Norwegian Clinical Guideline for Diagnostic Assessment of Fetal Alcohol Spectrum Disorder (FASD) in Childhood and Adolescence

Norwegian guideline for use by the specialist healthcare services

Regional Competence Center for children with prenatal alcohol and/or drug exposure South-Eastern Region of Health (RK-MR HSØ), Sørlandet Hospital Arendal, September 2024

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HELSE SØR-ØST

FOREWORD

Fetal Alcohol Spectrum Disorder – What is it?

This guideline addresses the assessment and diagnostic process of children and adolescents with suspected Fetal Alcohol Spectrum Disorder (FASD). Children with FASD have a high prevalence of cognitive and regulatory difficulties, including impaired adaptive and social functioning. There is also a high incidence of comorbidities such as mental health challenges and neuropsychiatric conditions that are believed to persist into adulthood. The diagnostic process demands specialized healthcare service with access to multidisciplinary expertise. Short- and long-term outcome are thought to be reduced or prevented with early diagnosis in childhood and appropriate follow-up.

FASD affects a large group of children and adolescents, comparable in size to those with autism spectrum disorders, who are often undiagnosed and have not received appropriate assessments and support that they and their families need. Developing a clinical guideline for this patient group can significantly contribute to ensure that children and adolescents with FASD undergo multidisciplinary assessments and based on these results, receive targeted interventions.

Need and Purpose of the Current Guidelines

In 2021, the RK-MR surveyed specialist health services across the country regarding the need for a clinical evidence-based guideline for FASD. We received responses from 94 professionals, 89% of whom expressed a need for such a guideline. Clinical guidelines aim to contribute to more consistent and quality-assured practices within the healthcare system. This is the rationale behind publishing a guideline for the diagnostic assessment of children and adolescents (0-18 years old) with suspected FASD by the Regional Competence Center for children with prenatal alcohol and/or drug exposure in the South-Eastern Health Region (RK-MR HSØ).

The purpose of the guideline is to ensure that children and adolescents aged 0-18 with suspected FASD receive an evidence-based multidisciplinary assessment at a specialist level, regardless of geographical location or assessment site.

The guidelines provide recommendations based on research evidence and expert consensus for the diagnostic assessment of children and adolescents up to the age of 18 with clinical presentations associated with FASD and prenatal alcohol exposure (PAE). Evidence-based recommendations for the assessment of prenatal alcohol exposure (PAE) are included. Consensus-based recommendations are also provided regarding the diagnosis of FAS (as a medical diagnosis) and the diagnostic assessment and description of FASD (as a clinical symptom complex).

We believe that the responsibility for diagnosing this patient group should rest with specialist health services. All specialist health services that assess children regarding neurodevelopmental disorders should be able to assess and diagnose children and adolescents with suspected FASD and diagnose children with FAS. To equip these services with the necessary competence for assessments, capacity-building measures must be implemented, including access to the current guidelines, formal training through diagnostic

courses provided by RK-MR HSØ, and/or participation in online training courses from the University of Washington. See the section below regarding the activities of RK-MR HSØ, which also involves years of work in disseminating competence.

Target Audience for the Guidelines

Doctors and psychologists (primarily from the Child and Youth Habilitation Service (HABU) or from the Child and Adolescent Psychiatric Departments/Clinics (BUP)) are the primary target audience for this guideline. The secondary audience includes other health professionals involved in the diagnosis and assessment of the relevant patient group within the mentioned specialist services.

Tasks Outside the Mandate of This Guideline

- The guideline addresses children and adolescents aged 0-18 years. It can also be used as a basis for the assessment of adults, but it is not designed for that group. The Adult Habilitation Service (HAVO) at Sørlandet Hospital Arendal has developed a specific procedure for FASD assessment in individuals over 18 years of age, now available on the RK-MR website.
- Suggestions for interventions and follow-up for the relevant patient group are not included in this guideline. A research- and experience-based summary of knowledge regarding interventions for this patient group is planned to be developed by RK-MR in 2025.
- RK-MR has initiated the development of an intervention package based on psychoeducation, which will be evaluated in an ongoing PhD project. If the program proves effective, it will be made available to all specialist services in Norway that work with the relevant patient group.
- The guideline does not address the early identification of children at increased risk for FASD. It is intended for use in children and adolescents with a clinical suspicion of FASD, i.e., children presenting with difficulties that require intervention, not children who only have prenatal alcohol exposure (PAE) as a risk factor.
- The guideline does not cover possible conditions following prenatal exposure to other substances. Clinical conditions in children and adolescents resulting from prenatal exposure to other substances will be the subject of a knowledge-based summary report for specialist health services that RK-MR will prepare during 2024/25.

Regional Competence Center for children with prenatal alcohol and/or drug exposure, South-Eastern Health Region (RK-MR HSØ)

The RK-MR HSØ was established by the South-Eastern Health Region in November 2015. The service is located at the Department of Pediatrics at Sørlandet Hospital HF in Arendal. Our task is to improve the quality of services for the relevant patient group within the specialist health services in our health region. The service works to gather, systematize, and disseminate knowledge about the diagnosis, assessment, and follow-up of children and adolescents exposed to alcohol and/or illicit substances during pregnancy. We offer diagnostic assessments of children and adolescents in collaboration with local specialist health services. As a regional competence center, we primarily assess patients from our own

Hospital but can also accept patients with particularly complex conditions from other specialist healthcare institutions within the South-Eastern Health region when relevant.

RK-MR as Publisher
RK-MR is the publisher of this guideline and is responsible for updating when new knowledge suggests that changes are needed.

Regional Competence Center for children with prenatal alcohol and/or drug exposure (RK-MR HSØ), Expert Group

The guideline was presented to an expert group for review in the autumn of 2023, consisting of the following members:

- **Helse Sør-Øst**: Child psychiatrist Anne-Lene Friis Søhoel and neuropsychologist Cathrine Christiansen, Department of Child and Adolescent Mental Health, Vestre Viken Hospital HF. Neuropsychologist Ina Leistrud Fjærli, Adult Habilitation Service, (HAVO) Sørlandet Hospital in Arendal. Bjørg Halvorsen, Head of Regional Habilitation Competence Center (RHAB), Oslo University Hospital.
- **Helse Midt**: Special educator Torleif Hugdahl and special educator Maren Skrove Granum, Children's Clinic, St. Olav's Hospital, Trondheim University Hospital.
- **Helse Vest**: Child psychiatrist Marion Egeland, Department of Child and Adolescent Mental Health Care, Stavanger University Hospital.

The reference group for RK-MR HSØ contributed with guidance, input, and discussions throughout the process.

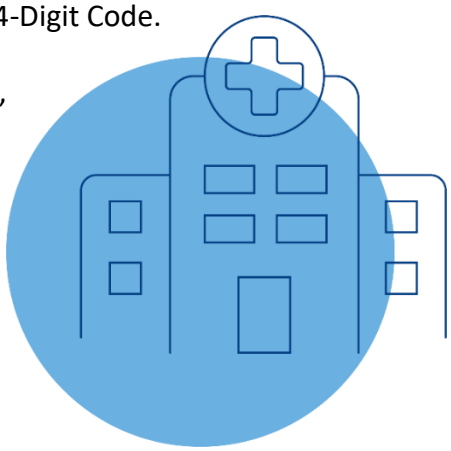
User Organization: FASD Norway, was represented by the board.

The guidelines were then revised and sent to all hospitals in Norway for consultation on May 15th, 2024. Final revision was done in August 2024.

RK-MR would like to thank BUP Innlandet SiHF, BUPA, the Clinic for Mental Health and Substance Abuse, Vestre Viken, the Habilitation Center Vestre Viken, and RHAB, OUS for their constructive feedback.

We also thank Professor Susan Astley Hemingway from the University of Washington, Seattle, USA, for allowing us to use images/materials from the 4-Digit Code.

Translation into English was done by ChatGPT and by Siv Stigen, Jon Skranes and Gro Løhaugen at RK-MR HSØ.



Arendal, september 10th, 2024

- Gro Christine Christensen Løhaugen, Neuropsychologist PhD / Head of RK-MR
- Jon Skranes, Senior Physician / Professor Dr. Med. / Pediatrician
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1 INTRODUCTION

1.1 Prenatal Alcohol Exposure – Prevalence

Among women of childbearing age in Norway, it has been reported that 77-93% consume alcohol [1, 2]. Most women discover their pregnancy at 4-6 weeks of pregnancy, but this can vary [3]. After confirmed pregnancy, Norwegian women are the best in Europe at completely stopping alcohol consumption (96%). Only about 4% continue to drink alcohol after confirmed pregnancy, and most of them significantly reduce their consumption [4]. This represents an important protection against fetal harm and later FASD. However, in practice, it means that many of us, and many of our children, have been exposed to some amount of alcohol before the pregnancy was recognized. For most, this has not impacted fetal development, but for some, it cannot be ruled out that the exposure has contributed to clinical difficulties consistent with FASD. Prenatal alcohol exposure is considered a risk factor that affects some fetuses but not all. Many factors influence the outcome: the amount of alcohol, duration of exposure, maternal health, fetal health, genetic vulnerability/protective factors, as well as other environmental factors before, during, and after birth [5].

1.2 Why is Alcohol Dangerous for the Fetus?

Alcohol is the only intoxicant classified as a teratogen, meaning it is a substance that can harm the fetus and cause malformations in various organ systems. The most critical period is when all the organs are formed, i.e., in the early stages of pregnancy (first trimester). The development of the central nervous system is particularly vulnerable as the fetal brain develops and can be damaged throughout the entire fetal period. Alcohol negatively affects several processes in normal early brain development, leading to reduced neuron formation, increased neuron death, migration disorders, impaired myelination, and disturbances in synaptic transmission. In addition to the direct toxic effects on the fetal brain, alcohol, through epigenetic mechanisms, can affect the genes that regulate brain development, thereby influencing brain growth after birth. This altered brain development increases the risk of different neurodevelopmental disorders that can be summarized under the term Fetal Alcohol Spectrum Disorder (FASD) [5].

1.3 Fetal Alcohol Spectrum Disorder (FASD)

The prevalence of FASD is estimated to be about 1-2% of the population, but it is much higher in risk populations such as adopted children from abroad, foster children, children in child welfare institutions, and children followed in child and adolescent psychiatry services [6]. We do not have prevalence studies of FASD in Norway, but if the aforementioned prevalence numbers also apply to Norway, it indicates that we have significant underdiagnosis and unreported cases of children and adolescents with FASD. This is problematic because it has been shown that early diagnosis and interventions can prevent secondary problems such as behavioral and mental health issues [7-9].

In the Government White Paper 30: "See Me! A Comprehensive Substance Abuse Policy. Alcohol – Narcotics – Doping" (2011-2012) [10], the incidence of Fetal Alcohol Syndrome (FAS) is estimated to be between 60 and 120 "new" cases per year in Norway. However, the

number is approximately ten times higher (600 – 1200 children) when the entire group of children and adolescents with FASD is included.

Children with FASD have a high incidence of complex neurodevelopmental impairments that require specialized healthcare with access to multidisciplinary expertise, and these challenges are believed to persist into adulthood [7-9]. Stade and colleagues conducted a survey of health-related quality of life (HRL) among 126 children and adolescents with FASD aged 8 to 21 years. The children reported significantly lower HRL than their peers, particularly severe difficulties related to cognition and emotions [11]. These difficulties are believed to be reduced or prevented through early diagnosis in childhood and proper follow-up, based on studies from the USA [7] and Sweden [8].

1.4 Different Diagnostic Systems for FASD

RK-MR HSØ does not perceive significant professional disagreement regionally or nationally in Norway regarding this patient group but rather limited knowledge and considerable uncertainty regarding how to diagnose FAS (ICD-10 diagnosis Q86.0) and how to conduct a diagnostic evaluation when FASD is suspected (no specific ICD-10 diagnosis exists).

