ADVANCING MEN'S REPRODUCTIVE HEALTH IN THE UNITED STATES

Current Status and Future Directions

Summary of Scientific Sessions and Discussions

September 13, 2010
Atlanta, Georgia






National Center for Chronic Disease Prevention and Health Promotion
Division of Reproductive Health

Table of Contents

Introduction

This report contains a summary of presentations and discussions from the meeting, "Advancing Men's Reproductive Health in the United States: Current Status and Future Directions." The meeting was originally planned to help CDC staff and our Federal colleagues gain insights into the emerging areas of public health activities related to male reproductive health.

What began as a "brown bag" seminar for CDC staff quickly developed into a one-day meeting of scientists, program managers, and clinicians. Through word-of-mouth, the Meeting Planning Committee received emails and calls from professionals asking to be included as attendees. Many understood neither CDC nor other Federal agencies could offer any form of travel reimbursement or subsidy. With the assistance of CDC staff members, the meeting venue and logistics were changed to accommodate almost 100 people within less than 4 weeks.

Since the meeting, many have requested a meeting summary that could be shared with other public health professionals. The Meeting Planning Committee requested this document be prepared for wider distribution and use. Thanks to the cooperation of speakers and others, this document was prepared. An electronic version of the report is scheduled for release at *www.cdc.gov/reproductivehealth*.

Questions concerning the Report, the 2010 meeting, or other matters related to this work are welcomed. Inquiries should be addressed to:

Men's Reproductive Health Activities
CDC Division of Reproductive Health
4770 Buford Highway, MS K-20 (LW)
Atlanta, GA 30341
Telephone: 770-488-5200
Fax: 770-488-6450
Email: drhinfo@cdc.gov

Important Information:

The Centers for Disease Control and Prevention (CDC), National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP), Division of Reproductive Health (DRH) supported the preparation of these proceedings using notes and documents obtained from meeting speakers and presenters. The views or opinions presented in this should not be construed as the official policies of the U.S. Department of Health and Human Services and its agencies (including CDC).

Notes to Readers:

- Technical and scientific concepts presented by speakers required the use of terms that may be considered, by some, to be explicit.
- Some information presented used information available at the time of the meeting. This document should be considered a historic context for future discussions of male reproductive health.
- The findings and recommendations presented do not reflect commitment of DHHS and its agencies to provide support for specific public health activities.

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion
Division of Reproductive Health

ADVANCING MEN'S REPRODUCTIVE HEALTH IN THE UNITED STATES

Current Status and Future Directions

September 13, 2010
Atlanta, Georgia

Summary

The "Advancing Men's Reproductive Health in the United States: Current Status and Future Directions" meeting was convened by the U.S. Department of Health and Human Services (HHS) and the Centers for Disease Control and Prevention (CDC), National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP), Division of Reproductive Health (DRH). The meeting was held on September 13, 2010, at the CDC Roybal Campus in Atlanta, Georgia.

ADVANCING MEN'S REPRODUCTIVE HEALTH IN THE UNITED STATES

Current Status and Future Directions

September 13, 2010
Atlanta, Georgia

8:00	**Welcome** Peter Briss, MD, MPH
8:10	**Meeting Process and Objectives** Elizabeth Martin, Meeting Facilitator
8:20	**Overview of Male Reproductive Health** Dennis Fortenberry, MD, MS
8:50	**CDC Activities Related to Male Reproductive Health** *Past and Current Activities*—Lee Warner, PhD *New Directions: Sexual Health*—John Douglas, MD
9:10	**HIV/STD Prevention** Cornelis (Kees) Rietmeijer, MD, PhD
9:30	**Break**
9:45	**Male Contraception** Ajay Nangia, MBBS, FACS
10:05	**Male Factor Infertility** Lawrence Ross, MD
10:25	**Fertility Preservation in the Male Patient with Cancer** Robert Brannigan, MD
10:45	**Modifiable Lifestyle Issues** Stanton Honig, MD
11:05	**Mental Health Issues** William Petok, PhD

Afternoon session	
12:25	**Introduction to Afternoon Session** Maurizio Macaluso, MD, DrPH
12:30	**Involving Men in Reproductive Health and Family Planning Services** Roy Jacobstein, MD, MPH
12:50	**Perspectives— A Panel Discussion** Scott Williams, Men's Health Network, Introductions and Purpose **Panelists:** Lynn Barclay, American Social Health Association Ken Mosesian, The American Fertility Association Barbara Collura, MA, RESOLVE Joyce Reinecke, JD, Fertile Hope Scott Williams, Men's Health Network Paul J. Turek, MD, American Society of Andrology Lawrence Ross, MD, American Urological Association and AUA Foundation Dolores Lamb, PhD, American Society for Reproductive Medicine
2:00	**Break**
2:20	**Afternoon Discussion Sessions:** Gaps in Research or Practice Advancing Men's Reproductive Health Group Feedback Meeting Outcomes and Next Steps
4:45	**Closing Session**

Welcome

Peter Briss, MD, MPH
Medical Director
Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion

Dr. Briss opened the meeting by welcoming the participants on behalf of CDC and its National Centers, Institutes, and Offices. He confirmed that CDC was extremely pleased with the high level of involvement and enthusiasm among participants. Dr. Briss also stated that CDC was honored to host a meeting highlighting issues relating to men's roles in reproductive and sexual health.

Dr. Briss announced that the content of the meeting would target two of six "Winnable Battles" identified by Dr. Thomas Frieden, director of CDC, as public health priorities: HIV prevention and prevention of unintended adolescent pregnancy. He also informed the participants that the Adolescent meeting was expanded beyond the initial focus on male infertility to a wider discussion of the current status of science and practice regarding men's reproductive health.

Dr. Briss concluded his opening remarks by thanking the participants for contributing their valuable time to attend the meeting and provide CDC with their expertise. He confirmed that CDC looked forward to the outstanding input and insights the participants would provide over the course of the meeting to advance the field of men's reproductive health.

Elizabeth A. Martin
President, Elizabeth A. Martin and Associates

Ms. Martin served as the facilitator of the meeting and joined Dr. Briss in welcoming the participants to the meeting. She explained that the Planning Committee developed three objectives for the meeting:

- Provide a greater understanding of the scope and nature of men's reproductive health (MRH) through presentations and discussions on the public health aspects of preventing, treating, and caring for conditions affecting reproduction and sexual health.
- Identify gaps in reproduction and sexual health research, health care services, and public health programs, especially when these gaps could sustain disparities or undue burdens on MRH.
- Identify future directions for effective ongoing partnerships among public health officials, health consumers, scientists, academic organizations, and others concerned with the status of MRH.

Ms. Martin reminded participants that 12 scientific presentations would present information on the status of several key areas of men's reproductive health.

Overview of Chronic Disease Prevention, Health Promotion and Reproductive Health

Maurizio Macaluso, MD, DrPH
Chief, Women's Health and Fertility Branch
Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion
Division of Reproductive Health

(Note: Dr. Macaluso, at the time of this presentation, was a federal employee. See the Registrant List for additional information.)

Dr. Macaluso explained that reproductive health plays an important role in chronic disease prevention and health promotion. The Greek physician, Soranus of Ephesus, first introduced the term "chronic disease" in the second century AD as *"those long diseases."* A more modern definition characterizes chronic diseases as having a multifactorial etiology, long induction time, and long duration of disease that may or may not be reversible.

The conceptual framework for reproductive health is similar to that used for chronic diseases, in that it involves complex interactions among genes, social environment, infections, and human behavior; the lifespan from preconception through menopause and beyond, including trans-generational effects; and specific chronic diseases (e.g., infertility, HIV/AIDS, cancer, diabetes).

The concept of health promotion is extremely relevant to reproductive health. The modern definition of "health promotion" is a focus on changing lifestyle and environment to achieve optimal health. "Optimal health" is defined as a broad and complex entity that includes a balance among a number of dimensions, such as physical, emotional, social, spiritual, and intellectual health. The focus on optimal health is important to reproductive health issues, including gender and social equity in health, optimal family planning, safe motherhood, and healthy babies.

A focus on reproductive health can play a critical role in chronic disease prevention and health promotion by providing strong theoretical models for causation and prevention, a life stage when exposures can be effectively modified, impact on nonreproductive outcomes, and integration of efforts to reduce health disparities.

Dr. Macaluso explained that the morning presentations would describe ongoing and completed MRH research and other activities both within CDC and in the field. Although these topics are relevant to MRH and were selected to stimulate discussion among the participants, these issues would not fully cover the complex and broad field of MRH. CDC would rely on the expertise of the participants to build a more comprehensive list of MRH topics, identify gaps in existing knowledge, propose strategies to effectively apply science to improve the reproductive health of men, and recommend approaches to promote MRH at the national level.

Overview of Men's Reproductive Health

J. Dennis Fortenberry, MD, MS
Professor of Pediatrics and Associate Director
Adolescent Medicine Section
Indiana University School of Medicine

Dr. Fortenberry reported that four concepts are extremely important to MRH: (1) consider the essential distinctions between men's and women's reproductive health; (2) respect, but not worship biological essentialism; (3) broaden the parameters of MRH; and (4) take a lifespan perspective on MRH by considering its intersection with women's reproductive health. Factors in MRH differ over the lifespan of boys, teens, emerging adult males 18–26 years of age, middle-aged men, and older adult men.

Gender plays an important role in clearly identifying and characterizing "males" with respect to MRH. Data collection was recently completed for a study with ~80 bisexual men in Indianapolis. For purposes of the study, "bisexual behavior" was defined as men who had sex with at least one man and one woman over the past 12 months.

Of all men included in study, ~50% had children and ~25%–30% of this subgroup had >2 children. These men reported the difficulties in navigating their dual roles as fathers and bisexual men. Gay and bisexual men are included in HIV and STD studies, but are typically excluded from MRH research.

Gender has both biological and cultural properties. In terms of the biological aspects of gender, the 2006 Bartlett and Vasey study analyzed gender-atypical behavior that was recalled among *fa'afafine*, men, and women in Samoa. *Fa'afafine* are biological males born to mothers who already have at least one son. The study indicated that *fa'afafine* undertook gender-atypical role preferences as children. As a result, these males identified a preference for female-typical behavior, preferred to play with girls, and had an interest in girl's toys, games, and makeup at the same level as females.

The study further suggested that adult *fa'afafine* often engaged in same-sex relationships, but a fair number of these men also had relationships with women and produce children. Overall, gender has essential aspects in the composition of humans, but is not limited to genes inherited at the time of conception. The study demonstrated that gender may be influenced by non-genetic factors, including those associated with intrauterine environment.

As an example of cultural aspects of gender, males are not "biologically required" to stand while urinating. However, this behavior is associated with masculinity and is extremely difficult to change from both cultural and societal perspectives.

Circumcision also is a source of longstanding scientific, social, and cultural debate regarding its importance to both public health and men's health. However, further research is needed to better understand the reasons why circumcision plays such a critical role in men's health.

Well-designed studies have demonstrated that circumcised men have a substantially lower risk of acquiring HIV if exposed. Recent research showed that circumcision significantly changed the microbiology of the coronal sulcus and made it less susceptible to HIV when exposed by modifying the microbial communities that are present.

The 2010 Price, et al. study analyzed the effects of circumcision on the penis microbiome in adult men in East Africa both pre- and post-circumcision. The study showed significant decreases in *clostridiales* and *Prevotellaceae* and also found an association between bacterial vaginosis in women and several genera, including *Anaerecoccus, Finegoldia, Peptoniphilus*, and *Prevotella*. The Price study further indicated a potential intersection between men's and women's reproductive health.

A study conducted in Indianapolis in adolescent circumcised and uncircumcised males <18 years of age demonstrated a similar shift in microbial populations using coronal sulcus swabs and urine. For example, circumcised adolescent males had much less *Staphylococcus* and *Prevotella* than uncircumcised males, while circumcision had no effect in the exchange of *Lactobacillus* and *Gardnerella*.

Partnering, mating, and fathering play important roles in MRH as well. The 2006 Van Anders and Watson study showed that men with lower

testosterone levels were more likely to be partnered than those with higher testosterone levels.

The 2008 Cannon, et al. study demonstrated the important role of fathers in the father-mother-child triad. An emerging body of literature is showing that fathers play a role in the outcomes of reproduction, particularly by influencing their children well beyond the sperm donor relationship. The components of effective fathering include psychological functioning, relationship conflict, and parenting style. The 2009 Schacht, et al. study demonstrated a slight association between fathering behaviors and child adjustment, such as problem drinking and depressive symptoms.

Understanding of masturbation is important to understanding men's sexual health. A number of studies have been conducted on the role of masturbation in men's sexual and reproductive health. This research includes the 2008 Dimitropoulou, et al. study on the role of masturbation in prostate cancer risk in men <50 years of age; the 2009 Amman study on the role of masturbation in semen quality; and the 2008 Santilla, et al. study on the negative association between masturbation and relationship satisfaction. However, these studies are not particularly rigorous and additional research is needed.

Masturbation is considered to be the defining characteristic of male sexual behavior rather than penile-vaginal intercourse, oral sex, or other partnered sexual behaviors. The 2010 Herbenick, et al. study analyzed masturbation over the past month among 2,879 men and 2,842 women. The study showed that masturbation was substantially more common in recent sexual behavior among men than women over the lifespan of 14–15 to >70 years of age. Overall, men's reproductive health must encompass and focus on the entire body beyond the penis.

CDC's Past and Current Men's Reproductive Health Activities

Lee Warner, PhD, MPH
Associate Director for Science
Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion
Division of Reproductive Health

Dr. Warner highlighted CDC's past and current MRH activities. The field of male reproductive health was described as currently being at a "tipping point," a term borrowed from Malcolm Gladwell's book, *The Tipping Point: How Little Things Can Make a Big Difference*. The book focuses on the beginning of an idea and its growth to a social epidemic.

In addition to CDC hosting its first MRH meeting, other "tipping points" leading up to this effort include the 2003 meeting by the U.S. Agency for International Development on MRH and gender equity; the long history of the HHS Office of Population Affairs, Office of Family Planning, in increasing male involvement in family planning by offering services to men through Title X clinics; and recent conferences by other groups to advance the evidence base of MRH activities and formulate strategies to better educate men about infertility. Two additional influences include the 1965 book by Norman Ryder and Charles Westoff, *Reproduction in the United States*, a hallmark of available data at the time on men's and women's reproductive health; Robert Hatcher's *Contraceptive Technology*, today a world-renowned resource on contraception now entering its 20th edition.

A 1994 statement by the World Health Organization (WHO) serves as the best available definition of MRH because this language is not gender-specific. WHO defined health as—*A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity*. *Reproductive health addresses the reproductive processes, functions, and systems at all stages of life. Reproductive health, therefore, implies that people are able to have a responsible, satisfying, and safe sex life and that they have the capability to reproduce and the freedom to decide if, when, and how often to do so.*

It is hoped that adoption of the WHO's 1994 statement as the definition of MRH will be embraced by the diverse group of participants attending the MRH meeting, including federal agencies, academia, professional societies, industry, and private practitioners who share a common goal and investment in MRH. This includes urologists, reproductive health specialists, endocrinologists, STD and family planning practitioners, and obstetricians/gynecologists.

CDC has made a number of notable accomplishments since its establishment in 1946 as the Public Health Service Malaria Program to its present role as the Centers for Disease Control and Prevention. In its current organizational structure, CDC's three major offices are the Office of Surveillance, Epidemiology, and Laboratory Services; the Office of Noncommunicable Diseases, Injury, and Environmental Health; and the Office of Infectious Diseases. National Centers in these three offices are responsible for conducting activities relative to CDC's public health mission.

