ICCFASD

Interagency Coordinating Committee on Fetal Alcohol Spectrum Disorders

Spring 2020 Public Meeting Summary

Monday, March 9, 2020

National Institute on Alcohol Abuse and Alcoholism
6700B Rockledge Drive, First Floor Conference Center, Rockville, Maryland 20817

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ICCFASD Spring 2020 Public Meeting Videocast link

A videocast of the ICCFASD Spring 2020 Public Meeting held on March 9, 2020 is available on the NIH videocast website.

ICCFASD Meeting Participants

A list of ICCFASD Executive Committee members and their contact information can be found on the ICCFASD website.

ICCFASD Chairperson:
Patricia A. Powell, PhD
Deputy Director
National Institute on Alcohol Abuse and Alcoholism (NIAAA)
National Institutes of Health (NIH)
The United States Department of Health and Human Services (HHS)

ICCFASD Scientific Coordinator and Executive Secretary:
Tatiana Balachova, PhD
Health Scientist Administrator
Division of Epidemiology and Prevention Research
National Institute on Alcohol Abuse and Alcoholism, NIH, HHS

Special Advisor to ICCFASD Leadership
Sally M. Anderson, PhD
Office of the Director
National Institute on Alcohol Abuse and Alcoholism, NIH, HHS

ICCFASD Primary Representatives:

Caitlin Cross-Barnet, PhD
Social Science Research Analyst
Research and Rapid-cycle Evaluation Group
Center for Medicare and Medicaid Innovation
Centers for Medicare and Medicaid Services (CMS), HHS

Minki Chatterji, PhD
Program Officer (Health Science Administrator)
Prevention Research Branch (PRB)
Division of Epidemiology, Services and Prevention Research
National Institute on Drug Abuse, NIH, HHS

Jon Dunbar-Cooper, MA, CPP
Public Health Analyst
Division of Systems Development

Center for Substance Abuse Prevention
Substance Abuse and Mental Health Services Administration (SAMSA), HHS

William Dunty, PhD
Program Director
Division of Metabolism and Health Effects
National Institute on Alcohol Abuse and Alcoholism, NIH, HHS

Shin Y. Kim, MPH - *participating via phone*
Team Lead, Lead Health Scientist
Prenatal Substance Exposure Surveillance and Research Team
Infacnt Outcomes Monitoring, Research and Prevention Branch
National Center on Birth Defects and Developmental Disabilities
Centers for Disease Control and Prevention (CDC), HHS

Tracy M. King, MD, MPH
Medical Officer
Intellectual and Developmental Disabilities Branch
Eunice Kennedy Shriver National Institute of Child Health and Human Development, NIH, HHS

Sharon McKiernan, MD, FAAP
Maternal/Child Health Consultant
Indian Health Service Headquarters
Indian Health Service (IHS), HHS

Dawn Levinson, MSW
Behavioral Health Lead
Division of Healthy Start and Perinatal Services
Maternal and Child Health Bureau
Health Resources and Services Administration (HRSA), HHS

Sharon Newburg-Rinn, PhD
Social Science Research Analyst
Office of Data, Analysis, Research and Evaluation
Administration for Children and Families (ACF), HHS

Chris Sarampote, PhD
Chief, Biomarker and Intervention Development for Childhood-Onset Disorders Branch
Division of Translational Research
National Institute of Mental Health (NIMH), NIH, HHS

Kristina West, MS, LLM
Social Science Analyst,
Division of Behavioral Health Policy
Office of Disability, Aging, and Long-term Care Policy
Office of the Assistant Secretary for Planning and Evaluation (ASPE), HHS

Invited Guest Speakers

Grace Chang, MD, MPH
Professor of Psychiatry
Harvard Medical School
Head of the Harvard Department of Psychiatry
VA Boston Medical Center
U.S. Department of Veterans Affairs
Director, Consultation Liaison Psychiatry
VA Boston Healthcare System

Claire D. Coles, PhD
Professor
Department of Psychiatry and Behavioral Sciences
Department of Pediatrics
Emory University School of Medicine

Amy Elliott, PhD - *participating via phone*
Chief Clinical Research Officer
Avera Research Institute Center for Pediatric & Community Research
The University of South Dakota Sanford School of Medicine

Edward Riley, PhD
Distinguished Research Professor
Center for Behavioral Teratology
San Diego State University

ICCFASD Agenda

	AGENDA
9:30 am	Welcome, Introductions, and Comments *Patricia Powell, PhD, Deputy Director, NIAAA, NIH; ICCFASD Chair*
9:40 am	Overview of ICCFASD Mission and Goals *Tatiana Balachova, PhD, NIAAA, ICCFASD Scientific Coordinator and Executive Secretary*
9:45 am	**Reports of Activities from FY2019: ICCFASD Federal Agencies** *NIAAA, NICHD, NIDA, NIMH, CDC*
10:40 am	BREAK
10:55 am	**Reports of Activities from FY2019: ICCFASD Federal Agencies** *CMS, IHS, ACF, HRSA, SAMHSA, ASPE*
12:00 pm	LUNCH BREAK
1:00 pm	**Special Panel** **Translating Research into Practice: What's Cooking and What's Almost Ready to Serve**
	Moderator: *Edward Riley, PhD, San Diego State University, San Diego, CA*
	Collaborative Initiative on Fetal Alcohol Spectrum Disorders (CIFASD) *Edward Riley, PhD, San Diego State University, San Diego, CA*
	Prevention of prenatal substance exposure (universal, selective, and indicated) *Grace Chang, MD, MPH, VA Boston Medical Center, Harvard Medical School, Brockton, MA*
2:15 pm	BREAK
2:30 pm	Child health outcomes of concurrent prenatal exposure to alcohol and other substances *Amy Elliott, PhD, Avera Research Institute Center for Pediatric & Community Research, Sioux Falls, SD*
	Interventions and services for affected individuals and families *Claire D. Coles, PhD, Emory University School of Medicine, Atlanta, GA*
3:30 pm	Discussion *ICCFASD Agency Representatives, Speakers, and Guests*
4:25 pm	Comments and Adjournment *Tatiana Balachova, PhD, NIAAA, ICCFASD Scientific Coordinator and Executive Secretary* *Patricia Powell, PhD, Deputy Director, NIAAA, NIH; ICCFASD Chair*

Welcome, Introductions, and Comments

Patricia Powell, PhD, Deputy Director, NIAAA, NIH; ICCFASD Chair

Dr. Powell, Deputy Director at NIAAA, welcomed participants to the meeting and introduced four new members of the ICCFASD: Dr. Minki Chatterji, Program Officer for the Healthy Brain and Child Development Study at the National Institute on Drug Abuse; Dr. Sharon McKiernan, Maternal Child and Health Consultant, the Indian Health Service; Kristina West, Social Science Analyst, Office of the Assistant Secretary for Planning and Evaluation; and Dr. Christopher Sarampote, Chief, Biomarker and Intervention Development for Child-Onset Disorders Branch, Division of Translational Research, National Institute of Mental Health. Dr. Powell reminded participants that the overarching vision for the ICCFASD is to work collectively across federal agencies and with public partners to generate evidence-based information for individuals with FASD and their families about prevention, diagnosis, and treatment interventions. In addition, such knowledge will guide the work of all participating federal agencies, and public and private entitles that provide services to the individuals with FASD and their families. Dr. Powell stated that the 2020 public meeting focusses on the translation of research to practice, in recognition that the prevalence of FASD is 1–5% of first graders in the United States. The ICCFASD members and the general public need to know what research knowledge is available and will be ready to use soon in various settings. The meeting consists of updates from participating agencies prior to a panel of speakers. Dr. Balachova was introduced as the Scientific Coordinator and Executive Secretary of ICCFASD, and participants were asked to introduce themselves and state their affiliation.

Overview of ICCFASD Mission and Goals

Tatiana Balachova, NIAAA, ICCFASD Scientific Coordinator and Executive Secretary

Dr. Balachova thanked Dr. Powell for the introduction and members of the public for attending the meeting. Following the participant introductions, Dr. Balachova gave a brief overview of the ICCFASD, which was created in 1996 in response to recommendations of an Expert Committee of the Institute of Medicine (IOM) of the National Academy of Sciences. The ICCFASD was established with the specific purpose to coordinate federal efforts for FAS and related disorders. ICCFASD is comprised of members and alternate members who represent relevant federal research, surveillance, and service agencies. ICCFASD is supported and administered by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) at the National Institutes of Health (NIH), the leading federal agency to conduct research on the effects of alcohol on health and well-being across the lifespan. In 2020, NIAAA celebrates its 50th anniversary, and has supported ICCFASD since its inception in 1996. ICCFASD's primary objective is to enhance and increase communication, cooperation, collaboration, and establish new partnerships among federal agencies that address issues related to FASD. The interagency collaboration aims to prevent fetal alcohol exposure and to improve outcomes in individuals with FASD and families impacted by FASD. The ICCFASD includes agencies primarily within the Department of Health and Human Services (HHS), including the Indian Health Service (IHS), Centers for Disease Control and Prevention (CDC), Health Resources and Services Administration (HRSA), Center for Medicare and Medicaid Services (CMS), Administration for Children and Families (ACF), Substance Abuse and Mental Health Services Administration (SAMHSA), and Institutes within

the National Institutes of Health (NIH), i.e., the National Institute on Alcohol Abuse and Alcoholism (NIAAA), *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD), and National Institute on Drug Abuse (NIDA). In 2019, the National Institute of Mental Health, NIH, and the Office of the Assistant Secretary for Planning and Evaluation (ASPE) joined the ICCFASD. Previously, the Department of Education and the Office of Juvenile Justice and the Delinquency Prevention (OJJDP) in the Department of Justice had representatives on the ICCFASD; however, these agencies are not currently active on the ICCFASD. The organizational chart of the ICCFASD is available on the ICCFASD website. Representatives from all active agencies on the ICCFASD will present reports on their activities for financial year 2019 and plans for 2020.

Reference:

Institute of Medicine. Fetal Alcohol Syndrome: Diagnosis, Epidemiology, Prevention, and Treatment. Washington, DC: The National Academies Press.1996 https://doi.org/10.17226/4991.

Reports of Activities from FY2019: ICCFASD Federal Agencies: NIAAA, NICHD, NIDA, NIMH, CDC

The National Institute on Alcohol Abuse and Alcoholism (NIAAA)
William Dunty, PhD, Program Director, Division of Metabolism and Health Effects, National Institute on Alcohol Abuse and Alcoholism, NIH

NIAAA supports a diverse portfolio of basic, translational, and clinical research on the etiology, prevention, diagnosis, and treatment of FASD. Over the past five fiscal years, NIAAA funding for research and training budget has risen; $401 million was allocated for FY2019. Over the past five fiscal years, awards for FASD investigators has remained steady, comprising 7–8% of the entire research and training budget. In FY2019, 7.4%, or approximately $30 million, supported 113 FASD-related grants, 23 of which were newly funded research projects from all four categories of supported research. For example, related to etiology, newly funded research includes investigations on sex-dependent effects of prenatal alcohol exposure on developmental programming, sleep disturbances in children with FASD, animal studies looking at the genes that underlie social deficits following prenatal alcohol exposure, and a 3D *in vitro* stem cell model to examine the effects of alcohol exposure on human cortical development. Among the grants that support the treatment category, two examples are projects investigating whether reducing oxidative stress could increase immune function in alcohol-exposed premature newborns and the potential benefit of exercise and environmental enrichment to mitigate some of the alcohol-related damage of specific circuits in the brain. Among the prevention grants, investigators are looking at electronic screening and brief interventions to prevent alcohol-exposed pregnancies. Finally, related to diagnosis, NIAAA continues to support novel technologies and methods aimed to identify more effectively individuals who have been exposed to alcohol prenatally. For example, three funded projects in this category focus on novel epigenetic markers, the use of a mobile application to assist in diagnosis, and application of machine-learning techniques.

In addition to individual research grants, NIAAA also supports the Collaborative Initiative on FASD (CIFASD), a multidisciplinary consortium of both clinical and basic science projects. Currently, the CIFASD is in its fourth iteration (CIFASD4), led by Dr. Ed Riley. The goal of the consortium is to enhance the diagnosis of FASD across different stages of the lifespan based on biological, physical, and behavioral assessments, and to improve outcomes in individuals with FASD. Some of the current themes of CIFASD4 include different imaging modalities, genetic studies on risk and resiliency factors, and developing screening tools and mobile health interventions, and an online registry of individuals with FASD. Dr. Claire Coles is leading the adult health survey as part of CIFASD4 with other projects that are looking at telemedicine approaches and biomarker discoveries. More information about the consortium can be found on the CIFASD website.

Dr. Dunty mentioned a press release by NIAAA that highlights recently published preclinical research from the laboratory of CIFASD investigator, Dr. Scott Parnell (University of North Carolina). The Fish et al., 2019 publication shows that one-time exposure during early pregnancy to compounds that are found in marijuana results in birth defects involving the face and brain. Importantly, this research showed that when those compounds are co-administered with alcohol prenatally, the likelihood of the birth defects more than doubled. The animal model used in the study corresponds to the 3rd-4th week of pregnancy in humans, which is a time period during which some women do not know that they are pregnant.

NIAAA supports 16 Specialized Alcohol Research Centers (P50s), two of which have a focus on FASD. The first is the New Mexico Alcohol Research Center (NMARC; Dr. Dan Savage, Principal Investigator) which is the only NIAAA-funded Alcohol Research Center with a primary focus on FASD. NMARC projects include pre-clinical and clinical studies addressing the neurobiological mechanisms underlying the behavioral problems associated with FASD. Using this knowledge will help the development of better methods of early diagnosis and more effective interventions for patients with FASD. The second FASD Specialized Research Center is the Developmental Exposure Alcohol Research Center (DEARC; Dr. Terrence Deak, Principal Investigator) at The State University of New York at Binghamton. DEARC mainly uses animal models to understand the functional and neural effects of alcohol exposure throughout brain development, including prenatal periods.

Larger research centers (P60s) include the Native Center for Alcohol Research and Education (NCARE; Dr. Dedra Buchwald, Principal Investigator), at Washington State University. One of NCARE's main projects is to compare the effectiveness of a culturally adapted intervention to prevent alcohol-exposed pregnancies among Cheyenne River Sioux women in South Dakota. NCARE is using an approach called Native-CHOICES that consists of motivational interviewing sessions plus contraceptive counseling, followed by supportive electronic messaging.

Dr. Dunty spoke about a new initiative at NIAAA. In October 2019, NIAAA held the Consensus Conference on Research Classification of FASD, which was attended by U.S. and international researchers. The goal of the conference to harmonize the various research classification systems for FASD in the hope that a single definition of FASD will allow for accuracy and consistency among FASD prevalence and other studies around the world. The 17 conference participants included representation from most of the current FASD classification systems including the

HOYME guidelines, the 4-Digit Diagnostic Code, and the Australian and Canadian guidelines. Currently, strategies are being developed for the participants to test these classification systems in their databases. The framework for a single research classification system is still being developed and updates will be presented at upcoming FASD meetings.

Reference:

Fish EW, Murdaugh LB, Zhang C, Boschen KE, Boa-Amponsem O, Mendoza-Romero HN, et al. Cannabinoids Exacerbate Alcohol Teratogenesis by a CB1-Hedgehog Interaction. Sci Rep. 2019 Nov 5;9(1):16057.

The Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD)

Tracy M. King, MD, MPH, Medical Officer, Intellectual and Developmental Disabilities Branch Eunice Kennedy Shriver National Institute of Child Health and Human Development, NIH

Dr. King described the broad mission and scope of NICHD, ranging from child health, including both typical development and intellectual developmental disabilities, trauma and critical care, prenatal, perinatal, and neonatal health, pregnancy and maternal health, and reproductive health. NICHD is the primary funder of many gynecological and reproductive health and rehabilitation research studies across the lifespan; the National Center for Medical Rehabilitation Research is housed within NICHD.

NICHD recently completed an institute-wide strategic planning process. This planning included identifying goals where NICHD should be the lead institute, areas in which NICHD should partner and collaborate, and areas for future investments in research training and infrastructure. Although NICHD is not the lead institute supporting FASD research, Dr. King emphasized that many of the institute's current scientific priorities have clear areas of overlap with FASD-related research. NICHD's current scientific themes and objectives are as follows:

- Understanding the Molecular, Cellular, and Structural Basis of Development
- Promoting Gynecologic, Andrologic, and Reproductive Health
- Setting the Foundation for Healthy Pregnancies and Lifelong Wellness
- Improving Child and Adolescent Health and the Transition to Adulthood
- Advancing Safe and Effective Therapeutics and Devices for Pregnant and Lactating Women, Children, and People with Disabilities

NICHD currently funds few research projects directly addressing children with FASD but does support some research projects on other substance abuse and risk factors in pregnancy that collect information on prenatal alcohol exposure. NICHD also provides indirect support for the FASD field through some research networks and research cohorts, and some support for basic science research, including research using animal models. NICHD also has a priority of participating in trans-NIH collaborations with relevance to FASD.

An example of trans-NIH collaboration is a recently published study (Ye et al., 2020) that examined the epidemiology of alcohol use during pregnancy. This collaborative NICHD, NIAAA, and the National Institute on Deafness and Other Communication Disorders (NIDCD) study surveyed pregnant or early postpartum women in the Northern Plains (South Dakota, North Dakota). The study recruited 4,877 pregnant women recruited at 5 sites, including 2 Native American/American Indian (AI) reservations. The conclusions of the study were:

- More Caucasian women reported consuming alcohol during pregnancy than AI women (63% versus 52%)
- More AI women reported binge drinking than Caucasian women (41% versus 28%)
- AI women were less likely than their Caucasian peers to drink during the 2nd & 3rd trimesters
- For AI women, change of residence between homes on a reservation and between reservations and cities was the only significant risk factor for prenatal drinking (usually associated with financial stress and lack of social support)

NICHD is also funding the clinical trial, "Health Check-up for Expectant Moms" (HCEM) intervention (NCT03826342), which is it its early stages with no results currently available. This study aims to enroll 250 pregnant women at high risk for alcohol and drug use during pregnancy. The goal of the study is to determine whether the HCEM intervention reduces sexually transmitted infections, alcohol and drug use compared to a time- and information-matched control intervention in pregnant women seeking prenatal care.

Another early-stage NICHD-funded research project (R03HD098507) looks at alcohol as a possible mediating factor to adverse outcomes. This study specifically focusses on women with disabilities who, in general, are more likely to have adverse pregnancy outcomes even when those outcomes are not obviously attributable to the disability itself. Data were obtained from a previous cohort study comprising 132 women identified as having congenital and neuromuscular defects (cNMD: spina bifida, cerebral palsy, muscular dystrophy, and limb anomalies), with a comparison group of 528 unaffected women. The goal of the current research is to assess a potential association between maternal cNMD, birth outcomes of affected women, and possible mediation of outcomes by maternal cigarette or alcohol use, use of vitamin supplements or various medications (pain, sleep, psychoactive), kidney/bladder infection, or pre-pregnancy BMI.

The trans-NIH "Helping to End Addition Long-term" (HEAL) initiative funds research to address the opioid crisis. NICHD is the lead institute for projects looking specifically at neonatal opioid withdrawal (NOW) syndromes. In this regard, the overarching goal of the Advancing Clinical Trials for Neonatal Opioid Withdrawal (ACT NOW) project is to optimize health for infants who are exposed to opioids *in utero*. The main question of this research asks, among neonates with opioid withdrawal symptoms, to what extent can clinicians safely reduce or eliminate opioid treatment? Interlinked studies include: the ACT NOW Current Experience Study, the ACT NOW Longitudinal Cohort Observational Study, and the ACT NOW Interventional Clinical Trials, such as the non-pharmacologic Eat, Sleep, Console Trial and the pharmacologic Weaning Trial. Although alcohol use and prenatal exposure are not a primary focus of these studies, each study collects information on self-reported alcohol use during pregnancy.

Reference:

Ye P, Angal J, Tobacco DA, Willman AR, Friedrich CA, Nelson ME, et al. Prenatal Drinking in the Northern Plains: Differences Between American Indian and Caucasian Mothers. Am J Prev Med. 2020 Apr;58(4):e113–21.

The National Institute on Drug Abuse (NIDA)

Minki Chatterji, PhD, Program Officer (Health Scientist Administrator), Prevention Research Branch, Division of Epidemiology, Services and Prevention Research, National Institute on Drug Abuse, NIH

Dr. Chatterji presented highlights of NIDA-funded research related to prenatal exposure to alcohol. The 2018 National Survey of Drug Use and Health (NSDUH) funded by SAMSHA, shows that substance use among pregnant women in the US remains high. The 2018 NSDUH revealed that 9.9% of pregnant women reported using alcohol in the past month. However, substance use among pregnant women is often not restricted to one drug, therefore, in contrast to NIAAA, NIDA is particularly focused on polydrug use during pregnancy. Another NSDUH survey over a 10 year-period focused on women who were using opioids non-medically during pregnancy. The study revealed that almost 50% of women who used opioids during pregnancy also reported alcohol use; 32.1% of the total women surveyed reported binge drinking or heavy alcohol use (Kozhimannil et al., 2017).

NIDA funds several grants related to prenatal exposure to substances including alcohol, nicotine, marijuana, legal and illicit opioids, and stimulants. The portfolio of NIDA-funded research grants is multidisciplinary, including the fields of neuroscience, epidemiology, and evaluation of interventions.

Dr. Chatterji highlighted three NIDA-funded studies. The first study (Gao and Grewen, under review; R21 DA043171, R01 DA042988, R01 DA043678) investigated the effects of prenatal substance use on newborn brain connectivity. The study included a cohort of 133 newborn babies, recruited from prenatal clinics and residential treatment centers in North Carolina, from 2009–2014. The outcome measure was brain connectivity, measured with resting fMRI during natural sleep of the babies. The authors examined effects of six drugs: three legal drugs (nicotine, alcohol, and selective serotonin retake inhibitors [SSRIs; prescribed to treat mental health disorders including depression and anxiety and other conditions]) and three illegal drugs (opioids, marijuana, and cocaine). The results showed that the six drugs collectively affected 5% of functional connections in the brains of the newborns. Interestingly, the legal drugs (SSRIs, nicotine, and alcohol) had a greater effect than the illegal drugs. Prenatal alcohol exposure primarily influenced connections in the newborn brain related to sensory, motor, and other functions. Dr. Chatterji emphasized that although NIDA is highly focused on the opioid crisis, Gao and Grewen's study indicates that while prenatal illicit drug use is important, a focus on effects of prenatal exposure to legal drugs should be maintained for policy implications.

The second study that Dr. Chatterji highlighted was a recently published epidemiological study (Young-Wolff et al., 2020) conducted in Kaiser Permanente, Northern California. The study aimed to determine how likely are pregnant women who are identified as using substances to participate in a counseling session integrated into prenatal care. The intervention was highly integrated into prenatal care as the counselors were located within the OB/GYN department in Kaiser Permanente. The study cohort consisted of 11,843 pregnant women who screened positive, through urine toxicology or self-report, for substance use in 2014–2015. The outcome measure was whether or not the women agreed to participate in the integrated substance use intervention. An encouraging finding was that 83% of pregnant women who screened positive for substance use via universal prenatal screening participated in the substance use intervention. Women from under-served groups were more likely to participate in the intervention, as were single women compared to married woman. The odds of participation were also higher among women from lower socioeconomic status households compared to higher socioeconomic status households. The policy implication from the study by Young-Wolff et al. is that free, integrated psychosocial assessment & counseling interventions, that are integrated into prenatal care, have the potential to reach traditionally under-served populations of pregnant women.

The third study presented was the HEALthy brain and Child Development Study (HBCD) for which Dr. Chatterji is the Program Officer. The HCBD study is part of the HEAL initiative which was also discussed by Dr. King in her earlier presentation. The HBCD study is in early stages and its research objective is to assess the effects of pre/postnatal exposure to opioids or other substances (e.g., cannabis, alcohol, tobacco, other prescription or illicit substances, alone or in combination) on developmental trajectories. The goal is to establish a large cohort (e.g., 7,500) of pregnant women from regions of the US affected by the opioid crisis and follow the children for 10 years. The cohort will also include non-exposed children to establish normative brain and behavioral development trajectories. Dr. Chatterji acknowledged that recruitment for the study will be challenging, particularly in states in which substance use is a felony. The HBCD will collect four types of data: neuroimaging, social and emotional assessment, environmental exposure, and biospecimens. Phase I of the HBCD study commenced in September 2019 and runs for 18 months. A total of 29 Phase I R21 grants were awarded. Phase II, which will start in September 2021, will launch a full longitudinal study.

References:

2018 National Survey of Drug Use and Health: https://www.samhsa.gov/data/release/2018-national-survey-drug-use-and-health-nsduh-releases

Kozhimannil KB, Graves AJ, Jarlenski M, Kennedy-Hendricks A, Gollust S, Barry CL. Non-medical opioid use and sources of opioids among pregnant and non-pregnant reproductive-aged women. Drug Alcohol Depend. 2017 01;174:201–8.

Young-Wolff KC, Tucker L-Y, Armstrong MA, Conway A, Weisner C, Goler N. Correlates of Pregnant Women's Participation in a Substance Use Assessment and Counseling Intervention Integrated into Prenatal Care. Matern Child Health J. 2020 Apr;24(4):423–31.

The National Institute of Mental Health (NIMH)
Christopher Sarampote, PhD, Chief, Biomarker and Intervention Development for Childhood-onset Disorders Branch, Division of Translational Research, National Institute of Mental Health, NIH Prevention

Dr. Sarampote thanked the ICCFASD for inviting NIMH to participate in the Committee and said that the Director of the NIMH, Dr. Joshua Gordon, was very interested in having NIMH representation on ICCFASD and examining area of potential collaboration not only to tackle the health issues of FASD, but to learn how FASD may inform research in mental health. Dr. Sarampote mentioned that the Director of the NIMH Division of Translational Research, Dr. Sarah Hollingsworth "Holly" Lisanby, thought that the possibilities of NIMH participating in the ICCFASD were excellent. Also, Dr. Julia Zehr, Chair of the Developmental Mechanisms and Trajectories of Psychopathology Branch in the Division of Translational Research is serving as an alternate representative for NIMH.

Dr. Sarampote gave a brief introduction of the mission of NIMH, which sponsors a broad range of research focused on addressing mental illnesses and resulting health burdens. The NIMH strategic plan for research has four objectives:

- Define the mechanisms of complex behaviors
- Chart mental illness trajectories to determine when, where, and how to intervene
- Strive for prevention and cures
- Strengthen the public health impact of NIMH-supported research

NIMH support varies from basic studies, mechanisms of complex behaviors, through to the understanding of trajectories of typical and atypical development to mitigate risk for mental illness. The Biomarker and Intervention Development for Childhood-Onset Disorders Branch of NIMH, in particular, is interested in developing new interventions and prevention, and finding new ways to disseminate and implement those interventions or prevention, to effectively impact the problem of mental illness within communities.

NIMH does not have any currently funded research projects that focus specifically on FASD. However, potential areas of relevance to FASD that intersect with the NIMH mission include the increased risk of adverse mental health outcomes in children caused by prenatal alcohol exposure; teens with FASD have an extraordinarily high risk of suicide. In addition, increased knowledge of how fetal alcohol exposure impacts development will provide valuable insight into the mechanisms underlying mental illness and improve the potential to develop new treatments. Dr. Sarampote acknowledged that some current NIMH-funded studies may include unreported prenatal exposure to alcohol but stated that alcohol has been an exclusion criterion for participants in some research studies. However, NIMH has already contributed both funding and scientific expertise to the HEALthy Brain and Child Development (HBCD) study led by NIDA. It is hoped that data from the HBCD study will identify effects of prenatal alcohol exposure that adversely impact brain systems and mechanisms that result in increased risk for mental illness.

Centers for Disease Control and Prevention (CDC)

Shin Y. Kim, MPH, Team Lead, Lead Health Scientist, Prenatal Substance Exposure Surveillance and Research Team, Infant Outcomes Monitoring, Research and Prevention Branch, National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention

Dr. Kim presented highlights of CDC's recent activity on prenatal alcohol exposure and FASD. To promote online training for healthcare providers, free online courses are available that offer continuing education and for supplemental learning. These supplemental or "micro-learnings" are ~5-minute videos focused on one objective and are meant to be complementary to the existing full-length courses. The existing micro-learnings and one upcoming micro-learnings include:

- Get the Facts about Alcohol Use & Pregnancy (new)
- How Much Alcohol Is Too Much? (new)
- How to Begin a Conversation about Alcohol Use
- Making a Referral for an FASD Assessment: How to Talk with Families
- Obtaining Prenatal Alcohol Exposure History in a Pediatric Setting (coming soon)

CDC continues to work with their grantees to update a database of FASD training resources which are available from the CDC FASD training website, including a promotional video.

Since September 2019, CDC has working with MITRE, a federally funded research and development center to create standard space, vendor-neutral, clinical decision support (CDS) for alcohol screening and brief intervention based on established guidelines. Creating an implementation of CDS will help facilitate clinical decisions needed to deliver screening and brief intervention in primary care settings. MITRE is developing semi-structured and structured logic for three screening instruments, including one focused on multiple substances, and two brief intervention tools. Implementation guides will also accompany each product. CDC has been working closely with MITRE, along with internal and external subject matter experts, clinicians, and electronic health record vendors, to identify appropriate screening instruments and brief intervention tools and to obtain appropriate permissions. All products would be made available via the Agency for Healthcare Research and Quality's CDS connect, which is an online repository that disseminates CDS tools for a wide range of health topics. Ultimately, CDC hopes that this experience will demonstrate how evidence-based guidelines can be translated into digital formats.

CDC is in its final year of an interagency agreement (IAA) with SAMHSA to promote a newly approved healthcare effectiveness data and information set (HEDIS measure; Unhealthy Alcohol Use Screening and Follow-up). This IAA is a three-year quality improvement (QI) learning collaborative to promote the implementation of this HEDIS measure across 4–5 large and diverse health plans, which include Medicaid, Medicare, and commercial plans. The work is being conducted by the National Committee for Quality Assurance. Final outputs include a toolkit on successful QI approaches and participant measure reporting and a joint agency communication plan is being implemented, including blog posts, press releases, and podcasts. More information on the HEDIS measure is available on the CDC website.

CDC's Infant Outcomes Monitoring, Research and Prevention Branch is also working to improve messaging for healthcare providers to emphasize the importance of providing alcohol Screening and Brief Intervention (SBI) to women of reproductive age and to inform the development of resources and tools to enhance patient-provider communication about alcohol use and its risks during pregnancy. Currently, the CDC is working with a contractor on how to engage healthcare providers to discuss the risks of alcohol use during pregnancy with their patients, and to conduct alcohol SBI with their patients, and other resources needed for health care providers to effectively deliver alcohol SBI.