Since FAS was first described about 40 years ago, establishing practical and user-friendly diagnostic criteria has been challenging, likely because the condition is highly heterogeneous by nature [12]. Currently, there are nine widely used national/international guidelines for the diagnosis of FAS/FASD, which to varying degrees are based on each other. Internationally, there is significant professional disagreement about how FASD, including FAS, should be diagnosed. The guidelines place different emphasis on physical, psychological, and functional challenges. Which one is used varies from country to country – some countries have developed their own national guideline, often as a modification of already established guidelines.

Among the three most commonly used guidelines are two American ones: the 4-Digit Code [13] and the Institute of Medicine (IOM) [14], as well as a Canadian guideline [15]. Additionally, guidelines exist from the following countries: Australia [16], USA - Center for Disease Control 2004 (only FAS) [17], Denmark [18], Poland [19], Scotland/England [20], and from Germany (only the part concerning FAS is translated into English) [21].

In a survey by Peadon et al. (2009), 23 diagnostic centers reported using only one diagnostic system, while 11 centers used elements from several established systems [22]. Twenty-four of the clinics were in the USA, five in Canada, and five in other countries (England, Italy, Chile, South Africa). Among the 23 centers that used only one system, 14 reported using the 4-Digit Code, while nine used the IOM system.

There is no evidence that one diagnostic system is better/more valid for diagnosing FASD than other systems [12].

There is no doubt that standardizing the diagnosis of FASD and agreeing on a common diagnostic system to replace the various guidelines is needed [23]. This would, make it possible to compare prevalence rates for FASD between different countries. Appendix 1 contains an overview of diagnostic criteria for nine different systems/guidelines.

Additionally, Appendix 6 includes a table with detailed text regarding the four main diagnostic criteria, showing the similarities/differences between the various systems.

The current guideline provides an overview of the methods available for the diagnostic assessment of FASD, with a primary focus on the practical use of the 4-Digit Diagnostic Code, developed by Professor Susan Astley Hemingway at the University of Washington, Seattle, USA [13]. The 4-Digit Code is the most widely used diagnostic system in the world. This system has been used as a diagnostic tool by RK-MR HSØ since its establishment in 2016. Professionals at RK-MR have held diagnostic courses using this system for doctors and psychologists in specialist healthcare services across Norway.

From a research perspective, there is no evidence to establish which of the existing guideline should be the gold standard for diagnosis [23], but:

1. The 4-Digit Code is well operationalized, verifiable, and is currently used by several professional communities in Norway.
2. The facial criteria in this system are recognized and used in all internationally developed guidelines, with one exception (IOM). The British Medical Journal's Best Practice recommends using the facial criteria in the 4-Digit Code in the diagnosis of FASD (2023).
3. It includes growth deviations as one of the criteria for FAS/FASD (see Appendix 2: Detailed information on growth deviations).

2 RECOMMENDATIONS

This chapter provides a summary of all the recommendations in the guideline. The following chapters discuss the professional reasoning behind these recommendations. The recommendations are based on the content of Chapter 4, which advocates for the use of the 4-Digit Code diagnostic system.

2.1 Ethical Considerations – Indications for Assessment – Chapter 3

- A professional and ethical evaluation of the indication for FASD assessment should be conducted.
- The specialist healthcare service should rule out other conditions that may explain the symptoms before initiating an FASD assessment.
- Regardless of the reason for referral, we recommend that all medical histories include questions about alcohol use during the three months before pregnancy, the period before pregnancy was recognized, and the rest of the pregnancy, as prenatal alcohol exposure (PAE) is a known risk factor for abnormal development.
- Confirmed PAE is not an independent indication for FASD assessment, as this is a risk factor that many children carry.
- Before conducting an FASD assessment, a general assessment based on the child's difficulties/symptom complex should be carried out according to current procedures

and guidelines (e.g., intellectual disability, hyperkinetic disorder, autism spectrum disorder, psychiatric conditions/symptoms), including a medical evaluation of the need for supplementary medical investigations (e.g., brain MRI, EEG, genetic testing).

- If a diagnosis can be made based on the current symptom complex, treatment and interventions should be implemented, and the effectiveness of these interventions should be evaluated.
- If interventions based on symptom diagnoses are effective, there is no need to investigate a possible causative diagnosis like FASD.
- If the child's symptoms/function do not improve as expected from treatment/interventions, the responsible healthcare provider should assess whether there is an indication for an FASD assessment.
- If there is strong suspicion of Fetal Alcohol Syndrome (Q86.0 FAS), i.e., growth abnormalities, specific facial features, significant functional difficulties, or microcephaly, an assessment according to this guideline should be carried out initially.

2.2 Diagnostic Assessment – Chapter 4

- FAS should be diagnosed by a medical doctor and should also in most cases include an assessment by a clinical psychologist.
- The diagnosis of FASD should be performed by a medical doctor and clinical psychologist.
- The 4-Digit Code system should be used for diagnosing FASD.
- Growth abnormalities should be assessed by a medical doctor using relevant growth percentile charts.
- The presence of the three facial characteristics of FASD should be assessed using the Lip-Philtrum Guide by a medical doctor, and the FASD software program should be used for measuring eye openings.
- **CNS damage/dysfunction**
  a. Microcephaly, neurological abnormalities, and possible MRI findings should be assessed by a medical doctor.
  b. Cognitive and neuropsychological assessments using standardized and norm-referenced methods should be performed by a psychologist/neuropsychologist.
- Preschool children should be offered reassessment after they reach school age.
- Prenatal alcohol exposure must be clarified – yes/no/unknown.

2.3 Supplementary Medical Examinations – Chapter 5

- FAS, partial FAS, and FASD with syndromic features should undergo genetic evaluation.
- In cases of comorbidities such as intellectual disability, autism spectrum disorder (ASD), and epilepsy, genetic testing should be conducted.
- EEG should be performed if seizure activity or significant sleep disturbances are suspected.
- A cerebral MRI should be considered if there are pathologic neurological findings, functional decline, or epilepsy.
- In cases of full FAS, other congenital malformations should be investigated.

- Vision and hearing should always be assessed in children and adolescents being evaluated for FASD.

2.4 Differential Diagnoses – Chapter 6

- A differential diagnostic evaluation should always be performed before diagnosing FAS or describing the clinical condition as FASD.

2.5 Comorbidity – Chapter 7

- Standardized screening tools and interviews should be used to identify or rule out treatable comorbid conditions: Neuropsychiatric conditions/neurodevelopmental disorders, regulatory difficulties (sleep disorders, eating disorders, and emotional/behavioral problems), adaptive dysfunction, and social challenges.

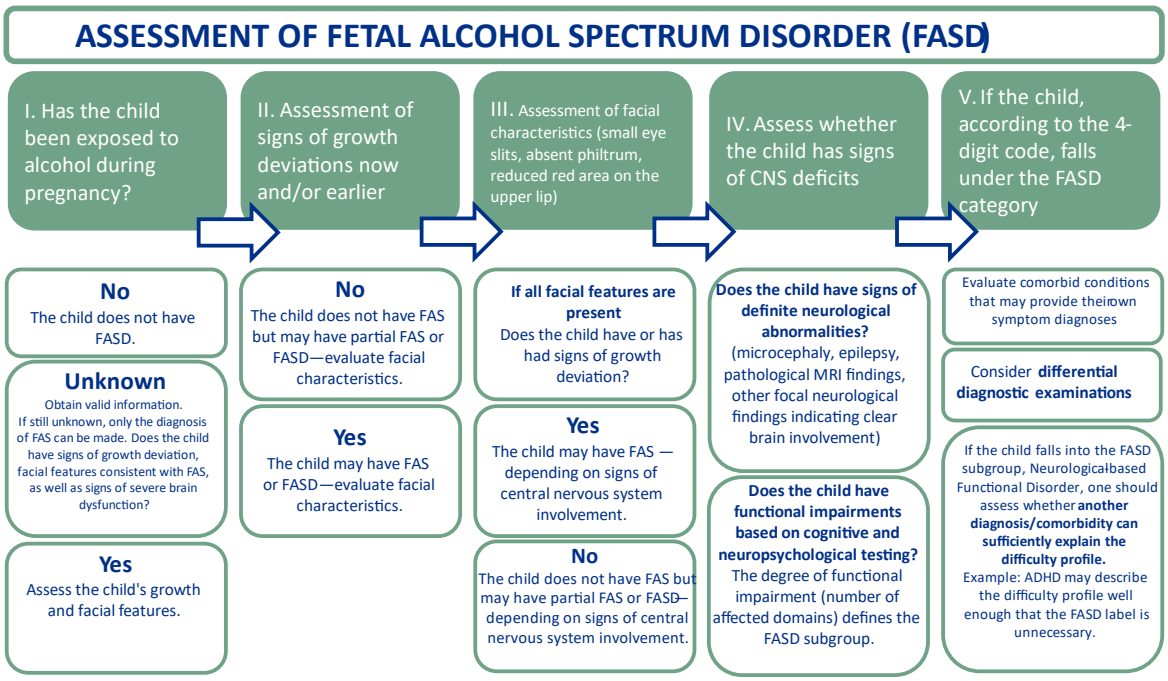
2.6 Assessment of Adaptive Skills – Chapter 8

- An assessment of adaptive skills should be conducted for all children and adolescents using tools like Vineland and ABAS (or a comparable method).

2.7 Feedback After Assessment – Chapter 9

- We recommend the preparation of both an assessment report with the results of the medical and multidisciplinary evaluation and a separate report with recommendations for interventions.

2.8 Flowchart - Assessment of Fetal Alcohol Spectrum Disorder (FASD)



3 ETHICAL CONSIDERATIONS – INDICATION FOR ASSESSMENT

3.1 Summary – Recommendations

- A professional and ethical evaluation of the indication for FASD assessment should be conducted.
- The specialist healthcare service should rule out other conditions before initiating an FASD assessment.
- Regardless of the reason for referral, we recommend that all medical histories include questions about alcohol use during the three months before pregnancy, the period before the pregnancy was recognized, and throughout the rest of the pregnancy, as prenatal alcohol exposure (PAE) is a known risk factor for later developmental problems.
- Confirmed PAE is not an independent indication for FASD assessment, as it is a risk factor that many children carry into life.
- Before conducting a possible FASD assessment, a general assessment based on the child's difficulties/symptom complex should be performed according to current procedures and guidelines (e.g., intellectual disability, hyperkinetic disorder, autism spectrum disorder, psychiatric conditions/symptoms), including a medical evaluation of the need for supplementary medical tests (e.g., brain MRI, EEG, genetic testing).
- If a diagnosis can be made based on the current symptom complex, treatment and interventions should be implemented, and the effectiveness of these interventions should be evaluated.
- If interventions based on symptom diagnoses work, there is no need to investigate for a potential causal diagnosis like FASD.
- If the child's symptoms/function do not improve as expected based on treatment/interventions, the responsible healthcare provider should assess whether there is an indication for an FASD assessment.
- If there is strong suspicion of Fetal Alcohol Syndrome (Q86.0 FAS), i.e., growth abnormalities, specific facial features, significant functional difficulties, or microcephaly, an assessment according to this guideline should be conducted.

It is important for health professionals to recognize that no mother deliberately exposes her unborn child to risk. There are various reasons why mothers may have consumed alcohol during pregnancy. Our experience, after conversations with a large group of biological mothers, indicates three main reasons for alcohol use during pregnancy: (1) the mother was unaware of the pregnancy for some time, (2) she was not aware of the particular risks that alcohol poses to a fetus, or (3) she had a problematic relationship with or addiction to alcohol.

3.2 Consent and Information

Parents must be informed about what an FASD assessment entails and the purpose of the assessment. It is the responsibility of the assessor to ensure that parents want the assessment and understand the diagnosis/description that may result from it. We have experienced situations where parents report pressure from child welfare services and have felt compelled to consent. In such cases, we inform them that an assessment of the child's difficulties can be conducted with a focus on interventions without specifically conducting an FASD assessment, allowing the parents to make an informed decision.