While CDC does not have a either a formal or funded MRH program, several National Centers and Institutes conduct activities in this area. The National Center for

Chronic Disease Prevention and Health Promotion (NCCDPHP), Division of Reproductive Health (DRH) analyzes reproductive health surveys that have collected data on vasectomies, infertility, in vitro fertilization cycles in the United States, and sexual and reproductive health of persons 10–24 years of age. Other NCCDPHP divisions have conducted research on the relationship between smoking and male infertility; rates of prostate and testicular cancer; and healthy behaviors, adverse risk behaviors and the use of preventive screening in adolescents, adults, and communities.

The National Center for Health Statistics (NCHS) has administered the National Survey of Family Growth since 1973 and began including men of reproductive age in the survey in 2002. NCHS also administers other surveys including the National Health and Nutrition Examination Survey (NHANES) and the National Health Interview Survey (NHIS).

The National Institute for Occupational Safety and Health (NIOSH) has conducted occupational studies to determine the impact of chemical and physical exposures on male and female reproductive health. One of NIOSH's most prominent studies focused on the association between bicycle seat type and the rate of sexual dysfunction among public safety workers who regularly rode bicycles. Results from this study led to recommendations encouraging the use of "no-nose" bicycle saddles.

The National Center for Environmental Health (NCEH) and the Agency for Toxic Substance and Disease Registry (ATSDR) have conducted studies on the impact of environmental exposures on male and female reproductive health. This research has included the relationship between diethylstilbestrol and testicular deformities in male offspring, male reproductive health risks to Vietnam veterans from Agent Orange, and risks to Gulf War veterans from other exposures.

The National Center on Birth Defects and Developmental Disabilities (NCBDDD) has conducted studies on sexual issues and reproductive health needs among persons with disabilities, such as the use of contraception and decision making, sexual dysfunction, and the relationship between various exposures and birth defects. NCBDDD's 1984 study documented the risk of Vietnam veterans fathering infants with birth defects. Another NCBDDD study with 1994–2004 data found an association between paternal age and risk for major congenital anomalies.

The National Center for Injury Prevention and Control (NHIPIC) has conducted a number of studies to document that men are survivors of crime and violence in addition to women. The National Center for Immunization and Respiratory Diseases has developed and released guidance on vaccine-preventable diseases (i.e., hepatitis B, human papillomavirus or HPV, and mumps) that affect men of reproductive age. The National Center for Emerging and Zoonotic Infectious Diseases is responsible for examining all new and emerging health threats including those that may affect MRH.

The National Center for HIV, Viral Hepatitis, STD, and TB Prevention (NCHHSTP) has a long history of conducting primary and secondary prevention initiatives from both behavioral and biomedical perspectives. These activities include creating the *National STD Treatment Guidelines*, producing the *HIV/STD Partner Services Guidelines*, and taking a lead role in developing the *National HIV/ AIDS Strategy*. MRH data collected by all of these National Prevention Centers and Institutes are available to the public on the CDC Web site (www.cdc.gov).

CDC's Sexual Health Activity

John M. Douglas, Jr., MD
Chief Medical Officer
Centers for Disease Control and Prevention
National Center for HIV, Viral Hepatitis, STD, and TB Prevention

Dr. Douglas described CDC's new public health approach to advancing sexual health in the United States. The 2001 *Surgeon General's Call to Action to Promote Sexual Health and Responsible Sexual Behavior* focused on the need to promote sexual health and responsible sexual behavior across the lifespan and stimulate respectful, thoughtful, and mature discussions about sexuality in communities and homes.

The *Surgeon General's Call to Action* further noted that sexual health is an essential component of overall individual health, has a major impact on the overall health of communities, and should be included in a national dialogue at all levels as a critical factor in improving population health.

CDC believes it is a priority to strengthen the focus on sexual health endorsed by the 2001 *Surgeon General's Call to Action* because of recent trends in the United States. STDs, HIV, and other sexual health problems, along with their associated costs, have a high population burden. Of 19 million STD infections that occur each year, ~50% are among young persons 15–24 years of age. Data show that 1 in 4 women 14–19 years of age is infected with at least one STD.

Estimates show that 1.1 million Americans are living with HIV at this time and >55,000 new infections occur each year. Of all pregnancies in the United States, >50% are unintended. HIV and other STDs

are associated with major health disparities, with rates 8 to 20 times higher among African Americans than whites and 40 to 50 times higher among men who have sex with men than other men. STDs, including HIV, are estimated to cost $15.9 billion per year.

Teen pregnancy rates in the United States began to increase in 2006 after a 15-year decline. In addition, data from the United Nations Demographic Yearbook indicate that in 2006, the U.S. teen pregnancy rate of 41.9/1,000 females was substantially higher in than any other developed country. At the other end of the lifespan, AARP released its third national survey of Sex, Romance, and Relationships in midlife and among older adults in April 2010. The survey showed a strong interest in sexual health among older adults.

To advance sexual health in the United States, CDC convened a Sexual Health Consultation on April 28–29, 2010. The purpose of the meeting was for participants to articulate the rationale, vision, and priority actions for a public health approach to advance sexual health in the United States. CDC staff and external consultants worked together as a Sexual Health Steering Committee to develop a sexual health green paper, *"A Public Health Approach for Advancing Sexual Health in the United States: Rationale and Options for Implementation."* The green paper is intended as a living document to stimulate discussion and will serve as the basis for the publication of a formal CDC White (policy) Paper in the future. (Editor's note: A summary of this document was released in August 2011 and is now available online at www.cdc.gov/sexualhealth).

CDC identified three major advantages of a sexual health framework. First, such a framework could help shift consideration of sexual health-related issues from a disease-focused approach to a more positive health-based approach that is based on understanding the complex factors to shape human sexual behavior. A more positive health-based approach could help reduce stigma and provide a framework that would be relevant to all persons seeking health. Second, the efficiency and effectiveness of prevention messaging and services would be enhanced by their bundling into a common framework. Third, capacity to normalize conversations regarding the contributions of sexuality and sexual behavior to overall health would be strengthened.

CDC also agreed on six key objectives to guide its public health approach to advancing sexual health in the United States. These include increasing healthy, responsible, and respectful sexual behaviors and attitudes; increasing awareness and capacity to make healthy, responsible, and coercion-free choices; promoting healthy sexual functioning and relationships (i.e., ensuring that individuals have control over and freely decide on matters related to their own sexual relations and health); optimizing and educating about reproductive health; increasing access to effective preventive, screening, treatment, and support services that promote sexual health; and decreasing adverse individual and public health outcomes, including HIV/STDs, viral hepatitis, unintended pregnancies, and sexual violence. While using the sexual health framework should lower adverse individual and public health outcomes overall, the sexual health framework will focus on health and wellness.

CDC is aware that a number of partners from diverse sectors will be needed to advance the sexual health framework in the United States, including government agencies at all levels, nongovernmental and community-based organizations, health profession organizations, the educational sector, industry, academia, media and entertainment, faith-based communities, individuals, and families.

An assessment will be conducted to determine existing capacity for national surveillance and research gaps in this area. Opportunities for the sexual health framework will be identified in the new health reform legislation, including enhanced clinical prevention coverage and potential support through community transformation grants and creation of a National Prevention Strategy.

CDC will consider a number of issues to make further progress on the sexual health framework. Additional consultations might be needed to specifically focus on research needs, measures, and lessons learned at the international level. A new National Sexual Health Coalition might need to be formally established. The Institute of Medicine might need to be commissioned to develop a sexual health report.

The outdated and fragmented disease-focused approach enhances stigma, promotes silence, and does not meet the needs of youth and older adults. Normalizing discussions on the intrinsic role of sexuality and sexual behavior as an essential aspect of being human is critical to reducing stigma; enhancing involvement by the public, providers, policy makers, and other key stakeholders; and improving efficiency and effectiveness of prevention efforts related to sexual health. Adoption of a sexual health framework in the United States also will meet both youth and adults on their terms to optimize sexual health as part of overall health.

Comprehensive Reproductive Health Services for Men Visiting STD Clinics

Cornelis ("Kees") Rietmeijer, MD, PhD, MSPH
Professor, Department of Community and Behavioral Health
Colorado School of Public Health

Dr. Rietmeijer reported that reproductive health service providers are increasingly poised to address sexual risk taking and contraception decision making among men. However, traditional venues to access men for reproductive health services are problematic. For example, funds are being set aside to provide services for men in family planning clinics, but men typically do not present to these settings.

The ability of primary care and community health centers to provide comprehensive care to men under the new health care reform legislation is uncertain. School-based clinics have legal and funding restrictions on the types of reproductive health services that can be provided to adolescent males and young men. Moreover, men at highest risk for developing STDs and causing unwanted pregnancies are older than the population served by school-based clinics.

As a result of these issues, STD clinics typically serve as the major or only setting for men to obtain reproductive health services across the country. STD clinics serve men, including those at high risk for developing STDs and causing unwanted pregnancies, and also provide extensive counseling on STD and HIV prevention. Because reproductive health counseling for women has been successfully integrated in many STD clinics, this same approach should be taken for men.

The Denver Metro Health Clinic (DMHC) has extensive experience and a long history in providing reproductive health services for adolescents and young adult men. DMHC is the largest STD clinic in Rocky Mountain West and provides comprehensive STD care at no cost to clients. DMHC's integrated services include STD diagnosis and treatment; HIV testing, counseling, and linkage to care; hepatitis A and B vaccination, hepatitis C testing; and family planning. DMHC serves ~18,000 persons per year.

Of all visits to DMHC in 2009, men accounted for 11,266 and women accounted for 6,780. Of all chlamydia cases that presented to DMHC in 2009, men accounted for 1,354 and women accounted for 553. Of reported cases in Denver in 2009, DMHC reported 46% of chlamydia cases in men and 13% of cases in women. Of all gonorrhea cases that presented to DMHC in 2009, men accounted for 361 and women accounted for 139. Of reported cases in Denver in 2009, DMHC reported 54% of gonorrhea cases in men and 20% of cases in women. This significant disparity stems from the ability of women to present for STD screening in many more settings than men.

DMHC began offering male family planning services in 2009 with Title X funds. Eligibility criteria for these services include males who are heterosexual or bisexual, present for a new problem visit, and were not previously enrolled in the calendar year. On the basis of 2010 data, 3,421 men (or 99% of eligible men) enrolled in male family planning services. Automated prompts in the clinic's electronic medical records (EMRs) system were a strong contributor to the high enrollment rate and have greatly enhanced DMHC's productivity over the past 5 years: a mechanism within each EMR prompts clinicians to ask specific questions to males and offer family planning services if needed.

DMHC's clinic process for men includes the initial registration and triage to identify symptoms and determine interest in and eligibility for family planning services. Services provided during a comprehensive new patient visit include a sexual history, STD testing, physical examination, and family planning if applicable. A nurse practitioner or registered nurse is responsible for conducting both the new patient visit and STD follow-up.

Asymptomatic men may be offered a fast-track "Express Visit" option. Services provided during an express visit include a sexual history, STD screening, and family planning if applicable. A licensed practical nurse, health care provider, registered nurse, or nurse practitioner is responsible for conducting the express visit. A family planning visit includes family planning services only that are provided by a nurse practitioner or registered nurse.

All DMHC clinicians are trained to provide basic HIV and STD prevention counseling by using the Project RESPECT model and concepts of motivational interviewing. DMHC takes a clinician-based approach to provide client-centered counseling in a single session during the clinic visit. DMHC provides ongoing training to staff and uses the prompting mechanism in EMRs to assure the quality of client-centered counseling sessions. EMRs prompt clinicians to ask clients about current contraception being used and future plans. DMHC's family planning counseling follows the same protocol as other types of prevention counseling.

Men 20–29 years of age and those in their early 30s accounted for the vast majority of 3,421 men enrolled in DMHC's male family planning services since 2009. By race/ethnicity, Hispanics, African Americans, and whites accounted for the vast majority of 3,421 men enrolled in DMHC's male family planning services since 2009.

On the basis of self-reported data prior to the counseling session, most of the 3,421 men enrolled in DMHC's male family planning services confirmed their intention to rely on partners for birth control. Following the counseling session, self-reports of relying on partners for birth control were lower and self-reports of plans to use condoms were higher. However, DMHC is aware that the overall effectiveness of the intervention is relatively small because of the brevity of the client-centered counseling session.

Overall, the provision of family planning counseling to men is feasible in the setting of an STD clinic. DMHC's experience has demonstrated that nearly 100% coverage is achievable if EMRs and a prompting mechanism for clinicians are used. DMHC's coverage rate of 40%–50% among men dramatically increased to 99% after implementation of these tools. DMHC's preliminary data suggest that modest gains can be achieved, specifically in terms of a shift from reliance on partner methods to an increased intent to use condoms.

Overview of Male Contraception

Ajay Nangia, MBBS, FACS
Associate Professor of Urology
Kansas University Medical Center
President, Society for the Study of Male Reproduction

Dr. Nangia reported that the worldwide population is 6.5 billion persons at this time, but current sexual practices result in a worldwide population growth of 75 million persons per year. The United States accounts for 300 million of the worldwide population. Of all conceptions in the United States, 50% are unplanned and 50% of resulting pregnancies are unwanted or undesired. Of all unintended pregnancies in the United States, 50% are because of a failure to use contraception and the remaining 50% are because of difficulties with contraception use or failure of the method.

The spectrum of male contraceptive life has not been clearly defined to date, but these needs change over the lifespan. For example, single young men not in stable relationships might need STD prevention, temporary pregnancy prevention, and birth control. Older men in stable relationships who have not yet completed their families might need temporary pregnancy prevention only and birth control. Mature older men in permanent relationships might need permanent pregnancy prevention through a vasectomy, tubal ligation, or menopause.

The 2010 Nangia, et al. study used National Census data to determine the distribution of the male population in their reproductive years 20–49 years of age. At the state level, California, Texas, and Florida had the highest populations of the target audience, while Vermont, the District of Columbia, Alaska, and Montana had the lowest populations of the target audience. Across all states, nearly 50% of the total male population was in their reproductive years. Florida and Montana had the lowest percentage of men in their reproductive years. At the county level per square mile, the Northwest, California, Florida, and the Northeast had the highest distribution of men in their reproductive years.

The 2006–2008 National Survey of Family Growth (NSFG) showed that 99% of women 15–44 years of age had used some form of conception in their lives. A significant increase in the use of condoms was observed from 1982 to 2002. An increase in the withdrawal technique was reported over the past 15 years, but this method has a 27% failure rate. These data indicate that men's health is at least 50 years behind women's health. The current choices for men are abstinence, withdrawal, reversible contraception with the condom, or irreversible contraception with a vasectomy.

In terms of reversible male contraception, no new product has been developed in more than 300 years. The 2009 UNAIDS position statement acknowledged the male latex condom as the single most efficient and available technology to reduce sexual transmission of HIV and other STDs. The condom has an added benefit of preventing STDs with any form of contraception.

The failure rate of the condom is 2% with "perfect" use and 15% with "typical" use. The condom has a breakage or slippage rate of 2%–9%. The CDC Youth Risk Behavior Surveillance System showed that condom use among U.S. high school students increased from 1991–2003, but began to decrease in 2005. Condom use in this population has only increased by 15 percentage points over the past 15 years.

With the exception of latex allergy or sensitivity, barriers to the adoption of male condom use historically have remained the same. These reasons include coital-dependency, reduced sensation, lack of spontaneity and partner cooperation, a requirement for male erection and withdrawal after ejaculation, embarrassment, implied mistrust, loss of intimacy, relationship-specificity, prevention of conception, and lack of availability or access.

Several studies have documented limitations and gaps in current knowledge regarding male contraception. Condom use is not directly observable and relies on self-reporting. Studies that used objective biomarkers of unprotected intercourse suggest inaccurate reporting of condom use. Results from improved questions and analytic techniques support self-reported measures. Future directions for reversible male contraception include better measures of use and use effectiveness, improved condom technologies, enhanced alternatives, condom

social marketing, peer-based education, and other prevention strategies specific to the target population.

