Medical education for obstetricians and gynecologists should incorporate environmental health

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THE PROBLEM: Although obstetricians-gynecologists are well positioned to prevent hazardous exposures, medical education on environmental health is limited.

A SOLUTION: Integrating environmental health topics into medical education can help ensure obstetricians-gynecologists are prepared to address patients' concerns about environmental exposures on their health, fertility and pregnancy outcomes.

Exposure to environmental chemicals is ubiquitous in air, water, food consumption, and consumer products, and concern is growing over the long-term health impacts of repeated, low-dose exposure to environmental chemicals. National Health and Nutrition Examination Survey data demonstrate widespread exposure to environmental chemicals among pregnant women and women of childbearing age including heavy metals, volatile organic compounds, and endocrine disrupting chemicals.[1]

Many health outcomes have developmental origins, and exposures in utero can have permanent and irreversible impacts on health.[2] For example, prenatal exposure to heavy metals, such as mercury, is well documented to cause adverse neurological effects in children[3-5] and can occur through maternal consumption of fish high in methylmercury. Mercury exposure during pregnancy is particularly concerning because mercury is actively transported across the placenta, causing a higher dose to the fetus than the mother.[6] Therefore, a mother may be asymptomatic, whereas the fetus sustains neurological damage.

Prenatal exposure to pollutants such as arsenic, tobacco smoke, air pollution, and polycyclic aromatic hydrocarbons (PAHs) induce epigenetic dysregulation, creating heritable changes in phenotypes.[7] Prenatal exposure to airborne PAHs, a group of chemicals that can be created through incomplete burning of fossil fuels, is associated with decreased birthweight and head circumference among African Americans.[8]

High levels of exposure to PAHs during the prenatal period is associated with lower cognitive development scores at 3 years of age[9] and lesser intelligence quotient scores at the age of 5 years.[10] By identifying hazardous environmental exposures during pregnancy, obstetricians-gynecologists can improve health over the life course.[2]

Environmental health has long been recognized to be of importance to pediatric practice. Although it certainly is critical for pediatricians to consider environmental health exposures, for many environmental exposures, diagnosis by a pediatrician is not timely enough to treat health outcomes resulting from exposures occurring during the prenatal period.

An example is the current pediatric approach to lead poisoning. Lead has long been known to cross the placenta and impair neurodevelopment however; current practice is for pediatricians to screen children for elevated blood lead levels at 12 months of age. This method is reactionary rather than preventative because once lead exposure has occurred, the adverse neurological outcomes are

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irreversible. Obstetricians-gynecologists can prevent lead poisoning in children by surveying patients during preconception and prenatal visits about potential lead exposures in their home, occupation, or cultural practices.

Collaboration of pediatricians and obstetricians-gynecologists can lead to the identification of previously unknown environmental exposures. In a recent case study by Dickenson et al,[11] the Pediatric Environmental Health Specialty Unit at the University of California, San Francisco assisted in identifying the source of an abnormally high mercury level in a pregnant woman as the use of an imported face cream containing mercury. The woman was identified as part of a study monitoring environmental exposures in pregnant women and demonstrates the necessity for the screening of heavy metals and environmental chemicals among women.[11]

The role of obstetricians-gynecologists

Much of the population of reproductive age are unaware of the environmental chemicals they are exposed to daily where they live and work and the effects these exposures have on their fertility and health of future offspring. Obstetricians and gynecologists can help patients make informed decisions and take steps to reduce exposures affecting their reproductive health. Obstetricians-gynecologists have a critical and unique role to play, both in clinical care and in advocacy for federal policy reform.

Clinical care. Obstetricians and gynecologists are increasingly confronted with clinical situations and questions from patients about the impact of environmental chemicals on their general health, fertility, and pregnancy outcome. Obstetricians-gynecologists are well positioned to provide guidance on environmental health issues to patients.[12] Obstetricians-gynecologists can inquire about environmental exposures[13] by asking questions about key exposures, such as mercury, lead, pesticides, and endocrine-disrupting chemicals.[14] Sathyanarayana et al[14] published an article in the Journal that provides specific risk communication messaging, exposure reduction actions, and sample clinical questions for determining environmental exposures among patients.

Despite the opportunity to educate patients on reducing environmental exposures, most obstetricians-gynecologists do not ask patients about environmental exposures aside from smoking, alcohol consumption, and nutrition.[15] A recent survey of 2514 American Congress of Obstetricians and Gynecologists (ACOG) fellows reported that half of the obstetricians-gynecologists surveyed rarely conduct an environmental health history, despite the majority of respondents agreeing that an environmental health history would identify patient exposures (86%) and help prevent harmful exposures (80%).[15] Reasons for not asking patients about environmental exposures included concern about creating unnecessary anxiety among patients, not possessing adequate information to answer patient questions, and the inability of patients to take steps to reduce exposures.[15]

Advocacy. Patient centered actions cannot reduce all exposure to environmental chemicals, and obstetricians-gynecologists can be influential advocates of environmentally safe policies.[12,16] An example of an area in which obstetricians-gynecologists can advocate is for the strengthening of current regulatory oversight of industrial chemicals. Of the 80,000 industrial chemicals in commerce, the majority have little to no toxicity testing on their impacts on human health.[17] Obstetricians and gynecologists can advocate for the development of robust screening regulations and make precautionary recommendations in the absence of complete data.[18]

Obstetricians-gynecologists can take a precautionary approach to addressing emerging environmental contaminants.[4] The Precautionary Principle "provides justification for public policy actions in situations of scientific complexity, uncertainty, and ignorance, where there may be a need to act in order to avoid, or reduce, potentially serious or irreversible threats to health or the environment."[19]

Delaying action until research provides causal support for an associated environmental exposure and adverse health outcome may take decades, time in which adverse reproductive health outcomes can be avoided.[19] This strategy is not meant to be alarmist; rather, obstetricians-gynecologists should exercise a degree of caution, to avoid delay in protecting patients, when the preponderance of evidence seems to be pointing toward the adverse reproductive health outcomes from chemicals ubiquitous in the environment.

An example of an area in which the precautionary principle can be used is exposure to chemicals that influence the endocrine system. In standard toxicity testing, chemicals are tested to determine a threshold value, below which there are presumably no adverse health outcomes. Endocrine-disrupting chemicals have been shown to have nonmonotonic dose-response curves, wherein even low doses are capable of producing adverse health effects, and in some cases, more severe effects occur at low doses than higher doses.[20]

Standard toxicity testing also does not account for the unique exposures of pregnant women and children, exposure to multiple chemicals, and susceptible windows of development. As a result, the Endocrine Society has called for use of the precautionary principle for regulation of endocrine-disrupting chemicals.[20] By utilizing the precautionary principle, obstetricians-gynecologists can address reproductive health concerns related to environmental exposures without causing unnecessary stress for their patients.

Environmental health in obstetrics-gynecology medical education. Recognition of environmental hazards among obstetricians-gynecologists has gained momentum with the release of the ACOG Committee on Health Care for Underserved Women and the American Society for Reproductive Medicine (ASRM) Practice Committee joint committee opinion 575.[18] In the opinion, ACOG and ASRM urge