National Institute on Alcohol Abuse and Alcoholism and the study of fetal alcohol spectrum disorders. The International Consortium

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Summary. Fetal alcohol syndrome (FAS) is a large and rapidly increasing public health problem worldwide. Aside from the full-blown FAS, multiple terms are used to describe the continuum of effects that result from prenatal exposure to alcohol, including the whole fetal alcohol spectrum disorders (FASD). The revised Institute of Medicine (IOM) Diagnostic Classification System and the diagnostic criteria for FAS and FASD are reported, as well as the formation of the four-state FAS International Consortium and its aims, as the development of an information base that systematizes data collection that helps to determine at-risk populations, and to implement and test a scientific-based prevention/intervention model for at-risk women. The Consortium was further enlarged, with the inclusion of some more states (including Italy), leading to the formation of the International Consortium for the Investigation of FASD. The objectives of the Consortium are reported, as well as its previous activities, the South Africa and Italy Projects (active case ascertainment initiatives), and its future activities.

Key words: fetal alcohol syndrome, diagnosis, intervention strategies.

INTRODUCTION

Fetal alcohol syndrome (FAS) is a large and rapidly increasing public health problem. The prevalence of FAS in the United States has been reported as 1-3 per 1000 live births and the rate of fetal alcohol spectrum disorders (FASD) as 9.1 per 1000 live births [1]. Prevalence studies completed in the United States have suggested estimates of FAS among chronically alcoholic woman of 25 per 1000. This is about twenty times higher than the estimates of prevalence in the general population [2]. By 1998, the cost of medical care for treatment of FAS-related growth retardation, surgical repair of organic anomalies, and treatment of vision defects and mental retardation had exceeded 4 billion dollars per years. The consequences of fetal exposure to maternal alcohol consumption, therefore, is a serious problem for the individual and for society, in terms of human suffering, lost productivity and medical and social monetary costs [3].

FETAL ALCOHOL SPECTRUM DISORDER

Multiple terms are used to describe the continuum of effects that result from prenatal exposure to alcohol, including fetal alcohol effects, alcohol-related birth defects (ARBD), alcohol-related neurodevelopment disorder (ARND), and, more recently, fetal alcohol spectrum disorders (FASD) [4, 5]. In April 2004, the National Organization on Fetal Alcohol Syndrome (NOFAS)
convened a meeting of representatives from three federal agencies (the National Institutes of Health - NIH -, CDC, and the Substance Abuse and Mental Health Services Administration - SAMHSA -) and persons with expertise in the field to develop a consensus definition of FASD. The resulting definition, which is used in this report, defined FASD as the range of effects that can occur in a person whose mother drank alcohol during pregnancy, including physical, mental, behavior, and learning disabilities, with possible lifelong implications. As this definition indicates, multiple diagnostic categories (e.g., FAS, ARND, and ARBD) are subsumed under the term FASD. However, FASD is not a diagnostic category and should be used only when referring to the collection of diagnostic terms resulting from prenatal exposure to alcohol.

**DIAGNOSTIC CRITERIA**

Despite the known adverse effects of prenatal exposure to alcohol [6], children who experience these effects often do not receive a correct diagnosis or referral for diagnostic evaluation because of the absence of uniformly accepted diagnostic criteria and guidelines for referral. Early identification and diagnosis of FAS in affected persons are essential components to providing health, education, and social services that promote optimal well-being. In 1996, a committee appointed by the Institute of Medicine (IOM) recommended adopting a new classification of fetal alcohol spectrum disorders. This included: FAS with and without a confirmed history of alcohol exposure, partial FAS, alcohol-related birth defects (ARBD), and alcohol-related neurodevelopmental disorders (ARND) [7]. In the late 1990s, another diagnostic system was developed by Astley and Clarren, which came to be known as the 4-Digit Diagnostic Code [8]. To increase the reliability of diagnosis, Astley and Clarren developed scales to assess clinically significant characteristics of the face such as philtrum and the vermilion border [9].

Although the IOM criteria and the 4-Digit Code have recognized the wide spectrum of outcomes produced by prenatal alcohol exposure, these two diagnostic systems have limitations. For example, two diagnostic categories introduced by the IOM report to replace the label FAE were found to be ambiguous. The question of the utility of multiple categories created by the 4-Digit Code has been questioned [10]. Accordingly, a few new diagnostic systems have been introduced recently.

The Canadian diagnostic guidelines are one new classification system, developed by harmonizing the IOM criteria and the 4-Digit Code. The Canadian Guidelines employ the objective measures from the 4-Digit Code and use the IOM diagnostic categories. The authors have described the diagnostic process in detail (which consists of screening and referral, physical examination and differential diagnosis, and neurobehavioral assessment), and underscore the necessity of a multidisciplinary team for accurate and comprehensive diagnosis [11]. The sensitivity and specificity of the Canadian guidelines have not been established yet.

