



Identifying Risk Factors for Autism Spectrum Disorder: A Practical Guide for Clinicians

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ABSTRACT

Background and Objectives: Autism spectrum disorder (ASD) arises from the interaction between genetic and non-genetic factors, including maternal conditions, perinatal complications, and early-life exposures. Recognizing these elements is essential to support primary prevention strategies. The aim of this article is to provide a practical synthesis of the main risk factors associated with ASD and to discuss the available evidence to guide Primary Care professionals.

Content: Prenatal, perinatal, and postnatal risk factors were reviewed and organized into tables designed for easy clinical application. The evidence regarding vaccines and ASD is also addressed. Current high-quality evidence, including large meta-analyses, consistently demonstrates no causal association between vaccination and ASD. Passive surveillance systems are not designed to establish causality and should be interpreted with caution.

Conclusions: Understanding modifiable risk factors for ASD enables Primary Care physicians and multidisciplinary teams to plan preventive interventions, support families, and promote healthy child development. This article provides a concise and practical guide for clinical decision-making and health education.

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INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by difficulties in communication, social interaction, and the presence of repetitive and restrictive behaviors. Its prevalence has increased over recent decades, impacting families, communities, and healthcare systems.

Although genetics plays an important role, several non-genetic factors—including maternal conditions, complications during childbirth, and early-life exposures—also influence the risk of ASD. Identifying these factors is essential for clinicians to act in primary prevention by reducing exposure to modifiable risks.

This article is primarily based on the narrative review by Karimi et al. (2017), which synthesizes the most relevant risk factors for ASD across three critical periods: prenatal, perinatal, and postnatal [1]. Based on this work, additional recent systematic reviews and meta-analyses [2–5] were included to complement the analysis and provide a practical guide adapted to the Brazilian medical context.

Vaccination and autism have been extensively investigated in the scientific literature, with consistent findings across high-quality studies. Large meta-analyses, such as that by Taylor et al. (2014), have consistently demonstrated no association between vaccination—including the measles, mumps, and rubella (MMR) vaccine—and ASD [4,5]. Data derived from passive surveillance systems, such as the Vaccine Adverse Event Reporting System (VAERS), are subject to significant methodological limitations, including reporting bias and lack of causal inference, and therefore cannot be used to establish or suggest causality [6,7].

The aim of this article is to present, in tabular format, risk factors associated with ASD and to propose practical prevention strategies, emphasizing evidence-based distinctions between association and causation. Risk factors are presented according to the strength and consistency of available evidence, distinguishing between well-established associations and those supported by limited or heterogeneous data.

RISK FACTORS

Table 1. Prenatal Risk Factors

Category	Risk Factors
Parental age	Maternal age >34 years; paternal age >34 years
Maternal conditions	Obesity before or during pregnancy; gestational diabetes; hypertension or preeclampsia; bleeding during pregnancy
Stress and mental health	Severe stress, anxiety, or untreated depression during pregnancy
Infections during pregnancy	Rubella, influenza, cytomegalovirus, herpes, varicella
Medications	Valproic acid, antidepressants (SSRIs), β 2-agonists, frequent use of acetaminophen
Nutritional deficiencies	Low levels of folic acid, iron, and vitamin D
Environmental exposure	Pesticides, air and water pollution, heavy metals (mercury, lead)

Table 2. Perinatal Risk Factors

Category	Risk Factors
Gestational age	Preterm birth (<35 weeks); post-term pregnancy (>42 weeks)
Delivery complications	Fetal distress, umbilical cord complications (e.g., cord entanglement), hemorrhages
Type of delivery	Cesarean sections without clinical indication (moderate risk increase)
Others	Pregnancy via in vitro fertilization (slight risk increase)

Table 3. Postnatal Risk Factors

Category	Risk Factors
Newborn health	Low birth weight (<2500 g), severe jaundice, early anemia, severe infections (e.g., meningitis)
Environment	Exposure to cigarette smoke, pesticides, household solvents
Nutrition	Vitamin D and iron deficiency
Emotional bonding	Impaired mother–infant bonding, lack of early social stimulation