CDC continues to monitor alcohol use among women and alcohol SBI using both patient and provider data. Alcohol consumption is monitored using the Behavioral Risk Factor Surveillance System data (BRFSS). Survey modules on alcohol SBI were collected in 2014, 2017, 2019, and another module is scheduled for 2022. For the module on alcohol SBI for 2019, 12 states collected data, which are expected to be available in the Fall of 2020. Alcohol SBI questions were also incorporated into the Pregnancy Risk Assessment Monitoring System (PRAMS) opioid call-back survey. Data for the (PRAMS) opioid call-back survey were collected from seven states from October 2019 to March 2020; these data should be available at the end of 2020.

CDC has received funding through the Assistant Secretary for Planning and Evaluations Patient-Centered Outcomes Research Trust Fund to implement a surveillance network on the MATernaL and Infant Network to Understand Outcomes Associated with Treatment of Opioid Use Disorder During Pregnancy (MAT-LINK). This project will improve understanding of the spectrum of maternal, neonatal, and pediatric outcomes following treatment of opioid-use disorder during pregnancy and may inform clinical management of prevention of these adverse outcomes. Data collection will include pregnancy exposure related to opioid-use disorder and other substances and medications. The Public Health Informatics Institute is a program of the Task Force for Global Health, which is CDC's implementation partner for the MAT-LINK project, and recently CDC awarded four clinical sites. The first data submission is anticipated to occur in the Summer of 2020.

Dr. Kim concluded her presentation by mentioning the upcoming CDC Public Health Grand Rounds on polysubstance use among reproductive-aged women, which is scheduled for August 2020.

Discussion

Dr. Balachova commented that she is glad to see the collaboration between SAMSHA and the CDC and hopes that the ICCFASD fosters more collaboration. Dr. Balachova highlighted a connection between CDC's new projects related to screening for alcohol use during pregnancy and the afternoon meeting presentations about translating science into practice, including Dr. Grace Chang's talk on improving screening and brief interventions. Dr. Balachova emphasized that the ICCFASD should work together to advance screening and intervention methods related to alcohol use during pregnancy.

Reports of Activities from FY2019: ICCFASD Federal Agencies: CMS,

IHS, ACF, SAMHSA, ASPE

The Centers for Medicare and Medicaid Services (CMS)
Caitlin Cross-Barnet, PhD, Social Science Research Analyst, Research and Rapid-cycle Evaluation Group, Center for Medicare and Medicaid Innovation (CMMI), Centers for Medicare and Medicaid Services (CMS)

CMS does not curently have a specific initiative directly connected to FASD, the Center for Medicare and Medicaid Innovation (CCMI), has two maternal child health models, which have recently been released to the public.

The first maternal child health model is the Integrated Care for Kids (InCK) model, which is a child-centered local service delivery and state payment model. InCK aims to reduce expenditure and improve the quality of care for children under age 21 who are covered by Medicaid. Components of InCK are the prevention, early identification, and treatment of behavioral and physical health needs. InCK is integrated across all services that a child is eligible for and also serves pregnant women if a state opts to do so. The core child services that InCK focuses on are clinical care, which includes a strong emphasis on behavioral health and physical health, schools, housing, food, nutrition, early care and education, Title V agencies, child welfare, and mobile crisis response services. The InCK model is concentrated on care coordination, to eliminate the fragmented care that can occur with multiple care coordinators in different locations such as a school, physician's office, and the department of social services. The integrated model provides one point of contact which facilitates registration across all services, which is particularly important for higher-need families.

States with InCK awards include Connecticut, Illinois, North Carolina, New Jersey, New York, Ohio, and Oregon. Illinois has two awards-one for Chicago and the other for a rural location in the south of Illinois. Connecticut and New York serve pregnant adults, as well as children. InCK serves highly populated urban areas because a comparison group elsewhere in each state is needed for evaluation purposes. Illinois has two awards—one for Chicago and the other for a rural location in the south of Illinois—because there is no full state implementation. Analysis of the intervention group for InCK and the comparison group within each state will determine whether the InCK model impacted costs and outcomes for children and pregnant adults in the case of New York and Connecticut.

Dr. Cross-Barnet acknowledged that participation in the ICCFASD has helped with the design and evaluation of the InCK model program. For FASD, the InCK model provides opportunities to increase early diagnosis and coordinated referrals and services. The model also increases the potential for accurate diagnosis and appropriate treatment for older children through improved behavioral health services. CMS also hopes to provide more preventative education for children and youth about alcohol use and its potential impact on health, and pregnancy-based education for pregnant teens and, in some states, pregnant adults.

The second maternal child health model is Maternal Opioid Misuse (MOM) model, which addresses fragmentation in the care of pregnant and postpartum Medicaid beneficiaries who have opioid-use disorder. The goal is a state-driven transformation of the delivery systems

surrounding this vulnerable population. Ultimately, it is expected that states will not rely on CMS funding for either the InCK or MOM model programs; self-funding through state Medicaid should support all program services. For the MOM model, however, CMS does offer funding for the first year that services are provided to women; thereafter, a transition to funding via state programs is expected. Ten states have MOM awards: Colorado, Indiana, Louisiana, Maine, Maryland, Missouri, New Hampshire, Tennessee, Texas, and West Virginia. The MOM model is not implemented in any states in which the InCK model exists; therefore, a total of 17 states will operate one of the models.

The MOM model provides opportunities for early and ongoing screening for co-occurring alcohol and other substance abuse. An opioid-use disorder is a requirement to participate in the MOM program. Almost all women who have an opioid-use disorder do have co-occurring substance abuse disorders and alcohol is the most common substance abuse disorder that pregnant people experience. The MOM model will also address nicotine use, in addition to other drugs that are illegal, focusing on prenatal education and support for women counseling and treatment. When substance exposure is known to have occurred prenatally, early infant assessment will help families to obtain the care they need.

Discussion

Mr. Dunbar-Cooper asked whether the grants for education were competitive. Dr. Cross-Barnet said that there were multiple applicants for both the InCK and the MOM programs. An outside review committee made recommendations; CMS reviewed the top-ranked applications to check that they complied with requirements and put forward a recommendation to OAGM (Office of Acquisition and Grants Management) for the actual funding. Mr. Dunbar-Cooper asked follow-up questions about the age range that the programs target and the competitive criteria and eligibility for program funding. Dr. Cross-Barnet said that InCK serves all children up to age 21 who are eligible for Medicaid or CHIP (Children's Health Insurance Program); two states chose to serve pregnant adults over the age of 21. The MOM model program serves any pregnant person who has an opioid-use disorder. To invite applications for funding, CMS released a Notice of Funding Opportunity (NOFO) which listed the funding criteria. For the InCK program, applicants had to propose a sub-state area and indicate that money would be saved by providing these services including an estimate of how many beneficiaries would be served, and how needs could be alleviated. CMMI goals are to improve care while either remaining cost-neutral or saving money, or to remain care neutral while saving money, but spending more money is not in an option. To apply for the programs, each state had to partner with a Health Insurance Portability and Accountability Act (HIPAA)-compliant entity, with a choice of whether the state Medicaid agency or the HIPAA-compliant entity is the awardee of record. The smallest and largest awards went to the Egyptian Public Health Department in Southern Illinois and Montefiore in the Bronx, respectively.

Nadia Carrell, PhD, FASD Advocacy and Support, asked whether all of these agencies that are screening for FASD for the integrated care programs are using the same screening methods. Dr. Cross-Barnet responded that CMS does have to approve the screening method which has to address all areas of a child's core services for which the program provides. For each child, a checklist needs to be completed which indicates whether services were needed for each core

child service area. So, there is one consistent tool in use, but the screening method may vary. Dr. Carrell asked how the criteria for the programs mesh with core services criteria of local infants' and toddlers' programs. Dr. Cross-Barnet explained that InCK is a population-level model, therefore, every family is screened. There are three service levels; in particular, the programs screen for children who qualify for higher levels of care, assessed by home visits by care coordinators. CMS is planning to ask states to provide data on existing provided services, for example, free or reduced-price school lunches. States already collect data for programs such as Head Start, Temporary Assistance for Needy Families, and the Supplemental Nutrition Assistance Program.

The Indian Health Service (IHS)
Sharon McKiernan, MD, FAAP, Maternal/Child Health Consultant, Indian Health Service Headquarters, IHS

The IHS is responsible for providing federal health services to American Indians and Alaska Natives. The IHS is the principal federal health care provider and health advocate for Indian people. The mission of the IHS is to raise the physical, mental, social, and spiritual health of American Indians and Alaska Natives to the highest level. The vision of the IHS is Healthy communities and quality health care systems through strong partnerships and culturally relevant practices.

The provision of health services to members of federally recognized Tribes grew out of a special government to government relationship between the federal government and the Indian Tribes. This relationship was established in 1787 and is based on the Constitution. It has been given form and substance by numerous treaties, laws, Supreme Court decisions, and executive orders. Titles I and V of the Indian Self-Determination and Education Assistance Act (Public Law 93-638, as amended), provide Tribes the option of exercising their right to self-determination by assuming control and management of programs previously administered by the federal government. Since 1992, the IHS has entered into agreements with Tribes and tribal organizations to plan, conduct, and administer programs authorized under Section 102 of the Act. Today, over sixty percent of the IHS appropriation is administered by Tribes, primarily through self-determination contracts or self-governance compacts.

IHS services are administered through a system of 12 Area offices and 170 IHS and tribally managed service units. As of January 2020, IHS services are provided to 2.6 million American Indian and Alaska Native members of 574 federally Tribes. Over 90% of American Indian and Alaska native births occurs outside of the federal facilities and 75% outside of federal or tribal facilities. Therefore, some women obtain all their care or only prenatal care from the IHS, whereas other women obtain all their care outside the IHS. Regardless of where care is provided, the IHS is an advocate for the population and works to improve the health of all American Indian and Alaska Native children.

Within the IHS, the Indian Children’s Program provides education, training, and consultation on issues affecting American Indian and Alaska Native youth including the IHS Telebehavioral Health Center of Excellence. Their services are available to all IHS tribal and urban providers.

An online form for real-time clinical consultation for FASD and suspected FASD is available on the IHS website. Submission of the online form can also lead to responses to queries and an appointment for telebehavioral health.

More than 26 hours of ongoing and archived FASD-related online training is available to all IHS, Tribal, and Urban Providers on the IHS website. Examples of the online training include:

- Children with FASD
- FASD Solutions
- FASD Screening and Diagnosis
- FASD for Educators
- FASD over the Lifespan
- FASD Assessment
- FASD Overview
- FASD and Historical Trauma
- Therapeutic Interventions in FASD

In addition, the Indian Health Service Alcohol and Substance Abuse Program (ASAP) works to reduce the incidence and prevalence of alcohol and substance abuse among American Indian and Alaska Natives to a level at or below the general U.S. population. ASAP strives to meet this goal via the implementation of alcohol and substance abuse programs within Tribal communities, including emergency treatment, inpatient and outpatient treatment, and rehabilitation services in rural and urban settings. ASAP nurtures excellence in holistic approaches that promote healthy lifestyles, families, and communities. Programs address alcohol and substance abuse by improving access to behavioral health services through telebehavioral health methods, and providing a comprehensive array of preventative, educational and treatment services. Currently, >50% of the mental health programs and >90% of the alcohol and substance abuse programs are tribally operated.

Other resources for FASD are also available on the IHS website.

Discussion

Dr. Riley asked who provides the telehealth and how widely is it used. Dr. McKiernan said that Chris Fore, PhD, Director of the Telebehavioral Health Center of Excellence coordinates the telehealth. Dr. McKiernan did not have data on how widely telehealth is used but said it is available 24/7 to adults and children. Dr. Riley commented on the similarity in which patients see a dysmorphologist or medical geneticist via a telehealth consultation. Dr. McKiernan responded that IHS telehealth does include consultations with a developmental pediatrician or a specialist in another field. Dr. Balachova mentioned that Dr. Fore was previously a member of the ICCFASD and is currently serving as an alternate representative and can be contacted for any questions.

The Administration for Children and Families (ACF)

Sharon Newburg-Rinn, PhD, Social Science Research Analyst, Office of Data, Analysis, Research and Evaluation, Administration for Children and Families

Within the ACF, the Children's Bureau is responsible for child welfare issues. ACF has collaborated for several years with the CDC's National Center on Birth Defects and Developmental Disabilities (NCBDDD). Dr. Jacquelyn Bertrand is the CDC lead for this collaboration. The first part of the FASD Children's Bureau–CDC Project addresses what happens when children and their families first come to the attention of child welfare agencies. Many people in the child welfare field misunderstand critical facts about alcohol and other drug exposure and focus strictly on drugs such as opiates and methamphetamines. In sharp contrast, the National Academies of Science's Institute of Medicine stated that, "Of all the substances of abuse (including cocaine, heroin, and marijuana), *alcohol* produces by far the most serious neurobehavioral effects in the fetus" (Institute of Medicine, 1996). Interviews with the child welfare agency staff revealed the misconception that facial abnormalities are present in most children with FASD. However, most children with FASD do not display any facial or other physical features, and even if present, evaluation of facial features needs to be completed by a dysmorphologist or a trained medical professional. Therefore, it is crucial to inform all child welfare professionals that all children who may have been exposed to alcohol and/or other substances should be referred for an evaluation, including children who do not exhibit any facial features of FASD.

Through data collected from several states thus far, the Children's Bureau–CDC FASD Project has shown that the majority of children and families that come to the attention of child welfare agencies have parental alcohol use as a cause or a contributing cause to the incidence of children placed in foster care. However, child welfare agency workers were generally unaware of FASD training materials even when such materials had been provided by supervisors. Foster parents divulged that they had not been informed that children may have been exposed to alcohol prenatally and were therefore not familiar with behaviors to look out for or where to go for help. Many foster parents had researched and found information on the internet, which made them suspect that a child may have FASD. The information learned from the interviews with foster parents aligns with a study by pediatrician Dr. Ira Chasnoff that showed that >80% of children had a form of FASD that had been undiagnosed or misdiagnosed when they first entered foster care (Chasnoff et al., 2015).

The Children's Bureau would like to avoid foster care and keep children safely in their homes. There is a link between the lack of an FASD diagnosis and entry into foster care. While children with FASD may appear to be misbehaving, they face challenges understanding rules and tend to forget them. Parents and child welfare agency staff therefore may interpret a child's actions as bad behavior which can result in maltreatment by parents who have poor self-control. Traumatized children are poor at self-regulation, as are children who were prenatally exposed to alcohol. Therefore, children in foster care may have FASD, which can be overlooked. Many of these children are given an incorrect diagnosis of ADHD, which poses the danger of over-medication. Ritalin or other drugs, such as Xanax and Prozac, may be prescribed for behaviors that mimic ADHD and depression/anxiety leading to over-medication. These observations have led to the second phase of the Children's Bureau–CDC FASD Project which aims to increase

screening of foster care children who may have been subjected to prenatal alcohol exposure, and to improve the training of staff in child welfare agencies.
Current tools to help identify behavioral concerns in foster care children include the Child Behavior Checklist and the Vineland Scales of Adaptive Behavior. However, these tools alone cannot indicate whether a child was harmed by prenatal alcohol exposure. A key issue in child welfare is the failure to ask the right questions when a child first comes to the attention of a child welfare or other service agency. The primary question should be whether it seems likely that a child could have been prenatally exposed to alcohol—this basic question is not currently being asked in the child welfare field. Child welfare staff tend to view prenatal alcohol exposure as unimportant. A FASD diagnosis is crucial for the needed services to be ordered and paid for by the medical insurance system. Pediatricians are reluctant to ask about a mother's potential prenatal alcohol use because they fear insulting her. However, well-research approaches for pediatricians to take during such conversations exist. These conversations are likely to be challenging as families fear that admission of prenatal alcohol use could result in a child being removed from the home. Child welfare caseworkers also know that asking about alcohol use could offend parents, therefore, agencies have typically relied on hospital toxicology results. However, as alcohol typically is eliminated from the body within 12 hours, these results are not always indicative of actual alcohol use and toxicology is an ineffective approach.