3.3 Information to Biological Parents in Foster Care Placements

If biological parents have parental responsibility, they are entitled to access and information about the assessment/treatment of their child. According to the new Child Welfare Act of 01.01.23, biological parents must consent to the assessment if the child is voluntarily placed in foster care. In cases of custody transfer, the child welfare service must provide consent for the assessment. We recommend that, regardless of the type of custody transfer, the child welfare service informs the biological parents about the planned assessment. RK-MR HSØ has developed information materials for the child welfare services and specialist healthcare services to use when preparing for referral, which can be found on the RK-MR website Regional Kompetansetjeneste - medfødte russkader - Sørlandet sykehus HF (sshf.no).

3.4 Information to the Child

Our approach is that the child should receive honest answers to questions about themselves. Children over 16 must consent to the assessment and should be fully informed about the reason for the assessment. Younger children should be informed in advance about the content of the assessment, but linking the assessment to a potential cause may not be appropriate, as the outcome is not yet known. The focus of the information should be on what the results might be of benefit for the child, for example, explaining that the assessors are experts in how children learn and remember things, which may help make school easier. Many children have a clear understanding that they are struggling with certain issues and can express what they want help with before starting an FASD assessment.

After the assessment, guidance should be offered to parents or a discussion with the child about the results. In many cases, the child prefers that the parents inform them rather than the assessor, but supporting the parents in this process is crucial. It is the parents who will decide when the child should receive information about their history, including about FAS/FASD. The child's age, maturity, and cognitive functioning will be key in determining when to provide this information. For adolescents above 16 years of age, they should be fully informed about the assessment and should receive feedback after the assessment is completed.

Regardless of whether the child is informed at the time of the assessment or later, having a conversation with those responsible for informing them is an important ethical consideration. We recommend that parents/assessors explain using the different reasons for PAE: for example, "Mom/I didn't know you were in the womb until quite some time had passed. Before she/I knew, she/I drank alcohol occasionally, as most women in Norway do from time to time. But when you are pregnant, it can be harmful to the baby because the baby also gets alcohol – and you are supposed to be 18 years old to consume alcohol in Norway. That might be one reason why you're struggling with…." Alternatively, if the explanation is related to addiction: "Mom didn't get help to quit until…," or "We didn't know it could be harmful to the baby." It is the biological mother who should decide how this should be explained, but time must be dedicated to discussing this issue. If the biological mother does not have custody of the child, it is still important that she be informed about what has been explained to the child. During later meetings, questions may arise, and it is helpful for the mother to know what has been said.

3.5 Risk vs. Causality

Prenatal alcohol exposure (PAE) is associated with a spectrum of difficulties (FASD), ranging from mild to severe. Currently, there are more than 4,000 scientific papers on PAE/FASD. We are unaware of any that recommend alcohol consumption during pregnancy. In other words, there is consensus that alcohol is a risk factor that can affect brain development in fetuses. However, this does not mean that all children exposed to alcohol will have difficulties. It is recommended that medical doctors and psychologists involved in FASD assessment familiarize themselves with the issue of risk versus causality, for example, by reading McQuire et al. 2020 [24].

The term FASD means that PAE is a possible causal factor for the child's difficulties. It is not possible to determine to what extent PAE has caused the child's difficulties, as there will always be other risk factors involved. Examples include genetic factors, maternal illness during pregnancy, use of other substances during pregnancy, medical conditions during birth and the neonatal period, as well as later environmental factors affecting the child's development. Other risk factors and potential causal factors are also typically present in cases where the child meets the criteria for full FAS. In the case of FAS, PAE is a likely cause of the child's difficulties, but not the only one.

3.6 The Benefits of Assessment/Diagnosis

Both the competence centers for drug addiction in Norway and RK-MR HSØ are working to spread information about FASD in a way that reduces the stigma of having a child with FASD or having FASD oneself. In addition, the few long-term studies available show that individuals with FASD are at high risk of continued challenges in adulthood and are significantly at risk of secondary difficulties, which may likely be prevented through early assessment and assistance [7-9]. International studies describe and evaluate the effectiveness of targeted treatment measures for individuals with FASD [22, 25, 26], and an intervention study in Norway led by RK-MR is set to begin in 2024. A user organization for families with children/adolescents with FASD was established in 2022 (FASD Norge), providing a resource for both patients and their families (https://www.fasdnorge.no/).

From a societal perspective, it has been shown that offering a diagnostic service reduces the prevalence of FASD. This is likely due to increased awareness of the condition and better prevention, as well as a reduced risk of PAE in future pregnancies [27]. Assessment and diagnosis of FAS are important, as this medical diagnosis (Q86.0) represents a need for follow-up throughout the individual's development and, by definition, constitutes a "permanent disability." For FASD without FAS, there is more uncertainty, as there is currently no specific medical diagnostic code for this condition, and there is insufficient knowledge of long-term outcomes to determine whether it is a permanent condition. There is extensive scientific documentation regarding the challenges faced by individuals with FASD throughout their lives, due to the complexity of the symptom profile and the significant individual variation in functioning (IQ, regulation, adaptive skills), which results in a need for support beyond what is seen in conditions such as ADHD.

Understanding FASD as a neurological, congenital condition affecting the central nervous system suggests the need for habilitation expertise in follow-up and intervention planning, meaning long-term follow-up and ongoing evaluation of interventions.

Helgesson et al. (2018) [28] from Sweden published an article discussing the ethical aspects of diagnosing and describing FASD for children and their families. They explored the advantages and disadvantages of FASD. Their conclusion was that the value of diagnosing FASD in a patient is not clearly established. Among the drawbacks of using the FASD label are the lack of a medical diagnosis, the risk of stigmatization, accusations or feelings of guilt among mothers, and potential difficulties in family relations and the local community due to guilt or blame. The authors suggested that these negative consequences can likely be mitigated by ensuring proper information is provided. Psychoeducation for families and their networks is therefore important. Although a child's difficulties can be understood in the context of FASD, this does not guarantee access to helpful interventions and resources. The authors also pointed out that describing FASD can have negative consequences for other patients who do not meet the criteria, as there is a risk that fewer resources will be available for them if FASD is prioritized.

However, they also pointed to the benefits of an FASD diagnosis including access to interventions based on a clear description of the difficulties, easier communication with support services when there is a name for the condition, better opportunities to connect with others who have the condition, and the creation of user organizations.

Knowing that children with FASD need more help and accommodations than their peers make it easier to constructively manage challenges that arise. It can be valuable for families to know that children with FASD do not always have control over their behavior, such as temper tantrums. If the healthcare system establishes procedures for diagnosing and describing conditions like FASD, a potential outcome is that children will be identified earlier, and interventions can be implemented in advance of difficult transitions, such as starting kindergarten or school. Using the term FASD increases the focus on the "whole picture"/complexity, rather than individual challenges, which can make it easier to find effective strategies for addressing the difficulties. Like Astley et al. 2013 [27], Helgesson et al. also pointed out that diagnosing FASD reduces the risk that younger siblings will be born with FASD.

We believe that many potential negative aspects of describing FASD can be reduced if the condition becomes well-known and society is educated about the facts related to PAE.
It should be the medical doctor and psychologist who evaluate whether there is an indication for an FASD assessment for the individual patient, possibly in consultation with the parents.

3.7 Responsibility for Assessment

A medical doctor should make the final diagnosis and conclusion. A clinical psychologist should conduct the cognitive and neuropsychological assessments. This requires that the professionals involved have completed training in the use of the 4-Digit Code system. This training can be done online (Online Training for 4-Digit Diagnostic Code, washington.edu) and through participation in a free two-day diagnostic course offered by RK-MR. These courses are approved as continuing education and specialist courses for several different specialties, both for medical doctors and clinical psychologists. After the FASD assessment, the results should be communicated in reports to the primary healthcare service, and

psychoeducation should be provided to the parents by the responsible medical doctor and clinical psychologist.

4 DIAGNOSTIC ASSESSMENT

4.1 Summary – Recommendations

- FAS should be diagnosed by a medical doctor and should in most cases also include an assessment by a psychologist.
- The diagnosis of FASD should be performed by both a doctor and a psychologist.
- The 4-Digit Code system should be used for diagnosing FAS/FASD.
- Growth abnormalities should be assessed by a medical doctor using relevant growth percentile charts.
- The presence of the three facial characteristics of FASD should be evaluated by a medical doctor using the Lip-Philtrum Guide, and the FASD software program should be used to measure palpebral fissures (eye openings).
- CNS damage/dysfunction
  a. Microcephaly, neurological abnormalities, and any MRI findings should be assessed by a medical doctor.
  b. Cognitive and neuropsychological assessments using standardized and norm-referenced methods should be performed by a psychologist/neuropsychologist.
- Preschool children should be offered a new evaluation after reaching school age.
- Prenatal alcohol exposure must be determined – yes/no/unknown.

4.2 The 4-Digit Code Diagnostic System – An Introduction

Professor Susan Astley Hemingway, Head of the Washington State FAS Diagnostic & Prevention Network (FAS DPN) at the University of Washington in Seattle, USA, has systematically worked for the past 25 years to develop a system for diagnosing children and adolescents across the full spectrum of FASD, not just FAS. The 4-Digit Diagnostic Code system was launched in 2000 and is based on the degree of presence of four key criteria:

1. Growth delay,
2. Typical FAS facial features,
3. Central nervous system abnormalities,
4. Alcohol exposure during pregnancy [29].

Each of the key criteria is rated on a scale of 1 to 4, where 1 indicates the absence of the criterion and 4 indicates the complete presence of the criterion. The 4-Digit Code is therefore the score assigned to each of the four key criteria [30].

The table below is a scoring table used in the 4-Digit Diagnostic Code system for assessing FASD.

Severity	Growth Delay	Facial Features	CNS Abnormalities	Prenatal Alcohol Exposure	Risk Level
Severe	Severe	Confirmed	4	4	High Risk
Moderate	Moderate	Probable	3	3	Possible Risk
Mild	Mild	Possible	2	2	Uncertain Risk
None	None	Unlikely	1	1	No Risk

- **Growth Delay**: Refers to physical growth impairments.
- **Facial Features**: Includes the characteristic facial features associated with FAS/FASD.
- **CNS Abnormalities**: Refers to central nervous system dysfunctions or damage.
- **Prenatal Alcohol Exposure**: Refers to the degree of alcohol exposure during pregnancy.

Each key criterion is graded from 1 (no presence of the feature) to 4 (severe presence), with the overall risk level depending on the combined score across these categories.

4.3 Growth

A key criterion included in most FASD guidelines is the assessment of the degree of growth restriction (see Appendix 1 for information on growth across diagnostic systems). Growth abnormalities are one of the four key criteria in the 4-Digit Code. Prenatal alcohol exposure can affect intrauterine growth, leading to reduced birth weight/length, and may also cause reduced postnatal growth. Both prenatal and postnatal growth delay are emphasized in the 4-Digit Code during FASD assessment. Growth delay associated with FASD can persist into adolescence and adulthood.

In assessing growth, either birth data (which indicates prenatal growth) or earlier childhood growth data, as well as data on current growth, may be used. The scoring is based on choosing the time point with the greatest discrepancy in height and weight data, meaning that height and weight data must be used from the same time. Documenting growth delay may require collecting previous growth records (from medical charts or health stations) and plotting growth parameters from birth to the current age.

The 4-Digit Code recommends adjusting height percentiles for age and gender. If the biological parents' height is known, adjustments can be made accordingly, but this information is often missing, particularly for children in foster care or adopted children. Weight percentiles should also be adjusted for age and gender, but not for height. Standardized national charts for growth and height are recommended for use (https://www.vekststudien.no/last-ned-vekstkurvene/). The Norwegian growth charts for children aged 4-19 do not include measurements of head circumference, which is a limitation. However, head circumference measurements for this age group can be found under the "Growth" tab in the DIPS medical records system or in older percentile charts for Norwegian children.