In terms of irreversible male contraception, studies estimate that 527,000 vasectomies were performed in the United States in 2002. The current incidence of vasectomy practices is ~10/1,000 men 25–49 years of age and has remained stable since the 1980s. The Midwest accounts for the most vasectomies, while the Northeast accounts for the least. The demographics of men who obtain vasectomies are non-Hispanic white, well educated, married, relatively affluent, and privately insured. Minority, low-income, and less educated men represent a disproportionately small number of vasectomies. Of men who obtain a vasectomy, 6% desire a reversal. However, the desire for a reversal is 12 times higher among men <30 years of age.

The 2010 Anderson, et al. study used NSFG data to show that of 1,234 married men 15–44 years of age, 13.3% had a vasectomy and 13.8% of their partners had a tubal litigation. By demographics, the prevalence of vasectomies was 2.5% in men 25–29 years of age, 28% in men >40 years of age, 21.9% in men who were married before 20 years of age, 16.5% in non-Hispanic whites, 14.2% in men who had one sex partner in the past year, and 19.5% in men who had two or more biological children.

Education, income, poverty status, health insurance coverage, general health status, and religious affiliation were not significantly associated with having a vasectomy. However, the demographics of men whose partners had a tubal litigation differed from men who had vasectomies. These men had lower education, lower income, and more "fair" or "poor" health status based on self-assessment.

The 2006 Cochrane Review stated that no conclusions could be drawn regarding the safety, effectiveness, acceptability, and costs of vasectomy-surgical techniques. This conclusion was reached as a result of low-quality and underpowered studies and the absence of randomized controlled trials that examined other vasectomy techniques.

The current limitations with vasectomy care can be grouped into four major categories. For post-vasectomy follow-up, the length of time from the vasectomy typically is 3–4 months. The number of ejaculations from time of the vasectomy typically is 20–24. However, the 2005 Griffin, et al. study concluded that men would have the best outcomes with post-vasectomy follow-up at three months and 20 ejaculations.

For the number of sperm, clinicians have not reached consensus in this area (i.e., azoospermia on one specimen, azoospermia on >2 specimens, or a spun or unspun evaluation). For compliance with follow-up, the patient is held personally responsible for obtaining a post-operative checkup. However, the 2008 Jones, et al. study advised clinicians to establish a definitive time and date for patients to present for the evaluation. For management of persistent sperm, the decision to repeat a vasectomy will depend on whether sperm are nonmotile or motile. The 2009 Korhorst, et al. study reported special clearance with <100,000 nonmotile sperm.

Rigorous data are needed to better determine the risk of pregnancy following a vasectomy. The 2000 Schwingl and Guess study estimated the overall risk of pregnancy to be <1% post-vasectomy. The 2004 Pollack study and the 2005 Griffin study reported that most studies define "vasectomy failure" by evaluating whether sperm are present in the ejaculate. Few studies have assessed pregnancy as an outcome.

The U.S. Collaborative Review of Sterilization (CREST) was a prospective multicenter cohort study of sterilization among women of reproductive age. Of 540 women whose husbands underwent a vasectomy, 6 pregnancies were reported. The cumulative probability of failure was estimated to be 7.4/1,000 procedures in year 1 post-vasectomy and 11.3/1,000 in years 2, 3, and 5.

To fill gaps in existing knowledge, a large database should be developed to study actual demographics in the United States, determine population densities, identify underserved groups and target public awareness. To address the considerable methodologic limitations that are inherent in existing studies, more rigorous and evidence-based studies should be conducted on vasectomy-surgical techniques, post-vasectomy follow-up protocols, and the risk of pregnancy after a vasectomy. A longitudinal prospective study should be conducted as well to follow a cohort for several years.

Overall, male contraception can be improved in the future with the following tools: (1) better approaches for clinicians to counsel patients and for patients to retain information with a standardized video or Web-based materials; (2) enhanced education to patients on compliance with vasectomy follow-up and personal responsibility; (3) improved public awareness of and increased access to options; (4) decreased liability for urologists; and (5) the development of a reversible male contraceptive other than condoms.

Condoms will still be needed for STD and HIV prevention. Moreover, men and women would need to address compliance and trust issues related to male contraception. A number of consensus panels in the United States, Canada, Great Britain, Australia,

and the Netherlands are currently developing or have already released vasectomy guidelines for the field.

Overview of Male Infertility

Lawrence S. Ross, MD
Saelhof Professor and Head Emeritus
Department of Urology,
University of Illinois at Chicago
Past President, American Urological Association

Dr. Ross reported that of infertility problems in couples, females account for 47%, males account for 33%, and males and females collectively account for the remaining 20%. However, 90% of evaluations for infertility are initiated by physicians who treat the female partner. An evaluation of the male is frequently overlooked or completed only after failure of assisted reproductive technologies in the female.

The major causes of male infertility include varicocoele, infection, congenital and acquired obstruction, hormone disorders, genetics, testis and other cancers, cancer therapies, erectile and ejaculatory dysfunction, recreational and prescribed drugs, and environmental toxins. Males should be evaluated at the beginning of an assessment of an infertile couple because conditions causing infertility or other significant illnesses can be detected at that time.

The 1994 Honig, et al. study found significant pathology in 13 of 1,236 men who presented to an infertility clinic. The 2002 Kessler and Honig study reported a 15% rate of testis cancer in secondary azoospermia. The expected incidence of testis cancer is 2.3/100,000.

Advanced reproductive technologies (ART) began in the early 20th century with recognition of the sperm/egg interaction. A quantum leap was made in the field in 1978 when Steptoe, Edwards, and Purdey first reported in vitro fertilization (IVF) in 1980 in which small numbers of sperm could be used to fertilize an egg outside of the body. The field was further advanced with the 1992 Palermo, et al. study that concluded only one sperm was needed for fertilization through human intracytoplasmic sperm injection (ICSI).

ART led to new reproductive possibilities for couples that never would have been able to conceive because of un-repairable female tubal and male ex-current duct obstruction, severe nonobstructive oligospermia or azoospermia, or advanced maternal age. ART also has stimulated a great deal of research and scientific developments in the areas of genetics; embryo biopsy and preimplantation genetic diagnosis; infertility, serious diseases and other men's health issues; and women's health issues (i.e., menopause, birth control, and uterine and ovarian cancers).

The cost of medical care is continuing to steadily rise. The health care share of the U.S. gross domestic product was projected to reach 17.3% in 2009 and is expected to reach 19.3% by 2019. Major illness is the most common cause of bankruptcy. The steady increase in health care expenditures has placed pressure on the U.S. government to change the health care system. In March 2010, the Obama Administration passed the Patient Protection and Affordable Care Act and the Health Care and Education Reconciliation Act of 2010.

Cost-effectiveness of medical care is extremely important. As a result, the reproductive health community must determine the role of ART in the current era of cost consciousness. Most notably, a decision is needed on whether IVF and ICSI are the best solutions to treating infertility.

IVF and ICSI present potential risks. These technologies are characterized as "extremely safe," but available studies have a follow-up period of 5 years on average. Much longer observation into second and third generations is necessary to detect significant genetic issues. The 2005 Hansen, et al. study reported that 66% of studies showed a 25% increase in congenital anomalies in infants conceived with ART compared to those conceived with spontaneous conception. The 2004 Bonduelle, et al. study reported major congenital malformation of 4.2% compared to 2%–3% in the general population.

Some reproductive medicine clinicians have expressed a belief that IVF and ICSI have eliminated the need for urologists. This observation was on the basis of a number of studies conducted from 1997 to 2005 that focused on the cost-effectiveness of treating male reproductive abnormalities with good outcomes rather than performing IVF or ICSI.

Male infertility screening has a number of positive outcomes, such as the detection of testis and prostate cancers, retrograde ejaculation caused by diabetes, erectile dysfunction caused by androgen deficiency or hyperprolactinemia, and fertility problems or infertility caused by genetic disorders (i.e., Klinefelter's syndrome, cystic fibrosis, Y chromosome microdeletion, *hypo*-gonadotropic hypogonadism, and Kallmann's syndrome).

The 2005 Raman, et al. study reported that men with testis cancer often have an abnormal semen analysis. The incidence of testis cancer was found to be 20 times higher in infertile men with an abnormal semen analysis compared to the general population. Erectile dysfunction in young men might predict later onset of coronary artery and other vascular diseases and also might serve as the first sign of diabetes.

Advances in sperm cryopreservation have resulted in the ability to conserve male fertility prior to cancer treatment with the storage of ejaculates. Sperm from testis of cancer patients or non-obstructive azoospermic patients also can be stored for use with ART in the future. Cancer specialists should be educated on the need to counsel their male patients on sperm storage and cryopreservation prior to cancer treatment.

Overall, male infertility is a "disease" that serves as the first window to detecting significant men's health issues. Treatment of male infertility increases the cost-effectiveness and safety of fertility therapy. Several issues need to be addressed to make further advances in male infertility. Existing data should be strengthened with randomized controlled trials of male infertility patients at multiple centers.

Gaps in current knowledge and pressing issues that require immediate attention should be identified. Long-range plans should be developed to fill less pressing gaps over the next 5–10 years. Strategies should be developed for the U.S. government and private insurance carriers to recognize, treat, and fund male infertility as a "disease." Approaches should be designed to effectively educate the public on good fertility health for men.

Fertility Preservation in the Male Patient with Cancer

Robert E. Brannigan, MD
Associate Professor, Department of Urology
Co-Director, Andrology Fellowship
Northwestern University,
Feinberg School of Medicine

Dr. Brannigan reported that ~50% of men will be diagnosed with cancer in their lifetime. A cancer diagnosis previously focused on survival only, but improvements in cancer detection and treatment have broadened the focus to include both survival and quality of life after treatment. Moreover, demographic changes include men who pursue parenthood later in life, men who begin a second family following a divorce or death of a spouse; and men with prostate, lung, or other cancers who are prospective fathers.

Physicians must take a proactive approach to respond to these demographic changes by discussing the impact of cancer disease and treatments on the fertility, sexual health, and reproductive health of their male patients. Any other approach is likely to lead to missed opportunities for fertility preservation in some patients. Some patients might permanently lose their reproductive potential as a result of cancer or cancer therapies.

Cancer has a multifaceted impact on reproductive health by disrupting the hypothalamic-pituitary-gonadal (HPG) axis. Immunological and cytological responses to cancer can lead to injury to the germinal epithelium. Fever, malnutrition, and other systemic processes that are common in cancer patients can adversely affect male fertility. Anxiety, depression, and other psychological issues that routinely arise following a cancer diagnosis and treatment also can negatively impact male fertility.

Cancer treatment can significantly impair male fertility in addition to the cancer itself. Low doses of radiation therapy can have drastic or permanent effects on spermatogenesis leading to transient oligospermia, transient azoospermia, or irreversible azoospermia. Chemotherapy, particularly toxic alkylating agents, can harm sperm production. However, less toxic platinum analogs, antimetabolites, vinca alkaloids, and topoisomerase inhibitor agents can impact male fertility as well.

Surgery for testicular cancer can result in a loss of testicular mass. Bladder and prostate cancer surgery can lead to disruption of the excurrent ductal system, erectile dysfunction, or disruption of lumbar sympathetic plexus or hypogastric plexus. Opioids can adversely affect male fertility by suppressing the HPG axis and decreasing gonadotropins and testosterone. A reduction in these hormones can result in a loss of libido, erectile dysfunction, and decreased sperm production.

Each year, 20,000 males of childhood and reproductive age are treated with radiation or chemotherapy. The 5-year survival rate is 75% among males <15 years of age and 61% among males 15–44 years of age. These data show that men of reproductive age live well beyond their cancer diagnosis and treatment. Male infertility is a common consequence after treatment for many malignancies. While infertility may be reversible for some treatment regimens, persistent infertility may result after cancer treatment. In young men with testicular tumors or Hodgkin's disease, impaired spermatogenesis is often noted upon presentation.

A number of oncologists have voiced opposition to cryopreserving sperm. These reasons include other pressing health issues that take precedence over banking sperm, the placement of patients on a fertility-friendly protocol, the need to focus on survival, incompatibility between semen parameters and freezing, and historically poor outcomes with cryopreserved sperm and intrauterine insemination (IUI).

The 1983 Hendry, et al. study, the 1987 Redman, et al. study and the 1986 Reed, et al. study reported pregnancy rates after IUI ranging from only 20%–29%. However, ART has resulted in the ability to use sperm of poor quality and low quantity to successfully achieve pregnancy. Recent data show that male cancer patients who cryopreserved sperm prior to treatment were able to impregnate their partners through IVF/ICSI sooner and in higher numbers than male cancer patients who used IUI or IVF alone.

The 1999 Zapzalka, et al. study reported the results of a survey administered to American Society of Clinical Oncology (ASCO) members in Minnesota. Of 165 members surveyed, the response rate was 28%. Of all respondents, 100% reported discussing fertility issues with their patients, but only 26% reported being familiar with ICSI.

The 2002 Schover, et al. study reported the results of 718 surveys that were distributed to oncology staff physicians at two cancer centers with a 24% return rate. Of all respondents, 91% agreed that sperm banking should be mentioned to all men at risk for infertility because of cancer treatment, but 48% mentioned sperm banking to <25% of eligible men or never discussed the topic at all with their patients. The major barriers to physician-patient discussions on sperm banking included the use of adolescent cryopreserved sperm, parental consent issues, and timing. The study strongly recommended clearer practice standards to assist oncologists in increasing their knowledge of sperm banking and avoiding dependence on biased patient selection criteria.

Another 2002 Schover, et al. study also reported the results of 904 surveys that were distributed to male cancer patients 14–40 years of age with a 27% return rate. Of all respondents, 60% had been informed about fertility issues, 51% had been informed about sperm banking, and 51% expressed a desire to have children after cancer treatment. Of all respondents without children, 77% expressed a desire to have children after cancer treatment. Only 24% of respondents banked semen overall and only 27% of respondents without children banked semen.

The President's Cancer Panel released the *Living Beyond Cancer: Finding a New Balance* report in 2004. The report acknowledged the communication breakdown regarding fertility loss and preservation and recommended that physicians use and review cultural- and literacy-sensitive educational materials verbally and in writing with their patients.

The 2006 Lee, et al. study reinforced (ASCO's) recommendations on fertility preservation in cancer patients that were published in June 2006. The recommendations advised oncologists to take action in four major areas: (1) discuss the risk of fertility impairment associated with cancer therapy at the earliest possible time with their patients; (2) consider fertility preservation approaches as early as possible during treatment planning; (3) provide a prompt referral to a qualified specialist if the patient is interested; and (4) promote clinical trials to advance state of the knowledge.

A number of methods can be used to obtain sperm for cryopreservation even from patients who are extremely ill or hospitalized. These techniques include masturbation, post-ejaculate urinalysis for retrograde ejaculation, vibratory stimulation or electroejaculation for an ejaculation, or testicular sperm extraction. The 2003 Schrader, et al. study documented an overall sperm retrieval rate of 40%–50% using testicular sperm extraction on patients who were azoospermic at the time of cancer diagnosis.

Northwestern University's Feinberg School of Medicine has monitored its experience with testicular sperm extraction from 2006–2010 among ten oncology patients with azoospermia or aspermia. Of the 10 patients, 6 had azoospermia, 2 had severe oligospermia/cryptozospermia, 1 had cryptozospermia/azoospermia, and one could not ejaculate despite repeated attempts. Northwestern University successfully extracted sperm from seven of the ten oncology patients.

With respect to cryopreservation for younger male cancer patients, the W-based SPARE Survey was developed to assess attitudes and practice patterns regarding fertility preservation in pediatric patients among pediatric oncologists. The survey was administered via e-mail to 1,426 pediatric oncologists who are registered American Society of Clinical Oncology (ASCO) members.