The Revised IOM Diagnostic Classification System is very similar in its approach to that proposed by the Canadian Working Group. Like the Canadian Guidelines, it recommends a multidisciplinary approach (including input from experienced physicians, psychologists, educational diagnosticians and skilled maternal interviewers), sets forth an objective method of morphological assessment and stresses differential diagnosis prior to assigning a diagnosis in the FASD continuum. However, as opposed to the Canadian system, the Revised IOM Diagnostic Criteria have been field tested in a large multiracial international cohort of children prenatally exposed to alcohol and have been found to accurately define the range of FASD [10].

Recently, the National Task Force on Fetal Alcohol Syndrome and Fetal Alcohol Effects have also issued guidelines for Referral and Diagnosis (Centers for Disease Control and Prevention, 2004) [12]. The focus of this task force was to provide diagnostic criteria for fetal alcohol syndrome. The task force underscored, however, the necessity of developing science-based guidelines for identifying other alcohol-related conditions such as alcohol-related neurodevelopmental disorders.

To increase understanding and reduce the risk factors that affect the prevalence of this preventable condition in 2000, under the guide of National Institute on Alcohol Abuse and Alcoholism, the states of Minnesota, Montana, North Dakota and South Dakota, formed the Four-State International Consortium.

**HOW THE FOUR-STATE FAS CONSORTIUM STARTED**

The Four-State FAS Consortium was funded for 5 years with a start date of September 29, 2000 and initially operated on a largely rural, sparsely populated area covered 380000 square miles. In Montana, North Dakota, and South Dakota there are vast distances between population centers. Minnesota is the urban exception in the Consortium, however it shares the rural, reservation characteristics of the other three states. All four states are economically dependent on agriculture and related industry.

Together the four states have a combined population of 7.2 million people and a combined total of approximately 95 000 births per years. Thirty-three Indian reservations are located within the four states. The rural nature of the states and the large numbers of Native American reservations are cited in several national studies as two relevant risk factors for alcohol use. In fact, in small rural communities alcohol is the drug of choice because it is more readily available than other drugs and, according with the data of Indian Health Service, the alcohol related death rates is as much as 14.4 times higher in Native Americans than in other population.

Therefore, the four states show a significant high-risk population for alcohol abuse, and similarities in landmass, economy and territorial characteristics: in this way, activities that could be effective in one state can be modified and replicated in the other Consortium states [13].
ADMINISTRATIVE STRUCTURE OF CONSORTIUM

The Four-State Consortium operates through a cooperative agreement with funding from the Center for Substance Abuse Prevention (CSAP).

The Four-State Consortium is administered by the Center for Disabilities at the University of South Dakota School of Medicine with subcontracts to the other three states. The Minnesota Organization on Fetal Alcohol Syndrome (MOFAS) is the lead agency for the Consortium activities within Minnesota. The Department of Public Health and Human Services is the lead agency for Montana. The FAS Center at the University of North Dakota School of Medicine is the lead agency in North Dakota [13].

OBJECTIVES OF THE CONSORTIUM

Three primary objectives are addressed through the Consortium structure. These include: to develop and evaluate the formation of the Consortium itself (objective 1); to develop an information base that systematizes data collection that helps determine populations and areas considered high risk (objective 2); and to implement and test a scientific-based prevention/intervention model for woman considered high risk of abusing alcohol during their childbearing years (objective 3).

Objective 1: The first objective was realized through significant event tracking forms to collect important information on the success and barriers encountered by the Consortium. In addition, advisory groups and consortium participants and staff are asked to complete interviews and surveys on a periodic basis. The analysis of this information provided a logical and comprehensive look at the effectiveness of supporting multi-state efforts in the area of the prevention of FAS/FASD [13].

Objective 2: To realize the second objective was activated a project to examine risk factors using a Prenatal Questionnaire (PNQ) that included substance-screening questions with a large sample of pregnant women. The participants (no. = 4676) for the study were sampled from four states. Clinic sites for the administration of the prenatal screening instrument were selected in each state. Univariate and multivariate procedures were used to determine predictive factors of alcohol use. The study results indicate that there are a number of maternal risk factor present: women at high risk for alcohol use when pregnant tended to be younger, less educated, single, and unemployed. Other variable associated were past sexual abuse, current or past physical abuse, using tobacco, using other drugs, living with substance users, and believing that drinking any amount of alcohol while pregnant is acceptable [14].

To systematize those data was used the FAS Data Entry Form. This instrument is helpful in determining what risk factors have been used to refer the individual for a possible diagnosis as well as what criteria was used in making the diagnosis. This instrument is also useful in collecting information on the biological mothers of the individual referred.

