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Case report

Nursing interventions and assessment tool for neonatal abstinence syndrome (NAS): a case report

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Abstract

A newborn female was admitted to the Neonatal Intensive Care Unit 2 days after birth with neonatal abstinence syndrome (NAS). The patient displayed withdrawal symptoms from substance misuse, which was passively absorbed *in utero* via the placenta. This clinical scenario analysis aims to investigate which nursing interventions are dedicated to restoring normal vital functions in NAS patients and which assessment tool is most commonly used to monitor withdrawal symptoms. NAS is a medical condition that affects newborns of drug-abusing mothers. The clinical presentation can involve different organ systems: the central nervous system (CNS), autonomic nervous system (ANS), gastrointestinal (GI) system, and respiratory system. Possible symptoms include excessive or high-pitched crying, agitation, fever, tremors, sleep disturbance, vomiting, weight loss, seizures, sweating, yawning, sneezing, tight muscle tone, tachypnoea, poor feeding, and uncoordinated suction. A NAS diagnosis can be confirmed by verifying the presence of drugs using biological tests and assessment tools to classify and manage the condition. Several biological tests are available to confirm exposure to a misused substance: urine testing, meconium testing, cord blood testing, and baby hair testing. The most commonly used assessment tool is the Finnegan Score. Treatment for an infant with NAS involves both non-pharmacological and pharmacological interventions and a multidisciplinary team. This team works with the parents, particularly the mother, who must be part of the newborn's healing process.

Keywords

Neonatal abstinence syndrome, NAS, neonatal abstinence syndrome rating score, neonatal abstinence syndrome nursing care, Finnegan scoring, newborn, neonatal withdrawal syndrome.

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Introduction

Neonatal abstinence syndrome (NAS) is "a collection of symptoms occurring in a baby as a result of withdrawal from physically addictive substances taken by the mother" [1]. Opioid exposure can be attributed to prescription medication use, improper medication use or abuse, illegal drug use, or medication-assisted treatment (MAT) for opioid abuse [2]. Globally, in the last 2 decades, the prevalence of individuals with substance use disorder (SUD) has increased by 47%, of which approximately 1/3 are females [3]. Furthermore, the number of opioid-based prescriptions for both medical and inappropriate use has increased dramatically in the USA and, to a lesser degree, in Europe [4]. In the USA, it is estimated that between 14-22% of recently postpartum females take opioids [5]. Around 1/5 of females admitted to improper use or abuse of prescription medications [6]. A further 5.4-5.8% admitted to using illegal drugs, such as opioids, marijuana, cocaine, and methamphetamines [7, 8]. The rate of MAT for childbirth in hospitals was 8.2 in every 1,000 admissions [9]. In Europe, data is much more limited. In Scandinavian countries, only approximately 1% of pregnant females are prescribed opioids [10]. Meanwhile, the use of illegal drugs and psychoactive prescription substances has been reported in 2.9% of Spanish [11], 3.6% of Danish [12], and 0.4% of Italian [13] pregnant females. In 2017, the estimated rate of NAS in the USA was 7.3 in every 1,000 live births [9], while in the UK, it was estimated to be between 1.6% [14] and 2.7% [15]. In Germany, the rate was estimated to be 2% [16], and in Spain, it was estimated to be 0.91% [17]. NAS is a common problem in newborns whose mothers have taken opioids during pregnancy [1]. In approximately half of cases, pharmacological treatment is needed [18, 19]. Additionally, it seems that male newborns are more likely to be diagnosed with NAS and receive pharmacological treatment than female newborns [20].

There are several non-pharmacological treatments nurses can use to control the symptoms of NAS: keeping the newborn in the incubator and monitoring the temperature; wrapping the baby in sheets and minimising external disturbances and nursing interventions; and monitoring vital signs for risk of respiratory depression and seizures [21]. Many tools have been developed to assess the degree of abstinence in newborns. These enable periodical, objective, and thorough newborn evaluation so their condition can be monitored and pharmacological treatment established and adjusted when required. The use of the Finnegan Score or its modified version appears to be an effective tool for the evaluation of NAS [22]. This tool was created to assess NAS severity and guide therapeutic treatment. The Finnegan Score is comprised of 21 items, with each item relating to a different symptom. A score between 1 and 5 is given based on the severity of the symptom presentation. Each item is further categorised into 1 of 3 groups based on the organ system it involves: central nervous system (CNS) symptoms (high-pitched or continuous crying; sleep disturbances; tremors; increased muscle tone; excoriations; generalised seizures), respiratory, metabolic, and vasomotor symptoms (fever; sweating; yawning; nasal stuffiness; sneezing; tachypnoea), and gastrointestinal (GI) symptoms (diarrhoea; vomiting; poor feeding; weight loss). Pharmacological treatment is started if the total score is 12 or higher for at least 2 consecutive evaluations or more than 8 for 3 consecutive evaluations. The assessment is performed by the nursing staff looking after the newborn. The assessment is carried out 2 hours post-birth and then every 4-6 hours, depending on symptom severity. To ensure assessment accuracy, it is recommended that the evaluation is carried out when the newborn is calm and/or after meals [23, 24].