Of 207 respondents (or a 15% response rate), >92% were pediatric oncologists, 46% were females, 54% were males, and 80% had university-based practices. The mean age of the respondents was 45 years and the oncologists saw 30 new adolescent patients per year on average. Leukemia, lymphoma, and brain tumors were the most common cancers treated by the oncologists.

Although all of the respondents were ASCO members, the survey showed that only 45% were familiar with the 2006 ASCO recommendations on fertility preservation in cancer patients, 56% were familiar with ICSI, and 67% were familiar with current fertility preservation research. The vast majority of respondents either "agreed" or "strongly agreed" with the following statements: "Fertility threats to my male patients are a major concern to me." "Fertility threats to my male patients are a major concern to their parents." "Male cancer patients and their parents have asked about potential fertility threats associated with cancer treatment."

Of all respondents, 48.5% reported never used the 2006 ASCO recommendations in making decisions about appropriate health care for their patients

and 21.9% reported using the guidance only 50% of the time. The survey results showed a breakdown among pediatric oncologists in terms of knowledge of fertility preservation and application of recommendations in actual clinical practice.

The survey also included questions to compare attitudes of pediatric oncologists regarding fertility preservation versus their actual practices. Of all respondents, 82% agreed that pubertal cancer patients should be referred to a fertility preservation specialist prior to cancer treatment, but only 47% implemented this practice >50% of the time. Of all respondents, 92% agreed that pubertal cancer patients should be referred for sperm banking, but only 75% implemented this practice >50% of the time.

Of all respondents, 73% agreed that pubertal cancer patients should be referred to a fertility preservation specialist after cancer treatment, but only 30% implemented this practice >50% of the time. Of all respondents, 80% reported never referring their most difficult pubertal cancer patients, such as those with azoospermia, for a more extensive evaluation to consider testicular sperm extraction or other methods.

Overall, male factor infertility is a common side effect of cancer and cancer therapy. Sperm cryopreservation should be considered prior to cancer treatment even if semen quality is poor. Many, if not most, patients of reproductive age are interested in preserving their reproductive potential. Significant gaps exist in the medical community regarding the deleterious effects of cancer therapy and the efficacy of fertility preservation. High-impact opportunities exist at this time to remedy these knowledge gaps and improve patient care on a broad scale.

Modifiable Lifestyle Issues and Male Reproductive Health

Stanton C. Honig, MD
Associate Clinical Professor of Urology
University of Connecticut Health Sciences Center
Staff Urologist, Yale New Haven Hospital, Hospital of St. Raphael New Haven CT

Dr. Honig reported that data show modifiable lifestyle issues have economic effects on individuals, populations, and third-party payers in terms of reproductive outcomes. However, evidence-based data on modifiable lifestyle issues are limited and contain significant gaps.

Modifiable lifestyle issues that affect MRH include testis self-examination (TSE) for testicular cancer prevention; chronic disease and prevention (i.e., diabetes, obesity, and drugs affecting fertility); sexual dysfunction resulting in infertility; varicoceles; recreational drugs (i.e., anabolic steroids, alcohol, tobacco, opioids, and cocaine); and technologies (i.e., cellular phones and laptop computers).

In terms of testicular cancer prevention, TSE is similar to the breast self-examination and should be performed monthly. Males should be taught this practice in middle school and high school and begin performing TSE as adolescents. Infertility is a risk factor for testicular cancer, but the disease is 99% curable with early diagnosis. Testicular cancer identified early requires less toxic therapy than other cancers and is associated with less significant costs for treatment. Recent data gathered in Connecticut and Massachusetts suggest a two-fold increase in the incidence of testicular cancer.

Testis Dysgenesis Syndrome can lead to infertility, testicular cancer, hypospadias, or cryptochidism. Multiple studies show a higher incidence of testicular cancer in infertile men. The 1994 Honig, et al. study found an association between male infertility and significant medical pathology. The study reported that a small number of patients presented to an infertility clinic and were diagnosed with a new testicular cancer.

The 2001 Kolettis and Sabanegh study reported similar results with 6% of male infertility patients having significant medical pathology, including some with testicular cancer. The 2009 Walsh, et al. study reported results of 43,000 infertile couples using 1967–1998 data. The risk of testicular cancer was 2.8–3.6 times higher in men who presented with infertility. Public awareness should be increased regarding testicular cancer prevention with TSE, the association between male infertility and testicular cancer, and the 99% cure rate of testicular cancer. In terms of chronic diseases, diabetes can affect fertility-related functioning in males and result in ejaculatory dysfunction or erectile dysfunction because of neurogenic or vascular issues. No clear evidence has been produced to show that diabetes significantly impacts spermatogenesis, but recent data suggest the disease is associated with some DNA damage. Diabetes-associated erectile dysfunction is a reversible and treatable problem in 70%–90% of men with injections or oral medication, such as phosphodiesterase type 5 inhibitors.

Limited data have been collected to show the incidence of diabetes-associated ejaculatory dysfunction, but this condition can be treated with early sperm cryopreservation, medical therapy to change retrograde ejaculation to antegrade ejaculation, or electroejaculation to collect sperm. Future directions in widely publicizing the role of diabetes in MRH include collecting rigorous data, increasing public

awareness, educating the juvenile diabetes population, and identifying effective male spokespersons with success stories in curing their diabetes-related fertility issues.

Obesity is a national epidemic with 1.6 billion overweight persons and 400 million obese persons in the United States. These statistics are expected to double by 2015, but the effects of obesity on male infertility are unclear at this time. However, obesity has been shown to decrease testosterone levels through increased aromatase activity and elevated estradiol levels; reduce inhibin B levels without a compensatory increase in follicle-stimulating hormone; increase Leptin levels; and cause direct effects on concentration, motility, DNA fragmentation, and sperm morphology.

The need to collect more data on the role of obesity in MRH is critical because previous studies have reported inconsistent results. For example, a population-based study could be conducted to track sperm parameters before and after gastric bypass surgery.

A national education campaign should be launched to inform the public, oncologists, rheumatologists, and other allied professionals about drugs that affect male fertility. These drugs include calcium channel blockers, spironolactone, and other hypertension medications; sulfasalazine for Crohn's disease; and cytoxan, methotrexate, and other chemotherapies for benign cancer diseases. Both patients and their physicians should be aware of the need to switch to non-cytotoxic medications to conserve male fertility and cryopreserve sperm prior to treatment.

A strong body of evidence shows that variococele is one of the most treatable and reversible causes of male infertility. The incidence of variococele is 16% in the general population and 35%–40% in infertile men. The 2007 Marmar, et al. meta-analysis of clinical varicocele suggested a clear beneficial effect with treatment. However, the causes of varicocele by heat effects, gonadotoxin release, or other factors are uncertain because of existing data gaps in the literature. Data show that after treatment of varicocele surgically or by embolization, 70% of patients will see improvement in their semen quality and 30%–40% can impregnate their partners.

In terms of recreational drugs, anabolic steroids affect spermatogenesis. Very few studies have been published on the role of anabolic steroids in male infertility, but Honig and Cohen presented a summary of these data in 2005 at the American Society for Reproductive Medicine (ASRM). This paper outlined the possibility of treating and reversing male infertility associated with anabolic steroids.

Of 15 patients in the Honig and Cohen study, 11 presented with a classic anabolic picture, 81% had azoospermia and 19% had oligospermia. The average age of the cohort was 33 years and drug use ranged from one cycle to years of continuous use. Azoospermia was reversible with either cessation of anabolic steroids or gonadotropin replacement in 78% of patients. Of seven patients, 71% required gonadotropin therapy for return of spermatogenesis and 29% had spontaneous return of sperm after cessation of anabolic steroids.

Anabolic steroid-associated infertility typically follows a pattern of low pituitary hormone and low endogenous testicular hormone production that usually results in azoospermia. However, not all persons with a history of anabolic steroid abuse are infertile. As a result, the Honig and Cohen study did not make global conclusions regarding all patients who have abused anabolic steroids.

Sperm production can rebound following cessation of anabolic steroids, but medical treatment for anabolic steroid-associated infertility is available as well. However, testis sperm retrieval/ intracytoplasmic sperm injection (ICSI) should be the last resort in reversing anabolic steroid-associated infertility. A national and international awareness campaign should be launched to publicize the dangerous reproductive effects of anabolic steroids and educate professional and recreational athletes at all levels. Similar to anabolic steroids, human growth hormone (HGH) has limited data and is extremely difficult to monitor. The effects of HGH on male fertility are unknown at this time.

Solid data show that men who live healthier lifestyles are more likely to produce healthy sperm. For example, the risk of reproductive health problems would be mild with moderate alcohol consumption. However, heavy alcohol consumption and heavy tobacco use could lead to hormone imbalances and sperm production issues. Previous studies have reported inconsistent results regarding the role of smoking on MRH. A wealth of clinical and basic science evidence found an association between smoking and sperm parameter abnormalities or apoptotic changes in testis.

Cocaine use has been linked to oligospermia, sperm motility, and morphology defects. Opioid abuse has been associated with decreased gonadotropins and testosterone levels. Heavy marijuana use has been linked to gynecomastia, low testosterone levels, pyospermia, and decreased sperm concentration. The role of heavy metals on MRH is unknown because of inconsistent study results, data gaps, lack of standardized protocols and controls, and small sample sizes.

In terms of technologies, the 2009 Cleveland Clinic study published in vitro data that suggested increased radiofrequency electromagnetic waves from cellular phones might lead to oxidative stress on human semen and effects on DNA integrity. A study is

underway to analyze the role of cellular phones on the incidence of testicular cancer patients in Connecticut. Despite this new research, major data gaps remain on the role of cellular phone use in MRH.

The literature on the role of laptop computers in MRH has significant data gaps as well. However, a 2004 published study analyzed 29 healthy males 21–35 years of age with both working and nonworking laptops. The study showed a significant increase in scrotal temperature among males with working laptops, but the study did not produce data to demonstrate a direct association between laptops and sperm production or fecundity.

Overall, gaps in data should be addressed and public awareness should be increased for all modifiable lifestyle issues that are known at this time to affect MRH (i.e., cancer, chronic diseases, sexual dysfunction, varicoceles, recreational drugs, technologies). Efforts should be made to officially define "infertility" as a disease or a marker for subsequent disease. Research should be initiated to shift nonmodifiable lifestyle issues in 2010, such as genetics, to modifiable lifestyle issues in the future.

Mental Health Issues in Male Reproductive Health

William D. Petok, PhD
Licensed Psychologist, Independent Practice
American Fertility Association

Dr. Petok reported that studies have documented gender-based differences between men and women in their reactions to fertility problems, but more recent data are beginning to disprove longstanding anthropological research results. For example, men do not solely equate fertility to their virility. The loss of fertility is not the most distressing outcome to men. Men are not less interested than women in having children.

In terms of behavioral differences, marketing data suggest that men make spatial rather than emotional purchases and consider the decisions of others as a guide to forming their own opinions. Women consider the opinions of others as a guide to forming their own decisions.

Studies also indicate gender-based differences in strategies men and women use in coping with stress. Men are more likely than women to use denial as a stress reduction technique. The 1997 Daniluk study demonstrated that men use avoidance as a means of decreasing stress.

The 2006 Peterson and Newton, et al. study showed a reduction in infertility-related stress among men who distanced themselves from the problem or their partners, implemented self-controlling strategies, or employed planned problem-solving approaches. However, these methods resulted in less cohesion and connectedness between men and their partners. The study also demonstrated that social support for infertility was the most preferred method among men, even among those with limited skills or interest in seeking these services. By contrast, social support for infertility was less helpful than it was to women.

Recent data suggest that the best approach to reach men regarding reproductive health issues is to focus on their strengths rather than their weaknesses. The 2002 Hardy study analyzed differences in social training and role definitions between men and women. The study noted that "motherhood" historically has been defined as a child-bearer, while "fatherhood" traditionally has been defined as ownership. Women have been described as "barren" or "childless," but men have never been characterized as "non-fathers."

The 2002 Hardy study further noted that motherhood is viewed as an "interactive" process, while fatherhood is considered as "participation during conception." These gender-based differences stem from longstanding biological versus social issues. Women are believed to "give" children to men after a 9-month pregnancy, while men are believed to "participate" in conception during a much briefer "experience." Results from this study indicate that the role of men in creating children historically has been overlooked.

A number of U.S. studies have reported the tremendous amount of pressure for men to conform to their "masculine" roles. These data show that men are expected to be independent, fearless, tough, invulnerable, self-reliant, stoic, and non-feminine. These cultural and social beliefs have increased the difficulty for men to seek social support for infertility problems. However, the 1993 Mason book documented emotional reactions among ~130 men in Great Britain who were incapable of producing children. These emotions included emotional pain, guilt, shame, anger, isolation, tremendous loss, and personal failure.

NIMH has estimated the lifetime risk of depression in the general U.S. population as 7% in men and 12% in women. However, the 1998 Band and Edelmann study reported that the rate of depression was elevated in infertile men, particularly among those who were predisposed to be anxious, had an avoidance coping style, or had a tendency to appraise situations as stressful.

The 1987 Snarey, et al. study and the 2002 Hardy study defined "loss" in the context of infertility and male roles.

In these studies, "loss" was characterized as a failure to create a commodity from a sociological perspective; a failure to continue the man's name or genetic line; an inability to control the man's individual life and destiny through the production of progeny; and weakened male sexual identity stemming from the traditional social and cultural linkage between male virility and fertility.

The 2010 Fisher, et al. study reported survey results on the basis of responses by ~112 men in Australia 5 years after a diagnosis of infertility. Of this sample of men, ~87% subsequently had children and ~90% subsequently underwent fertility treatment. The survey showed that parenthood was as important to 84% of men as their partners; 70% of men viewed children as an enhancement to marital and family relationships; and masculinity was not confirmed by fatherhood. Men in the study were satisfied with their lives in general, but were found to be more worried and less confident or assertive. The study concluded that adverse infertility experiences could threaten male identity and reduce personal confidence.

The 1996 Irvine and Cawood study analyzed the psychological impact of infertility on sexuality, including the loss of self-esteem, body image, masculinity/femininity and nurturance. The study noted that infertility treatment physically invades the private lives of women and exposes the sexual behaviors of men. The study also documented that infertility can reduce sexual desire in men and produce guilt regarding their sexual function.

The 1980 Berger study found that 63% of azoospermic men developed erectile dysfunction 1–3 three months after their diagnosis, with onset of this condition occurring as early as 1 week after diagnosis. The 1991 Berg and Wilson study found that men reported loss of ejaculatory control and reduced satisfaction over 3 years of infertility treatment. The 2003 Saleh, et al. study reported erectile dysfunction or male orgasmic dysfunction in men following a diagnosis of an abnormal sperm analysis. However, all of these studies are outdated and emphasize the need for more recent and rigorous data.

Previous studies have highlighted several themes that are common to male infertility and sex. Reduced foreplay equates to lower levels of arousal and less satisfaction. Males tend to strive for "efficient" ejaculation which leads to this reduced arousal and satisfaction. Avoiding sensual behavior to efficiently meet fertility needs causes men to lose connections with their partners. Men experience a loss of pleasure between the cycles of "procreative" and "nonfertile" sexual activity, primarily because couples tend to avoid sex at nonfertile times when they are engaged in lengthy fertility treatments

Widely noted anecdotal evidence has reported infertility treatment-related issues among men. Problems with clinic rooms to collect sperm specimens include limited privacy, issues with concentration, and lack of sufficient erotic material. Potential solutions to address these issues include providing men with separate locations, onsite bottles for sperm collection, and headphones to distract noise while collecting sperm.