Ethnicity is a source of error when assessing possible growth abnormalities in a child suspected of FASD. To the extent possible, growth data should be evaluated against the growth curve of the relevant population group. This is particularly important when evaluating birth weight/birth length, as Norwegian children (and thus Norwegian growth curves) tend to have higher values than most other countries [31].

Efforts should be made to obtain growth curves for the country the child is from, especially when assessing growth data from birth and early childhood. Sometimes these growth curves can be found through online searches or on adoption forum websites (http://adoptmed.org/topics/growth-charts.html). Sources of error when using such national growth curves include outdated data, small sample sizes, or data based on undernourished populations. In many cases, it may be better to use World Health Organization (WHO) growth curves for children who are not ethnically Norwegian.

4.3.1 WHO Growth Curves/Tables

If national growth curves are not available, WHO growth curves can be used. These can be found at: https://www.who.int/tools/child-growth-standards/standards. Both growth curves (z-scores or percentiles) and more detailed percentile tables are available. Data from the Growth Study in Bergen shows that Norwegian children are generally larger than the WHO curves, both in terms of height, weight, and head circumference (https://www.vekststudien.no/). For older children who are not of Norwegian/Caucasian ethnicity and who are either born in Norway or have lived here for several years, it may be appropriate to use both Norwegian curves and whatever growth curves are available for the child's ethnic group. Regardless, growth assessments will contain sources of uncertainty and errors, and results should be interpreted cautiously, unless the deviations from normal values are obvious.

Unfortunately, there is no consensus among the various diagnostic guidelines regarding the inclusion and grading of growth abnormalities in relation to the diagnosis of FAS/FASD (see Appendix 6, which shows how growth abnormalities are graded in the various diagnostic systems).

4.3.2 Assessing the Degree of Growth Restriction

In the 4-Digit Code, data from the time point at which the combination of height and weight measures is most deviant is recorded. For some children and adolescents, this is the growth data from birth (indicating prenatal growth), while for others, it may be a set of growth measures from later in childhood (postnatal growth). When assessing, height and weight from the same time point must be used. Height and weight are first calculated based on the current percentile range using standardized growth charts. The growth deviation, measured from the current percentile range, is then converted into an ABC score (see below, or the form in the 4-Digit Code manual, pages 23-24). The ABC score is then transferred to a 4-Digit Code numeric score for growth.

ABC-score for growth based on percentile range:

Circle the ABC score for:

Percentile range	Height	Weight
≤ P3	C	C
> P3 og ≤ P10	B	B
> P10	A	A

Diagnostic Guide for FASD: The 4-Digit Diagnostic Code [13]. Copyright 2022, Susan Astley Hemingway PhD, University of Washington

Transfer of ABC score to 4-Digit Code numeric score for growth:

4-Digit numeric score for growth	Growth restriction category	Height – Weight ABC score combinations
4	Severe	CC
3	Moderate	CB, BC, CA, AC
2	Mild	BA, BB, AB
1	None	AA

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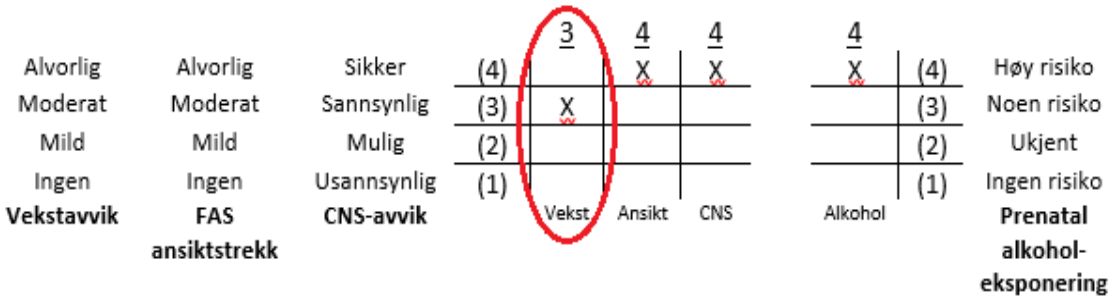
The numeric value for growth is entered as the first number in the 4-Digit Code; see the example below where growth has been assigned a value of 3, i.e., moderate growth deviation.



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Chapter 6 on Differential Diagnoses discusses other causes of growth deviation. See also the relevant appendices related to growth assessment – Appendix 2: Detailed information on growth deviations in FASD.
Note that only the diagnosis of full FAS requires the presence of growth restriction, i.e., a

growth score greater than 1. For the other subgroups of FASD, growth restriction is not required but may be present. Postnatal height percentile has been shown to be a more sensitive parameter than weight percentile in assessing growth deviations in FASD [32].

4.4 Face

A key criterion in all FASD guidelines is the assessment of facial characteristics consistent with facial dysmorphism (abnormal facial development) [23]. All guidelines are based on the same three facial features evaluated in the 4-Digit Code: shortened palpebral fissures (horizontal distance from the inner to the outer corner of the eye), poorly defined philtrum (lack of central midline groove), and a reduced amount of vermilion (red) on the upper lip. These characteristic facial features may be present to varying degrees in children who were prenatally exposed to alcohol.

The facial features result from developmental abnormalities of the skull and face, which are caused by alcohol exposure early in the first trimester and can lead to underdevelopment of the midface [27]. Studies have shown that the combination of these three facial features—short palpebral fissures, poorly defined philtrum (groove between the nose and upper lip), and thin vermilion border on the upper lip—has high specificity for FAS [30] (Figure 1).

1. "Small eyes" defined by short horizontal palpebral fissure length (≥2 SD below the mean).
2. Smooth philtrum (Lip-Philtrum Guide, grade 4 or 5).
3. Thin vermilion border of the upper lip (Lip-Philtrum Guide, grade 4 or 5)."

Figure 1. Child with the three diagnostic facial characteristics of FAS: 1) Reduced horizontal palpebral fissure; 2) smooth philtrum; and 3) thin upper lip. Copyright 2023, Susan Astley Hemingway PhD, University of Washington.

4.4.1 Assessment of Facial Features in FASD

A scoring of all three main facial features in FASD is performed.

Horizontal Palpebral Fissure Length (see Figures 2A and 2B):
When measuring the palpebral fissure length in preschool children, we recommend taking a photograph of the child and measuring the fissure length on the photo.

For older children, measurements can be done directly on the child using a ruler. The distance is measured in millimeters from the inner corner of the eye (endocanthion) to the outer corner of the eye (exocanthion), as shown in the figures below, while the patient looks slightly upwards (Figure 2). The length is assessed according to how many standard deviations (SD) above or below the norm it falls by comparing with values from an eye growth chart. For reference articles, Iosub S (1985) is used for individuals of African/African-American descent, and Stromland (1999) is used for individuals of other ethnicities [13]. Unfortunately, these two original articles do not include charts that can be used separately as printed copies.

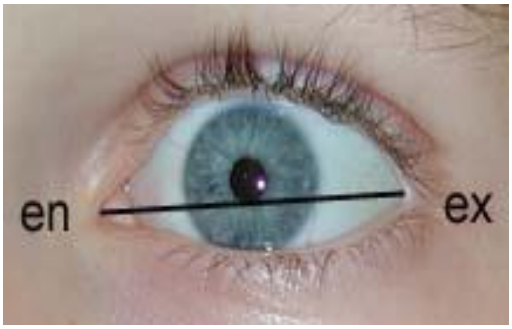

Figure 2. Palpebral fissure length is defined as the distance between the medial corner of the eye – endocanthion (en) – and the lateral corner – exocanthion (ex). Copyright 2023, Susan Astley Hemingway PhD, University of Washington.

The palpebral fissure length can be measured with a small plastic ruler. Copyright 2023, Susan Astley Hemingway PhD, University of Washington.

We recommend using the software program **FAS Facial Photographic Analysis Software** by Susan Astley Hemingway for measuring palpebral fissure length and assessing the philtrum/vermilion border. The program can be ordered from the website; see the link below. If you do not have access to the program, you can use the **palpebral fissure z-score calculator** to calculate deviations in palpebral fissure length; see the link below. The relevant website also provides useful information on how to best take facial photographs of the child. It is important that the child wears a sticker with a known length (e.g., 1.5 cm) on the forehead so that the program has a reference value when estimating the actual palpebral fissure length. When using the calculator, the actual palpebral fissure length (x), based on the photograph, is calculated using the following formula:

X/measured palpebral fissure length = reference value of the sticker (e.g., 1.5 cm)/measured length of the sticker

If the palpebral fissure is measured "live" with a ruler, the measured value can be directly entered into the calculator.
The palpebral fissure measurement divides children into three groups based on values:

- ≤ -2 SD,
- Between > -2 SD and ≤ -1 SD,
    - -1 SD from the age average (50th percentile).

Link to the software program: FASD software program
Link to the palpebral fissure calculator: **Palpebral fissure calculator**

Philtrum and Upper Lip (see Figure 3):
The thinness/amount of vermilion on the upper lip and the smoothness of the philtrum (not the Cupid's bow) are assessed on a scale of 1 to 5 based on the **Lip-Philtrum Guide** developed by Astley (Figure 3).

The **Lip-Philtrum Guide** (for Caucasians and African-Americans) can be ordered from the website as digital images; see the link below. The website also provides information on how to use the Lip-Philtrum Guide when assessing individual children. For Asians, the guide for Caucasians is used. For children and adolescents from South America, the child's appearance should be considered to determine which guide is most suitable. Sometimes, it may be necessary to assess using both guides.

Link to order the **Lip-Philtrum Guide**: https://depts.washington.edu/fasdpn/htmls/lip-philtrum-guides.htm

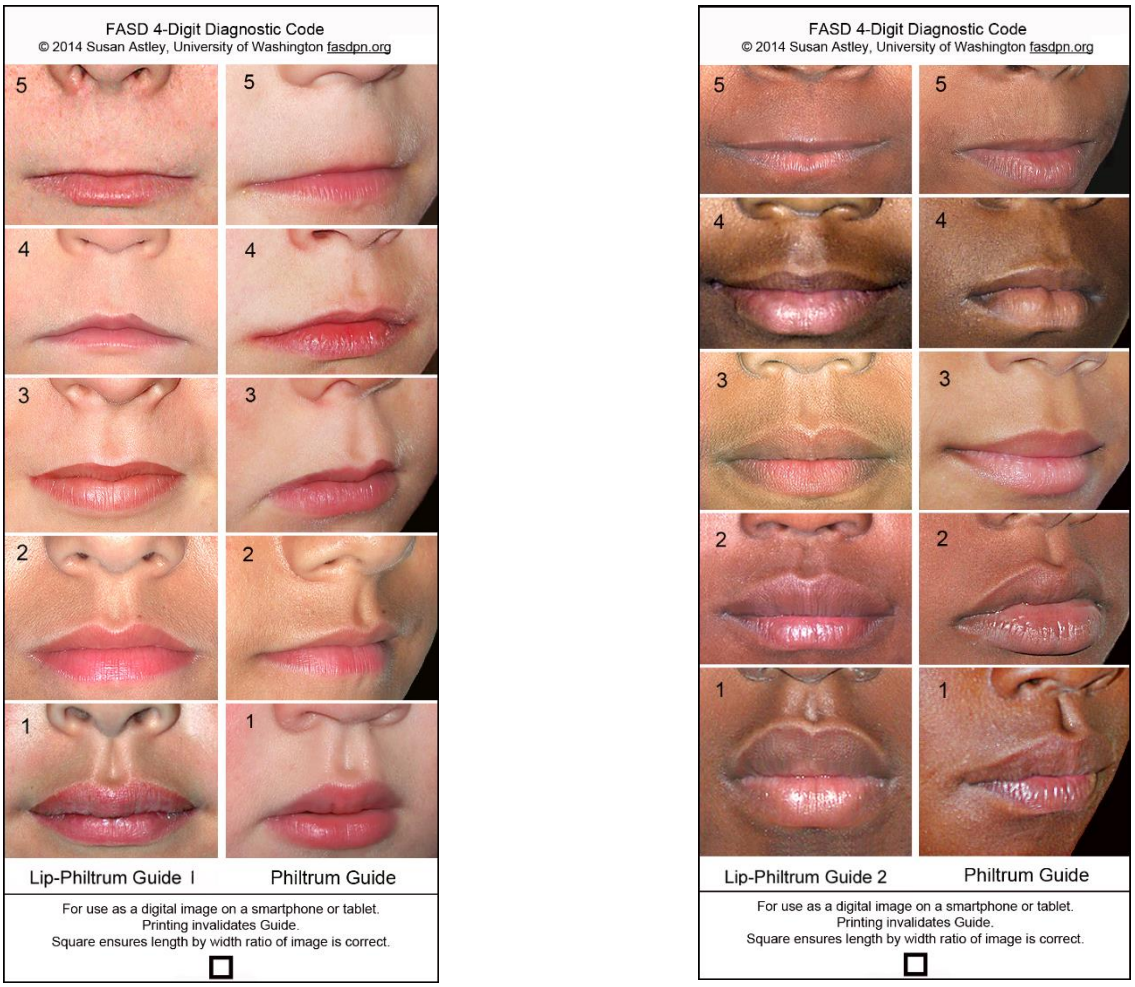

Figure 3: The University of Washington Lip-Philtrum Guides 1 (A) and 2 (B) are used to rank reduced upper lip thickness and philtrum. The philtrum is the vertical indentation in the skin between the nose and upper lip. The guides show the full spectrum of lip thickness and philtrum depth, where Rank 3 corresponds to the average. Rank 4 and 5 indicate reduced lip thickness and a smooth philtrum as seen in FAS facial characteristics. Guide 1

