be directly transmitted from mother to child at the point of fertilization. If the mother's telomeres are short throughout her body (including the telomeres on her eggs), the baby's telomeres will also be short. Fathers can also transmit shortened telomeres, although not to the same extent as mothers. The developing child's telomeres can be further shaped by the mother's nutrition and stress levels during pregnancy, with poor nutrition and high stress levels leading to shorter telomere lengths. There are also studies suggesting that telomere length can be transmitted generationally and affected by not only environmental adversity but also by historical trauma.[4]

[1] The First Thousand Days of Life. An Evidence Paper. Center for Community Health https://www.rch.org.au/uploadedFiles/Main/Content/ccchdev/CCCH-The-First-Thousand-Days-An-Evidence-P...

[2] Li Y. Epigenetic Mechanisms Link Maternal Diets and Gut Microbiome to Obesity in the Offspring. Front Genet. 2018 Aug 27;9:342. doi: 10.3389/fgene.2018.00342. PMID: 30210530; PMCID: PMC6119695.

[3] Gritti E.S., Barbot B. (2019) Developmental Plasticity. In: Zeigler-Hill V., Shackelford T. (eds) Encyclopedia of Personality and Individual Differences. Springer, Cham. https://doi.org/10.1007/978-3-319-28099-8_1622-1

[4] Skogen JC, Overland S. The fetal origins of adult disease: a narrative review of the epidemiological literature. JRSM Short Rep. 2012 Aug;3(8):59. doi: 10.1258/shorts.2012.012048. Epub 2012 Aug 22. PMID: 23301147; PMCID: PMC3434434.

These, as well as other pathways, show how social and historical determinants, diet and environment, stress and adversity, can biologically alter the architecture, the integrity, and the functioning of our brain and organ systems. They in fact, to a large degree "set" a person's life-health trajectory. A low-risk trajectory is set by a safe, secure and healthy thousand days. A high-risk trajectory is more likely to be set by disease, trauma, adversity or neglect within the first thousand days, culminating in an increased risk for developing chronic, non-communicable diseases and premature death. Furthermore, as a person's life course progresses it becomes more difficult to alter the life-health trajectory. Thus, an optimum life-healthy trajectory is best realized through a healthy first thousand days: it is our "first best chance" to promote the health, well-being and flourishing of the human person.

Clinical Manifestations within the First Thousand Days

Multiple conditions have their genesis in the first thousand days. Stunting, for example, identifies a child whose "height for age" is less than two standard deviations of the WHO median.[5] The prevalence of stunting ranges from 34% in South Central Asia to 43% in East Africa.[6] With stunting, not only is a child's height compromised, but his or her neurological and immunological development is also likely to fall below potential. The effects of stunting include increased childhood mortality from infectious diseases, lower cognitive ability, increased rates of anxiety and depression, poorer school performance and limitations in employment and economic security. Stunting can be traced back to a multitude of factors within the first thousand days: maternal malnutrition, untreated illnesses in the mother, pregnancy complications such as IUGR and birth trauma, repetitive childhood infections, disordered emotional attachment, poor breastfeeding and inadequate infant nutrition.

Within adequately resourced countries, the health of the first thousand days can be compromised by maternal obesity, tobacco use, uncontrolled hypertension, and uncontrolled diabetes. Unrecognized and untreated maternal depression pre-conception, during pregnancy and postpartum can adversely impact pregnancy outcomes and affect infant attachment and bonding. Other social and relational factors, including domestic violence and substance use, can also adversely affect the first thousand days of a child's life. Other harmful factors include living in a disadvantaged neighborhood or living within a community that has experienced historical and generational trauma.

The well-being (or lack thereof) of the first thousand days also interfaces with "Adverse Childhood Experiences" (ACEs). ACEs include physical, emotional and sexual abuse, divorce/separation, domestic violence, substance use and incarceration of a parent. While ACEs are "counted" through adolescence, it is clear that exposure to early childhood trauma or neglect has profound effect on physical, mental and relational

[5] WHO. Global nutrition targets 2025: stunting policy brief (WHO/NMH/NHD/14.3). Geneva: World Health Organization; 2014. Available at https://www.who.int/publications/i/item/WHO-NMH-NHD-14.3.