The 2006 Carabis study, the 2006 Peterson, et al. study, and the Rochlen, et al. study reinforced the need to pay attention to gender-based differences with respect to reproductive health. These studies documented that compared to women, men make purchases differently, cope with infertility differently, and seek help for psychological issues differently.

Overall, efforts should be made at this time to widely publicize the role of mental health issues in MRH employing methods that will play to the strengths and known proclivities of men. For example, fertility awareness could be marketed via video games and other formats of interest to men. Therapeutic products should be created for and specifically targeted to men. Male therapists should be actively recruited and trained. The number of male-oriented medical providers with a specialty in infertility should be increased. Although 50% of infertility is because of males, men represent <5% of ~450 members of the ASRM Mental Health Professional Group at this time.

The Importance of Men's Reproductive Health on Women's Health and Fertility

Maurizio Macaluso, MD, DrPH
Chief, Women's Health and Fertility Branch
Centers for Disease Control and Prevention
National Center for Chronic Disease
Prevention and Health Promotion
Division of Reproductive Health

Dr. Macaluso explained that the sexual and reproductive behavior of men is related to many adverse reproductive health outcomes of women, including unintended pregnancy, STDs, infertility, and cancer. Improving the sexual and reproductive health of men and increasing men's awareness of and involvement in family planning could, in part, have a significant impact on women's health.

Dr. Macaluso explained that the final scientific presentation would describe effective strategies to increase men's awareness of and involvement in reproductive health and family planning based on lessons learned from international programs.

Involving Men in Reproductive Health and Family Planning Services

Roy Jacobstein, MD, MPH
Clinical Director,
RESPOND Project, EngenderHealth
Adjunct Professor of Public Health,
Department of Maternal and Child Health
University of North Carolina
School of Public Health

Dr. Jacobstein reported that international programs have a long history of considering, recognizing, and including men's perspectives in reproductive health and gender equality. Most notably, official statements on this issue have been released since 1994 including the Cairo Statement, the Beijing Statement, and others issued by the United Nations and its affiliate organizations. Successful reproductive health service programs are complex and need systems thinking and holistic programming.

The client-provider interaction model that is used in international family planning programs focuses on increased access, quality and use, supply and demand, and the enabling environment to meet the reproductive intentions and rights of clients and assure obligations by providers. However, a number of barriers exist to accessing family planning and MRH services in international programs, such as cost, location, inappropriate eligibility criteria, sociocultural norms, provider bias, and legal or regulatory restrictions.

The three major domains of male involvement in international family planning and reproductive health programs are outlined as follows. "Men as clients" are encouraged to use reproductive health services to benefit themselves, their partners, and communities; lessen the burden of reproductive health complications on their partners; and improve their individual health.

The worldwide prevalence of vasectomy is low at <3%. China and India account for 66% of 22.5 million vasectomies that are performed in Asia. The highest percentages of married women of reproductive age who rely on vasectomy are in North America (10.3%) and Oceania (11.8%). The number of vasectomies performed worldwide has remained relatively stable from 30 million in 1982 to 32 million in 2007. However, the number of female sterilizations has dramatically increased from 100 million in 1982 to 225 million in 2007.

The low use of vasectomy worldwide is because of a lack of awareness, rumors and myths about masculinity and sexual function, health concerns (i.e., the procedure will weaken the man), anxiety about the procedure, strong cultural and gender norms, limited access to services, and provider or program bias.

International family planning and reproductive health programs have implemented several strategies to address barriers to vasectomy use. The procedure is promoted to clients, providers, and programs. The advantages of vasectomy over other methods and the benefits of the procedure are emphasized to men, such as the man providing for his family, showing love and concern for his wife, and achieving sexual satisfaction. The procedure is explained to women in addition to men.

Messages regarding vasectomy are delivered through multiple channels, including mass media, interpersonal communication, and hotlines. These messages are repeated often to aid in adult learning and behavior change. Satisfied clients, providers and programs are used to serve as "vasectomy champions."

A number of successful campaigns have been launched to directly address men's concerns and provide accurate information about vasectomy to eliminate myths and misconceptions. One public awareness campaign resulted in a five- to six-fold increase in men's vasectomy use at clinics in Punjab, Pakistan, from 1996 to 2001.

"Men as supportive partners" are encouraged to become involved in women's reproductive health services. Men's roles in international programs include prevention of mother-to-child transmission of HIV in Ethiopia and South Africa; prevention and care of obstetric fistula in Uganda; safer motherhood in Nepal; and support for post-abortion care and family planning in Turkey.

Data collected in the Nepal Family Health Program showed increases in the role of men as supportive partners of women's reproductive health services ranging from 19% to 288% pre- and post-intervention. These positive reproductive health behaviors included women completing four antenatal visits, men accompanying partners to antenatal visits, women giving birth at a health facility or at home with a skilled birth attendant, women presenting for their first family planning visit, men accepting vasectomy, men seeking services for STDs, and men and women using condoms.

"Men as agents of change" are considered in their various roles of policy makers, decision makers, service providers, or community leaders to support gender equity and oppose gender-based violence. Because champions are essential to advocacy, family planning programs are strongly encouraged to identify and nurture vasectomy champions at policy, program, facility, and provider levels.

Overall, all development interventions, public health interventions, and medical interventions require behavior change. However, the principles, dynamics, and evidence of fostering successful change often are not factored into thinking and programming. Policy makers issue new policies, researchers publish new findings, experts devise new guidelines, and programs introduce new or expanded services, but changes are rarely made.

A number of examples in the United States illustrate the slow pace of change in medical settings, (i.e., 500,000 Caesarian sessions each year, 80,000 unnecessary hysterectomies annually, an 11-year lag in correctly treating heart attacks). Moreover, the non-scalpel vasectomy (NSV) was invented in China in 1972 and was proven to be a better or the main approach in programs in the 1980s. However, WHO still referred to NSV as a "new method" in 2003. Of all vasectomies performed in the United States in 2004, only 51% were non-scalpel procedures.

Evidence-based issues should be considered to successfully foster change in medical settings. A perceived benefit is the most important factor in the rate and extent of adopting a new behavior at provider, client, facility, and organizational levels. Other important variables to fostering change in medical settings are the perceived simplicity of a new behavior, perceived compatibility with norms, standards, and practices of the medical system, and characteristics of the adopter. Early adopters have been found to be more receptive to change.

Panel Perspectives on Men's Reproductive Health

This is a summary of information presented to the audience by members of a panel formed to suggest important perspectives on MRH as viewed by national organizations.

Scott Williams
Vice President
Men's Health Network

Mr. Williams moderated a discussion with a multidisciplinary panel of leaders representing patient and professional associations. The panel also represented a group of key leaders with experience in communicating with and reaching men, women, families, and communities across the nation.

The goal of the panel discussion was to begin translating data from the scientific presentations into credible public education, awareness, and advocacy efforts to advance field of MRH. The panel discussion also would be used for the MRH community to collectively speak with one voice; identify opportunities, gaps, synergies, and strategies for MRH; and propose strategies to initiate a national MRH movement.

Mr. Williams stated the diversity and breadth of the participants at this MRH meeting could play a critical role in reaching millions of men, women, and families across the country, especially if partners and constituencies in government, academia, industry, and nonprofit organizations were to become involved.

Mr. Williams opened the floor for the panelists to briefly describe their organizations and respond to eight questions posed by CDC.

Barbara Collura, MA
Executive Director
RESOLVE: The National Infertility Association

Question 1: *What barriers have you witnessed in your organization's work to engaging men in conversations about their reproductive health?*

Ms. Collura responded that RESOLVE conducted research in collaboration with CDC among couples diagnosed with infertility. The study showed that men did not seek information on infertility and had no interest in acknowledging, discussing, researching, or obtaining information on infertility. In all couples with male factor infertility included in the study, the woman located information and conducted research on this topic.

On the basis of the stigma associated with male infertility, RESOLVE acknowledged the need to appeal to women regarding the health of their male partners. In all of RESOLVE's support groups for couples, the woman is responsible for the couple's attendance and participation. The study also emphasized the tremendous lack of information and basic knowledge about reproductive health among the general public.

RESOLVE holds infertility support groups across the country that is led by both peers and professionals, but has never convened a men-only support group. RESOLVE uses online bulletin boards and Web-based support groups for male infertility in which men could remain anonymous. It also convenes a men-only breakout session during its 1-day educational conferences. The session is led by a mental health professional. RESOLVE is interested in learning about effective strategies to reach and provide support to infertile men.

Lynn Barclay
President/CEO
American Social Health Association

Question 2: *What messages do young men and the public not understand about reproductive health issues?*

Ms. Barclay responded that the top three reproductive health issues most often misunderstood by the public are the linkage between STDs and infertility, correct condom usage, and effective reproductive health conversations with their partners.

Data show significant disparities in reproductive health. Of all sexually active young men, 33% of African Americans and 45% of Hispanics received instructions on birth control prior to first sex compared to 66% of whites. In 2002, only 33% of males 15–19 years of age had discussed birth control with their parents. The proportion of high school teachers who teach correct condom usage to their students declined from 50% in 2000 to 39% in 2006.

The missed opportunities in teaching young men about basic reproductive health issues are substantial. For example, young men typically do not receive education and counseling during sports physicals and in other health settings. Although two out of three males 15–19 years of age had a physical examination in the past year, <20% received counseling or advice about birth control or HIV/STD prevention from their providers.

Joyce Reinecke, JD
Cancer and Fertility Advisor
Fertile Hope/LiveSTRONG,
Lance Armstrong Foundation

Question 3: *What tools or resources exist to affect change in men's perceptions and attitudes toward reproductive health?*

Ms. Reinecke responded that famous spokesmen, particularly athletes and entertainers, who have described their personal experiences of banking sperm before cancer treatment have been extremely effective with adolescent males and young adult men. This strategy has been found to minimize stigma and shame associated with male infertility or other MRH problems Social networking sites also are useful tools to change perceptions and attitudes of young men about their reproductive health.

Ken Mosesian, BA
Executive Director
The American Fertility Association

Question 4: *What are important roles of women, partners, friends, and loved ones in educating and engaging young men in their reproductive health?*

Mr. Mosesian responded that the question assumes women, partners, friends, and loved ones are knowledgeable of reproductive health issues and have the ability to effectively communicate this information to young men. The question also assumes that young men are willing and open to listen to these messages.

Comprehensive, lifelong, and age-appropriate education on sex and reproduction must be provided in the United States to place women, partners, friends, and loved ones in a position to educate and engage young men in their reproductive health. However, the United States is particularly challenged for "sex" is used to sell virtually every commercial product, but open and honest conversations regarding male sex, sexuality, or infertility are stigmatized and avoided.

Scott Williams
Vice President
Men's Health Network

Question 5: *What approaches can be taken to better link male reproductive health to overall men's health?*

Mr. Williams responded that strategies should be developed to better understand men as health care consumers and encourage men to prioritize their health. For example, the Men's Health Network launched the successful "Tune Up Your T" campaign to raise awareness of low testosterone levels. The campaign compared the need for men to have regular reproductive health examinations and the need for their vehicles to have regular tune-ups.

Health and reproductive health messages should be delivered that are relevant to men, such as the impact of their health and well-being on their spouses, partners, and other loved ones. More aggressive and direct messages that would resonate with men should be distributed as well. For example, a message of "check your balls" would have more success in reaching men than a message of "perform regular testicular self-examinations." These messages should be integrated into multimedia campaigns, posted on YouTube, and linked to Facebook, Twitter, and blogs.

Grassroots efforts should be undertaken to show men the linkage between their reproductive health and overall health and also to help men move beyond their traditional unwillingness to discuss impotence, incontinence, infertility, or other sensitive issues. Celebrities, athletes, and role models should be used to inform men that physical power, sexual prowess, and other aspects of their reproductive health are deeply connected to their overall physical, mental, emotional, and spiritual health.

Advocacy and legislation at the federal level should be used as tools to coordinate efforts and increase the focus on men's health and MRH at state and local levels. National campaigns should be launched to widely publicize "Men's Health Month" in June and "National Infertility Awareness Week." These media events should be used as platforms to promote the linkage between MRH and overall men's health. Messages should be targeted to women and partners as well because of their critical role in MRH and men's health. Education on MRH and men's health should be provided in trusted settings where men live, work, play, and pray.

Lawrence S. Ross, MD
Past President
American Urological Association

Question 6: *What approaches can be taken to better engage men in discussions about their reproductive health? What types of successful programs, outreach, and campaigns have you witnessed or developed?*

Dr. Ross responded that large-scale outreach at the national level traditionally has been difficult because male patients with reproductive health problems were required to present to their physicians. There is an informal Male Infertility Workgroup currently exploring the possibility of broadcasting MRH public service announcements (PSAs) on Facebook and other social media sites. These actions would engage men on a much larger scale, encouraging them to seek information and support regarding their reproductive health problems. This group is also aware of the need to launch an aggressive campaign targeting primary care physicians and obstetricians/gynecologists that encourages them to refer men to male infertility specialists.

Paul Turek, MD
President
American Society of Andrology

Question 7: *What approaches can be taken to inform consumers of advances in science?*

Dr. Turek responded to this by presenting several facts from a 2009 Pew study. The study reported that 61% of adults seek health care information online. The study further showed that women make the vast majority of health care decisions in families. Women were also found to take better care of men than men did of themselves.

Consumer messaging on men's health care is fragmented among various stakeholders. A national call to action should be launched to eliminate silos in the MRH field, enhance collaboration, and provide education. Science should be relevant to consumers, including both providers and patients, and communicated at the third- to fifth-grade level to a diverse community of Americans in languages beyond English and Spanish.

Health care publicists unanimously agree that comprehensive, broad-based, and consumer-oriented educational campaigns are the best strategies to inform consumers of scientific advances. Outreach efforts should be continuous and employ multiple media sources, including social media, print media, visual media, and engage key individuals as champions.

CDC, professional associations, and journalists should play a major role in interpreting and communicating consistent, reliable, and accurate scientific information to consumers. CDC should convene science reporting workshops in which health care reporting experts would train interns and journalists. Professional associations could then filter information to the newly trained journalists on novel trends, papers in press, and other developments for dissemination to consumers.

Academic societies should collaborate with journals to highlight a paper each month on their Web sites. Community transformation grants should be used to publicize resources that are available to consumers, such as Fertile Hope's cancer and infertility risk calculator for patients. Through both broad and deep routes of dissemination, scientific advances can be filtered to the public to inform consumers of health care advances.

Dolores J. Lamb, PhD
Vice President
American Society for Reproductive Medicine

Question 8: *What approaches can be taken to more efficiently and effectively communicate with each other to advance unified messages about male reproductive health, particularly through the media?*

Dr. Lamb responded that the media, Internet, and Web sites of professional associations should be used to effectively deliver MRH messages, promote patient education, and disseminate patient information. Although reproductive health professional societies speak with a unified voice overall, stronger efforts are needed for this collective voice to be heard by the public and federal agencies.

Other sectors of the medical community should be represented at future MRH conferences and events to promote unified messages about the need to connect men to sexual and reproductive health care. These groups include primary health care providers, medical and nursing school professors, health care providers at MD and middle levels, and community-based organizations that serve men's non-health care needs (i.e., workforce development, GED, and prison reentry programs).

Ms. Martin identified the common elements of the panelists' viewpoints and audience response.

- Education and communication were identified as the means to raise awareness of MRH issues among patient/consumer groups.
- Men and women need to know about effective strategies to discuss sexuality, reproductive health, and sensitive issues with each other, with family loved ones, and with those serving men's health needs.
- Education on MRH issues should not be restricted to patients and consumers. Health care providers also need education and resources for their work with patients and their families.
- Social media and the Internet offer channels for reaching health care professionals and patients or consumers.