Consequences of the lack of an FASD diagnosis and the acquisition of the appropriate services can lead to frustration and a negative impact on both children with FASD and their parents. Compared to non-affected youths, youths with FASD are much more likely to get into trouble with the law than non-affected youths and have difficulty living independently due to poor judgment and organization. Douglas Waite, MD, a pediatrician who studies FASD, created guidelines to help children and perhaps adults with FASD. This advice includes:

- Highly structured, consistent routines
- Limited stimulation
- Simplicity with concrete language and examples (NOT “Go upstairs and brush your teeth, put on your jacket and get in the car”, which are complex instructions)
- Repetition
- Realistic expectations
- Supportive environments
- Supervision (as children and adults with FASD are emotionally younger than their chronological age)

Children’s Bureau–CDC FASD Project goals for 2020 include the identification, development, and evaluation of strategies to ensure that child welfare staff ask parents about potential prenatal alcohol exposure. Also, to make certain that appropriate follow-up screening is carried out, if needed. Another goal is to identify and develop and test training materials to help parents, foster parents, child welfare agencies, and others improve outcomes for children and youth with FASD.
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The Health Resources and Services Administration (HRSA)
Dawn Levinson, MSW, Behavioral Health Lead, Division of Healthy Start and Perinatal Services, Maternal and Child Health Bureau, Health Resources and Services Administration, Department of Health and Human Services

Acknowledging that there is no health without mental health, Maternal and Child Health Bureau (MCHB) programs within the Health Resources and Services Administration (HRSA) promote mental health and wellbeing for maternal and child populations across the lifespan. The mission of the MCHB is to improve the health of America's mothers, children, and families. Along the public health continuum, MCHB programs promote, prevent, screen, intervene, refer, treat, train, and support behavioral health issues. Programs address mental and behavioral health in reference to multiple issues such as assistance and support for providers, policies, state and local systems. For example, the Title V Maternal and Child Health Services Block Grant Program, supports workforce training, patients and families, and innovations that harness technology-based solutions.

For the past three years, MCHB has supported one focused initiative on the prevention of FASD. Funding for this activity came through a set-aside in Title V's Special Projects of Regional and National Significance (SPNS). MCHB integrated FASD prevention into the existing training and technical assistance services provided by the Technical Assistance Center for the Healthy Start Initiative, eliminating disparities in perinatal health.

The purpose of the Healthy Start Initiative is to improve health outcomes before, during, and after pregnancy, and to reduce racial and ethnic disparities in rates of infant death and adverse perinatal outcomes. MCHB developed several resources under the Alcohol and Substance-exposed Pregnancy Prevention (AStEPP) initiative which is run by the Healthy Start Technical Assistance Center. AStEPP materials were designed to help community health workers and home visitors learn more about prevention and early identification of fetal exposure to alcohol or other drugs. AStEPP materials include:

- **Staff development resources for groups** – e.g., 6 Staff Meeting Training Packages on various topics including FASD, depression, and group discussion guide on Opioid Use During Pregnancy
- **Self-Study resources** – e.g., E-learning course; Self-study Guide on State Legislation on Substance Use During Pregnancy
- **Resources on Substance Use During Pregnancy in Tribal Communities** – e.g., two videos; Compendium of Tribal Behavioral Health Resources; infographic on the Social Determinants of Substance Use During Pregnancy in Tribal Communities

HRSA/MCHB resources include two new brochures to help mothers, partners, family, and friends to identify depression and anxiety during pregnancy. The brochures are available for

download or online viewing the Healthy Start EPIC website. A longer booklet, 'Depression During & After Pregnancy' is available in both English and Spanish on the MCHB website.

MCHB resources related to the opioid epidemic include:

- **Healthy Start's Quick Start List on Opioid and Behavioral Health Resources**, compendium covers everything from policy papers, to trainings, to community awareness campaigns and other tools. Geared toward Healthy Start grantees, also appropriate for community health workers, home visitors, and other providers
- **Mothertobaby.org** Ask the Experts on Medications and More During Pregnancy & Breastfeeding – *Call* 866-626-6847 *or text* 855-999-3525
- **AIM's Maternal Safety Bundle on Obstetric Care for Women with Opioid Use Disorder** (set of evidence-based practices)
- **Resource document:** HRSA's Home Visiting Program: Supporting Families Impacted by Opioid Use and Neonatal Abstinence Syndrome, encapsulates relevant research and offers strategies for state agencies; and highlights promising efforts underway in Maine, Colorado, West Virginia, and Massachusetts
- **Webpages on Adverse Childhood Experiences/Trauma and Intimate Partner Violence**, SAMHSA/HRSA Center for Integrated Health Solutions

HRSA has a new funding opportunity, 'Support for Fetal Alcohol Spectrum Disorders (FASD) Prevention, Identification, and Intervention' (Grants.gov; HRSA-20-111). The purpose of this cooperative agreement funding opportunity is to improve the ability of primary care providers, especially those in rural and medically underserved areas, to screen, assess, manage, and refer to specialty care, obstetric patients struggling with alcohol use during pregnancy and pediatric patients and their families affected by FASD. The recipient will use a variety of models to train and support primary care providers, including telehealth approaches such as teleconsultation or telementoring, as used in Project ECHO, for example. This may include other HRSA-funded programs. Training will curate, incorporate, and build on existing virtual training, tools, and resources developed by federal agencies such as the CDC and national professional associations and stakeholders to create and sustain changes in practice among trained primary care providers.

Discussion

Mr. Dunbar-Cooper asked about the duration of the grant and Ms. Levinson responded that the grant is for three years. Dr. Carrell mentioned a concern that people in rural areas may not avail of the Healthy Start Initiative for various social reasons. However, as dental care is now provided under Medicaid, during the pregnancy and three months after pregnancy, people will visit the dentist even they do not avail of other services. Therefore, Dr. Carrell suggested distributing some brochures and information in dental offices to reach a captive audience. Ms. Levinson said that HRSA does a lot of outreach to promote dental care including mobile dental clinics and outreach, especially for maternal and child populations. Ms. Levinson thanked Dr. Carrell for the suggestion and said she would relay it to HRSA.

The Substance Abuse and Mental Health Services Administration (SAMHSA)

Jon Dunbar-Cooper, MA, CPP, Public Health Analyst, Division of Systems Development, Center for Substance Abuse Prevention, Substance Abuse and Mental Health Services Administration

Mr. Dunbar-Cooper presented an overview on the SAMHSA National Survey of Drug Use and Health (NSDUH). The NSDUH is a comprehensive household interview survey of substance use, substance use disorders, mental health, and the receipt of treatment services for these disorders in the United States. Approximately 67,500 people, including individuals from all 50 states and Washington D.C., are interviewed annually from January to December. NSDUH includes household, college dorms, homeless and shelters, civilians, and military bases, and is a face-to-face interview for less sensitive questions. For completion of more sensitive questions, respondents are transitioned to a computer-associated self-interviewing process.

The NSDUH summary of alcohol use in 2018 revealed no significant change in the alcohol initiation rate among female adolescents since 2015. A significant decline in alcohol use among female adolescents between 2017 and 2018 was observed as well as a significant decline in alcohol use disorder among female adolescents during 2015 to 2018. SAMHSA efforts to reduce alcohol use in children/youth/transition age youth include:

- Center for Substance Abuse Prevention (CSAP) Drug-Free Communities (DFC) Support program prioritizes alcohol use and has reported a 27% and a 23% reduction in use by middle-school and by high school students, respectively
- SAMHSA Prevention technology Transfer Centers produce resources and materials related to alcohol misuse prevention
- CSAP 'Talk They Hear You' focuses on underage drinking
- CSAP requires Partnerships for Success grantees to emphasize underage drinking prevention
- The Center for Substance Abuse Treatment (CSAT) has required Screening, Brief Intervention, and Referral to Treatment (SBIRT) for alcohol use in all programs including criminal justice, pregnant and postpartum women, adolescent treatment, HIV, and homeless programs
- CSAT has funded SBIRT training in medical residences and other healthcare practitioner programs which screen for hazardous alcohol use and use disorders

The 2017 NSDUH revealed that new users of heroin significantly decreased relative to 2016. Significant decreases in pain reliever misuse was observed for all ages. There was a downward trend in heroin users. An estimated 2.1 million people have an opioid-use disorder. Past month and daily/near daily use of marijuana significantly increased in young adults (18–25 years of age) and young adult women. Frequent marijuana use was associated with opioid misuse, heavy alcohol use, and depression in youths aged 12–17 and young adults aged 18–25. Young adults had increasing rates of serious mental illness, major depression, and suicidality. Co-occurring substance use and mental disorders were common. Major gaps in treatment received by affected individuals were reported.

Substance use in pregnancy showed a startling increase, particularly for marijuana. Substance use in pregnancy may be associated with fetal growth restriction, stillbirth, preterm birth, and may cause problems with child neurological development resulting in hyperactivity or poor

cognitive function. There was a significant decline in illicit drug use among pregnant women between 2017 and 2018. SAMHSA/HHS made strong efforts to address illicit drug use during pregnancy to improve the health of mothers and their babies. These efforts included:

- Public awareness efforts: information sharing with stakeholders and the public
- Launch of SAMHSA.gov/marijuana
- Launch of Substance Abuse Prevention Technology Transfer Centers with a focus on marijuana and other substance use in pregnancy
- Expansion of treatment programs for pregnant/postpartum, parenting women: both residential and outpatient through the Comprehensive Addition and Recovery Act (CARA) grant program
- Publication of Clinical Guidance for Treating Pregnant and Parenting Women with Opioid-Use Disorder
- Publication of Healthy Pregnancy/Healthy Baby Factsheets for woman and their families
- Use of State Targeted Response and State Opioid Resource funding for opioid use disorder in pregnancy and prevention interventions
- Joint article from the Assistant Secretary for Mental Health and Substance Use and the Surgeon General addressing the treatment of opioid use disorder in pregnancy

A summary of opioid misuse in the United States in 2018, showed a significant decrease in prescription opioid misuse among female adolescents and young adults during 2015–2018. The majority of women continue to obtain these drugs from friends, relatives, healthcare providers, and prescribers. This observation underscores the need for ongoing education for practitioners, appropriate pain management, and partnership with states to monitor opioid analgesic prescribing. Among women, aged 12+ using prescription opioids, buprenorphine is most likely to be misused. No significant changes in heroin use and use disorder were found for women across age groups during 2015–2018.

Summary of other substance use in the United States in 2018 showed that during 2015–2018, marijuana use remained stable among female youth but significantly increased among adult women aged 18–25 and 26+. There was a significant increase in marijuana-use disorder in adult women aged 18–25 during the same period. Illicit drug use by pregnant women significantly declined between 2017 and 2018. There was a significant increase in methamphetamine use in women age 26+ between 2017 and 2018, and a significant decline in prescription stimulant misuse and LSD use in female adolescents during 2015–2018. Serious mental illness significantly increased during the same period in women aged 18–49, especially in women aged 18–25. There was also a significant increase in major depressive episodes in female youth ages 12–17 and 18–25 during 2015–2018. Significant increases in major depressive episodes with severe impairment were seen in women aged 12–17 during 2016–2018 and women aged 18–25 during 2015–2018. Significant increases in suicidal thoughts, plans, and attempts were found for women aged 18–25 during 2008–2018. Co-occurring substance use and mental disorders were common among women. Among women, use of one substance—alcohol or other illicit substances—was strongly correlated with polysubstance use and with major depressive episode and serious mental illness. These findings underscore the need to screen for all substances, as well as mental disorders when evaluating a person, identifying a substance problem or a mental

health issue, and to treat all co-occurring disorders. Substance use disorders were found to be associated with increased risk for suicidality among women and a large gap in treatment need among women was also observed.

NSDUH results have revealed some progress but there is an ongoing need to help Americans living with substance use and mental health issues. NSDUH data highlight areas on which SAMHSA resources should be focused:

- Continuing need to address the ongoing opioid epidemic
- Significant increase in marijuana use among women aged 18+
- Significant increase in methamphetamine use in women aged 26+
- Significant increases in major depressive episodes in youth aged 12–17 and women aged 18–25
- Substance use and mental disorders are closely linked. NSDUH data indicates that illicit substance use is associated with increased risk for other hazardous substance use and mental illness, and mental illness is a risk for illicit substance use
- Need for ongoing efforts in the prevention of substance use disorders

SAMHSA's response to the 2016–2017 NSDUH findings include, in 2018, the launch of a new approach to technical assistance and training. A prior focus on technical assistance to grantees has been expanded to a national approach that includes:

- Establishment of Clinical Support System for Serious Mental Illness
    - National practitioner training efforts
    - Focus on appropriate use and monitoring of psychotropic medications
    - Use of clozapine in treatment refractory schizophrenia
    - Assisted outpatient treatment
- Establishment of a regional systems of Technology Transfer Centers throughout the U.S.
    - Substance Abuse Prevention Technology Transfer Centers
    - Addiction Technology Transfer Centers
    - Mental Health Technology Transfer Centers with supplements for school-base services
    - Native American/Alaska Native, Hispanic/Latino focus centers
- Establishment of a new national training/technical assistance programs
    - State Targeted Response/State Opioid Response TA/T Program–over 100 requests met
    - Privacy Technology Transfer Center addressing confidentiality and information sharing related to the Health Insurance Portability and Accountability Act (HIPAA) and Confidentiality of Substance Use Disorder Patient Records (42CFR)
    - Eating Disorders Technology Transfer Center

Other SAMHSA responses to NSDUH findings include:

- Established Providers Clinical Support System (PCSS)-Universities to embed DATA waiver training in pre-graduated education for physicians, nurse practitioners, and

physician assistants
- Expanded training and technical assistance on opioid issues in rural American through supplements to USDA Cooperative Extension programs.
- Reestablished the Drug Abuse Warning Network (DAWN)
- Expanded the Suicide Prevention Lifeline network
- Public-targeted messaging based on areas of concern identified in NSDUH: marijuana, methamphetamine, suicide prevention

SAMHSA's workforce continues to address the need for clinicians to be prepared to assess and treat mental health and substance use issues with national training technical assistance programs. SAMHSA continues to work with states to address needs resulting from the opioid crisis in terms of prevention, treatment, and community recovery resources. For other substance use, SAMHSA encourages the use of block grant funds to address prevention/treatment needs and provides training and technical assistance on evidence-based psychosocial therapies. SAMHSA is connecting with the public on the importance of prevention, treatment, and community support. Public service messaging on substance use and mental health issues focusses on prevention. SAMHSA continues to monitor outcomes through NSDUH, DAWN and grant program evaluation and continues to make policy modifications.

The full report, Key Substance Use and Mental Health Indicators in the United States: Results from the 2018 National Survey on Drug Use and Health is available on the SAMHSA website.