is used for Caucasians and all other ethnicities with lip characteristics similar to Caucasians. Guide 2 is used for African-Americans and all other ethnicities with lips similar to those of African-Americans. Digital versions of these guides for use on smartphones are available upon request at astley@uw.edu. Copyright 2023, Susan Astley Hemingway PhD, University of Washington.

Hint 1: At Rank 5 in the figure, the philtrum is not present at all – it is completely smooth without a groove. At Rank 4, you can barely see an indentation corresponding to the philtrum, but you have to get very close to see it. At Rank 3, you can see a shallow philtrum even from some distance.

Hint 2: Remember that the child's face must be relaxed when assessing the philtrum and the amount of vermilion on the upper lip. When smiling, the philtrum smooths out, and the lip becomes thinner. The face cannot be assessed correctly under these conditions. To avoid this source of error, ask the child to breathe calmly through their nose with their mouth closed. This often helps the child relax their face, allowing for accurate measurements.

After ranking the philtrum and lip on a scale from 1 to 5, the facial features are scored with an ABC letter code before being assigned the numerical value that will be included in the 4-Digit Code – see the tables below.

ABC score for facial characteristics:

Rank 1 to 5 for philtrum and lip	Assessment of SD for palpebral fissure length (z-score)	Horizontal palpebral fissure length	Philtrum	Upper lip
4 or 5	< = -2SD	C	C	C
3	> -2SD og < = -1SD	B	B	B
1 or 2	> -1SD	A	A	A

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Transfer of ABC score to 4-Digit Code numeric score for facial characteristics

4-Digit Code numeric score	Degree of FAS facial features	Horizontal palpebral fissure length - philtrum - upper lip ABC score combinations
4	Severe	CCC
3	Moderate	CCB, CBC, BCC
2	Mild	CCA, CAC, CBB, CBA, CAB, CAA BCB, BCA, BBC, BAC, ACC, ACB, ACA, ABC, AAC
1	None	BBB, BBA, BAB, BAA ABB, ABA, AAB, AAA

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Washington.

The numeric value for facial characteristics is entered as the second number in the 4-Digit Code. In order to diagnose FAS, all three facial characteristics must be present (numeric score 4). For partial FAS, 2.5 out of 3 criteria must be present (numeric score 3). The presence of facial criteria is not required for Static Encephalopathy or Neurobehavioral Disorder.
More information about facial characteristics can be found in **Appendix 3: Detailed Information on Facial Characteristics**. Information about the facial characteristics emphasized in the different diagnostic systems can be found in **Appendix 6**. **Chapter 6 on Differential Diagnoses** describes other causes of dysmorphic facial characteristics.

4.5 CNS Assessment

There must be signs of clinically significant central nervous system (CNS) dysfunction for a child's difficulties to be described as FASD, even if there is growth impairment, facial features consistent with FAS, and confirmed PAE. The functional difficulties are assessed through neurological and cognitive/neuropsychological evaluations. The exception is for young children who, due to age, cannot be tested cognitively but show signs of CNS numeric score 4 (e.g., microcephaly, epilepsy) along with other signs of FAS (growth abnormalities and all facial features). If a diagnosis of FAS is made at a young age, it should be reassessed as the child gets older. For other children showing signs of developmental delay, FASD should only be considered a tentative diagnosis until CNS function can be assessed through formalized testing. CNS function is graded from 1 to 4 in the 4-Digit Code, with higher values reflecting an increased likelihood of underlying CNS dysfunction or damage.

- **Numeric Score 4**: Confirmed CNS dysfunction: Structural/neurological abnormalities are present. This indicates a medical condition, and the score is determined by a medical doctor. Examples of conditions that result in a score of 4: Microcephaly, i.e., head circumference measured at ≤ -2 SD from the mean. Structural abnormalities observed on brain MRI that are likely of prenatal origin, such as hydrocephalus, corpus callosum abnormalities (midline brain structure pathology), and other malformations or structural brain abnormalities. Neurological abnormalities/clinical findings that are believed to be congenital, such as epilepsy/seizures not caused postnatally, and spasticity. CNS findings that result in a score of 4 can be included in the FASD subgroups FAS, partial FAS, or Static Encephalopathy (with known alcohol exposure).
- **Numeric Score 3**: Probable CNS dysfunction: Significant impairment in at least three CNS functions/domains. This is usually defined as scores -2 SD or more below the mean on valid, standardized cognitive/neuropsychological tests. Global delays, such as intellectual disability (e.g., ICD-10 F70.0), can form the basis for a score of 3.
  CNS findings that result in a score of 3 can be included in the FASD subgroups FAS, partial FAS (with known PAE), or Static Encephalopathy (with known PAE).
- **Numeric Score 2**: Possible CNS dysfunction: This refers to mild to moderate difficulties in at least two CNS functions or impairments in one or two CNS functions. This is if results on valid, standardized cognitive/neuropsychological tests are -2 SD or more below the mean in one or two domains, or scores between -1.5 SD and -2 SD from the mean in two or more domains. This can be described as findings consistent with a delay or functional difficulty suggesting CNS dysfunction, but not enough to

warrant a score of 3. The 4-Digit Code allows the use of screening results (e.g., Vineland, BRIEF) as the basis for a score of 2. See the manual for details and knowledge from RK-MR (text in blue box). CNS findings that result in a score of 2 can be included in the FASD subgroup Neurobehavioral Disorder (with known PAE).

- **Numeric Score 1**: Unlikely CNS dysfunction. There are no functional deficits, or fewer than two domains show results -1.5 SD or more below the mean on valid, standardized cognitive/neuropsychological tests, observation, and/or information from caregivers. This can be described as the absence of indications of CNS delay or dysfunction. If the CNS score is 1, the child does not meet the criteria for an FASD diagnosis in the 4-Digit Code, regardless of the results for the other three key criteria (growth, facial features, PAE).

Experience based knowledge RK-MR HSØ:
RK-MR HSØ only uses standardized tests as the basis for CNS scores of 1 or 2. In the 4-Digit Code, it may be useful to report two separate CNS scores: one based on a medical examination, and one based on cognitive/neuropsychological testing. For example: A child has deficits in one domain and moderate difficulties in another, resulting in a CNS score of 2. In addition, the child has microcephaly, which gives a score of 4. The CNS score that will be included in the 4-Digit Code is therefore 4, due to microcephaly, but a score of 2 can be written in parentheses to document the degree of functional difficulties: **CNS score 4(2)**.

Domains: Cognitive domains or CNS functions may include, but are not limited to: IQ, attention, executive functions, language, learning/memory, social perception, visual-motor coordination, and processing speed.
We assess difficulties/deficits within various domains. This becomes a clinical judgment. For example: If a child's score on the verbal comprehension index from the WISC-V is 75, this corresponds to mild to moderate difficulties in one domain (-1.5 SD or more) and may count toward a CNS score of 2. If the child also has subtest scores on language from another test, corresponding to -1.5 SD or more, this pertains to the same domain and should not be counted as two domains. If the child additionally has difficulties of -1.5 SD or more on attention tests, the score will be 2, as this represents another domain (unless the attention test is particularly demanding for language).
It is up to each psychologist/neuropsychologist to determine which set of domains and tests to use for evaluating CNS functions. An overview of the test methods/tools used at RK-MR is available in **Appendix 4: Detailed Information on CNS Function Assessment**.

When assessing CNS function, the child's age must be taken into account. Functional difficulties may become apparent later in development. Both Danish and Canadian guidelines on FASD recommend that preschool-aged children be retested before a final conclusion is made. This aligns with the experience and practices of RK-MR.
See **Appendix 4** and **Appendix 6** for more detailed information on CNS function assessment.

4.6 Prenatal Alcohol Exposure

According to the 4-Digit Code, prenatal alcohol exposure is graded from a numeric score of 1 to 4. The table below is from the 4-Digit Code manual [13].

Numeric Score	Categorization of Prenatal Alcohol Exposure	Description of Alcohol Use During Pregnancy
4	High risk	Prenatal alcohol exposure is confirmed. The pattern of exposure is consistent with what the medical literature considers to put the fetus at high risk. This is explained as high blood alcohol concentration* at least weekly.
3	Some risk	Prenatal alcohol exposure is confirmed. The level of alcohol use is less than described in code 4 or the level is unknown.
2	Unknown risk	Prenatal alcohol use is unknown, e.g., adopted children.
1	No risk	Prenatal alcohol exposure is confirmed to be absent from conception to birth.

*High blood alcohol concentration is defined here as > 100 mg/dl, which corresponds to a woman weighing 55 kg consuming 6-8 beers ("binge drinking") weekly and early in pregnancy.

The 4-Digit Code manual describes a score of 1 as unusual unless the mother is completely abstinent or refrains from alcohol even before confirmed pregnancy, for example, in the case of a planned pregnancy with lifestyle changes.
See also **Appendix 5: Detailed Information on Prenatal Alcohol Exposure**. Other professional guidelines and diagnostic guides have different ways of assessing prenatal alcohol exposure, and **Appendix 6** provides an overview of diagnostic criteria for exposure in the various diagnostic systems.

Experience based knowledge RK-MR HSØ:
It is very difficult to obtain valid data related to PAE, simply because it is hard to accurately remember what/how much one consumed, for example, before a confirmed pregnancy, many years later. Another reason could be underreporting. One of the advantages of the 4-Digit Code is that the grading of PAE as score 3 or 4 does not affect the outcome of the diagnostic assessment, i.e., within which FASD subgroup the child's difficulties fit in the 4-Digit Code. In our service, the code is usually 3. Only Fetal Alcohol Syndrome (FAS, Q86.0) can be diagnosed with unknown alcohol exposure. Unknown is, for example, when the child is adopted, or the biological mother is deceased, and no health records or legal documents verify PAE. No risk corresponds to code 1 and is used if the mother reports that she abstained from alcohol during the pregnancy from the time of conception. FASD assessment is not recommended with unknown PAE (code 2) unless the child is suspected to meet the criteria for full FAS due to characteristic facial features and growth abnormalities.