[6] AJ, Humphrey JH. The stunting syndrome in developing countries. Paediatr Int Child Health. 2014;34(4):250-265. doi:10.1179/2046905514Y.00000001583.

health. For example, the estimated population-attributable risk for ACEs and serious/persistent mental illness is 69 percent and for IV drug use is 78 percent. Multiple ACEs are also associated with increased levels of cardiovascular disease, metabolic disease, certain cancers and premature death.

Intervening

Conceptually, the first thousand days can be considered a journey with the stages of "preparing for the journey" (pre-conception care and health), "the journey *en route*" (pregnancy), "arriving safely" (safe birth") and "settling back home" (physical, nutritional, and emotional health within infancy and early childhood.) Throughout this journey, there are multiple opportunities to improve health and well-being.

Preparing for the Journey

Pre and peri-conception health have a great impact on the first thousand days. A 2018 Lancet article noted, "A woman who is healthy at the time of conception is more likely to have a successful pregnancy and a healthy child. A sharper focus on intervention before conception is needed to improve maternal and child health and reduce the growing burden of non-communicable disease. Alongside continued efforts to reduce smoking, alcohol and obesity in the population, there is a need for heightened awareness of preconception health, particularly regarding diet and nutrition."[7]

Finally and essentially, greater attention must be paid to improving "relational health" between men and women, including husbands and wives. In this context, the status of relational health between the mother and father likely represents the greatest environmental influence on the first thousand days.

The Journey En Route

Multiple opportunities exist to ensure and improve the physical, emotional, nutritional and relational health of women during pregnancy. Effective prenatal care must address not only obstetrical risk factors but also social determinants, such as intimate partner violence, mental health, housing and food security. All of these factors link the health of a mother to her baby. Within the thousand days, a pro-life ethos rejects abortion as a therapeutic option and affirms opportunities to care for the mother-child dyad as skillfully and compassionately as possible. This commitment to care should be made, even with identified congenital defects, aneuploidies, and lethal malformations. These life-affirming options promote comprehensive maternal and familial support, and they can range from fetal surgery (in the case of correctable defects) to perinatal hospice (in cases of lethal malformations).

[7] J, Heslehurst N, Hall J, Schoenaker DAJM, Hutchinson J, Cade JE, Poston L, Barrett G, Crozier SR, Barker M, Kumaran K, Yajnik CS, Baird J, Mishra GD. Before the beginning: nutrition and lifestyle in the preconception period and its importance for future health. Lancet. 2018 May 5;391(10132):1830-1841. doi: 10.1016/S0140-6736(18)30311-8. Epub 2018 Apr 16. Erratum in: Lancet. 2018 May 5;391(10132):1774. PMID: 29673873; PMCID: PMC6075697.)

Arriving at a Safe Destination

Birth is a defining moment within the first thousand days. Globally, obstetrical and perinatal care should remain consistent with the "Sustainable Developmental Goals" of reducing maternal and perinatal mortality and morbidity. Women of all backgrounds should be provided with care that is accessible, comprehensive, and respectful. While vast resources are directed towards providing contraception, comparatively fewer resources are directed toward the care of women during pregnancy, childbirth and postpartum. Within the United States, physicians and health care systems should continue to prioritize efforts to reduce maternal mortality and severe maternal morbidity. No matter where a mother delivers, a safe birth should be a fundamental and universal right.

Settling Back Home

With birth, a child transitions from an intrauterine to an extra-uterine environment. In this new environment, the physical, nutritional and emotional security of the infant becomes paramount. Health is maximized by a range of supports. Actions as simple as delayed cord clamping, ensuring best breastfeeding practices, or an appropriate introduction and composition of complementary feedings can greatly impact a child's well-being. Opportunities exist to provide parental support and education in order to establish secure emotional attachments between parents and infants. Support for childhood immunizations, home hygiene and access to quality primary and pediatric care help secure the physical environment. At another level, building loving and supportive relationships within a couple and family is key to preventing ACEs.