Office of the Assistant Secretary for Planning and Evaluation (ASPE)
Kristina West, MS, LLM, Social Science Analyst, Division of Behavioral Health Policy, Office of Disability, Aging, and Long-Term Care Policy, Office of the Assistant Secretary for Planning and Evaluation (ASPE)

ASPE is the principal advisor to the Secretary of the Department of Health and Human Services on policy development in health, disability, human services, data, and science; and provides advice and analysis on economic policy. ASPE leads:

- special cross-cutting initiatives
- manages cross-Department planning activities such as strategic planning, legislative planning, and review of regulations and budget
- conducts research and evaluation studies and develops policy analyses

ASPE's interest in FASD was driven by a change in leadership of the organization within the past two years. Deputy Assistant Secretary of ASPE, Brenda Destro, who gained knowledge and experience of FASD while working at HHS and on Capitol Hill, wanted to incorporate FASD as a topic of interest for ASPE. Within the Office of Disability, Aging, and Long-Term Care Policy, Deputy Assistant Secretary, Arne Owens, who has worked with SAMHSA and the Virginia Department of Mental Health, is also very interested in FASD.

ASPE is highly committed to the topic of FASD. In September 2019, ASPE held an FASD Technical Expert Panel meeting, which included national and federal experts in FASD. An

environmental scan included literature review, and review of state policies, FASD databases and national surveys. Particular emphasis concentrated on policy barriers and solutions to FASD prevention, identification, and intervention. The meeting resulted in the following examples of strategies to scale up the response to FASD:

- Using CMMI innovative models to include FASD as qualifying condition (InCK)
- Single FASD diagnosis on the spectrum in the Diagnostic and Statistical Manual of Mental Disorders (DSM)
- FASD definitions in state and federal disability programs
- Best practices in working with corrections and judicial courts
- National Communication Strategy

These strategies evolved from topics that were raised as issues during the meeting. One issue is funding; a CMMI representative suggested that innovating models, such as InCK, should be used to consider including FASD as a qualifying condition to be enrolled in state programs. Another topic raised was the fact there is confusion about the definition and diagnosis of FASD. To increase provider education, it would be beneficial to have one definition of FASD in the DSM to aid diagnosis. In this regard, ASPE will closely follow NIAAA's work on FASD classification. A third issue was the different needs of children with FASD and the variation in disability programs in which these children become enrolled. Standardization of the qualifying conditions for enrollment in state and federal disability programs related to FASD should be addressed. At the meeting, the topic of best practices in working with correctional and judicial court systems was raised as a concern. Many children and adults with FASD are involved with the criminal justice system. Again, stemming from the lack of a universal definition of an FASD diagnosis, consistent information about FASD should be circulated to everyone involved in correctional and judicial court systems, rather than only judges and correction and probation officers. Participants at the 2019 meeting also discussed the idea of a national communication strategy regarding FASD, that may be initiated by a task force led by a federal agency. Market research could be used to determine effective messaging with a positive tone about actions parents can take regarding their child's health, rather than warnings about FASD, which may have a more negative tone.

ASPE has an upcoming publication on their work on FASD so far which will be available on the ASPE website within the next few months. ASPE continues to develop its policy research portfolio for FASD, increase visibility for FASD policy issues within the Office of the Secretary at HHS, and participate in ICCFASD strategic planning processes.

Special Panel: Translating Research to Practice: What's Cooking and What's Almost Ready

Moderator, Edward Riley, PhD, San Diego State University, San Diego, CA

Collaborative Initiative on Fetal Alcohol Spectrum Disorders (CIFASD)

Edward Riley, PhD, San Diego State University, San Diego, CA

Dr. Riley thanked the ICCFASD, in particular Dr. Balachova, for the invitation to speak at the meeting with the prestigious panel whom he introduced. Some of the tools described in this presentation were developed using a Small Business and Technology Transfer (STTR) grant 1R41AA028142-01 funded by NIAAA on which Dr. Riley has a subcontract, and, in collaboration with Dr. Ganz Chockalingam and San Diego State University, holds provisional patents.

Current FASD challenges include the lack of consensus among the different diagnostic criteria. FAS is estimated to affect 2.0 to 7.8 per 1,000 children, meaning that 8,000 children born are with FAS in the US each year; FASD is found in 1.1%-5% of children in the general population (May et al., 2018), which equates to >40,000 children per year. There is a scarcity of professionals able to screen, diagnose, and treat those affected. For example, Cooksey et al. (2005) found that in 2005, 17 states had an inadequate support of MD clinical geneticists to meet the population needs. A recent publication estimated that there are, at most, just over 2 clinical geneticists per 1 million people in the population (Maiese et al., 2019). Family practitioners are reluctant to make FASD diagnoses. A survey of the Toronto area physicians found that 49% expressed very little confidence in their ability to diagnose FAS (Nevin et al., 2002). Almost 20 percent of the physicians said that they had suspicions about a FAS diagnosis but did not make the diagnosis. In Western Australia, >75% of pediatricians admitted to having suspected FAS but not making the diagnosis (Elliott, 2006).

More recently, a series of focus groups among the general public in the United Kingdom (UK) revealed a lack of knowledge and a need for consistent guidelines (Mukherjee et al., 2015). Pediatricians in Connecticut were presented with cases of FAS, alcohol-related neurodevelopmental disorder & Williams Syndrome and were asked to make a diagnosis and rate their confidence in doing so. Only 17.4% correctly identified the cases of FAS and they were not confident about their diagnosis (Rojmahamongkol, et al., 2015). The Collaboration on FASD Prevalence (CoFASP) study showed that only 2 of 222 children with FASD were known to have been previously diagnosed with the disorder (May et al., 2018).

There is a lack of uniform, simple, diagnostic tools for FASD screening and diagnosis. Current tools include a lip-philtrum guide, which uses antiquated norms that are difficult to quantify, even when the person is trained, and the guide has moderate reliability (Tsang et al., 2017). Even trained dysmorphologists disagree when rating the lip-philtrum measure. Measurements of palpebral fissure length (PFL) also differ between physicians, which impacts whether a FASD diagnosis is made (Astley, 2015).

Numerous groups are working on ways to improve facial measurements, using telemedicine, photographic tools, and automated analysis. Dr. Riley leads the Collaborative Initiative on Fetal Alcohol Spectrum Disorders (CIFASD) and has been working with Dr. Kenneth Jones and Dr. Miguel Del Campo on a telemedicine approach using an iPhone. The validity of FASD diagnoses over the phone is comparable to in-person diagnoses. Telemedicine reduces geographical barriers to an FASD diagnosis but there is still as the mismatch between the

number of clinicians who are capable of making such a diagnosis and the number of people who need their assistance.

3D facial photogrammetry was started by Dr. Peter Hammond in CIFASD and is currently being performed by Dr. Michael Suttie in the lab of Dr. Raj Mukherjee. 3D facial photos are taken with handheld 3D cameras. From these images, computer-generated landmarks and a heat map produce fully automated objective measurements that may be important in FASD diagnosis. These measurements include: PFL, nose/philtrum length, lip area/circularity and volume, micrognathia, and facial shape analysis including philtrum shape and midfacial hypoplasia. FASD diagnosis is aided by clinical report is produced from these measurements. Analysed measurements are compared to those assessed from 3D facial images of individuals of the same age and sex.

CIFASD is also investigating the possibilities of mobile health (mHealth). Over 90% of adults under the age of 50 in the United States own a smartphone, so there is good potential for scalability. Information can be accessed at anytime from anywhere and mHealth reduces barriers related to geography, stigma, or how many clinicians might be available.

Dr. Riley is currently working on the iPhone tool MorpheusQ, funded with a Small Business Technology Transfer grant; Dr. Riley holds in collaboration with Dr. Ganz Chockalingam and San Diego State University provisional patents on MorpheusQ. Goals of MorpheusQ development aim to develop tools that would empower non-dysmorphologists and non-experts to screen for FAS, providing them with more confidence in their diagnostic ability, improve the accuracy of their diagnosis, and to make a diagnosis in Northern Alaska as accessible as it is in San Diego. An image of the lips is shown with a slider bar underneath. Rather than using a discrete Likert scale for measuring the lip, the slider changes the shape of the lips along a continuous scale until the shape matches an uploaded image of the lips of the individual being assessed for FASD. Nine dysmorphologists have provided expert opinions of cutoff points along the continuous scale that would differentiate between FAS and non-FAS cases. MorpheusQ returns a percent likelihood of an FASD diagnosis once the lip match is completed by the professional seeking the diagnosis. MorpheusQ can also be used for the philtrum. Additional investigations need to determine whether one morph is sufficient for all lip and philtral shapes, and whether new morphs need to be developed for different ethnicities and ages.

The latest versions of the iPhone contain a true-depth camera which is being used to measure PFL, which is a difficult measure in FASD diagnosis. An iPhone application prompts the subject to move their head in particular directions to capture a 3D image of the face and eye region. Once cutoff and norms are established, it is hoped that MorpheusQ can give immediate feedback to the user. The investigators are determining whether PFL measures using this approach are compatible with an FASD diagnosis and whether a degree of confidence in such a diagnosis can be determined. Using a virtual reality headset, Dr. Kenneth Jones can directly manipulate the 3D facial images that have been uploaded to the Cloud to place markers for PFL, lip, and philtrum measurements to improve diagnoses of FASD. Dr. Jones finds this virtual 3D method particularly useful to diagnose children who tend to move their heads during an in-person examination. Artificial intelligence may also improve these diagnoses.

Another project in CIFASD is a decision tree (eTree) developed by Dr. Sarah Mattson's team (Goh et al., 2016). She is trying to identify children impacted by prenatal alcohol exposure using only four measures that can be obtained during one clinical visit. The eTree has an accuracy rate of >80%; the four measures are: a physical exam, Child Behavior Checklist, Vineland Adaptive Behavior Scale, and an IQ score. The eTree and the CoFASP data set have 83% agreement in the diagnosis. Dr. Sarah Mattson is developing a small neurobehavioral battery of online tasks, including the Go/No-Go Task and the Flanker Task. These behavioral tasks will be available for use on an iPad.

In terms of FASD interventions, Dr. Christie Petrenko and Dr. Cristiano Tapparello at the University of Rochester are working on a derivative product (FMF Connect) of the Families Moving Forward (FMF) Program that developed by Heather Carmichael-Olson and was funded by the CDC. FMF Connect consists of learning modules, a notebook, a dashboard family forum, and a library, which can all be used on an iPhone. FMF Connect has been through beta testing, works on iOS and Android platforms, and has been tested and well-received by focus groups and interviews. A large randomized clinical trial in late 2020 or early 2021, with pre- and post-measures, is scheduled to determine how FMF connect impacts family development and families with FASD.

Dr. Jeff Wozniak (University of Minnesota) is looking at FASD as a brain-based disorder examining transcranial Direct Current Stimulation (tCDS) in combination with computerized cognitive training. The study objectives include evaluating if tCDS paired with cognitive training is more beneficial than cognitive training alone for an individual with FASD. Imaging will be used to assess if brain circuitry changes occurred following the intervention. Dr. Wozniak has also investigated supplementation with the nutrient choline and found children with FASD who took choline had improvements in neurological processes four weeks post-study termination that were not observed in the placebo group.

CIFASD is also looking for genetic biomarkers of alcohol exposure, identification of interactions with other drugs, and potential genetic contributions to susceptibility or resistance to FASD. The cannabinoids seem to be particularly detrimental when used with alcohol. Assessing health impacts in adults with FASD is being investigated for the first time.

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Discussion

Dr. King asked whether Dr. Mattson's iPhone/iPad tool is similar to the NIH toolbox and, if so, are the NIH toolbox activities used in the tool. Dr. Riley said that NIH toolbox activities were modified but some features, including the timelines, were not included. Dr. King asked if NIH toolbox norms are applied in the iPhone/iPad tool. Dr. Riley said that he was unsure but that the eTree is a new development for Dr. Mattson, who has worked on the decision tree which includes the Child Behavior Checklist (CBCL), Vineland Adaptive Behavior Scale, and an IQ test. These data, along with the physical exam, led to 83% accuracy of an FASD diagnosis when compared with the CoFASP measure. Dr. Mattson is trying to reduce the number of questions from the CBCL and integrate everything into one iPad application so that a diagnosis of FASD can be manageable and made in a reasonable timeframe. Dr. Riley said that multidisciplinary clinics are a great idea but there are not enough trained professionals to diagnose 40,000 potential FASD births per year.

Mr. Dunbar-Cooper asked whether the diagnoses are made without any maternal history of alcohol use. Dr. Riley responded questionnaires about maternal alcohol use have already been developed and it is assumed that the professionals using Dr. Mattson's eTree will use those. The specific tools Dr. Riley is involved with are to increase confidence of an FASD diagnosis or to consult professionals such as Dr. Ken Jones, a dysmorphologist or a medical geneticist. Dr Riley

emphasized that the tools are not for self-diagnosis but are useful in areas in which local nurses and doctors are not accessible.

Dr. Carrell asked what is the youngest age for which the tools can be used to screen for an FASD diagnosis. Dr. Riley responded that a child of five or six years of age can turn their head in the various directions to capture the 3D image for MorpheusQ (see conflict of interest statement at start of presentation) to be used to calculate PFL measurements. However, infants as young as 24 months can be placed in a chair with a cradle; a camera on a rocker can be used to take PFL measurements when an infant's eyes are open.

Prevention of prenatal substance exposure (universal, selective, and indicated)
Grace Chang, MD, MPH, VA Boston Medical Center, Harvard Medical School, Brockton, MA

Dr. Chang spoke about prenatal alcohol use in the context of exposure to other substances. Substance use in the antepartum is prevalent, and the legal substances that are the most problematic in terms of their effect and magnitude. Almost 20% of pregnant women will drink alcohol in their first trimester, 15.4% of pregnant women will smoke cigarettes, 7% will use cannabis, and nearly 3% will use prescription opioids during the same period.

This opioid crisis has affected everyone from birth to death. Neonatal abstinence syndrome/neonatal opioid withdrawal may occur when a pregnant woman uses opioids. There has been a five-fold increase in neonatal abstinence syndrome/neonatal opioid withdrawal between 2004 and 2014, which equates to 1.5 to 8.0 cases per 1,000 hospital births. In Massachusetts, the rate was 14.5 cases per 1,000 births. In neonatal abstinence syndrome/neonatal opioid withdrawal, the newborn displays disturbances in the gastrointestinal, autonomic, and central nervous systems; irritability; high-pitched crying; poor sleep; and uncoordinated sucking reflexes leading to poor feeding. Currently, in the United States approximately every 15 minutes a baby is born suffering from opioid withdrawal, even though opioids are the least frequently abused substance during pregnancy. The societal costs of neonatal abstinence syndrome during childhood, based on 2.2 million children affected, is estimated to be $117.5 billion over their lifetime.

Self-reported cannabis use amongst pregnant women has increased from 2002 to 2014. Based on 467,100 respondents from the National Survey on Drug Use and Health (NSDUH), 7% reported past-month cannabis use, 12.1% in the first trimester, and 3% used cannabis every day while pregnant (Volkow et al., 2019). These observations are coincident with the legalization of "medical marijuana" and "recreational marijuana," so these increases in cannabis use could reflect effects of cannabis use legalization or normalization. In 2017, a poll found that 21% of Americans think it is OK for a pregnant woman to use pot for nausea or pain and amongst Americans who use marijuana, 40% think it is OK (Yahoo News/Marist Poll, 2017).

A population-based cohort study of 661,617 pregnant women in Canada found an association between preterm birth rate and marijuana use; the rate of preterm birth was doubled (12% versus 6%; Corsi et al., 2019). Another study concluded that maternal marijuana use is not an independent risk factor for adverse neonatal outcomes such as low birth weight once

confounders are adjusted for (Conner et al., 2016). In contrast, another study showed that maternal marijuana smokers had increased odds for anemia and infants exposed *in utero* had increased rates of low birth weight and neonatal intensive care unit admissions (Gunn et al., 2016).