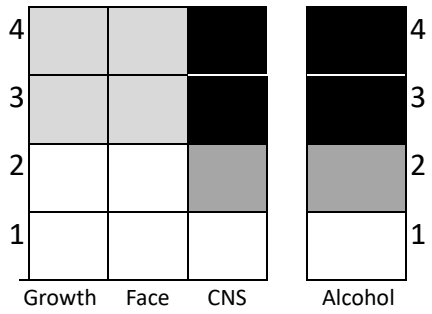
The information provided by the biological mother is what we primarily rely on. Secondarily, there is written documentation (medical records, blood test results, legal documents) that confirms PAE. Information from a partner, relatives, healthcare workers, child welfare services, etc., is not considered to have enough validity to determine the presence of PAE.

4.7 Compilation and Description of the 4-Digit Code and Relevant Symptom Diagnoses

Once a numeric score has been assigned for each of the four main criteria in the 4-Digit Code, you are left with a specific 4-digit code. You then need to check whether the current code is one of the combinations that fall within FASD in the 4-Digit Code diagnostic manual, and, if so, which of the four FASD subgroups the numeric code belongs to.

4-Digit Code – Nomenclature and Interpretation:

Severe	Severe	Confirmed	4	High risk
Moderate	Moderate	Probable	3	Possible risk
Mild	Mild	Possible	2	Uncertain risk
None	None	Unlikely	1	No risk
Growth Restriction	Facial Features	CNS Abnormalities		Prenatal alcohol



Physical signs Static Encephalopathy (SE) Neurobehavioral Disorder (ND)

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Generally, one can say:

FAS: requires at least a score of 2 for growth, at least a score of 4 for face (i.e., all facial features), at least a score of 3 for CNS, while alcohol can be either known or unknown, i.e., a score of 2 or more.

Partial FAS: growth can be a score of 1-4, meaning no requirement for growth abnormalities; the face must have at least a score of 3, and there must be at least a score of 3 for CNS and at least a score of 3 for alcohol, meaning alcohol exposure must be confirmed.

Static Encephalopathy: growth can be a score of 1-4, face can be a score of 1-4, meaning no requirement for growth abnormalities or facial characteristics; at least a score of 3 for CNS and at least a score of 3 for alcohol, meaning exposure must be confirmed.

Neurobehavioral Disorder: growth can be a score of 1-4, face can be a score of 1-4, CNS score 2, and at least a score of 3 for alcohol, meaning exposure must be confirmed. For a summary, see **Figure 4**.

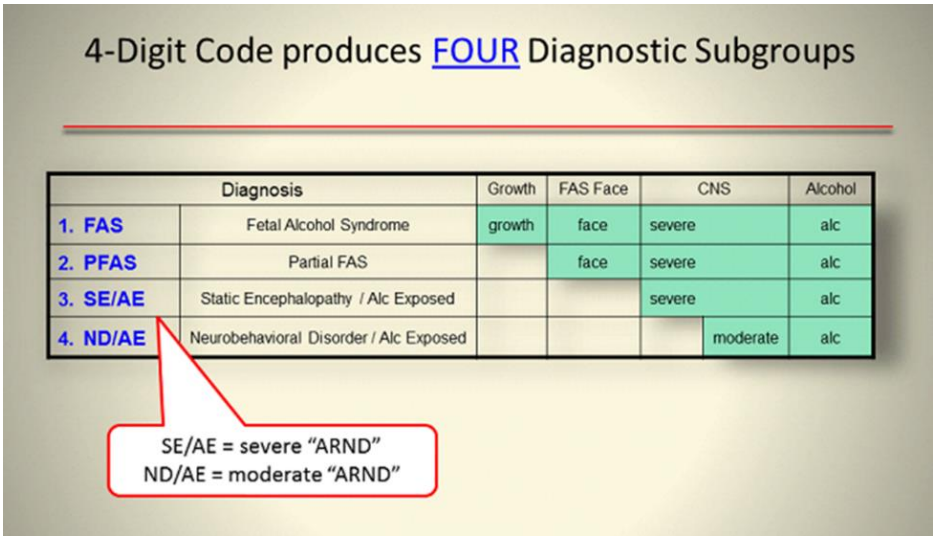

Figure 4: The four FASD subgroups in the 4-Digit Code and the requirements for the presence of key criteria. Copyright 2022, Susan Astley Hemingway PhD, University of Washington.
See also Appendix 8: Numeric Combinations in the 4-Digit Code and the Corresponding FASD Subgroup.

4.8 Medical Diagnosis Codes in ICD-10

4.8.1 Use of Medical Diagnosis Codes in Relation to the 4-Digit Code

Several factors contribute to the challenges in assessing a clinical picture consistent with FASD. The child's difficulties are often nonspecific and resemble those seen in other neurodevelopmental disorders. There are often multifactorial causes that work together: genetic/hereditary factors, pre-/peri- and postnatal environmental factors, and a disease pattern that will vary with age. Additionally, there are no unified criteria for diagnosis, and multidisciplinary diagnostics are essential, especially for assessing CNS function. At the same time, we know that delayed diagnosis worsens the prognosis.

The **World Health Organization's International Classification of Diseases (ICD-10)** from 2013 is used in both somatic and psychiatric healthcare in Norway. In **ICD-10**, there is no medical diagnosis for FASD, only for FAS (Q86.0). Therefore, various symptom diagnoses should be used to describe the clinical presentation of FASD when full FAS is not present. Some children may have comorbidities that justify separate diagnoses, such as **F90 ADHD**. There is no international consensus on which symptom diagnoses in ICD-10 that best describe an FASD condition.

Experience based knowledge RK-MR HSØ:

Our experience is that it may be usefull to describe the complexity of a child's difficulties in FASD by using various symptom diagnoses. FASD usually means a cluster/spetctrum of symptoms, such as learning difficulties, social difficulties, possible autistic traits, visuomotor/writing motor difficulties, and regulatory difficulties (see Chapter 7 Comorbidity)

4.8.2 Suggestions for the Use of ICD-10 Diagnoses for the Various FASD Subgroups

4-Digit Code **FASD Subgroup**	**ICD-10 Diagnosis**	**Comment**
Fetal Alcohol Syndrome (FAS)	Q86.0	This is an established medical diagnosis for Fetal Alcohol Syndrome (FAS). Prenatal alcohol exposure is considered a likely cause of the child's difficulties (though other risk factors/causal factors may also be present).
	Q86.0	FAS (partial type) should be written after the diagnosis code. Prenatal alcohol exposure is considered a likely cause of the child's difficulties

Partial FAS (pFAS)		(though other risk factors/causal factors may also be present).
Static Encephalopathy with Known Alcohol Exposure (SE/AE)	G96.8	“"Complex neurodevelopmental disorder" should be written after the diagnosis code. Prenatal alcohol exposure is considered a possible cause of the child's difficulties (though other risk factors/causal factors are present).
Neurobehavioral Disorder with Known Alcohol Exposure (ND/AE)	F89	"Unspecified neurodevelopmental disorder" should be written after the diagnosis code. If the child already has the diagnosis F90 ADHD, a clinical assessment should be made to determine whether F89 is also necessary. Prenatal alcohol exposure is considered a possible cause of the child's difficulties (though other risk factors/causal factors are present).

4.8.3 FASD in Cases of Uncertainty About the Cause of the Child's Difficulties

In most children with clinical signs of a complex neurodevelopmental disorder, there will be multifactorial causes, where prenatal alcohol exposure (PAE) is one of several risk factors that can affect early brain development. In Susan Astley Hemingway's own research material on children and adolescents with FAS, the following risk factors are described in addition to PAE: maternal learning difficulties (36%), prenatal nicotine (62%), prenatal cocaine (37%), complications in the newborn period (53%), physical abuse (34%), sexual abuse (24%), and neglect (64%). It is concluded that alcohol is never the only risk factor [27]. Astley further writes in the same article:

> “It is important to clarify that, when we report above that there is extensive evidence to support inclusion of ND/AE under the umbrella of FASD, we are not stating that all individuals who meet the criteria for ND/AE have FASD. By definition, all individuals with Fetal Alcohol Spectrum Disorder have a disorder caused, at least in part, by their prenatal alcohol exposure. But not all individuals with ND/AE necessarily have a FASD.
>
> Only the subset of individuals whose neurobehavioral disorder was caused, at least in part, by their prenatal alcohol exposure, have a FASD. This is a current inherent weakness in the umbrella term FASD. In the absence of a biomarker that can causally link an individual’s alcohol exposure with their neurodevelopmental disorder, there is no way to identify which individuals with ND/AE have FASD. This same argument applies to the diagnostic classification of SE/AE and ARND.
>
> Not all individuals who meet the criteria for SE/AE (or meet the criteria for ARND using the IOM or Canadian Guidelines) necessarily have FASD. Only the subset of individuals whose CNS abnormalities were caused, at least in part, by their prenatal alcohol exposure has FASD.

Once again the field of FASD currently has no way (no biomarker) to identify this subset. Until such a biomarker is identified, if such a biomarker exists, the 4-Digit Code elects to label these categories with terms that do not imply causality". [27]

When interpreting the subgroups in the 4-Digit Code this way, one might question the value of using the term FASD (when neither FAS nor partial FAS is present) and there is thus uncertainty about the cause(s) of the child's difficulties. The use of the term FASD indicates that prenatal alcohol exposure is a (partial) cause of the child's difficulties. However, for Static Encephalopathy and Neurobehavioral Disorder, we can only say that PAE is a possible cause of the child's difficulties, or that it cannot be ruled out as a contributing factor.
There is evidence-based knowledge showing that early diagnosis of FASD in children and adolescents is important for several reasons [23, 33]. For parents and other caregivers, FASD can help explain the child's difficulties as a manifestation of a brain-organic dysfunction, and a comprehensive cognitive/neuropsychological evaluation can identify the child's strengths and weaknesses, help caregivers set realistic expectations, and determine daily support needs.Early diagnosis can lead to early and appropriate interventions and tailored support measures at home, in preschool, and possibly in school, as well as access to support services such as benefits, respite care, and possibly a support contact.
Helping the mother if there is a substance abuse problem can prevent PAE and future children with FASD in subsequent pregnancies. However, there is still ongoing discussion about the value and ethical aspects of giving a child an FASD diagnosis, see **Chapter 3: Ethical Considerations**.

5 SUPPLEMENTARY MEDICAL EXAMINATIONS

5.1 Summary - Recommendations

- FAS, pFAS, and FASD with syndromic features should be genetically investigated.
- In cases of comorbidity such as intellectual disability, autism spectrum disorder (ASD), and epilepsy, genetic testing should be conducted.
- EEG should be performed if there is a suspicion of seizure activity or significant sleep disturbances.
- Cerebral MRI should be considered in cases of patholgic neurological findings, functional decline/loss, or epilepsy.
- In full FAS, other congenital malformations should be evaluated.
- Vision and hearing should always be assessed in children and adolescents undergoing FASD evaluation.

5.2 Brain MRI

Brain MRI is not routinely performed in FASD evaluations since structural MRI, which is qualitatively assessed in clinics, often yields normal findings or non-specific pathology. Additionally, most children with FASD would require anesthesia to undergo an MRI. Corpus callosum pathology can be visible on clinical structural MRI, even in children with FASD who do not have characteristic facial features [34]. A comprehensive review of MRI findings in FASD is provided in a summary article by Nguyen and colleagues from 2017 [35].

There are some exceptions where brain MRI is indicated:

1. In cases of known epilepsy, abnormal EEG, or a history of seizures, brain MRI should be performed based on these indications (if not previously done). This is in line with the *National Norwegian guidelines for epilepsy evaluation* [36].
2. If the child has intellectual disability along with one or more of the following additional symptoms:
   a. Focal neurological deficits or other specific neurological symptoms beyond "soft signs," such as spasticity, rigidity, paresis.
   b. Micro-/macrocephaly (head circumference <p3 or >p97 for age and gender).
   c. Dysmorphic facial features.
   d. Epileptic seizures and/or loss of skills, both cognitive, linguistic, and motor.
   Brain MRI evaluation would then be in accordance with the *Regional Guideline for Diagnostic Evaluation of Children and Adolescents in Cases of Intellectual Disability* [37].