Discussion Session 1: Gaps in Men's Reproductive Health Research or Practice

The first discussion session focused on three questions developed to obtain ideas and insights from participants. There was no expectation for either consesus or priority-setting before the end of the meeting. Rather, the discussion would identify topics that may represent "common ground."

(Editorial note: Information gathered from verbal comments and written notes from participants have been organized for ease of the reader.)

The following lists present information gleaned from audience feedback (verbal and written) during the Discussion Session.

Question 1: What are the most important gaps in current knowledge regarding men's reproductive health issues, conditions, or concerns?

- Enhanced collection of data on the frequency, causes, and treatment of male-factor infertility.
- Data on the frequency and treatment of male reproductive cancers.
- Patient preferences in receiving sexual and reproductive health services.
- Impact of environmental and occupational exposures on male-factor infertility.
- Data on infertility services used by those dealing with male-factor infertility.
- The scope of clinical practices and how specific practice allowances/funding affect MRH service delivery.
- The specific and evidence-based MRH recommendations by professional organizations and government programs.
- Evidence of "what works" for MRH education for males of different ages, backgrounds, and medical histories.
- Evidence to indicate the best clinical practices for screening, diagnosis, and treatment of MRH in specific settings (e.g., primary care vs. specialty practices).
- Behavioral and social research to understand issues related to men's reproductive health, including health-seeking behaviors and influence on quality of life.
- Communications research to determine perceptions regarding key concepts related to MRH (e.g., sexuality vs. reproduction, sexual dysfunction vs. infertility/sterility).
- The scope of biomarkers related to MRH and which biomarkers should be standardized and monitored by researchers.

The discussion's context also included one or more participants raising these observations.

- Some states do not allow Title X Family planning clinics to serve males.
- Some insurance companies will not pay for MRH services if delivered by OB/GYN providers.
- The U.S. Preventive Services Task Force (USPSTF in 2004 gave testicular self-examination a Grade D. USPSTF recommends against offering or providing Grade D services in any circumstance.
- There is a need to include pediatricians into MRH efforts to facilitate early discussions with parents about male health (i.e., well babies, vaccinations, reproductive health over the lifespan).

Question 2: What is the state of public awareness of conditions, behaviors, preventive measures, and health care services in the area of men's reproductive health?

This question elicited several types of responses from the participants. Most could be categorized

as ways to focus on the public and consumers of care and those that rely on intermediaries such as advocacy groups, professional organizations, or other intermediaries (including health professionals).

- Public awareness of MRH should be elevated from a "1" on a scale of "1–10."
- Strong advocacy groups are needed to raise awareness of MRH. The breast cancer awareness and advocacy models should be considered for future MRH efforts.
- There is a need to increase awareness and knowledge of the linkage between STDs and male infertility.
- Public awareness efforts should include assessments of the meanings of "sex" and "healthy sexual behaviors" in different populations and cultural contexts.
- MRH messages must be clear and based on evidence.
- The work must be on the basis of having evidence of effective interventions in male sexual and reproductive health.
- The importance of effective and consistent condom use should be included for sexually active males, and those who may become active at a later date.
- It is important that MRH issues be normalized across the lifespan so that young males can later feel comfortable (as adults) to having open and honest discussions about sexuality, STD prevention, infertility, reproductive cancers, and known connections between chronic diseases and sexuality/fertility.
- Education on MRH issues should include "direct to provider to consumer" (intermediary rather than only "direct to consumer."

The participants also identified areas related to the MRH communications and public awareness through intermediaries, especially public health and medical professionals. These areas include the following:

- **Spokespersons:** Health care providers and scientists should take steps to increase their familiarity and comfort with the press on MRH issues This can insure accurate and consistent messages are effectively communicated to the public.
- **Scientific in ormation:** Similarly, providers and scientists should encourage their professional organizations to devote attention to MRH issues and topics. This could include special attention in journals or newsletters as well as issuing media or press releases about scientific findings. Collaboration between patients and health care providers should be promoted to increase public awareness of MRH issues
- Communications with consumers and patients need to—
  - Improve communications about the linkages between obesity, diabetes, and hypertension on MRH and sexual functioning, including infertility and erectile dysfunction.
  - Encourage men to have a regular "reproductive health assessment," not only for sexual health but also to identify other problems that can be detected and diagnosed.
  - Use the ACOG recommendations for integrating sexual health, primary care and reproductive services into an annual patient visit. Use this model for increasing communications between providers and patients.
  - Strengthen public awareness regarding the impact of primary care issues (i.e., obesity, diabetes, hypertension) on men's sexual and reproductive health functioning, including infertility and erectile dysfunction. Men should be encouraged to present to their health care providers for a reproductive health assessment because this evaluation could detect problems with their overall health beyond their ability to father children.
  - Develop tool kits that providers and staff can use to improve communications and raise awareness among their patients.
- Communications, Patient Care, and Outreach–
  - Oncologists could increase their knowledge of appropriate steps, including fertility preservation, to help male patients of reproductive age.
  - Reproductive endocrinologists should strongly encourage fertility testing that, when appropriate, includes the male partner if there is no diagnosis of male-factor infertility.
  - Primary care providers should receive education on MRH issues for they are most likely to have the first encounter with a man entering the health care system.
  - Urologists and other MRH specialists could contribute more of their time and expertise to public service to increase awareness of MRH issues. These professionals could give MRH presentations to community-based organizations and other medical and public health groups.

Question 3: *What role could your organization or profession play in advancing science, public awareness, or service delivery?*

- Ensure that scientific rigor is neither entangled nor confused with stereotypes (i.e., all young men are dishonest when responding to surveys or questions regarding their reproductive health or sexual health behaviors).

- Engage men in conversations about their reproductive health in a positive sense.
- Develop effective strategies to educate and outreach to the public and providers to emphasize the critical need for men to pursue their reproductive health.
- Collaborate rather than compete with colleagues in other parts of the MRH community. For example, urologists could ask STD clinicians and family planning specialists to add new male-specific questions on their intake forms regarding testicular self-examinations, recreational drug use, and other MRH behaviors.
- Help develop standards and recommendations for implementing MRH into family planning settings.
- Create a "Scope of Practice" clarification that documents circumstances when men can be offered and receive clinical settings in family planning and other reproductive health clinics.
- Help convene a national annual meeting to expand discussion of scientific, clinical, and programmatic services needed for improving men's reproductive and sexual health.
- Establish or improve the continuum of care to improve MRH services to males across their lifespan.
- Encourage federal partners to expand partnerships and collaboration among academic, nongovernmental, and professional organizations.
- Develop a MRH research agenda that addresses concerns raised during this meeting.
- Foster new research on occupational and environmental health hazards to fill gaps about exposures on male infertility.
- Share survey and research findings with others to prevent "reinventing the wheel."

Dr. Kevin Fenton, Director of the National Center for HIV, Viral Hepatitis, STD, and TB Prevention at the time of the meeting, made additional remarks on CDC's role in advancing science, public awareness, and service delivery related to MRH. He noted CDC's sexual health activities would complement some of the work that was discussed during the meeting.

Advancing Men's Reproductive Health

Ken Moseisan
Executive Director
The American Fertility Association

The meeting participants were asked to take part in a "brainstorming" session that looked at the potential of MRH scientists and advocates to promote MRH among young adult males. The discussion would identify what activities, if any, could be taken on by organizations through existing partnerships. The following activities would need to be—

1. Grounded in science.
2. Build capacity to identify and convene stakeholders.
3. Disseminate accurate information.
4. Identify spokespersons who speak with authority and credibility.
5. Connect MRH work with existing community programs.

Feedback from the brainstorming included, but was not limited to, the following ideas and concepts:

- Bombard college campuses to reach and engage young men who can obtain services through school and university clinics or referrals to community programs.
- Include young men who are not in college but may have dropped out of high school, are fulltime workers, or may be active duty military.
- Partner with Boy's Clubs of America, Big Brothers, and other community groups that partner male adults as mentors for young males.
- Engage community health centers to increase outreach to young males.
- Involve programs working with sexual violence prevention activities.
- Include labor unions and other organizations representing workers.
- Adapt the key concepts of "empowerment" and "responsibility" from the women's health movement.
- Replicate national models that can initiate dialogue and reduce stigma or shame (e.g., National Breast Cancer Awareness campaigns).
- Encourage men to develop a "reproductive life plan" much as that being promoted for women.
- Identify industry groups that may become stakeholders in promoting MRH (e.g., National Football League, ESPN, others).
- Improve data on incidence and prevalence of MRH problems among adolescent males and young adult males.
- Conduct focus groups with this audience to learn more about what resonates with them and their peers.
- Survey or poll young adult males using appropriate and scientifically sound methods.

Closing Session

The closing session allowed participants to provide final thoughts through a review of next steps that could advance MRH in the United States. Some participants noted opportunities to promote MRH through existing activities planned by their organizations. Others expressed ideas for future partnerships and collaboration. The following three key "next steps" were identified during the discussion:

1. Prepare and distribute the summary report of the meeting to participants.
2. Identify meetings, including webinars, where discussions could continue among peers to promote understanding of MRH.
3. Assess the need for a "white paper" that could define the field of MRH, identify relevant issues in this area, and provide a synthesis of available scientific evidence.

The members of the Meeting Planning Committee were acknowledged as well as the speakers and panelists. Dr. Warner also expressed CDC's appreciation to participants who traveled, at their own expense, to take part in the day's discussions.

Attachment 1

Registrants

Contact Information as of 9/13/2010

Sevgi Aral, PhD, MS, MA
Associate Director for Science
Division of STD Prevention
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-402
Atlanta, GA 30333
Telephone: 404-639-8260
E-mail: soa1@cdc.gov

Linda Baffo, MPH, CHES
ASPH/CDC Fellow
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Hwy, NE, MS K-22
Atlanta, GA 30341
Telephone: 770-488-6587
E-mail: inl7@cdc.gov

Shirley Banks, AASECT Counselor
Health Educator
Emory University Student Health
and Counseling Services
1525 Clifton Road
Atlanta, GA 30322
Telephone: 404-727-7312
E-mail: shirley.banks@emory.edu

Willie Bannister, MS, LPC
Health Educator/AOD Counselor
Emory University Student Health
and Counseling Services
1525 Clifton Road
Atlanta, GA 30322
Telephone: 404-727-0395
E-mail: wbannis@emory.edu

Natan Bar-Chama, MD
Director Male Reproductive Medicine
Mount Sinai
5 East 98th Street Box 1272
New York, NY 10029
Telephone: 212-241-4812
E-mail: nbarchama@gmail.com

Lynn Barclay
President/CEO
American Social Health Association
P.O. Box 13827
Research Triangle Park, NC 27709
Telephone: 919-361-3125
E-mail: lynnbarclay@ashastd.org

David Bell, MD, MPH
Assistant Clinical Professor
Columbia University
Medical Director
The Young Men's Clinic
Center for Community Health and Education
60 Haven, B3
New York, NY 10032
Telephone: 646-382-3913
E-mail: dlb54@columbia.edu

Anna Bergdall, MPH
ORISE Fellow
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-34
Atlanta, GA 30341
Telephone: 770-488-6588
E-mail: fwj3@cdc.gov

Stuart Berman, MD, ScM
Senior Advisor
National Center for HIV/AIDS,
Viral Hepatitis, STD and TB Prevention
Centers for Disease Control and Prevention
1600 Clifton Road, MS-E-07
Atlanta, GA 30333
Telephone: 404-639-8846
E-mail: smb1@cdc.gov

Geeta Bhat
Work Study Student
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-34
Atlanta, GA 30341
Telephone: 770-488-6405
E-mail: jhq0@cdc.gov

Starla Blanks
Program Manager, Community Voices
Morehouse School of Medicine
720 Westview Drive, SW, Suite 216C
Atlanta, GA 30310
Telephone: 404-752-1977
E-mail: sblanks@msm.edu

Barbara Bowman, PhD
Associate Director for Science
National Center for Chronic Disease
Prevention and Health Promotion
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-40
Atlanta, GA 30341
Telephone: 770-488-5414
E-mail: bbb8@cdc.gov

Robert Brannigan, MD
Associate Professor
Northwestern University Department of Urology
675 N. St Clair, 20-243
Chicago, IL 60611
Telephone: 312-695-6124
E-mail: r-brannigan@northwestern.edu

Peter Briss, MD, MPH
Medical Director
National Center for Chronic Disease
Prevention and Health Promotion
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS D-14
Atlanta, GA 30333
Telephone: 404-639-7000
E-mail: pbriss@cdc.gov

Kathryn Brown, MPH
Public Health Analyst
Office of the Associate Director for Program
1600 Clifton Road, NE, MS D-37
Atlanta, GA 30333
Telephone: 404-639-2219
E-mail: hff4@cdc.gov

Renee Brown-Bryant, MSW
Associate Director, Health Communications
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-20
Atlanta, GA 30341
Telephone: 770-488-5200
E-mail: crb0@cdc.gov

Kelly Brumbaugh, MPH, CHES
Health Communications Specialist
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-20
Atlanta, GA 30341
Telephone: 770-488-6344
E-mail: kub7@cdc.gov

Charlaya Campbell, MD
Pediatric Resident
Morehouse School of Medicine
720 Westview Dr SW
Atlanta, GA 30310
Telephone: 314- 610-9631
E-mail: chcampbell@msm.edu

William Callaghan, MD, MPH
Senior Scientist
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-23
Atlanta, GA 30341
Telephone: 770-488-6327
E-mail: wgc0@cdc.gov

Barbara Collura
Executive Director
RESOLVE: The National Infertility Association
1760 Old Meadow Road, Suite 500
McLean, VA 22102
Telephone: 703-556-7172
E-mail: bcollura@resolve.org

Jocelynn Cook, PhD, MBA
Chief Science Advisor
Assisted Human Reproduction Canada
301 Elgin Street
2nd Floor, AL 5002A
Ottawa, ON K1A 0K9
Telephone: 613-952-9358
E-mail: jocelynn_cook@hc-sc.gc.ca

Shanna Cox, MSPH
Epidemiologist
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-20
Atlanta, GA 30341
Telephone: 770-488-6477
E-mail: cio8@cdc.gov

Dana Cropper, MPA, MHR
Director, Training & Education
National Coalition of STD Directors
1029 Vermont Avenue NW, Suite 500
Washington, DC 20005
Telephone: 202-842-4660
E-mail: dcropper@ncsddc.org

Kate Curtis, PhD
Epidemiologist
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-34
Atlanta, GA 30341
Telephone: 770-488-6397
E-mail: kmc6@cdc.gov

Katherine Lyon Daniel, PhD
Deputy Associate Director for
Communication (Acting)
Office of the Director
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-21
Atlanta, GA 30333
Telephone: 404-498-6701
E-mail: kdl8@cdc.gov

Sally Darney, PhD
National Program Director for Human Health
U.S. Environmental Protection Agency
MD E205-09
Research Triangle Park, NC 27511
Telephone: 919-541-3826
E-mail: darney.sally@epa.gov

John Douglas, MD
Chief Medical Officer
National Center for HIV/AIDS,
Viral Hepatitis, STD and TB Prevention
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-07
Atlanta, GA 30333
Telephone: 404-639-8261
E-mail: jyd3@cdc.gov

Tonji Durant, PhD
Epidemiologist
Division of HIV/AIDS Prevention
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-59
Atlanta, GA 30333
Telephone: 404-639-4262
E-mail: tdd4@cdc.gov

Sherry Farr, PhD
Epidemiologist
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-34
Atlanta, GA 30341
Telephone: 770-488-6235
E-mail: SFarr@cdc.gov

Kevin Fenton, MD, PhD, FFPH
Director
National Center for HIV/AIDS,
Viral Hepatitis, STD and TB Prevention
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-07
Atlanta, GA 30333
Telephone: 404-639-8000
E-mail: kif2@cdc.gov