It has been reported that 15.4% of pregnant women smoke cigarettes. Complications from prenatal cigarette exposure include ectopic pregnancy, placenta previa, prematurity with decreased birth weight, birth length head circumference, intrauterine death, and Sudden Infant Death Syndrome (SIDS). Prenatal cigarette exposure has adverse effects on central nervous system development, cognitive function, and behavior. These following effects are associated with prenatal cigarette exposure: disturbed maternal infant interaction, excitability, hypertonia, stress abstinence signs, reduced IQ, aggression, conduct disorder, antisocial behavior, impulsivity, Attention Deficit Hyperactivity Disorder (ADHD), and tobacco use and dependence.

Alcohol is a known teratogen and use during pregnancy can lead to lifelong effects. Up to 1 in every 20 school children in the United States may have FASD. Individuals with FASD can experience physical issues such as low birth rate and growth, problems with the heart, kidneys and other organs. Damage to parts of the brain can lead to behavioral and intellectual disabilities, for example, learning disabilities and low IQ, hyperactivity, difficulty with attention, poor ability to communicate in social situations, and poor reasoning and judgement skills. Such behavioral and intellectual disabilities can, in turn, lead to lifelong issues with education and socials skills, independent living, mental health, substance abuse, job retention, and trouble with the law. It is estimated that drinking while pregnant cost the U.S. $5.5 billion in 2010.

Using the Behavioral Risk Factor Surveillance System (BRFSS) data from 2015–2017, the April 2019 Morbidity and Mortality Weekly Report revealed that among pregnant women, aged 15–44, 11.5% were current drinkers and 3.9% were binge drinkers. The past month average of binge drinking episodes was 4.5, with an average intensity of 6 drinks. Unmarried women were more likely to drink and to binge drink. The National Birth Defects Prevention Study reported data on alcohol consumption by 4,088 randomly selected control women who delivered live born infants without birth defects (Ethen, et al., 2009). Of these women, 30.3% had alcohol at some time during pregnancy, 8.3% reported binge drinking (4 or more drinks/episode); however, these numbers are likely an underestimate because these were women who gave birth to babies without birth defects. According to the National Birth Defects Prevention Study, alcohol exposure increases the risk of spontaneous abortion, fetal death, and fetal birth defects.

Women who drink during pregnancy include non-Hispanic white women and women who smoke. The demographic group who are more likely to drink during pregnancy are white, upper middle class, educated women in their 30s. Drinking during pregnancy is associated with an unintended pregnancy; 50% of all U.S. pregnancies are unplanned. The best predictor of prenatal alcohol use is pre-pregnancy drinking. One of the most challenging messages that should be conveyed to patients is that there is no safe time, there is no safe amount, and there is really no safe period for drinking while pregnant. Unfortunately, there is a reluctance by patients to heed this message and by doctors to pass on this information.

The American College of Obstetricians and Gynecologists recommends early universal screening for prenatal substance use, using validated questionnaires, having conversations with your patients, but they advise against routine urine toxicology screening. Three screening questionnaires for prenatal alcohol use, for which the reference standard is maternal self-report, include the T-ACE, the TWEAK, and the AUDIT-C (Chang, 2014). These questionnaires give an approximate representation of alcohol use and are well-researched and validated.

Biomarkers for recent alcohol use can be evaluated by the blood alcohol level by obtaining a breathalyzer sample. However, variations in ethanol pharmacokinetics are one limitation of this approach. In addition, many patients do not want to be breathalyzed and obtaining serum for a toxicology screen can be invasive. Indirect biomarkers for recent alcohol use include products that reflect permanent organ damage, but they are unspecific as they can be affected by physiological and pathological states other than alcohol consumption. Three direct biomarkers are specific and indicative alcohol consumption are: Phosphatidyl Ethanol (PEth), Fatty Acid Ethyl Esters (FAEEs), and Ethyl Glucuronide (EtG). PEth has a long half-life, measurable up to 6 weeks after alcohol intake and can be detected from a serum sample. FAEEs persists in blood for at least 24 hours after last alcohol use and can be also be detected in maternal hair and neonatal meconium. EtG is very specific and sensitive, detectable *only* if alcohol is consumed. EtG can be detected from serum or urine, has low incorporation in hair, and is found 1 hour after last alcohol consumption and up to 5 days later. However, it is important to consider the therapeutic clinical utility of these tests, for example, are they used to identify single episodes or patterns of alcohol use.

The goal of brief intervention is to increase a woman's intrinsic motivation to affect behavioral change. Brief intervention consists of 1−5 patient-centered, supportive counseling sessions which each last <15 minutes. Principals of motivational interviewing to help the patient to set goals. Goals that are unmet are reinforced with advice, and the plan to achieve the goals is reviewed and seeking additional support is encouraged. Women who need more treatment are referred for specialty care and treatment. These simple steps have been associated with a sustained reduction in alcohol consumption.

There are barriers to early identification of alcohol use. For example, only 58% of obstetricians use a validated tool, such as the T-ACE, the TWEAK or the AUDIT-C to assess alcohol risk. In addition, currently available tools are not adequate to screen for concurrent use of alcohol and other substances.

The criminalization of prenatal substance use has had a chilling effect on substance use screening and on patients. Tennessee was the first state to explicitly criminalize prenatal substance use if the child is harmed. Seventeen states consider prenatal drug use to be child abuse and mandate civil commitment in three states of these states. Fifteen states mandate health care providers to report suspected substance use, and four states required testing for drug exposure. Criminalization of prenatal substance use dissuades patients from telling the truth and dissuades healthcare professionals from asking the question.

A study looked at the association between state policies and neonatal abstinence syndrome (NAS). Between 2013 and 2014, 4,567,963 births in 8 states were examined (Faherty et al.,

2019). The main outcome measure was the rate of NAS. The study found that states that criminalized substance use in pregnancy (grounds for civil commitment, child abuse or neglect) had higher rates of NAS in the first year after enactment. States that required reporting of suspected prenatal substance did not have higher rates of NAS. Neither approach resulted in reduced rates of NAS, which was obviously the intention of the various laws.

Criminalization of prenatal substance use has resulted in a number of unintended consequences:

- Incarceration has been ineffective in reducing the incidence of drug or alcohol abuse
- Therapeutic relationship is jeopardized
- Prenatal care is avoided
- Substance dependence is treated as a moral failing
- May expose some groups of women to greater risk of legal sanctions (e.g., minority women, poor women)
- The American College of Obstetricians and Gynecologists has recommended retraction of the punitive laws and build an evidence-based treatment approach

In summary, the use of legal substances and pregnancy is common. There are effective approaches to address prenatal alcohol use, such as screening and brief intervention. However, no good screening measures exist for identifying the whole range of prenatal substance use in the antepartum, and legal consequences that have been enacted are, in fact, counterproductive.

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Discussion

Dr. Riley asked whether Dr. Chang thinks that asking about alcohol use or other substance use should become a routine part of medical history from the first time that a patient sees a doctor, such as is the case for tobacco use. Dr. Chang replied that asking about alcohol and substance use should be a standard of care, so that everyone is asked and the stigma around such questions is therefore reduced. However, Dr. Chang acknowledged that people do not tend to volunteer information about alcohol use and, therefore, doctors feel inhibited to inquire—situations that would likely change if alcohol and substance use became standard of care questions.

Dr. Dunty asked why more obstetricians are not using questionnaires such as the T-ACE, the TWEAK, and the AUDIT-C. Dr Chang said that the typical explanations are that they do not think it is necessary, they were not aware of it, or use depends on when the professional was trained. She said that perhaps with the introduction of the electronic medical records, use may change.

Dr. Cross-Barnet asked if any study exists of the rates at which different kinds of prenatal care providers, such midwives or nurse practitioners versus obstetricians, use the screening tools. Dr Chang responded that studies have shown poor use of the questionnaires by all types of providers. Dr. Cross-Barnet mentioned guidelines from the American College of Nurse-Midwives and other organizations that serve women prenatally and wondered if violation of guidelines occurs extensively. Dr. Chang replied that some guideline violations occur due to lack of knowledge. For example, a recent survey of advanced nurse practitioners showed that they did not believe that drinking during pregnancy is risky and will frequently state to patients that is OK to drink a certain amount of alcohol during pregnancy. Dr. Chang believes that a major issue in the FASD field is that people expect to be informed of an exact number of alcoholic drinks that is safe to consume during pregnancy. However, there is no universally safe number, and so people come up with their own conclusions. Another limitation is that many people fundamentally do not believe prenatal alcohol use is dangerous.

Dr. Newburg-Rinn reinforced that the Children's Bureau of the ACF has significantly changed its policy regarding the legal consequences of admission of prenatal alcohol use. Now, policy is driven to avoid putting children into foster care as much as possible, and keeping children in their homes, regardless of the issues at home. ACF is trying to instead provide services that can keep children safely in their homes. ACF is trying to get the message about their current policy out to all states.

Dr. Carrell pointed out that in terms of the questionnaires about alcohol use, in some military treatment facilities such as Walter Reed, a routine part of screening for any appointment includes questions about alcohol and tobacco use. On the other hand, a hospital obstetrics department will likely have various pamphlets about pregnancy risks but not regarding alcohol use. Dr. Carrell also agreed with Dr. Chang that a major problem is that people do not believe that prenatal alcohol use can have adverse effects because that message has not yet been communicated effectively. Dr. Chang said that the lack of an absolute dose-response relationship between prenatal alcohol use and adverse outcomes makes it difficult to convince people. Some patients state that their mothers drank alcohol during pregnancy with no consequences. Dr. Carrell suggested another perspective is that it is not known how many drinks can be consumed before a particular person will exceed the blood alcohol limit for driving. Perhaps it is worth asking patients to question whether any risk is worth taking regarding prenatal alcohol use. Dr. Chang agreed that patients should be educated that if they want a healthier pregnancy, and a better outcome, then alcohol use should be minimized—to none. This would be more effective than healthcare providers' concern about the amount or pattern of alcohol use. Perhaps a strong analogy would be equating prenatal drinking with not wearing a seatbelt while driving.

Ms. West mentioned that pregnant women are warned about the risk of using medications such as Tylenol during pregnancy and remarked that the same concern should exist for alcohol. Ms. West said that she was particularly struck by the criminalization aspect of the presentation based on her own work with neonatal abstinence syndrome for which criminalization is also a barrier to aid. Ms. West brought up a meeting in which Sarah Roberts spoke about FASD policies and the fact that states that required reporting of substance use have higher rates of neonatal abstinence syndrome. Therefore, Ms. Roberts concluded that policies may be deemed supportive but there is no evidence of positive impact. Ms. West commented that states should consider improving their policies in terms of the public health perspective. Dr. Chang concurred and said that criminalization of prenatal substance use can drive the problem underground. A perfect screening measure could exist, but it will not accomplish anything if it is not used out of fear. However, if the stigma and legal consequences of prenatal substance use can be eliminated then the problem can be addressed in terms of educating women about an optimal pregnancy. Pregnant women are highly motivated to make changes in their health behaviors during pregnancy when they have the correct knowledge.

Dr. Balachova asked which alcohol screening tool has research shown to be most effective for the general population and for pregnant women. Dr. Chang replied that the top three screens are the T-ACE, the TWEAK, and the AUDIT-C. Studies have shown various success rates in different populations. However, Dr. Chang emphasized that any screen is better than no screen. Also, certain providers may prefer a particular screen. For example, AUDIT-C is mandated within the V.A. Healthcare System, although it is set positive at the wrong number, therefore, its use is suboptimal. An optimal screen may not exist, but the T-ACE, the TWEAK, and the AUDIT-screens are good enough. Dr. Balachova enquired about the one-question screen about binge drinking that NIAAA endorsed. Dr. Chang responded that the single item screener has not worked out well and that the T-ACE, the TWEAK, and the AUDIT-C screening questions can be completed in under one minute.

Dr. Chatterji queried the appropriate course of action once pregnant women are identified as having alcohol use disorder. For example, unlike opioid-use disorder for which there are medications, do safe medications for alcohol use disorder during pregnancy exist? Dr. Chang recommended that pregnant women with alcohol use disorder are referred to specialty treatment. An outpatient detoxification should never occur, rather there should be a consultation with an obstetrician and a substance use specialist. There may be a recommendation for a long, slow, medically managed and monitored detoxification, for example using benzodiazepines. The drug Antabuse® (disulfiram) should never be used to stop drinking as it is dangerous. Acamprosate and naltrexone have both been rated Category C by the FDA, but the effect sizes may not justify the risk. Once abstinence is achieved, supportive psychotherapy, group therapy, and residential treatment can be offered. However, Dr. Chang suggests that women should be educated about the risk of prenatal alcohol use during pregnancy planning or provided such education in high schools.

Child health outcomes of concurrent prenatal exposure to alcohol and other substances
Amy Elliott, PhD, Avera Research Institute Centre for Pediatric & Community Research, Sioux Falls, SD

Dr. Elliott spoke about child health outcomes of concurrent prenatal exposure to alcohol and other substances. Concurrent exposure could mean use of >1 substance at the same time or the use of >1 substance during the course of pregnancy. The latter, >1 substance during the course of pregnancy, is reported seen most often in the literature. The effects that concurrent exposure can have can be additive, in which the effects of each substance are combined to result in a given outcome. The other possibility that concurrent exposure can could have a synergistic effect in which outcome is actually worse than either substance individually or added together. For example, alcohol and cocaine, when used at the same time during pregnancy, can form highly toxic cocaethylene, which can have significant adverse health consequences.

Polysubstance use is thought to be very common and may occur in as many as half of all pregnancies by women who use substances. The prevalence of polysubstance use during pregnancy varies according to the substance (Cook et al., 2017). For example, in the case of amphetamine use, 78% also used tobacco, 14% used alcohol, and 24% used another illicit substance, which was measured through meconium (Lester et al., 2001). A study in Sweden looked at women who were admitted to substance abuse treatment by court order. The study found that average number of drugs being used concurrently was 2.65 (Reitan, 2017). A study of a methadone clinic in Canada examined meconium samples from 273 participants; almost half of the methadone-positive samples (*n*=164) were also positive for at least one other opioid compound (Delano et al., 2013). This is a significant finding as methadone is assumed to be the treatment for opioid use, therefore, it is important to consider the potential for polysubstance use by pregnant women who use opioids.

Dr. Elliott discussed fetal outcomes following opioid exposure. One study (Garrison et al., 2016). found that the risk of microcephaly (small head circumference; occipital frontal circumference<10^{th} centile was significantly greater in pregnant women who were polydrug (*n*=59) users compared to exclusive opioid users (*n*=22) or abstinent controls (*n*=278). Another

study found that children of frequent cocaine users during pregnancy had lower birth weights compared to nonusers (Richardson & Day, 1994). However, when alcohol and tobacco use during pregnancy were controlled for, the difference in birth weight completely disappeared as it did for prematurity, Apgar Score, and head circumference after controlling for alcohol or tobacco use; or marijuana, or other illicit drug use. The lesson from this publication from the 1990s is that the effect of one drug can be wrongfully attributed to another if polydrug exposure is not taken into account.