5.3 Genetic Testing

FASD encompasses a broad spectrum of clinical symptoms and associated comorbidities that can affect various organ systems [38]. Chromosomal abnormalities can phenotypically overlap with FASD, making them an important differential diagnosis [39].
Genetic testing using a microarray (aCGH: Array Comparative Genomic Hybridization) should always be considered as part of the differential diagnostic evaluation for FASD. If clinical findings such as abnormalities on brain MRI, dysmorphic facial features, epilepsy, or intellectual disability are present, genetic testing beyond aCGH is recommended, for example, specific gene panels or so-called TRIO testing (which requires samples from the parents) in consultation with a geneticist.
FAS/FASD is based on clinical criteria, and in the absence of confirmatory diagnostic tests, both overdiagnosis and misdiagnosis can occur [40]. Moreover, diagnosing a genetic condition is relevant not only for the patient regarding the management of specific medical issues, but it also has implications for the family and allows for more precise genetic counseling concerning recurrence risk and prognosis [41]. In children with FAS, dysmorphic, characteristic facial features are present, but the combination of ethnic traits and the presence of other anomalies not clearly related to prenatal alcohol exposure can lead to diagnostic challenges [40].
Greater challenges arise when diagnosing the entire FASD spectrum. In a study from the UK, 9% of 80 patients with suspected FASD received an alternative diagnosis after genetic testing [39]. Jamuar et al. found that 14% of 21 children diagnosed with FASD and confirmed prenatal alcohol exposure had abnormalities detected via aCGH in the form of pathogenic copy number variants (CNVs). Among children with genetic abnormalities, there was an overlap in the phenotype between FASD and relevant microdeletion/microduplication syndromes [42]. In a recently published study by Lam et al., genetic testing of 110 patients with FASD diagnosis revealed pathogenic chromosomal abnormalities or CNVs in 4% of the cases [43].

5.4 EEG

Epileptic seizures have been reported with a high prevalence (3-21%) in older FASD studies, but often with lacking information about the type of seizures, response to antiepileptic

drugs, EEG findings, and correlation with brain MRI changes, facial features consistent with FAS, and other physical findings [44, 45]. EEG is not recommended as a routine examination in the evaluation of FASD unless there is suspicion of epilepsy or severe sleep disturbances. EEG should also be considered in cases of extensive problems with concentration and short attention span.
For further information, see **Appendix 7**, which provides more details on supplementary medical examinations, including reference articles for this section.

6 DIFFERENTIAL DIAGNOSES

6.1 Summary - Recommendation

- A differential diagnostic assessment should always be made before diagnosing FAS or describing the clinical condition as FASD.

The key criteria of FASD—growth restriction, facial characteristics, and CNS dysfunction—each provide a basis for considering differential diagnoses for FASD. Differential diagnoses may involve one or more of the key criteria. In particular, genetic syndromes may exhibit both growth restriction, distinct facial features, and varying degrees of CNS involvement. Below is a list of differential diagnoses associated with each key criterion. A physician must decide to what extent differential diagnoses should be investigated in order to be ruled out or confirmed. See also **Appendix 7: Detailed Information on Supplementary Medical Examinations** as well as **Chapter 7 Comorbidity**.

6.2 Differential Diagnoses Related to Growth: Growth Abnormalities/Reduced Growth

In a child with growth restriction, this can result from prenatal and/or postnatal influences. Causes of prenatal growth abnormalities leading to reduced growth include the following (this list is not exhaustive but contains some key causes of fetal growth restriction):

- **Normal placenta/fetal growth restriction**
  - Congenital malformation syndromes, e.g., trisomy 13 or 18
  - Other genetic conditions: Silver-Russell syndrome, Smith-Lemli-Opitz syndrome, Prader-Willi syndrome
  - Metabolic diseases
  - Fetal infections (TORCH: toxoplasmosis, rubella, CMV, herpes)
  - Multiple births
  - Prematurity
- **Impaired blood flow to the fetus**
  - Maternal conditions: Preeclampsia, hypertension, anemia, kidney diseases, smoking, medications/illegal drugs, which can reduce placental function
  - Placental disease: Placenta previa, chromosomal placental mosaicism (CPM), placental infarctions
  -

Postnatal causes of growth restriction:

- Constitutional growth delay
- Familial short stature
- Various childhood diseases: skeletal dysplasias, metabolic diseases, kidney diseases, endocrine disorders, malabsorption conditions, cancers, genetic syndromes
- Inadequate nutritional intake: feeding difficulties, insufficient breast milk, neglect/psychiatric illness in the caregiver

6.3 Differential Diagnoses Related to Facial Features

- **Toxic effects during fetal life** (Antiepileptic drugs, e.g., congenital valproate syndrome, toluene embryopathy, maternal phenylketonuria)
- **Genetic conditions**: Many genetic syndromes have facial features and physical characteristics similar to those seen in FAS/FASD, see below.

6.3.1 Differential Diagnoses Classified by Individual Facial Features "Typical" of FAS

Smooth / absent / poorly defined philtrum:

- Cornelia de Lange syndrome
- Opitz syndrome
- Floating-Harbor syndrome
- Toluene embryopathy

Thin / reduced vermilion on the upper lip:

- Miller-Dieker (lissencephaly) syndrome
- Cornelia de Lange syndrome
- Toluene embryopathy
- Congenital valproate syndrome

Reduced palpebral fissure length (eye opening):

- DiGeorge syndrome
- Williams syndrome
- Dubowitz syndrome
- Duplication of 10q sequence
- Duplication of 15q sequence
- Opitz syndrome
- Trisomy 18
- Toluene embryopathy
- FG syndrome

6.4 Differential diagnoses related to CNS function

- Various neurodevelopmental disorders: intellectual disability, language disorders, ADHD, DCD, ASD, Tourette syndrome, behavioral disorders
- Child psychiatric conditions can be differential diagnoses, but also comorbid conditions, e.g., post-traumatic stress disorder (PTSD), attachment disorders, psychosis, bipolar disorder, abuse/substance misuse
- Epilepsy (especially involving the frontal lobe)
- Cerebral palsy, neuromuscular diseases
- Genetic syndromes

6.5 Differential diagnoses related to microcephaly

- Familial type (genetically based)
- Chromosomal abnormalities and genetic syndromes (trisomies, various microdeletion syndromes: e.g., Williams syndrome, Cornelia de Lange syndrome, Wolf-Hirschhorn syndrome, Rubinstein-Taybi, Angelman syndrome, Cri-du-chat syndrome, Smith-Lemli-Opitz syndrome)
- Intrauterine infection (e.g., TORCH, HIV, syphilis, Zika virus)
- As part of general fetal growth restriction, e.g., exposure to illegal drugs, antiepileptic drugs
- Brain malformations
- Hypoxic-ischemic brain injury or meningitis, which can lead to reduced brain growth postnatally
- Extreme prematurity, which can lead to reduced brain growth postnatally
- Metabolic conditions, e.g., maternal diabetes mellitus, phenylketonuria, neuronal ceroid lipofuscinosis

7 COMORBIDITY

7.1 Summary - Recommendation

- Standardized assessment tools and interviews should be used to identify or rule out comorbid conditions requiring treatment: neuropsychiatric disorders/neurodevelopmental disorders, regulatory difficulties (sleep disorders, eating disorders, and affect/behavioral problems), adaptive dysfunction, social difficulties.

7.2 Clarification of terms

Comorbidity refers to the presence of multiple diseases or conditions occurring simultaneously in the same person. It contrasts with the term differential diagnosis, which refers to alternative diseases that may explain symptoms, clinical examinations, and the results of supplementary investigations.

It is also essential to differentiate between symptom diagnoses, which describe a pattern of

difficulties but may have various underlying causes, and a cause/etiologic diagnosis, which points to a specific cause for the difficulties. Neurodevelopmental disorders often have multiple causal factors, where the overall pattern of difficulties results from a combination of factors. Prenatal, including hereditary, factors during birth and postnatal environmental factors can disrupt early brain development and lead to various neurological and neuropsychological difficulties.
Examples of symptom diagnoses include specific and general learning difficulties, ADHD/ADD, autism spectrum disorders, cerebral palsy, and epilepsy, while FASD should be considered an etiologic diagnosis, as it refers to a possible specific cause of the difficulties—prenatal alcohol exposure (PAE).
When discussing comorbidity in FASD, we refer to medical conditions that occur more frequently among children and adolescents with FASD than in the general population. An example of a symptom diagnosis within the spectrum of neurodevelopmental disorders is ADHD, which is present in most (64-89%) children with FASD, as also described in Norwegian studies [46, 47]. According to the recommendations in **Chapter 3 Ethical Considerations**, ADHD would first be a differential diagnosis. In other words, if ADHD-like symptoms are present, they should be evaluated and treated. If treatment produces the expected results, further investigation for FASD is not recommended. If the treatment is ineffective, a clinical evaluation should be made to determine whether FASD should be assessed. In that case, ADHD may be considered a comorbid condition with FASD. It is impossible to clinically distinguish between a child with ADHD and one with FASD through neuropsychological testing alone, but children with ADHD who also meet the clinical criteria for FASD often have greater adaptive and social difficulties than children with ADHD without indications of FASD. The literature review below focuses on psychiatric and neurodevelopmental disorders.

7.3 From the research literature

The term "secondary difficulties" is often used in relation to FASD and psychiatric problems and refers to conditions that are not present at birth but thought to result from interactions between primary difficulties (e.g., cognitive impairments, poor adaptive skills) and environmental demands [48].
Initially, it is essential to emphasize that there are several biases in studies examining comorbidity in people with FASD. In clinical samples, these are people referred to specialist healthcare services due to significant symptoms. In non-clinical samples where PAE (prenatal alcohol exposure) is the inclusion criterion, the quality of exposure data can be a challenge. There is no consensus on a direct link between PAE and an increased incidence of psychiatric disorders [49, 50], but there is consensus about the higher prevalence of psychiatric disorders in FASD [51-54].

Popova et al. found an increased prevalence of more than 400 medical conditions from 18 out of 22 diagnostic chapters in ICD-10 among people with FASD [38]. It is recommended to read the article for a good summary of comorbidity in FASD [5].

7.4 What the different guidelines say about comorbidity in FASD

- **BMJ Best Practices** refers to a high prevalence of depressive disorders (up to 44%), psychosis (up to 40%), and substance abuse issues (up to 40%) among adolescents, and anxiety disorders (up to 20%) among adolescents and adults with FASD.

- **The Danish guideline** points out that limited knowledge about FASD can increase the risk of misdiagnoses, usually psychiatric ones, leading to inadequate follow-up, particularly regarding somatic issues. The Danish guideline is based on the **CDC's** revised recommendations for treating FASD, which can improve outcomes [17, 18].
- The **CDC guideline** for diagnosing FAS (2004) links functional CNS issues to secondary maladaptive behavioral and psychological difficulties, which can have lifelong consequences. The CDC notes that the most common psychiatric disorders are behavioral problems, oppositional defiant disorder, anxiety disorders, adjustment issues, sleep problems, and depression. ADHD is described as a primary difficulty in the CDC guideline [17].
- The **Scottish/English guideline (SIGN 156)** suggests that emotional regulation difficulties may be related to prenatal alcohol exposure (PAE) if these problems are long-term but not if they are linked to life events or environmental conditions. Clinically significant problems are defined as anxiety or depressive disorders, or as conduct disorder [55].

A review article from 2009 reports increased signs of difficulties from infancy among children with PAE, including jitteriness, irritability, problems with habituation, regulation of wakefulness, activity levels, and disrupted sleep patterns. In addition, there was an increased incidence of insecure attachment and depressive difficulties in preschool age. From ages 5-13, there was a reported increase in mood disorders, ADHD, depression, psychosis, antisocial behavior, social difficulties, anxiety, and obsessive-compulsive disorder (OCD) [53]. Khoury et al. reported a medium effect size (d=0.71) in a meta-analysis of 65 studies concerning internalizing disorders and a high effect size (d=0.90) for externalizing disorders from PAE. The effect was moderated by age, socioeconomic status, and the degree of exposure [54].