In summary, a pro-life ethic can address the continuum of this journey. This view can protect human lives threatened by intentional abortion. At the same time, this view allows parents and physicians to attend to the well-being of the first thousand days, taking into account the constellation of biological, social, relational and ecological factors that underlie its trajectory. We have seen that abortion as a supposed "solution" disproportionately affects disadvantaged communities. For example, African American women experience an abortion rate 3.6 times higher than white women.[8] Yet, this disproportionate level of abortion provision has not significantly improved the racial disparities in health and social outcomes between African American and white populations, despite fifty years of its provision.[9] We both need to push back on abortion and at the same time push forward with securing the health of the first thousand days. We as pro-life physicians are to be the most skilled practitioners and greatest advocates for excellence in "Thousand Days Medicine."

[8] Kortsmit K, Mandel MG, Reeves JA, et al. Abortion Surveillance — United States, 2019. MMWR Surveill Summ 2021;70(No. SS-9):1–29. DOI: http://dx.doi.org/10.15585/mmwr.ss7009a1

[9] CDC Vital Signs, African American https://www.cdc.gov/vitalsigns/aahealth/index.html.Accessed 8/19/2022.)

A Thousand Ways Forward

Within the continuum of the first thousand days there is great need for far-reaching solutions, from research to best practices, which inform the safety, security and well-being of this most critical time frame. The solutions rest on the foundation of respect for the life and dignity of all persons, born and unborn, Building on this foundation, we propose six core ideals that should illuminate care within the first thousand days. Care should be relationship-centered, trauma-informed, team-based, quality- assured, equitable, and global.

Relationship-Centered

Humans, in general, can only be as healthy as their relationships. This begins with the most foundational relationship of all—the relationship between men and women. Within this context, the most important social determinant and environmental influence within the first thousand days is the relationship of the couple who are having a child together. A secure, responsible, nurturing relationship improves nearly every measure of a child's well-being. The opposite also holds, that a fractured or hostile relationship between mother and father is much more likely to lead to adverse childhood experiences with life-long negative consequences.

We need to further integrate relational health into our practices. A young pregnant woman may be perfectly healthy physically and obstetrically, but her relationship with the father of the baby may be marked with adversity. A woman struggling with obesity and hypertension may have a troubled marriage that creates stress and depression, making it difficult for her to care for herself and make lifestyle changes. A cursory visit, driven by a template model of medicine, may not allow for the trust and the breakthrough which identifies the root causes of her disease and distress. Perhaps, our inquiry into the patient's well-being may ask not only "What is your chief concern?" or "Are you having any problems with the pregnancy?" to a deeper question, "What is keeping you from realizing peace in your life?"—a question that often elicits a response identifying difficult and entrenched problems in primary relationships.

Trauma-Informed

Dr. Robert Block, the former President of the American Academy of Pediatrics stated, "Adverse Childhood Experiences are the single greatest unaddressed public health threat facing our nation today." Trauma, neglect and adversity during pregnancy mirror the effects of ACEs that occur during childhood, creating a toxic environment for the developing fetus. Furthermore, we must recognize that ACEs have impacted the health, well-being and decision making of many of the women and mothers we care for.

As we look at the continuum of the thousand-day journey and the reproductive health of women, having one or more ACEs is associated with two to five times the risks of early initiation of sexual intercourse and having had multiple partners within the past 12 months. Adolescent and adult health behaviors such as tobacco use and

substance use are also associated with numbers of ACEs—with obvious implications for pre-conception and pregnancy health.

Trauma-informed care is sensitivity to the plight of our patients, trying to understand the behavior and decision-making posed by an addicted mother or a dysfunctional parent not so much in terms of "What is wrong with them?" but "What happened to them?" Trauma informed care demands that we ask deeper questions. For example, we may ask "How is it that ACEs are so prevalent?", "How do we create and better support social, relational and cultural environments that protect children and prevent ACEs?", and "How do we better implement resilience and support systems for those whose lives have been wounded by ACEs?" Until we engage and prioritize these questions—culturally, socially, ethically and spiritually—we continue to skim the surface of public health and preventive medicine.