A longitudinal study followed the childhood outcome of cognitive function born to 132 women who were enrolled during pregnancy (Nygaard et al., 2017). Of the women who used drugs while pregnant, the average number of drugs used was 3.4 (range 2–6), including tobacco. Currently, follow-up continues, and the children are now 17–22 years old. Of these children, 44 had heroin and polydrug prenatal exposure, 48 children did not have prenatal substance exposure. The majority of children (84%) with heroin and polydrug exposure were adopted or moved to permanent foster homes before six months of age. With respect to cognitive function, the exposure group mean was within normal range but was consistently lower compared to the non-exposed group. Statistically significant differences were found for most cognitive means including general mental abilities, fine motor control, long-term memory, and verbal memory. Many of these same significant differences found in earlier follow-up's at ages 1, 2, 3, & 4.5 years and cognitive problems persisted over time. The same longitudinal study examined neuroanatomical characteristics in the children at 17 to 22 years of age (Nygaard et al., 2020). Individuals in the polydrug-exposed group, had smaller neuroanatomical volumes, smaller cortical surface areas, and thinner cortices. These findings persisted from the earlier assessments, done in early childhood, into youth and young adulthood. In regard to mental health, the study revealed a higher proportion of youth in the drug-exposed group who had lifetime experiences with depressive episodes, alcohol abuse, or attention-deficit/hyperactivity disorder. These individuals also scored higher on aggressive behavior and had more sexual partners compared to the non-exposed group. No difference in current self-reported satisfaction with life was found between the groups.

Dr. Elliott stressed that in the studies mentioned so far, it is difficult to obtain data that can be used to distinguish the effects of prenatal single drug exposure versus polydrug exposures. Such studies require a large number of participants and are challenging to perform. It is also important to make a distinction between the effects of prenatal substance exposure versus postnatal substance exposure.

Dr. Elliott next discussed a study in which she has been involved with for the past decade—the Safe Passage Study which was conducted by the Prenatal Alcohol, Stillbirth, and SIDS (PASS) network. The study examined the relationship between prenatal alcohol use and smoking on SIDS and stillbirth and was recently published (Elliott et al., 2020). The origin of the Safe Passage Study came from data of infant mortality in South Dakota compared to the US national average, starting from 1990. The infant death rate is calculated as the number of babies born at a certain time who had died by one year of age. The infant death rate from 1990–2017 was relatively similar to the national average when all data from all races where combined for South Dakota. However, when these data were separated by race, the American Indian infant mortality rate in South Dakota was much higher than the national average. Early in the 1990s, American

Indian Tribes in South Dakota approached the NIH and the CDC and invited these groups to try to figure out why American Indian babies were dying at a rate almost threefold compared to Caucasian babies born in the same state. As a result, the Aberdeen Area Infant Mortality Study was carried out from 1992–1996; Aberdeen Area refers to the local Indian health service unit where the study took place. Nine Tribes and 1 urban area in the Northern Plains participated in the study. The sample size was 72 deaths, of which 38 were confirmed as SIDS (Iyasu et al., 2002). A surprising finding—drinking during the periconceptual period of pregnancy (defined as the period three months preceding and following conception), increased the risk of a baby dying from SIDS by almost six-fold. The assessment for alcohol consumption was very simplistic—yes versus "no" for consumption of only one beer during the periconceptual period was a "yes" response. Maternal binge drinking (defined as five drinks on any one occasion) increased the risk of a baby dying by eight-fold. These risks were equal to or greater than a known risk for SIDS which is the baby wearing two or more layers of clothing at the time of death which increases risk of a baby dying by six-fold.

The PASS Study led by the NIH and the investigators involved in the Aberdeen area aimed to determine whether the findings of the South Dakota study would be reinforced by a large-scale prospective study (Dukes et al., 2014). During Phase I of the PASS study, 2003–2006, hypothesis and protocols were developed in addition to pilot/feasibility studies. Phase II, 2006–2017 comprised the performance of full-scale hypotheses-driven prospective and retrospective studies. The investigators were blind to the majority of the data until the study was completed in 2017. Throughout the PASS study, a total of 12,192 early pregnancies were enrolled in clinical sites in North Dakota (PI, Amy Elliott) and South Africa (University of Stellenbosch; PI, Hein Odendaal). In addition to the clinical sites, the PASS network included a Physiology Assessment Center (Columbia University; PI, Bill Pfeiffer) a Data Coordinating Center (DM-STAT, Boston; PI, Kim Dukes) and a Developmental Biology & Pathology Center (Children's Hospital, Boston, PI, Hannah Kinney). Three NIH institutes, NICHD, NIAAA, and the National Institute on Deafness and Other Communication Disorders, contributed resources including funding and project scientists to the PASS study.

In a study of serotonergic brain stem abnormalities and infant mortality, Kinney et al. (2003) found that regardless of diagnosis as a SIDS or non-SIDS case, maternal smoking led to significantly lower serotonin receptor binding in the arcuate nucleus than was observed in infants who did not have prenatal exposure. A marginal reduction in receptor binding also was observed in infants prenatally exposed to alcohol compared to non-exposed control infants. The arcuate nucleus is part of the serotonergic system in the brainstem medullary region that controls cardiorespiration and central chemosensitivity during sleep. Sleeping on the stomach is known to increase the susceptibility of an infant to SIDS; the peak age at which SIDS occurs is 2–4 months of age. When sleeping on their stomach, infants with normal development should be able to lift and turn their heads to the side, avoiding a potentially dangerous situation. However, brainstem dysfunction, can cause a lethal cascade of events including failure of arousal, hypoxic coma, failure of an autoresuscitation process, resulting in death. The results of Kinney et al. (2003) and knowledge of SIDS influenced the research protocol for the Safe Passage study.

Enrollment of women early during pregnancy into the Safe Passage study enabled the investigators to gather comprehensive information on maternal and child health including infant

fetal physiology, Doppler studies, psychosocial assessments, maternal saliva samples, and information on socioeconomic status and nutrition. There were approximately four prenatal visits and the infant was seen at birth, at 1 month and 12 months of age). An embedded study contained about 35% of the 12,192 pregnancies enrolled in the main study. Fetuses and infants who died were, with consent, enrolled in the stillbirth and infant demise portions of the study, respectively, which collected autopsy and neuropathology results. Alcohol exposure was determined using timeline follow-back methodology (Dukes et al., 2017) that uses a calendar to prompt women to think about a certain time during their pregnancy when special events involving alcohol consumption may have occurred. The self-reported recall period was short; women were asked when their last drink was, and the data collected, alcohol type, container size, number of containers, sharing, iced, or frozen, was based in the 30-day period prior to the last recalled drink. Data, including tobacco use, were collected by clinical coordinators during an interview used a coding-based methodology.

The percentage of women who reported dual exposure (drinking and smoking) versus single exposure (drinking only) was higher in both the low (level) continuous and high continuous groups. Therefore, women who drank and smoked during pregnancy, drank more alcohol than women who drank alcohol but did not smoke. Drinking/smoking variables were collapsed to create two two-level variables: the none/quit early group and the continuous quit/late group. Quitting early or late referred to before or after the end of the first trimester, respectively.

Two primary comparisons were made. The first comparison was between babies that died from SIDS versus babies alive at 1 year of age ('alive group'). The other comparison was between babies with a known cause of death versus babies alive at 1 year. Dr. Elliott emphasized that the definition of SIDS is where there is no identified cause of death even after complete examination of the infant through autopsy, as well as all medical materials, and a death scene investigation.

Of the alive group that included 10,727 infants, 52% percent were in the none/quit early group, 8.7% in the drinking only group, 21.7% in the smoking only group, dual exposures to both alcohol and smoking comprised 17.5% of the babies alive at 1 year of age. In the first year of life, 28 babies died from SIDS. There was no significant difference in the SIDS group versus alive group for mothers in the drinking only group. The smoking only group showed a significant, almost five-fold relative risk for SIDS and in the dual exposure group, risk for a baby dying from SIDS was almost twelve-fold.

The investigators compared the alive group to babies that died from known causes of death, such as respiratory infections and accidents that all occurred post-discharge from hospital (that is, does not include babies that died in neonatal intensive care or from prematurity). There were no significant findings for drinking only, smoking only, or dual exposures. Overall, the results of the Safe Passage Study indicate that there is a synergistic effect between alcohol and nicotine exposure on the outcome of SIDS (Elliott et al., 2020).

Dr. Elliott mentioned two large new NIH studies that should be very informative. Environmental influences of Child Health Outcomes (ECHO) will enroll a 50,000 people cohort of mothers and children. This study will assess different outcomes, including neurodevelopment, growth, respiratory function, positive health, and pre-, peri-, and post-natal factors that influence

development. Approximately 2,200 of the children in the ECHO study were originally enrolled in the PASS study.

The second study, currently in the planning phase (Phase I) is the HEALthy Brain and Child Development (HBCD) study, which will examine the effect of prenatal exposures, primarily opiate exposures, but also, polydrug and other drug exposures on brain development. The HBCD study will use imaging and other technologies and Phase II is scheduled for Spring 2021.

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Interventions and services for affected individuals and families

Claire D. Coles, PhD, Emory University School of Medicine, Atlanta, GA

Dr. Cole presented a historical review on FASD research and clinical services. The first publications about FASD in the United States (Jones et al., 1973; Jones & Smith, 1973), resulted in research on the teratology of FASD and to the development of diagnostic clinics in Seattle in 1995 and Atlanta in 1996. The Institute of Medicine (1996) recommended interventions, because none were available at the time. As a result, the CDC received funding in 2000 and initiated five studies to examine various aspects of FASD and potential interventions. From 2000 until now, research has resulted in perhaps 50–60 publications on interventions for FASD which is extremely low compared to autism for example, a topic on which thousands of studies have been published.

Dr. Cole stated the importance of providing care for individuals affected by prenatal alcohol exposure. She said she is asked almost daily about recommendations for care, but evidence-based interventions are lacking; this is a dilemma, which needs to be addressed. Individuals with FASD may have problems in the following areas throughout their lives: physical/health/motor, developmental/cognitive, behavioral/social, and academic/vocational. Therefore, there is a need for multidisciplinary care and multiple treatments may be needed. In some cases, there is a mismatch between FASD characteristics, and the systems regulations. Thus, it becomes hard to qualify for services, particular within the educational system. There can be a lack of understanding on the part of systems about the needs of individuals with FASD. Behavioral problems in individuals with FASD may be misinterpreted and mental health issues are a significant problem in this population. Necessary resources may not exist, for example, financial aid/insurance, lack of specific programs to address FASD, and interventionists may not be trained or may not exist.

A study (Pei et al., 2017) by clinicians in Canada recommended interventions and services for individuals with FASD that include: a modified school program, medication/psychiatry, developmental therapy, counseling for children, support for parent, parent advocacy and education, and behavioral intervention. Therefore, individuals with FASD require a variety of

services. For example, health alone, requires services to potentially address growth delays and hearing, vision, dental, cardiac, and motor issues. It is very expensive and time-consuming to address medical issues by people in different circumstances, for example, a parent with a substance abuse problem, a grandparent who is taking care of a parent with a substance abuse problem, and foster care or adoptive parents.

The developmental, cognitive, and social service needs of alcohol-affect children include:

- Behavioral regulation problems
    - Parent Training
    - Child cognitive habilitation
    - Child therapy
    - Psychiatry care
- Learning problems
    - Psychoeducational assessments needed
    - Assistance with designing educational programs
    - Individual speech and occupational therapy
    - Tutoring services
    - Parent training to "partner with the schools"
    - Special education services
- Social supports and assistance with linking to community resources
- Vocational Planning and Supports

Potential FASD treatment and research efforts include:

- Medication
- Nutrition
- Parent Education/Training
- Behavioral Management of children and development of Self-Regulation skills
- Attention and Executive Functioning
- Social Communication and Social Skills
- Adaptive and Safety Skills
- Academic Interventions
- Preventing Adolescent Substance Abuse (1 study)

To date, there are no FDA-approved drugs that have been tested that prevent or specifically treat the symptoms of FASD. Medications are widely prescribed based on the clinical judgment of the prescribing physician. They frequently are not as effective for individuals with FASD compared to another group of individuals. For instance, medications that are typically used for ADHD do not appear to be as effective in the FASD group as for people who have ADHD.

Appropriate nutritional interventions have been investigated. Two studies found that children with FASD had poorer nutrition than a national sample (Fuglestad et al., 2013; Nguyen et al., 2016). Micronutrients, such as choline had a slight protective effect in alcohol-exposed infants (Coles et al., 2015), but this effect was not observed at preschool ages (unpublished observation).

Choline had a protective effect on visual information processing (Kable et al., 2015). A cohort of choline-deprived pregnant women in South Africa were treated with supplemental choline which lead to an improvement in eye-blinking conditioning in 6-month-old infants. The study also found that growth improved at 6 and 12 months and visual recognition memory improved at 12 months (Jacobson et al., 2018). However, other studies did not find benefits from postnatal choline supplementation (Wozniak et al., 2015; Nguyen et al., 2016).

Parent education programs have looked at training for parents to help support positive behavioral and educational outcomes (Kable et al., 2012; Leenaars et al., 2012; Reid et al., 2017). In general, parenting programs seem to help parents manage better, but do not reduce their stress. A number of programs targeted to impairments in self-regulation exist as self-regulation is a significant issue for individuals with FASD. For example, the Alert Program (Wells et al., 2012; Nash et al., 2015; Wagner et al., 2018), the MILE Program (Coles et al., 2009), the GoFAR Program (Coles et al., 2015; Kable et al., 2016; Coles et al., 2018), and the Families Moving Forward Program/Families on Track programs led by Dr. Carmichael-Olson in Seattle and Dr. Petrenko in Rochester, NY, respectively. Three of the intervention programs targeted to impairments in self-regulation—Alert, MILE, and Families Moving Forward—were part of the CDC original group of programs. The GoFAR program was sponsored by the NIAAA and NIMH.

Another study examined whether working memory and attention can be altered using computerized measures; an improvement on memory on standardized tests was observed (Kerns et al., 2016). Measures looking at social communication led to more strategies on how to behave in social situations (Timler, 2005). The measure for social skills resulted in improved social skills and reduced behavioral problems and improved self-concept (O'Connor et al., 2006, 2012).

In collaboration with Dr. Dorothy Strickland, Dr. Coles worked on virtual reality programs to develop safety skills regarding fire and street crossing for children. The programs included an animated character to visualize the safety skills (Padgett et al., 2006; Coles et al., 2007). Dr. Strickland had originally developed these programs for children with autism spectrum disorder; the programs were altered for children who are alcohol-affected. For instance, when directed at children with autism spectrum disorder, the programs contained very little language and the children were able to maneuver themselves around the virtual field. When directed at children with FASD, the programs contained much more language because children with FASD have good language skills, relative to their non-verbal skills. However, these children originally had difficultly maneuvering around the virtual reality field, so it was redesigned with appropriate modifications.

In terms of educational interventions, the MILE (Math Interactive Learning Experience) program was a manualized treatment program that allowed an interventionist to work directly (one-on-one) with a child to improve their mathematical outcomes; an area of specific deficit in children with FASD. Interestingly, the educational intervention resulted in significantly improved behavior of the children, therefore; MILE served as the basis of the GoFAR program. In Canada, Dr. Carmen Rasmussen modified the MILE program to perform clinical trials to identify effective elements of the intervention. The modified MILE program was carried out in the

classroom in both individual and group settings and did not include parent education. The MILE program was still effective with the above modification (Kully-Martens et al., 2018).

A school in Kelowna, British Columbia, Canada, implemented the MILE program in 2018 and reported that children with FASD are making two-year advances in achievement, over a 10-week period. This program has also been implemented in Poland and Ukraine. Therefore, programs for children with FASD exist, but they have to be implemented, including teaching and training of the individuals who will lead these programs.