Case presentation

A 2-day-old female, born at 32^{+4} weeks, was admitted to the Neonatal Intensive Care Unit (NICU) following seizures, which were reported by the

mother to the medical team. On arrival, the patient was agitated, sweaty, and had tight muscle tone and increasing body temperature. Tremors could be seen after stimulation, and when given a bottle, the patient's suctioning was frenetic. Doctors decided to run a toxicology screen, which returned positive for opioid presence. It was assumed the mother used opioids during pregnancy. The team proceeded with standard protocol, which included assessing the patient using the Finnegan Score every 4 hours, to monitor whether the patient fit the diagnosis for NAS. Pharmacological treatment for NAS caused by opioids uses morphine, methadone, or clonidine [7]. Doctors started treatment with 25 units (I.U.) of sublingual methadone 4 times a day, with a decrease in dosage every 48 hours. The patient initially responded well to the treatment, with her Finnegan score becoming negative (score = 1). After the first 48 hours, the medical team agreed to decrease the prescription of methadone to 25 I.U. twice a day. After this change, the patient appeared agitated, slept for less than 60 minutes after meals, was sweating, presented with increased muscle tone, and had a continuous, high-pitched cry. Following reassessment, the patient's Finnegan score had increased from 8 to 12.

After a week, the doctors deemed it appropriate to transfer the patient from the incubator to the cot, as the patient had started to respond well to the treatment. The patient continued to receive 24-hour monitoring. After 4 days, the methadone dose was reduced to 20 I.U. every 12 hours. However, on the first night of the new regime, the patient again looked agitated, slept for a short time after feeding, and had a high-pitched cry. After post-admission day 10, the medical team decided to monitor cerebral activity using cerebral functioning monitoring (CFM) to assess whether there was brain damage. The CFM was removed after 20 hours of monitoring, and the results were normal.

As there was persistent increased muscle tone in the lower limbs, the medical staff requested electroencephalogram (EEG) and physical therapy assessments to be carried out. The EEG was performed the next day and was normal. The medical team decided to change the methadone treatment to 20 I.U. in the morning and a further 15 I.U. after 12 hours. The following day, the dose was again changed to 15 I.U. twice a day. During this, the patient was constantly monitored to assess how she was coping with the new regime. The patient seemed to respond well to treatment. However, the patient still presented with mildly increased muscle tone in the lower limbs, including "synchronised cramps" where movements appeared rigid, and the muscles of the limbs and torso contracted and released simultaneously.

After 6 days, the methadone dose was further reduced to 10 I.U. twice a day. Upon physical examination, the patient appeared normal. Furthermore, a negative Finnegan score was obtained. Once 24 hours since the last methadone regime change had passed, doctors decreased the dose to 8 I.U. twice a day. That night, the patient displayed some muscle hypertonia. Despite this, doctors were considering discharging the patient from the NICU 20 days after admission. When the patient was admitted, social services were alerted to organise follow-ups for both the patient and the mother after discharge. Social workers also proposed the mother use a supported living service with the newborn, which she seemed to accept. So, the doctor proceeded with the discharge.

Discussion

The patient was diagnosed with NAS 2 days after birth after withdrawal symptoms. Biological tests confirmed the presence of drugs in the urine. According to previous publications, there are several tests that are most commonly used for NAS diagnosis, including urine tests, meconium tests, cord blood tests and hair tests [23]. As one study states, "identifying children born from drug-addicted mothers is essential to effectively recognise and treat a possible NAS and its complications" [24]. To treat NAS, it is critical that the newborn is placed in an incubator, external stimuli are limited, and vital signs are continuously monitored [24]. In the current case, non-pharmacological treatment was insufficient. Therefore, doctors prescribed treatment with methadone for 15 days, which was gradually reduced until being completely stopped. However, the patient was surrounded by a prosthetic environment, and several non-pharmacological techniques were administered by the nursing staff. Non-pharmacological approaches must be the first line of care for healthcare professionals, as they encourage the mother-baby dyad even after discharge, as mothers can introduce these approaches within their home environment, such as darkening the room, keeping quiet, and avoiding visual and auditory stimuli [3].

Conclusion

The European Monitoring Centre for Drugs and Drug Addiction reports that up to 30,000 pregnant

females may be using opioids in Europe each year; the number of pregnant females using non-opioid drugs is thought to be similar [25]. It is essential to quickly identify newborns affected by NAS to ensure they are treated promptly and adequately. It is also important to reserve pharmacological treatments for critical patients. For non-critical patients, non-pharmacological treatments should be used first. Such treatments include adopting techniques to improve sleep quality, avoiding external stimuli, and creating a "healing and prosthetic" environment. Staff must be properly trained to raise awareness among professionals and to eliminate discrimination that could lead pregnant or postpartum females to avoid asking for help [1].

Ethics and consent

This case was written in accordance with all ethical considerations. Written patient consent was obtained from the mother.

Declaration of interest

The Authors declare no conflicts of interest. The Authors received no specific funding for this work.

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