In 2016, **Popova et al.** published a systematic literature review and meta-analysis of comorbid conditions with a prevalence of over 50% in individuals with FAS. Among the non-somatic diagnoses reported, >90% had behavioral problems (ICD-10 diagnosis F91), nearly 82% had receptive language difficulties (DSM diagnosis H65.2), >76% had expressive language difficulties (ICD-10 diagnosis F80.1), >69% had unspecified developmental delay (ICD-10 diagnosis F89), >67% had unspecified speech disorders (ICD-10 diagnosis F80.9), 54.5% had alcohol or substance dependency diagnoses (ICD-10 diagnoses F10.2, F19.2), while 51.2% had ADHD (ICD-10 diagnosis F90) [38].

Weyrauch et al. included individuals with FASD and focused on psychiatric disorders in a systematic review from 2017. The studies included almost 6,000 participants with an average age of 10 years. ADHD was the most common comorbid condition, with a prevalence of 50.2%. Intellectual disability was present in 23%, learning difficulties in 19.9%, behavioral problems in 16.3%, depression in 14.1%, psychotic disorder in 12.3%, bipolar disorder in 8.6%, anxiety disorder in 7.8%, PTSD in 6%, OCD in 4.9%, and reactive attachment disorder in 4.7%. For 5 of the 12 conditions investigated, there was a 10-45% increased prevalence in those with FASD [52].

Lange et al. conducted a literature review and meta-analysis using data from 20 studies focusing on the prevalence of externalizing problems among children/adolescents (ages 6-

22) with FASD. Externalizing problems were defined as ADHD (n=2582), autism spectrum disorder (ASD) (n=1029), conduct disorder (CD) (n=1514), and oppositional defiant disorder (ODD) (n=2719). The authors reported a prevalence of 52.9% for ADHD, 12.9% for ODD, 7% for CD, and 2.6% for ASD. This is significantly higher than the general population in the USA, which has prevalence rates of ADHD: 4.1%, ODD: 2.7%, CD: 2.7%, and ASD: 1.5% [56].
It is essential that any comorbid conditions identified with FASD are diagnosed and treated.

7.5 Comorbidity in adults with FASD

In the world's largest study of adults with FASD, **Streissguth et al.** found that over 90% had psychiatric disorders [7]. In Sweden, the prevalence of psychiatric disorders was 33% among 79 adults with FAS compared to 5% in the general population, and 57% of those with FAS were prescribed psychotropic drugs, compared to 27% in the general population. Larger studies from Scandinavia, including FASD or PAE, are still needed to provide more reliable assumptions about comorbidity and prognosis.
An increased risk of suicide was reported in a registry study from Canada, where the life expectancy of individuals with FAS was significantly reduced compared to the general population. The most common causes of death among adults with FAS were suicide (15%), accidents (14%), and poisoning from alcohol or drug overdose (7%) [57]. **Ragnmar et al.** found that 6% of adults with FAS had been treated in hospitals for suicide attempts [8]

Experience-based knowledge RK-MR HSØ:

Both guidelines and clinical studies show that FASD increases the risk of co-occurring neurodevelopmental disorders and/or the development of mental health issues. Therefore, screening for mental health challenges should be part of the diagnostic evaluation and follow-up of patients with FASD to identify treatment needs early. It has been shown that early diagnosis can help prevent secondary difficulties by providing the child with appropriate support and realistic expectations [7, 23].

8 ASSESSMENTS OF ADAPTIVE SKILLS

8.1 Summary - Recommendation

- Assessment of adaptive skills should be performed for all children and adolescents using tools like Vineland and ABAS (or equivalent methods).

8.2 Clarification of Terms

In this context, assessment methods refer to standardized, norm-referenced questionnaires used for children up to 18 years of age.

Experience-Based Knowledge RK-MR HSØ: Children with FASD often struggle with regulating behavior and emotions, which tend to improve in a structured setting such as cognitive/neuropsychological testing. The test environment is well-suited to showcase the child's potential, and we frequently observe better test results than what is reported by caregivers and teachers in everyday life. The test outcomes can provide insights into what the child could achieve with proper accommodations. This information is crucial for developing interventions for the educational-psychological services (PPT), particularly in relation to expert recommendations and their content. In general, results from assessment methods tend to have higher ecological validity than test outcomes, but they are also more vulnerable to reporting errors (over/underreporting, misunderstandings, etc.). At RK-MR, we consider assessment results from questionnaires as useful supplementary and clarifying information but do not interpret them as signs of CNS dysfunction.

8.3 Assessment

Research literature has shown a lack of consistency between parental evaluations of a child's functioning and results from corresponding functional tests [58-62]. Several factors likely explain this discrepancy, but one reason could be that functioning improves in structured, predictable environments with close adult guidance, such as during a test situation. Meanwhile, parents describe the child's functioning in everyday life. This underscores the importance of including questionaires, even though these may not impact the diagnostic conclusion in the 4-Digit Code within our framework. It is recommended that practitioners familiarize themselves with the reliability, validity, and norms of the chosen assessment methods; for example, visit RBUP's website: PsykTest barn.

8.4 Adaptive Function in Children and Adolescents with FASD

Assessment is conducted using standardized methods; we recommend using Vineland-III as a parent interview or the Adaptive Behavior Assessment System III (ABAS-III).
Adaptive skills are often described as personal and social abilities necessary for daily life mastery and independence in everyday tasks. The assessment covers communication, social, and daily living skills. Adaptive skills can be categorized as either basic or instrumental. Basic adaptive skills (BAS) refer to fundamental personal self-help abilities like eating, dressing, hygiene, etc. BAS largely depend on routines or habits and therefore require less reliance on executive functions once established. Instrumental adaptive skills (IAS) refer to activities that enable individuals to function effectively in their environment to achieve necessary goods and services, demanding greater executive function (e.g., using the internet, banking services, transportation, etc.).

Several studies support a connection between IAS and executive functions among clinical groups with functional loss (e.g., elderly individuals, Alzheimer's patients, those with acquired brain injuries) [63]. Neuropsychological tests may not necessarily reveal difficulties with IAS, as this depends on how ecologically valid the tests are. Test results are also influenced by the test environment itself, which provides structure and can inherently support executive functioning.

In a 2019 review, Mattson et al. reported that patients with FASD struggle with adaptive skills regardless of where they fall on the FASD spectrum and irrespective of age. The

authors suggest that difficulties with adaptive function may be related to issues with social problem-solving [64]. This is also described in a 2012 summary article by Kully-Martens et al., which concluded that individuals with FASD struggle both to establish and maintain social relationships, linking these difficulties in part to deficits in executive functions [65].

In 2021, Kautz-Turnbull and Petrenko published a meta-analysis and review of the literature on adaptive function and FASD, focusing particularly on the effects of IQ and age. The analysis included 30 studies with a total of 2,272 patients with FASD, 3,294 non-exposed individuals, and 472 individuals with ADHD. The results showed that the FASD group had lower adaptive functioning than the control group, with a large effect size [66]. Even after accounting for moderators such as IQ and age, the analyses remained significant, indicating that neither IQ nor age could explain the large effect size between the groups. When comparing results between individuals with FASD and those with ADHD, the FASD group performed significantly lower, with small to moderate effect sizes. The authors concluded that adaptive skills are weaker in individuals with FASD than would be expected based on their age and IQ, and they struggle more than the ADHD group.

Canadian, Australian, Scottish/English, Polish, and American (CDC) guidelines for diagnosing FASD all include deficits in adaptive skills as an indication of abnormal brain development.

In the 4-Digit Code, deficits in adaptive skills can contribute to a CNS score of 2 (possible sign of CNS involvement) but not to a CNS score of 3 (probable sign of CNS involvement). For further comments, see Section 3.4 on CNS function assessment.

Experience-based knowledge RK-MR HSØ:
We observe that our patients consistently exhibit adaptive difficulties far beyond what would be expected based on their age and cognitive abilities. Identifying this discrepancy is crucial for intervention planning and understanding the actual support and care needs. Among children and adolescents with FASD, we suggest supplementing testing with assessments, such as the Vineland Adaptive Behavior Scales or other comparable methods. In our patient group, the average score on the Vineland is more than -2 standard deviations below the mean, while cognitive ability in the same group falls within the mildly reduced range for age (within -1.5 standard deviations).

Our experience shows that the level of independence in children and adolescents with FASD is often comparable to that seen in individuals with an F70 diagnosis (intellectual disability), despite adequate or only mildly reduced cognitive ability. Therefore, we find that children with FASD often require assistance, support, and reminders from adults at a level one would expect for children half their age. This also means that parents are, in practice, caring for a much younger child over an extended period, leading to more demanding caregiving tasks than what might be anticipated based on the child's chronological age. Using methods such as Vineland or similar tools, one can adequately capture parents' perceptions of their child's functioning and support needs.

9 FEEDBACK AFTER ASSESSMENT

9.1 Summary - Recommendations

- We recommend preparing both a comprehensive assessment report detailing the results of the medical and interdisciplinary evaluation and a separate report with recommendations for interventions.

9.2 Presentation of Results

Once the assessment has been completed, the results should be communicated to the family, possibly the child welfare services (if the child is in foster care), and the referring agency. In addition to the medical assessment report, a separate intervention report should be prepared, directed toward the kindergarten/school and primary care services, focusing on how to understand and address the child's challenges in daily life. This usually includes explanations of learning conditions, such as general learning difficulties, attention/executive functions, and descriptions of comorbid conditions (e.g., anxiety), low adaptive levels, and suggestions on how to address these challenges: for example, providing structure, routines, reducing demands, focusing on error-free learning, compensatory strategies, the need for assistive devices, etc. The practical consequences of the assessment results in the form of interventions should be discussed in a meeting with the parents and primary care services.

A

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Alkohol og graviditet. Hva er farlig for fosteret? Hvordan forebygge og behandle? Rapport fra en ekspertgruppe. Oslo: Helsedirektoratet; 2005. IS-1284. https://www.alver.kommune.no/globalassets/innhald/alver-kommune/alver---helse-sosial-og-omsorg/helsestasjonen/tidleg-inn-rapport-om-alkohold-og-graviditet.pdf

BMJ Best Practice. Fetal alcohol spectrum disorders. https://bestpractice.bmj.com/topics/en-us/1141

Folkehelseinstituttet: Alkoholbruk i den voksne befolkningen - FHI

Helsedirektoratet: Helsepersonell bør tilby gravide en samtale om alkohol og andre rusmidler og ved bruk gi tilbud om oppfølging for å slutte - Helsedirektoratet

Nettside 4-tallskoden: http://depts.washington.edu/fasdpn/htmls/4-digit-code.htm

Rapport om konsekvenser for fosteret/barnet ved bruk av rusmidler/avhengighetsskapende legemidler i svangerskapet. Utarbeidet av Nasjonalt folkehelseinstitutt på oppdrag fra Helsedirektoratet v/ Gunhild Heide Mørch-Johansen, Jannike Mørch Andersen og Gudrun Høiseth, August 2015.

Tidlig samtale om alkohol og levevaner – Veiviser for helsepersonell i svangerskapsomsorgen.pdf (helsedirektoratet.no)

UpToDate: https://www.uptodate.com/contents/fetal-alcohol-spectrum-disorder-clinical-features-and-diagnosis?search=fasd&source=search_result&selectedTitle=1~44&usage_type=default&display_rank=1

Norwegian Clinical Guideline for Diagnostic Assessment of Fetal Alcohol Spectrum Disorder (FASD) in Childhood and Adolescence

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The guidelines can be downloaded here:
(Will be available after the consultation period and potential revision)

Regional Kompetansetjeneste - medfødte russkader - Sørlandet sykehus HF (sshf.no)

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