Team-Based

The first thousand days requires teamwork. On the continuum of the thousand days, there are physicians from multiple disciplines who contribute to a child's health and security. These physicians include obstetrician-gynecologists, maternal fetal medicine specialists, neonatologists, pediatricians, family physicians, psychiatrists, researchers and public health experts. Their ability to communicate and collaborate towards the shared goal of a healthy first thousand days of life is crucial.

In day-to-day clinical practice, it is difficult to provide quality thousand days medicine as a "lone ranger." As physicians, we cannot possibly attend to all of the patient's needs. These needs are often complex and far-reaching, especially in regard to mental health, substance use, and compromised social and relational circumstances such as housing and domestic violence. An example of a successful model of team-based care for obstetrical patients was developed through the Perinatal Behavioral Health program (Meadowlark Initiative) in Montana.[10] Through the program, mothers and their families receive care not only from the prenatal care physician or midwife, but also from a behavioral health provider and a care coordinator. The care coordinator is linked to the "Community Team", which consists of a group of organizations that provide critically needed support for pregnant and postpartum women and their families. Some of these services include child and family services, home visiting programs, housing support agencies, peer recovery coaches and medication assisted treatment.

Equitable and Global

The goal of a thousand days programming is for human persons to flourish no matter what their background or circumstance. Reaching this full potential is much more difficult when there are social, economic, racial and geographic barriers to health care access and quality. We need to be the champions of overcoming these barriers, as

[10] Montana Healthcare Foundation. "The Meadowlark Initiative Update." October 28, 2020. Available at: https://mthcf.org/news/meadowlark-initiative-update/. Accessed 8/16/2022.

referenced by the United States Conference of Catholic Bishops Ethical and Religious Directives:

> Distinguishing ourselves by service to and advocacy for those people whose social condition puts them at the margins of our society and makes them particularly vulnerable to discrimination: the poor; the uninsured and the underinsured; children and the unborn; single parents; the elderly; those with incurable diseases and chemical dependencies; racial minorities; immigrants and refugees. In particular, the person with mental or physical disabilities, regardless of the cause or severity, must be treated as a unique person of incomparable worth, with the same right to life and to adequate health care as all other persons.[11]

The world cries out for global, equitable health, as well as health care delivery and interventions that respect the cultural and religious values of people. While there is a need for improved health services at every level, the greatest need by far is for medical support services for the first thousand days. Improving care at this stage is the only way we can solve the vexing problems of maternal deaths, stillbirths, stunting, and adverse childhood experiences that exist in low-resource countries. While many are aware of the inadequacy of basic health care services in wide swaths of low-resource countries, few are aware of the silent epidemic of mental illness that exists in Africa—and the suffering it brings to millions. By way of example, a recent review showed "the pooled prevalence of depression among African pregnant women was 26.3%, and it is significantly associated with economic difficulties, poor support from relatives, bad obstetric history (such as previous pregnancy loss and complications), unfavorable marital condition, and history of mental health problems."[12]

Quality-Assured

At every point on the thousand-day journey, we want to provide care that is reasoned, skilled, and evidence-based. That kind of care has its foundation in our motivation, education, knowledge base and experience. It is made complete through being person-centered, relationship-centered, trauma-informed, team-based and equitable.

Conclusion

The ideas of the first thousand days move us as pro-life physicians not only to oppose abortion but also to develop and put into place a system that supports human life at its most critical stages of development. These ideas challenge us to care for the whole person and to address the relational, social, cultural and spiritual environments that so profoundly influence human health and flourishing.

[11] Catholic Ethical and Religious Directives. Sixth Edition. https://www.usccb.org/about/doctrine/ethical-and-religious-directives/upload/ethical-religious-directives-catholic-health-service-sixth-edition-2016-06.pdf. Page 9

[12] Dadi, A.F., Wolde, H.F., Baraki, A.G. *et al.* Epidemiology of antenatal depression in Africa: a systematic review and meta-analysis. *BMC Pregnancy Childbirth* 20, 251 (2020). https://doi.org/10.1186/s12884-020-02929-5.