Allison Friedman, MS
Health Communication Specialist
Division of STD Prevention
Centers for Disease Control & Prevention
1600 Clifton Road, NE, MS E-44
Atlanta, GA 30333
Telephone: 404-639-8537
E-mail: alf8@cdc.gov

Suzanne Folger, MPH, PhD
Epidemiologist, Senior Scientist
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-34
Atlanta, GA 30333
Telephone: 770-488-6375
E-mail: sxg1@cdc.gov

Ann Forsythe, PhD
Deputy Associate Director for Communication Science
National Center for HIV/AIDS,
Viral Hepatitis, STD and TB Prevention
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-07
Atlanta, GA 30333
Telephone: 404-639-8032
E-mail: akf9@cdc.gov

J. Dennis Fortenberry, MD, MS
Professor of Pediatrics
Indiana University School of Medicine
410 W. 10th Street
Room 1001
Indianapolis, IN 46202
Telephone: 317-274-8812
E-mail: jfortenb@iupui.edu

Jean Fourcroy, MD, PhD, MPH
ASA
610 Swords Way
Bethesda, MD 20817
Telephone: 301-897-5563
E-mail: fourcory@aol.com

Deanna Fowler, MPH
Community Health Promotion Coordinator
Men's Health Network
P.O. Box 75972
Washington, DC 20013
Telephone: 202-543-6461, ext. 101
E-mail: health@menshealthnetwork.org

Taleria Fuller, PhD
Health Scientist
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-22
Atlanta, GA 30341
Telephone: 770-488-4774
E-mail: TFuller@cdc.gov

Donna Garland
Associate Director for Communication
Office of the Director
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS D-14
Atlanta, GA 30333
Telephone: 404-639-7540
E-mail: dbg3@cdc.gov

Marybeth Gerrity, PhD, MBA
President
Reproductive Biology Resources, Inc.
2314 N. Lincoln Park West
Chicago, IL 60614
Telephone: 773-248-0916
E-mail: mgerrity@fertilitylabs.com

Annahita Ghassemi, PhD
Senior Research Manager
Church & Dwight Co., Inc.
469 North Harrison Street
Princeton, NJ 08088
Telephone: 609-279-7736
E-mail: Annahita.Ghassemi@churchdwight.com

Chelsea Glass, MD
Pediatric Resident
Morehouse School of Medicine
720 Westview Dr SW
Atlanta, GA 30310
Telephone: 404-752-1500
E-mail: cglass@msm.edu

Howard Goldberg, PhD
Associate Director for Global Health
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-20
Atlanta, GA 30341
Telephone: 770-488-5257
E-mail: hig1@cdc.gov

Yvonne Green, MS, RNP
Director, Office of Women's Health
Office of the Associate Director for Program
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-89
Atlanta, GA 30333
Telephone: 404-498-2366
E-mail: ygreen@cdc.gov

Bob Hatcher, MD, MPH
Professor of Gynecology & Obstetrics
Emory University School of Medicine
Family Planning Division
Faculty Office Building, 3rd Floor
49 Jesse Hill, Jr., Drive, S.E.
Atlanta, GA 30303
Telephone: 404-778-1377
E-mail: rhatche@emory.edu

Matthew Hogben, PhD
Behavioral Scientist
Division of STD Prevention
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-44
Atlanta, GA 30333
Telephone: 404-639-1833
E-mail: yzh5@cdc.gov

Stanton Honig, MD
Associate Clinical Professor of Urology
University of Connecticut
Past President,
Society for the Study of Male Reproductive
Urology Center
330 Orchard Street Suite 164
New Haven, CT 06511
Telephone: 203-867-4383
E-mail: stan.honig@gmail.com

Duane House, PhD
Health Scientist
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-22
Atlanta, GA 30341
Telephone: 770-488-6302
E-mail: hve8@cdc.gov

Megan Ivankovich, MPH
ORISE Fellow
National Center for HIV/AIDS,
Viral Hepatitis, STD and TB Prevention
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-07
Atlanta, GA 30333
Telephone: 404-639-1988
E-mail: joq6@cdc.gov

Roy Jacobstein, MD, MPH
Clinical Director, RESPOND
EngenderHealth
440 Ninth Avenue
New York, NY 10001
Telephone: 919-614-0704
E-mail: rjacobstein@engenderhealth.org

Keith Jarvi, MD, FRCSC
Professor, Dept of Surgery
University of Toronto
6th Floor-60 Murray Street
Toronto, ON M5G 1X5
Telephone: 416-586-8867
E-mail: KJarvi@mtsinai.on.ca

David Johnson, MPH
Public Health Advisor
Office of Family Planning
Office of Population Affairs
U.S. Department of Health and Human Services
1101 Wootton Parkway, Suite 700
Rockville, MD 20852
Telephone: 240-453-2841
E-mail: david.johnson@hhs.gov

Tim Johnson, MSc, DrPH
Demographer, Consultant/Contractor
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-23
Atlanta, GA 30341
Telephone: 770-488-6236
E-mail: jtj2@cdc.gov

Debra Kalmuss, PhD
Professor
Mailman School of Public Health
HDPFH, 60 Haven Avenue
New York, NY 10032
Telephone: 212-304-5234
E-mail: dk6@columbia.edu

Juliette Kendrick, MD, FAAFP
Senior Medical Epidemiologist
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-20
Atlanta, GA 30341
Telephone: 770-488-6282
E-mail: jkendrick@cdc.gov

Dmitry Kissin, MD, MPH
Epidemiologist
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-34
Atlanta, GA 30341
Telephone: 770-488-6408
E-mail: DKissin@cdc.gov

Dolores Lamb, PhD
Director, Scott Department of Urology
Baylor College of Medicine
One Baylor Plaza, Suite N730
Houston, TX 77030
Telephone: 713-798-6267
E-mail: dlamb@bcm.edu

Nina Larsen, MSPH
Senior Epidemiologist, SAIC
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-34
Atlanta, GA 30341
Telephone: 770-488-5172
E-mail: ncl5@cdc.gov

Jennifer Legardy-Williams, MPH
Health Scientist
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-34
Atlanta, GA 30341
Telephone: 770-488-6513
E-mail: jlegardy@cdc.gov

John Lehnherr
Deputy Director (Acting)
National Center for Chronic Disease
Prevention and Health Promotion
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-40
Atlanta, GA 30341
Telephone: 770-488-5192
E-mail: jrl5@cdc.gov

Andrew Levack, MPH
Senior Technical Advisor
EngenderHealth
4206 Avenue C
Austin, TX 78751
Telephone: 512-373-3555
E-mail: alevack@engenderhealth.org

Laura Lindberg, PhD
Senior Research Associate
Guttmacher Institute
125 Maiden Lane
New York, NY 10038
Telephone: 212-248-1111
E-mail: llindberg@guttmacher.org

Penny Loosier, MPH, MA
Health Scientist
Division of STD Prevention
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-02
Atlanta, GA 30333
Telephone: 404-639-6492
E-mail: plf4@cdc.gov

Maurizio Macaluso, MD, DrPH
Chief, Women's Health and Fertility Branch
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-34
Atlanta, GA 30341
Telephone: 770-488-6370
E-mail: mmacaluso@cdc.gov

C. Kevin Malotte, DrPH
Professor and Director
California State University, Long Beach
5500 Atherton Street, Suite 400
Long Beach, CA 90815
Telephone: 562-985-2177
E-mail: kmalotte@csulb.edu

Arik Marcell, MD, MPH
Assistant Professor
Johns Hopkins & Male Training Center
200 N. Wolfe Street, Room 2062
Baltimore, MD 21287
Telephone: 443-287-8946
E-mail: amarcell@jhsph.edu

Andrew Margolis, MPH
Senior Research Officer
Division of HIV/AIDS Prevention
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-37
Atlanta, GA 30333
Telephone: 404-639-1904
E-mail: amargolis@cdc.gov

Elizabeth Martin
Elizabeth Martin and Associates, Inc.
5555 Glenridge Connector
Suite 200
Atlanta, GA 30342
Telephone: 404-210-7801
E-mail: elizabeth@eamartin.com

Robert McKenna, MS, CHES
Director, Training & Performance Improvement
Family Planning Council, Inc.
1700 Market Street
18th Floor
Philadelphia, PA 19103
Telephone: 215-985-2640
E-mail: rob@familyplanning.org

John Moore, PhD, MS
Health Scientist
Office Of The Chief Of Staff
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS D-14
Atlanta, GA 30333
Telephone: 404-639-7754
E-mail: jrm3@cdc.gov

Leo Morris, PhD, MPH
Senior Advisor
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-23
Atlanta, GA 30341
Telephone: 770-488-6224
E-mail: lmorris@cdc.gov

Ken Mosesian, BA
Executive Director
The American Fertility Association
5025 N. Central Avenue, #613
Phoenix, AZ 85012
Telephone: 602-626-7200
E-mail: ken.mosesian@theafa.org

Susan Moskosky
Director
Office of Family Planning
Office of Population Affairs
U.S. Department of Health and Human Services
1101 Wootton Parkway, Suite 700
Rockville, MD 20852
Telephone: 240-453-2818
E-mail: susan.moskosky@hhs.gov

Stuart Moss, PhD
Program Director
National Institute for Child Health
and Human Development
National Institutes of Health
6100 Executive Blvd.
Room 8B01H
Rockville, MD 20892
Telephone: 301-435-6979
E-mail: mossstua@mail.nih.gov

Ajay Nangia, MBBS, FACS
Associate Professor of Urology
University of Kansas Medical Center and MRHA
Dept of Urology
3901 Rainbow Blvd.
Kansas City, KS 66160
Telephone: 913-588-0799
E-mail: anangia@kumc.edu

Craig Niederberger, MD
Chief, Division of Andrology and Director,
Urologic Basic Research
University of Illinois at Chicago College of Medicine
840 South Wood Street, M/C 955
Chicago, IL 60612
Telephone: 312-996-2779
E-mail: craignied@gmail.com

Chloe Oram
Executive Administrative Assistant
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-34
Atlanta, GA 30341
Telephone: 770-488-6519
E-mail: hwa5@cdc.gov

Mark Perloe, MD
Medical Director
Georgia Reproductive Specialists
5445 Meridian Mark Road, Suite 270
Atlanta, GA 30342
Telephone: 404-561-2229
E-mail: mperloe@ivf.com

Thomas Peterman, MD
Medical Officer
Division of STD Prevention
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-02
Atlanta, GA 30333
Telephone: 404-639-6102
E-mail: tap1@cdc.gov

William Petok, PhD
Licensed Psychologist
Independent Practice and American Fertility Association
479 Jumpers Hole Road, Suite 304B
Severna Park, MD 21146
Telephone: 410-664-3329
E-mail: bpetok@comcast.net

Sharon Rachel, MA, MPH
Program Manager
Morehouse School of Medicine
720 Westview Drive, SW, Suite 235
Atlanta, GA 30310
Telephone: 404-756-5044
E-mail: srachel@msm.edu

Joyce Reinecke, JD
Cancer & Fertility Advisor
Fertile Hope/LiveSTRONG
Lance Armstrong Foundation
1510 Reliez Valley Road
Lafayette, CA 94549
Telephone: 914-391-3675
E-mail: joyce@fertilehope.org

Segrid Renne, MPA
Director, CHHS
Northern Manhattan Perinatal Partnership
127 West 127th Street, 3rd Floor
New York, NY 10027
Telephone: 212-665-2600, ext. 324
E-mail: smdew904@yahoo.com

Kees Rietmeijer, MD, PhD, MSPH
Professor
Colorado School of Public Health
533 Marion Street
Denver, CO 80218
Telephone: 303-981-0008
E-mail: krietmei@dhha.org

Wendie Robbins, PhD, RN
Professor
University of California Los Angeles
5-254 Factor Bldg., Mail Code 956919
Los Angeles, CA 90095-6919
Telephone: 310-825-8999
E-mail: wrobbins@sonnet.ucla.edu

Bonnie Roberts, MSSW
Senior Public Health Advisor
Health Resources and Services Administration
U.S. Department of Health and Human Services
61 Forsyth Street, SW, Suite 3 M 60
Atlanta, GA 30303
Telephone: 404-562-7984
E-mail: BRoberts@hrsa.gov

Roger Rochat, MD
Professor
Rollins School of Public Health
1518 Clifton Road, Suite 7005
Atlanta, GA 30322
Telephone: 404-712-9506
E-mail: rrochat@emory.edu

Raul A. Romaguera, DMD, MPH
Associate Director, Prevention and Care
Division of STD Prevention
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-02
Atlanta, GA 30333
Telephone: 404-639-2004
E-mail: rromaguera@cdc.gov

Anne Rompalo, MD, ScM
Medical Director
Male Training Center for Family Planning
5200 Eastern Avenue
Mason F Lord Center Tower, Suite 4000
Baltimore, MD 21224
Telephone: 410-550-653
E-mail: arompalo@jhmi.edu

Lawrence Ross, MD
Past President
American Urological Association
Department of Urology University of Illinois
840 S Wood Street
Chicago, IL 60612
Telephone: 312-996-9330
E-mail: lsross51941@gmail.com

Susan Rothmann, PhD, HCLD
President and Laboratory Director
Fertility Solutions Inc
11811 Shaker Blvd., Suite 330
Cleveland, OH 44108
Telephone: 216-491-0030, ext. 201
E-mail: srothmann@fertilitysolutions.com

Jessica Sales, PhD
Research Assistant Professor
Rollins School of Public Health
1520 Clifton Road, Room 266
Atlanta, GA 30322
Telephone: 404-727-6598
E-mail: jmcderm@emory.edu

Catherine Satterwhite, MSPH, MPH
Epidemiologist
Division of STD Prevention
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-06
Atlanta, GA 30333
Telephone: 404-639-6044
E-mail: COL8@cdc.gov

Steven Schrader, PhD
Leader, Reproductive Health Assessment Team
National Institute for Occupational Safety and Health
Centers for Disease Control and Prevention
4676 Columbia Parkway, MS C-23
Cincinnati, OH 45230
Telephone: 513-533-8210
E-mail: sms4@cdc.gov

Alison Spitz, MPH
Team Leader, Adolescent Health
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-22
Atlanta, GA 30341
Telephone: 770-488-6233
E-mail: aspitz@cdc.gov

Aaron Spitz, MD
Urologist
Orange County Urology Associates
25200 La Paz Road
Laguna Hills, CA 92653
Telephone: 949-855-1101
E-mail: aaronspitz@verizon.net

Paul Turek, MD
President
American Society of Andrology
55 Francisco Street
Suite 500
San Francisco, CA 94133
Telephone: 415-392-3200
E-mail: DrPaulTurek@gmail.com

Crystal Tyler, PhD, MPH
EIS Officer
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-34
Atlanta, GA 30341
Telephone: 770-488-6371
E-mail: ctyler@cdc.gov

Hubert Vesper, PhD
Research Chemist
Division of Laboratory Sciences
National Center for Environmental Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS F-25
Atlanta, GA 30341
Telephone: 770-488-4191
E-mail: hav2@cdc.gov

Cathleen Walsh, MSPH, DrPH
Director (Acting)
Division of STD Prevention
Centers for Disease Control and Prevention
1600 Clifton Road, NE, MS E-02
Atlanta, GA 30333
Telephone: 404-639-8260
E-mail: cwalsh@cdc.gov

Lee Warner, PhD
Associate Director for Science
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-34
Atlanta, GA 30333
Telephone: 770-488-5989
E-mail: dlw7@cdc.gov

Hannah Weir, PhD
Epidemiologist
Division of Cancer Prevention and Control
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-55
Atlanta, GA 30345
Telephone: 770-488-3006
E-mail: hbw4@cdc.gov

Carla White, MPH,CHES
Health Communication Specialist
Division of Reproductive Health
Centers for Disease Control and Prevention
600 Webster Drive
Decatur, GA 30033
Telephone: 404-471-1199
E-mail: carlawhite@comcast.net