Objective 3: The third objective was realized through a multifaceted intervention procedure to reduce the substance use of high-risk women of child-bearing age. The intervention arm featured an intensive home visit/case management system delivered by support specialists through direct programming or referrals. Six domains (mental health, social support, family functioning, self-efficacy/general well being, alcohol use, and tobacco and other drug use) were the focus of the program. The intervention model is based on the Health Belief Model (HBM) [15, 16].

The application of the HBM are: define population at risk and personalize risks based on person’s characteristics; specify consequences of the risk and the condition; identify and reduce barriers and risk factors, through reassurance, incentives and assistance; define specific action and clarify the positive effects to be expected; provide how-to information and promote awareness; use goal setting and verbal reinforcement; reduce stress; improve mental health.

Within the construct of the HBM, if a pregnant mother thinks or feels that her baby is susceptible to harm as a result of her actions, then the mother will perceive that she and her baby are susceptible to the consequences of her actions.

Through those projects, the Consortium has produced excellent data on prenatal care risk markers in 9360 women from the four states. Hundreds of woman at increased risk to have a child with FASD have received education and 604 women at the highest risk have been enrolled in the Consortium’s prevention trial to reduce risk factors for FASD [13].

FURTHER STEPS

In the last five years other countries decided to agree to the Consortium projects to investigate the national prevalence and the specific risk factors for FASD. Those countries includes: South Africa, Italy, Ukraine, Finland, Russia. Therefore, the International Consortium for the Investigation of FASD was founded.

The active projects are focused on different objectives, according to the resources and infrastructures available, the economy and territorial characteristics, the population.

The South Africa Project was an active case ascertainment initiative funded by US and Africa sources to establish the prevalence of Fetal Alcohol Syndrome in a community in the Western Cape Province of the Republic of South Africa. This area is densely populated, constituted by small towns and rural settlements and involved in growing grapes and producing wine.

The study was based on a school-based screening program: dysmorphology, growth, developmental and maternal risk data were collected and utilized to identify 626 children to evaluate with a full dysmorphology examinations. Full examinations for so many children also provided intensive training for South African physician trainees.

The results showed a high risk rate of fetal alcohol syndrome in the schools: 40.5 to 46.4 per 1000 children aged 5 to 9 years. These rates are 18 to 141 times greater than in the United States [17].
The aims of the Finland Project were to examine the spectrum of dysmorphic features in a genetically homogeneous subgroup of children with known heavy alcohol exposure; to determine whether a weighted dysmorphology score could be used as an adjunct clinical diagnostic tool when an FASD diagnosis is suspected; to evaluate determinants of cognitive development in Finnish children with FASD; to compare the newly revised IOM criteria for FAS diagnosis with the original alcohol-related diagnoses in Finnish population.

Seventy-seven children born between 1984 and 1996 and diagnosed as having FAS or FASD in one of the major hospitals in Helsinki were evaluated using six subtests from the Wechsler Intelligence Scale for Children III and were undergone to a systematic dysmorphologic examination.

Using the Revised IOM criteria, it was identified 23 children with full FAS, 7 children with partial FAS, and 2 children with ARND. In addition, 14/77 children evaluated had congenital heart disease related to FAS [18].

Finally, the Italian Project utilized active case ascertainment to determine prevalence and risk factors in Italy. A school-based project was realized in the partial rural and wine-producing area around Rome (Lazio).

Children were ascertained: by referral from teachers and/or parents, occipito-frontal circumference (OFC) < 10%, height and weight <10%. All subjects and controls underwent: blinded dysmorphology examination, neuro-psychological testing, maternal interview. Preliminary data analysis following the first wave of screening indicates FAS as a significant problem in Italy, too [19].

**CONCLUSIONS**

Data from the projects realized by the International Consortium for the Investigation of FASD indicate that drinking during pregnancy is a universal problem which requires a comprehensive international approach to be successful in diagnosing, treating and preventing this tragic spectrum of disabilities.

The identification of affected people was been crucial for early entry into intervention programs and for the development of prevalence estimates and those projects have demonstrated effectiveness and efficiency of a community-based screening strategy to obtain this result. Besides, the prevention programs activated in several countries have obtained excellent outcomes among women considered at high risk for alcohol use during their childbearing years.

Next steps: Those results indicate that each state needs to have a FAS task force to implement appropriate identification, treatment, and prevention strategies for FAS and related disorders. This would include screening to identify high-risk women and a system to link mothers with diagnosed children in order to identify them for immediate substance abuse treatment. This system also needs to emphasize early identification of affected children, early entry into treatment, prevention of secondary disabilities, and development of a specialized service delivery system for affected adults.

The cost of inaction will be higher than the cost of science-based action against alcohol related damage.

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**References**