Practical Prevention Strategies

Phase	Recommended Actions in Primary Care
Preconception	Assess BMI and encourage a healthy weight; manage chronic conditions (diabetes, hypertension); initiate folic acid and vitamin D supplementation; counsel on environmental risks such as pesticides and pollution; discontinue tobacco and alcohol use.
Pregnancy	Regular prenatal visits; monitor blood glucose and blood pressure; strict control of weight gain; provide emotional support to the pregnant woman; ensure safe use of medications; administer recommended vaccines during pregnancy according to established public health guidelines.
Delivery	Encourage natural childbirth when safe; continuous fetal monitoring; avoid unnecessary cesarean sections; ensure a team prepared for neonatal emergencies.

Vaccines and Autism: Evidence-Based Consensus

The relationship between vaccines and autism has been extensively studied, and current high-quality evidence is consistent in demonstrating no causal association.

- **Consensus from large studies:** High-quality meta-analyses, such as Taylor et al. (2014) and the Cochrane Collaboration review (2020), have not identified an increased risk of ASD associated with vaccination, including the MMR vaccine [4,5].
- **Limitations of passive surveillance systems:** Passive surveillance systems may generate temporal reporting patterns but should not be interpreted as evidence of association or causality, as they are highly susceptible to reporting bias and confounding [6,7].

- **Balanced interpretation:** Current evidence does not support any causal relationship between vaccines and ASD. Healthcare professionals should communicate this clearly while addressing parental concerns with empathy and evidence-based information, reinforcing the well-established safety and benefits of vaccination.

DISCUSSION

The prevention of autism spectrum disorder (ASD) involves a set of relatively simple yet impactful interventions that can begin even before conception and be effectively implemented within Primary Care. In this context, the physician plays a central and strategic role—not only in diagnosing and managing conditions, but also in educating, counseling, and longitudinally monitoring women of reproductive age, pregnant individuals, postpartum patients, and young children. By doing so, clinicians can actively reduce exposure to modifiable risk factors such as maternal obesity, gestational diabetes, hypertensive disorders, nutritional deficiencies, and exposure to environmental toxins, including pesticides and household pollutants. Importantly, these actions are often low-cost, feasible, and scalable within public health systems, making them particularly relevant in resource-limited settings.

Furthermore, the integration of multidisciplinary teams—including nurses, nutritionists, psychologists, and community health workers—can enhance the effectiveness of preventive strategies. Early identification of psychosocial stressors, mental health conditions during pregnancy, and suboptimal maternal–infant bonding allows for timely interventions that may positively influence neurodevelopmental outcomes. Monitoring child development during routine visits also enables early detection of atypical developmental trajectories, facilitating prompt referral and intervention when necessary.

Vaccination in the context of ASD remains a topic of public concern despite consistent scientific evidence demonstrating no causal association. Therefore, the persistence of public concern requires careful, empathetic, and evidence-based communication. Although passive surveillance systems may generate hypotheses, they are not suitable for establishing causal relationships and should not be interpreted as evidence of risk. The current body of high-quality scientific literature consistently supports the safety of vaccines with respect to ASD.

Ultimately, effective communication is essential. Building a trusting relationship with patients and families, addressing concerns transparently, and providing evidence-based guidance are key components of successful prevention strategies. In this sense, the physician acts not only as a healthcare provider but also as an educator and advocate for child health.

CONCLUSION

The identification and prevention of risk factors for ASD should be an integral part of clinical practice, spanning from reproductive planning through the early years of life. A proactive and preventive approach allows healthcare professionals to intervene at critical windows of neurodevelopment, potentially reducing the incidence or severity of ASD-related outcomes. This guide, primarily based on the study by Karimi et al. (2017) and complemented by additional systematic reviews and meta-analyses, offers a practical and clinically applicable framework for Primary Care physicians and multidisciplinary teams.

By systematizing current evidence into accessible tables and actionable recommendations, this article supports early and targeted interventions that promote healthy child development. In addition, it reinforces the importance of continuous education, surveillance, and patient-centered communication in addressing both established and emerging risk factors. Ultimately, such strategies may contribute to reducing the overall burden of ASD on families, healthcare systems, and society, while fostering a more preventive and integrative model of care.

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