Scott Williams
Vice President
Men's Health Network
PO Box 75972
Washington, DC 20013
Telephone: 202-543-6461, ext. 103
E-mail: scott@menshealthnetwork.org

Yolanda Wimberly, MD
Associate Professor of Clinical Pediatrics
Morehouse School of Medicine
720 Westview Dr SW
Atlanta, GA 30310
Telephone: 404-752-1500
E-mail: ywimberly@msm.edu

Janis Winogrardsky, MPH
Health Communications Specialist
National Center for Chronic Disease
Prevention and Health Promotion
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-40
Atlanta, GA 30341
Telephone: 770-488-5714
E-mail: jwinogradsky@cdc.gov

Lauren Zapata, PhD
Research Scientist
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-34
Atlanta, GA 30341
Telephone: 770-488-6358
E-mail: lzapata@cdc.gov

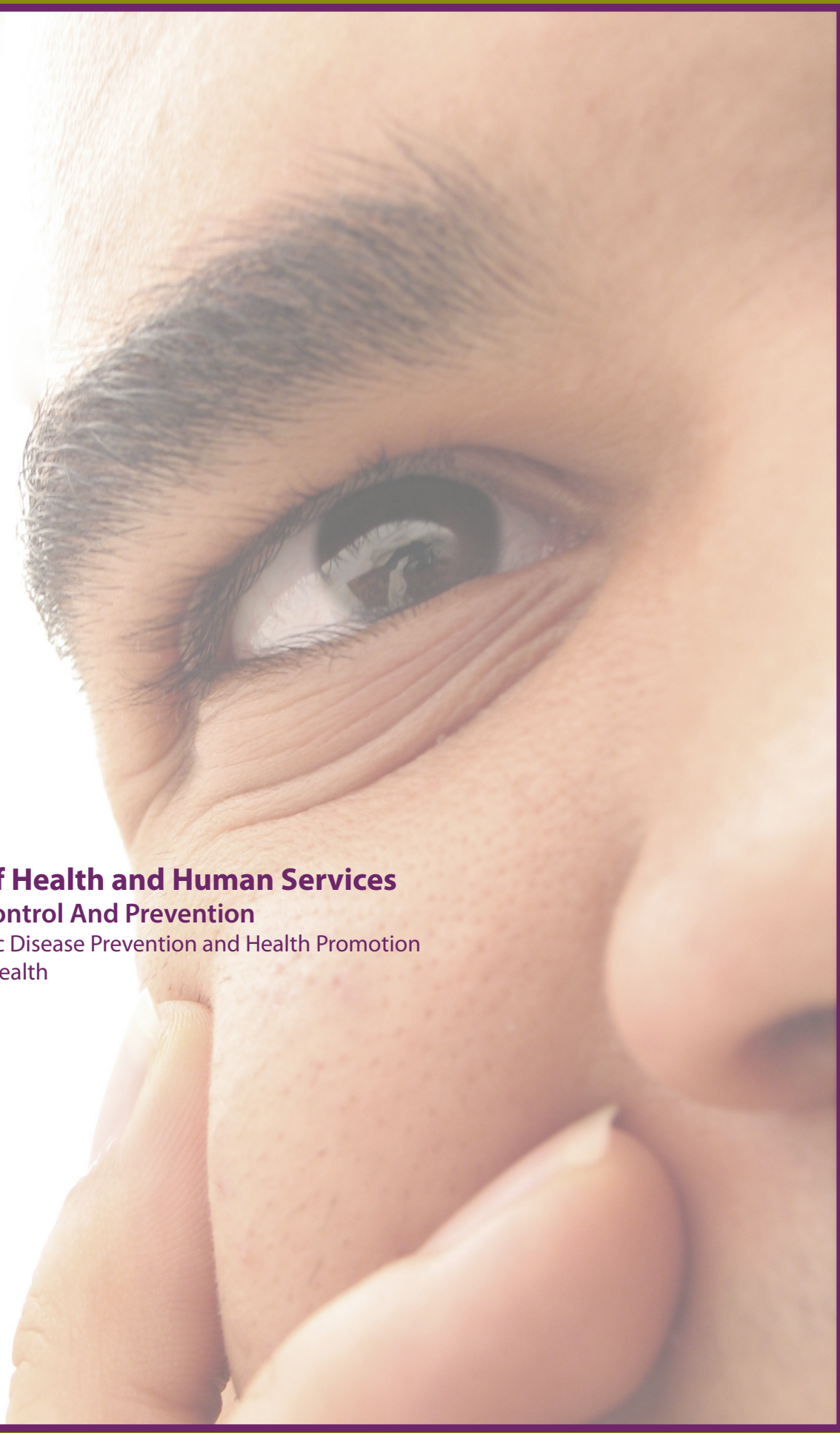
Yujia Zhang, PhD
Mathematic Statistician
Division of Reproductive Health
Centers for Disease Control and Prevention
4770 Buford Highway, NE, MS K-34
Atlanta, GA 30341
Telephone: 770-488-6342
E-mail: coi8@cdc.gov

Attachment 2

References Cited by Presenters and Others

- Anderson JE, Warner L, Jamieson DJ, Kissin DM, Nangia AK, Macaluso M. Contraceptive sterilization use among married men in the United States: results from the male sample of the National Survey of Family Growth *Contraception*. 2010;82(3):230-5. PubMed PMID:20705150.
- Bartlett NH, Vasey PL. A retrospective study of childhood gender-atypical behavior in Samoan fa'afafine. *Arch Sex Behav*. 2006;35(6):659-66. PubMed PMID:16909317.
- Berg BJ, Wilson JF. Psychological functioning across stages of treatment for infertility. *J Behav Med.*1991;14(1):11-26. PubMed PMID:2038042.
- Berger DM. Impotence following the discovery of azoospermia. *Fertil Steril.*1980;34(2) :154-6. PubMed PMID:7409234.
- Bonduelle M, Wennerholm UB, Loft A, Tarlatzis BC, Peters C, Henriet S, Mau C, Victorin-Cederquist A, Van Steirteghem A, Balaska A, Emberson JR, Sutcliffe AG. A multi-centre cohort study of the physical health of 5-year-old children conceived after intracytoplasmic sperm injection, in vitro fertilization and natural conception. *Hum Reprod*. 2005;20(2):413-9. PubMed PMID:15576393.
- Cook LA, Pun A, van Vliet H, Gallo MF, Lopez LM. Scalpel versus no-scalpel incision for vasectomy. Cochrane *Database Syst Rev*. 2006;18.; PubMed PMID:17054197.
- Daniluk JC. Infertility: intrapersonal and interpersonal impact. *Fertil Steril.* 1988;49(6):982-90. PubMed PMID:3371493.
- Dimitropoulou P, Lophatananon A, Easton D, Pocock R, Dearnaley DP, Guy M, Edwards S, O'Brien L, Hall A, Wilkinson R, Eeles R, Muir KR. UK Genetic Prostate Cancer Study Collaborators, British Association of Urological Surgeons Section of Oncology. Sexual activity and prostate cancer risk in men diagnosed at a younger age. *BJU Int.* 2009;103(2):178-85. PubMed PMID:19016689.
- Donovan JF Jr, DiBaise M, Sparks AE, Kessler J, Sandlow JI. Comparison of microscopic epididymal sperm aspiration and intracytoplasmic sperm injection/in-vitro fertilization with repeat microscopic reconstruction following vasectomy: is second attempt vas reversal worth the effort? Hum Reprod. 1998;13(2):387-93. PubMed PMID:9557844.
- Fisher JR, Baker GH, Hammarberg K. Long-term health, well-being, life satisfaction, and attitudes toward parenthood in men diagnosed as infertile: challenges to gender stereotypes and implications for practice. *Fertil Steril*. 2010;94(2):574-80. PubMed PMID:19342027.
- Griffin T, Tooher R, Nowakowski K, Lloyd M, Maddern G. How little is enough? The evidence for post-vasectomy testing. *J Urol.* 2005;174(1):29-36. PubMed PMID:15947571.
- Hansen M, Bower C, Milne E, de Klerk N, Kurinczuk JJ. Assisted reproductive technologies and the risk of birth defects--a systematic review. *Hum Reprod*. 2005;20(2):328-38. PubMed PMID:15567881.
- Heidenreich A, Altmann P, Engelmann UH. Microsurgical vasovasostomy versus microsurgical epididymal sperm aspiration/testicular extraction of sperm combined with intracytoplasmic sperm injection a cost-benefit analysis. *Eur Urol*. 2000;37(5):609-14. PubMed PMID:10765102.
- Hendry WF, Stedronska J, Jones CR, Blackmore CA, Barrett A, Peckham MJ. Semen analysis in testicular cancer and Hodgkin's disease: pre- and post-treatment findings and implications for cryopreservation. *Br J Urol*. 1983;55(6):769-73. PubMed PMID:6652450.
- Herbenick D, Reece M, Schick V, Sanders SA, Dodge B, Fortenberry JD. Sexual behavior in the United States: results from a national probability sample of men and women ages 14-94. *J Sex Med.* 2010;7(Suppl 5):255-65. PubMed PMID:21029383.
- Honig SC, Lipshultz LI, Jarow J. Significant medical pathology uncovered by a comprehensive male infertility evaluation. *Fertil Steril.* 1994;62(5):1028-34. PubMed PMID:7926114.
- Kolettis PN, Sabanegh ES. Significant medical pathology discovered during a male infertility evaluation. *J Urol.* 2001;166(1):178-80. PubMed PMID:11435851.
- Kolettis PN, Thomas AJ Jr. Vasoepididymostomy for vasectomy reversal: a critical assessment in the era of intracytoplasmic sperm injection. *J Urol.* 1997;158(2):467-70. PubMed PMID:9224325.
- Lee SJ, Schover LR, Partridge AH, Patrizio P, Wallace WH, Hagerty K, Beck LN, Brennan LV, Oktay K, American Society of Clinical Oncology. American Society of Clinical Oncology recommendations on fertility preservation in cancer patients. *J Clin Oncol.* 2006;24(18):2917-31. PubMed PMID:16651642.

- Makker K, Varghese A, Desai NR, Mouradi R, Agarwal A. Cell phones: modern man's nemesis? *Reprod Biomed Online*. 2009;18(1):148-57. PubMed PMID:19146782.
- Marmar JL, Agarwal A, Prabakaran S, Agarwal R, Short RA, Benoff S, Thomas AJ Jr. Reassessing the value of varicocelectomy as a treatment for male subfertility with a new meta-analysis. *Fertil Steril.* 2007;88(3):639-48. PubMed PMID:17434508.
- Meng MV, Greene KL, Turek PJ. Surgery or assisted reproduction? A decision analysis of treatment costs in male infertility. *J Urol*. 2005;174(5):1926-31. PubMed PMID:16217347.
- Nangia AK, Likosky DS, Wang D. Distribution of male infertility specialists in relation to the male population and assisted reproductive technology centers in the United States. *Fertil Steril*. 2010; 94(2):599-609. PubMed PMID:19361796.
- Office of the Surgeon General (US), Office of Population Affairs (US). 2001 Jul; PubMed PMID:20669514.
- Oldereid NB, Abyholm T, Tanbo T, Engelund IE, Irgens LM. [Congenital malformations in children born after assisted fertilization in Norway]. *Tidsskr Nor Laegeforen*. 2003;123(19) 2696-9. PubMed PMID:14600738.
- Palermo G, Joris H, Devroey P, Van Steirteghem AC. Pregnancies after intracytoplasmic injection of single spermatozoon into an oocyte. *Lancet*. 1992;340(8810):17-8. PubMed PMID:1351601.
- Penson DF, Paltiel AD, Krumholz HM, Palter S. The cost-effectiveness of treatment for varicocele related infertility. *J Urol*. 2002;168(6):2490-4. PubMed PMID:12441947.
- Peterson BD, Newton CR, Rosen KH, Skaggs GE. The relationship between coping and depression in men and women referred for in vitro fertilization. *Fertil Steril*. 2006;85(3):802-4. PubMed PMID:16500370.
- Pile JM, Barone MA. Demographics of vasectomy—USA and international. *Urol Clin North Am*. 2009;36(3):295-305. PubMed PMID:19643232.
- Price LB, Liu CM, Johnson KE, Aziz M, Lau MK, Bowers J, Ravel J, Keim PS, Serwadda D, Wawer MJ, Gray RH. The effects of circumcision on the penis microbiome. *PLoS One.* 2010; 5 (1):e8422. PubMed PMID:20066050; PubMed Central PMCID: PMC2798966.
- Raman JD, Nobert CF, Goldstein M. Increased incidence of testicular cancer in men presenting with infertility and abnormal semen analysis. *J Urol*. 2005;174(5):1819-22. PubMed PMID:16217294.
- Redman JR, Bajorunas DR, Goldstein MC, Evenson DP, Gralla RJ, Lacher MJ, Koziner B, Lee BJ, Straus DJ, Clarkson BD. Semen cryopreservation and artificial insemination for Hodgkin's disease. *J Clin Oncol*. 1987;5(2):233-8. PubMed PMID:3806168.
- Reed E, Sanger WG, Armitage JO. Results of semen cryopreservation in young men with testicular carcinoma and lymphoma. *J Clin Oncol*. 1986 ;4(4):537-9. PubMed PMID:3958766.
- Saleh RA, Ranga GM, Raina R, Nelson DR, Agarwal A. Sexual dysfunction in men undergoing infertility evaluation: a cohort observational study. *Fertil Steril*. 2003;79(4):909-12. PubMed PMID:12749429.
- Schacht PM, Cummings EM, Davies PT. Fathering in family context and child adjustment: a longitudinal analysis. *J Fam Psychol*. 2009;23(6):790-7. PubMed PMID:20001137; PubMed Central PMCID: PMC2805856.
- Schlegel PN. Is assisted reproduction the optimal treatment for varicocele-associated male infertility? A cost-effectiveness analysis. *Urology.* 1997;49(1):83-90. PubMed PMID:9000191.
- Schlegel PN. Testicular sperm extraction: microdissection improves sperm yield with minimal tissue excision. *Hum Reprod.* 1999;14(1):131-5. PubMed PMID:10374109.
- Schover LR, Brey K, Lichtin A, Lipshultz LI, Jeha S. Knowledge and experience regarding cancer, infertility, and sperm banking in younger male survivors. *J Clin Oncol*. 2002;20(7):1880-9. PubMed PMID:11919248.
- Schover LR, Brey K, Lichtin A, Lipshultz LI, Jeha S. Oncologists' attitudes and practices regarding banking sperm before cancer treatment. *J Clin Oncol*. 2002;20(7):1890-7. PubMed PMID:11919249.
- Schwingl PJ, Guess HA. Safety and effectiveness of vasectomy. *Fertil Steril*. 2000;73(5):923-36. PubMed PMID:10785217.
- van Anders SM, Watson NV. Relationship status and testosterone in North American heterosexual and non-heterosexual men and women: cross-sectional and longitudinal data. *Psychoneuroendocrinology*. 2006;31(6):715-23. PubMed PMID:16621328.
- Workowski KA, Berman S, Centers for Disease Control and Prevention (CDC). Sexually transmitted diseases treatment guidelines, 2010. *MMWR Recomm Rep*. 2010;; 59(RR-12):1-110. PubMed PMID:21160459.
- Zapzalka DM, Redmon JB, Pryor JL. A survey of oncologists regarding sperm cryopreservation and assisted reproductive techniques for male cancer patients. *Cancer*. 1999;86(9):1812-7. PubMed PMID:10547555.



U.S. Department of Health and Human Services
Centers For Disease Control And Prevention
National Center for Chronic Disease Prevention and Health Promotion
Division of Reproductive Health