Programs currently being investigated include the Dynamic Adaptive Social Health (DASH) Program at the University of Queensland, Brisbane, Australia. Led by Dr. Natasha Reid, this will be a group program for older, school-aged and teenage individuals with FASD. The focus is on social/adaptive skills. Also, under investigation is the Tuning into Kids (TIK) program in New York, led by Christie Petrenko at the University of Rochester School of Medicine. This is an 8-week program to teach parents how to do emotional coaching to improve children's emotional regulation.

Dr. Coles next summarized what is known about interventions that have proven to be beneficial for children with FASD. Behavioral interventions have been more successful than other methods. Children respond to structured intervention that focuses on behavioral management and skill development. Successful intervention strategies include the following important elements:

- Early diagnosis and treatment
- Dealing with the child as an individual
- Educating parents about this disorder and its "brain" base and involving parents in treatment
- Educating interventionists about this disorder and its characteristics
- Helping children learn to control arousal levels (self-regulation)
- Behavior Learning Methods
- Specific skill building

Recommendations from empirical research include the following observations:

- Existing methods (can/must) be adapted to special needs of FASD
- Intervention/treatment can be provided within existing networks
- Caregiver involvement greatly facilitates improvements
    - Parent as the focus of intervention
    - Improving parental knowledge of FASD
    - Providing tools to support behavioral changes
- Explicit instruction is more effective
    - Children learn new skills better with explicit, focused instruction

FASD is a life-long disability and services need to be provided across the lifespan. Comprehensive, multidisciplinary services are necessary to address multiple disabilities.

According to parents and professionals, successful intervention strategies for FASD should have the following important elements:

- Early intervention, including early diagnosis and treatment, and proactive services to prevent development of secondary disabilities
- Individualized approach to treat a child
- Coordination of services; educated case managers and interventionists who have knowledge about FASD and its characteristics are necessary
- Educating parents about this disorder and involving parents in treatment
- Behavior learning methods
- Helping children learn to control arousal levels (self-regulation)
- Skill-building training

Dr. Coles concluded with recommendations for future strategies to address FASD, including the establishment of more FASD clinics that include multidisciplinary teams and specialized knowledge, and expertise and training. In addition to the direct effects of the prenatal exposure, social factors that exist not only in the individual with FASD, but within the family, need to be addressed.

More research with larger clinical trials, including multi-site trials, is needed to validate previous findings and adapt existing methods that are used for other developmental disabilities to special needs of children with FASD. Improving access to care and providing treatment within existing networks. Better behavioral and pharmaceutical interventions are needed in addition to innovative ways for assessing treatment effects.

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Discussion

Dr. Cross-Barnet asked whether a single, evidence-based strategy exists to guide the provision of services focused on behavioral health in children with FASD. Moreover, what are the most important recommendations to be given to parents of children with FASD? Dr. Coles suggested

that particular focus needs to be paid to arousal dysregulation, because sleep problems can be picked up early. Arising from sleep issues, children can have behavioral problems including an inability to self-regulate. Dr. Coles stated that play therapy is not recommended in such situations, but other recommendations include parent training and parent coaching to aid behavioral management of children with FASD. In addition, metacognitive interventions in which people are taught metacognitive strategies for self-regulation are very effective for individuals with FASD.

Ms. West remarked that she noticed a theme of technology in the meeting presentations. Ms. West brought up an NIH meeting a few years ago that discussed the use of technology to not only diagnose, but also to treat people, and even to recruit them in clinical studies. One of the presentations was by a researcher from the University of California in San Francisco who was developing games to teach self-regulation. Ms. West mentioned that in addition to the difficulty for people with FASD to find resources or care services, young people prefer telehealth over going to a clinic. Therefore, young people may be more engaged by games or virtual reality programs.

Dr. Riley mentioned that the researchers from the University of California in San Francisco are currently asking for FDA approval for their game as a medical device to treat ADHD—this is the first kind of virtual reality submitted for FDA approval, so it is a new type of technology. Dr. Coles stated that the problem with games and virtual reality is that the platforms keep changing and unless these tools are commercialized, sold, and make enough money to maintain the platform and update the operating system, then the games and virtual reality become obsolete. The platforms for virtual reality safety skills and GoFAR games did go out of date, meaning the entire code would have needed to be rewritten, incurring a large expense. Hence, the infrastructure is a significant consideration for these types of technologies.

Dr. Riley said he believes that purpose of telemedicine or virtual reality is to mitigate the fact that there are not enough clinicians in the world to provide regular base therapy for the number of individuals seeking treatment related to FASD. He agreed with Ms. West that younger people gravitate toward interactive interventions. Dr. Riley said that telemedicine is currently used by 18% of medical geneticists. Dr. Kenneth Jones has a three-month waiting list at his clinic which is shorter than at some other clinics. Telemedicine is a way to handle the disparity between service providers and the number of people needing services.

Dr. Riley asked whether a cost analysis has been done on early intervention and the prevention of secondary disabilities. Dr. Coles replied that cost analysis has been done for other disorders but not FAS. It is very clear that the earlier the intervention, the better the long-term trajectory, such as fewer disabilities, which lead to lower long-term costs.

Dr. Balachova asked about opportunities to integrate some FASD services into more general developmental disability structures in an efficient manner. Dr. Coles said that inter-center collaboration among some specialists would be useful in this context, for example, the interventionists who Dr. Coles trained within a few days in British Columbia are currently providing expertise throughout the province. Dr. Riley mentioned a debate in Canada whether FASD clinic should be separate clinics or be integrated within developmental disabilities clinics.

The separate FASD clinic approach was chosen but there were pros and cons to either approach. Dr. Coles responded that FASD knowledge can certainly be integrated into a developmental disability clinic which may be the better approach because the specialists are also knowledgeable about other disorders. Otherwise, a clinic with only FASD specialists may not ensure adequate recognition of other genetic and developmental disorders. Dr. Riley stressed that teachers and nurse practitioners also need to recognize signs that a child might be affected with FASD and know when a referral for treatment should be made.

Ms. Levinson queried whether FASD and autism spectrum disorder have any overlap in symptomology for which interventions used and whether interventions for the autism spectrum may be effective for children with FASD. Dr. Coles explained that it is very easy to tell the difference between FASD and autism because people who have FAS or FASD tend to be friendly, socially cooperative, have relatively spared language in comparison to nonverbal skills. In contrast, people with autism spectrum disorder tend to be withdrawn, non-social, have poor language, and relatively preserved nonverbal skills. Therefore, interventions would not coincide for both disorders. Dr. Coles said that some basic principles of behavioral interventions, such as Applied Behavior Analysis therapy may be useful under certain circumstances.

Dr. Carrell enquired whether any evidence-based studies exist that show that interactive multi-sensory teaching is more effective for children with FASD than more passive, less interactive approaches. Dr. Coles responded that in her opinion, social engagement is beneficial when working with a person who has difficulty with learning. When socially engaged, children try to please the person they are working with which turns out to be an effective method to teach specific skills. Dr. Carrell asked a follow-up question on whether it is known why individuals with FASD have a low level of abstract thinking that affects their education. Dr. Coles responded that damage to the frontal lobes of the brain can affect the ability to think abstractly. Dr. Riley states that he believes that individuals with FASD have a developmental delay in brain maturation; therefore, abstract thinking may improve during adulthood.

Dr. Chatterji asked what is known about the geographic distribution of FASD throughout the U.S. Dr. Dunty mentioned that three papers by the Collaboration on FASD Prevalence (CoFASP) research consortium that sampled FASD prevalence in four areas of the U.S. should be published soon. Dr. Anderson said that FASD is found across the world in all areas in which alcohol is consumed and across all socioeconomic levels and ethnic groups. Dr. Coles said that identification of FASD can also vary by other factors such as the relationship between developmental issues and social class. Ms. West pointed out that resources and cultural beliefs also vary internationally.

Discussion ICCFASD Agency Representatives, Speakers, and Guests

Dr. Balachova thanked the panel for their excellent talks and for taking the time to participate in the meeting and invited all meeting participants to join in a general discussion. Dr. Balachova said that she was very impressed with the agency reports. From the talks, polysubstance use is a major concern; perhaps the FASD field may benefit from focusing on polysubstance use and

funding for programs that address alcohol use along with use of opioids and other substances. Dr. Balachova also highlighted the importance of discussing the stigma of substance use to inform how better services can be provided.

Ms. West raised the topic of intervention and shared an experience from a recent project she was involved in related telehealth targeted to adolescents in Kansas. Kansas passed a law that required all health insurance to cover telehealth, which gave a boost for statewide development of a network of telehealth clinics, within community health clinics. Researchers at the University of Kansas Medical Center are conducting a study through HRSA's LEND (Leadership Education in Neurodevelopmental and Related Disabilities) program. LEND is a grant program that provides long-term, graduate level interdisciplinary training as well as interdisciplinary services. It connects university LEND faculty from medical allied health, mental health, and related disciplines, family members, and self-advocates to provide interdisciplinary graduate level training utilizing telemedicine. During a telehealth session, a child is evaluated for autism spectrum disorder in the presence of the school counselor or school psychologist. Therefore, the interdisciplinary team at the university is evaluating the child while teaching the school provider how to identify and evaluate symptoms of autism. Ms. West suggested that a similar approach could be used to connect healthcare to the educational system in remote locations where access to FASD specialists is not accessible.

Dr. Cross-Barnet mentioned a study by CMMI on preventive services in the Medicare population. Analysis of claims data revealed that screening for alcohol misuse, which is a preventative service that should be universally offered, was only used by ~1% of the population. Dr. Cross-Barnet said that when providers were queried why alcohol screening was so low, providers expressed not having time to talk about alcohol misuse with their patients or the providers suggested their knowledge of the patients was enough to decide whom to screen for alcohol misuse. However, comments from Medicare beneficiaries revealed that patients would actually like to be asked about potential alcohol misuse and a desire for doctors to initiate the conversation. Feedback also indicated that patients would feel less 'picked on' if alcohol screening was a question that everyone was asked.

Dr. Dunty asked what the federal government can do to help speed the translation of FASD research into practice. Dr. Riley said the primary answer is more funding. NIAAA and the CDC are the main agencies providing FASD funding and smaller amounts comes from other agencies but there is room for collaborative aspects of FASD between agencies. In addition, Dr. Riley highlighted the need for large randomized multi-site clinical trials related to FASD. Dr. Riley also brought up how alcohol use is discussed as a mainstream topic with a concern that some media articles and books imply that prenatal alcohol use is safe. He suggests that the consequences of maternal alcohol use need to be corrected for mainstream audiences. Dr. Riley also stressed that the stigma of alcohol use needs to be addressed and that doctors need to have such conversations with their patients. Dr. Anderson comments that she has observed that in the past 10 years, parts of NIH have decreased the dollars dedicated to FASD research, but it seems there is now a renewed interest in FASD by other agencies within NIH. Dr. Anderson said that many social workers in their 20s and 30s are aware of FASD and younger doctors and more doctors overall are acquiring knowledge of FASD.

Dr. Elliott suggested that perhaps the inter-agency model in which a multi-site clinical trial for neonatal opiate withdrawal syndrome is funded could be applied to a similar trial for FASD.

Dr. King said that several ICCFASD meetings have revealed small demonstration projects or small efficacy trials that would serve as a good basis for dissemination and implementation research. There is a need to understand which interventions will translate well into real-world contexts. She suggested that alcohol screening and FASD diagnosis may be particularly suitable for dissemination and implementation research.

Dr. Chatterji asked whether end users such as states and local agencies are engaged in FASD research from the get-go to facilitate the translatability of the research. Dr. Coles said that in her experience, unless treatment options are available, healthcare professionals do not tend to diagnose FASD or refer individuals for treatment. However, there are opportunities, for example in the education system. A relatively small initial MILE program was introduced in British Columbia, well received, and then implemented throughout the entire Province as an educational program at educational settings with great success. It worked for them, fit in their system. Dr. Coles believes that there are other ways to intervene in the educational system, who should be the agent of change for children with FASD. However, the educational system seems reluctant to such participate in FASD-related programs.

Dr. Newburg-Rinn commented that interests in particular fields is cyclical. For example, the child welfare field was interested in trauma for a long time. Currently, a big topic is opiates, but she believes that people are ready to hear about the effects of prenatal alcohol. Dr. Coles pointed out that some children have been exposed to alcohol and opiates prenatally in addition to adverse environmental experiences.

Dr. McKiernan asked whether early childhood special educators who evaluate the 0–3 population for developmental disorders are involved in aspects of FASD. Dr. Coles responded that one of the mandates for the early intervention system is that it should serve children 0 to 3 who are FAS and drug exposed. However, that varies based on regulations within states and counties and may not lead to universal implementation. For older children, FASD is not a criterion for services in the special education system, therefore, a child has to have some other condition that is associated with the disorder to be eligible for services. Dr. McKiernan said that given that the 0–3 population does not need an FASD diagnosis to qualify for services that there may be an opportunity for early screening and intervention.

Dr. Carrell remarked that the Office of Special Education states in the Federal Register, that FASD should be included under other health impaired and they have a list of topical issues of accommodations and services that should be applied to that. But there is no policy directive to the state education departments for them to implement. Dr. Carrell noted that in her attendance at the ICCFASD meeting for the past three years, there has been no representative from the Department of Education or the Office of Special Education present, even though many school children have FASD. She referred to Dr. Coles' presentation and the MILES program. Children could be identified and have treatment. Dr. Carrell noted that she has observed many children with FASD at schools during her teaching career. She emphasized that it is necessary to identify children with FASD in educational settings. She stated that there is no infrastructure for FASD in

the country and pointed at the importance of establishing an infrastructure in the United States for FASD. Every state is mandated to have some sort of a developmental disability clinic, but many agencies have no knowledge of FASD. Many children with FASD have been misdiagnosed with ADHD so if experts on FASD could be brought into the developmental disability clinics, then integration within the existing infrastructure may be an easy way to get children with FASD services that they need. Dr. Balachova reinforced the need to develop an infrastructure for FASD considering that states already have established systems and programs for developmental disabilities. Dr. Riley said that San Diego probably has more FASD researchers and clinicians than elsewhere in the country. However, after a diagnosis of FASD is made, further services are not consistently available.

Dr. Riley stated that an FASD diagnosis can prevent a mother having another child with FASD once the deleterious effects of prenatal alcohol exposure are known. Dr. Chang said that preventing birth of a second child with FASD requires funding to be dedicated to the improvement of alcohol screening techniques. With the current alcohol screening questionnaires that are effective, this gap could be readily addressed.

Dr. Carrell said that she only knows of two medical schools in the U.S. that teach about FASD. Therefore, how will services for children with FASD be developed when social workers, nurses, and doctors are not aware of the disorder. Dr. Dunty said that NIAAA does have outreach programs and an FASD session, what mental health professionals need to know, planned for the American Psychiatric Association meeting in two months. Dr. Balachova said that CDC has made significant efforts to provide education on FASD but clearly it is not enough.

Dr. Balachova remarked that one topic addressed at the meeting which should be addressed in future meetings is that FASD is a lifelong disability. ICCFASD typically speaks about FASD in children, therefore, attention should be paid to recent research data about the lifelong effects of FASD.

Adjournment

Dr. Balachova thanked the meeting participants. Dr. Balachova reminded the participants that a videocast of the meeting will be archived on the NIH website. Next steps for the ICCFASD include exchange of information and seeking advice from experts. In addition to the ICCFASD Public Annual Meeting, there is also an Executive Committee meeting to discuss how interagency coordination can lead to better services for individuals with FASD and families.

Dr. Powell thanked the meeting participants and emphasized that the ICCFASD works to improve overall care of a child and a goal of the ICCFASD is to ensure that FASD becomes a better recognized disorder in children.

Dr. Balachova adjourned the Spring 2020 ICCFASD Public Meeting.