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Short Communication

Digital Technologies in Remote Monitoring of Childbirth with a Clinical Decision Support System (CDSS)

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Abstract

The AIST_PARTUS service is an intelligent system for central monitoring of partograms with automated assessment of critical indicators of the mother and fetus during labor, analysis of the progress of labor (is the frequency and duration of contractions sufficient/cervical dilation/head advancement) with the formation of signal lists across the entire region for the purpose of labor supervision.

The AIST_PARTUS service is a solution for clinical workflows that performs such important functions as continuous monitoring of labor from basic to advanced levels and automated assessment of critical deviations, while ensuring mobility and data security.

The main structural element of the "AIST_PARTUS" service is a digital partogram, which can be maintained on any mobile device in the obstetric hospital.

The intelligent system of central monitoring of partographs "AIST_PARTUS" offers such innovative options as:

- Automated analysis of all critical indicators
- Visual marking of deviations,
- Pop-up tips on labor management tactics
- Remote monitoring across the entire region, which provides AIST_PARTUS with a key role in online monitoring of births in various medical care settings.

Flexible access to patient vital data provides enhanced clinical decision support, improving quality of care and streamlining workflow.

"AIST_PARTUS" is the basis of a comprehensive solution for online monitoring of labor, designed to help clinicians confidently make informed decisions.

Keywords: *Partogram; Information Technology; Remote Monitoring; Telemedicine; CDSS; Electronic Document Management; Obstetrics; Childbirth Online; Personal Medical Assistant to a Doctor*

Presentation came into force in the Russian Federation, regulating new rules and the format of maintaining a partogram, different from previous years of using a partogram in obstetric practice.

According to the World Health Organization (WHO), almost 140 million births occur worldwide every year, and most of them have a low risk of complications for the mother and child. According to the statistical digest of the Russian Ministry of Health (key indicators of maternal and child health, activities of the child protection and obstetric services in the Russian Federation), the share of normal births in 2018 was 37.3%, i.e. 584,767 [1].

During labor, in order to dynamically assess the condition of the mother and fetus, it is recommended to keep a partogram [2]. The partogram is a structural element of the medical record of the mother when providing medical care in an obstetric hospital.

Medical records are maintained in the form of electronic documents (hereinafter referred to as electronic medical records) without duplication on paper in the absence of a patient's (his legal representative's) application, drawn up in simple written form, for maintaining his medical records in paper form and subject to compliance with the requirements of the procedure for organizing a document management system in the field of health care in terms of maintaining medical records in the form of electronic documents [3].

In the Sverdlovsk region, the intelligent system of central monitoring of partographs "AIST_PARTUS" with technologies for remote monitoring of digital partographs and support for medical decision-making has been launched.

Doctors were given the opportunity to switch from paper to electronic partographs.

What benefits has the professional community received from the implementation of IT solutions for maintaining a digital partogram and online monitoring of labor?

Convenient access to information helps in clinical decision making

A specialist can view the necessary information about a patient online and on a work computer, and on a tablet from the hospital or remotely, for example, from home or on the way to work. AIST_PARTUS provides access to the main patient monitoring data almost anywhere and at any time.

Figure 1

Complete overview of patient information

You can access the patient monitoring data history throughout the entire care cycle – in AIST_PARTUS from admission to the maternity ward or emergency delivery room until delivery.

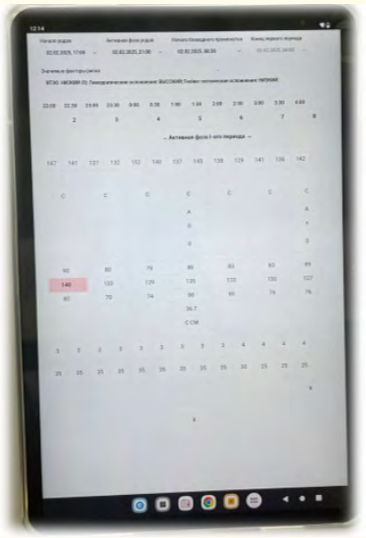

Figure 2

Advanced clinical decision support to improve quality of care

"AIST_PARTUS" provides monitoring of the patient's condition during labor, and also has the functions of an intelligent assistant for reviewing data and tools for supporting clinical decision-making. Medical personnel can receive timely access to clinical information of the entire EHR of the woman in labor from registration for pregnancy to the current state.

The functions of the intelligent assistant to the doctor/midwife are realized through automated analysis of all critical indicators during labor:

- Fetal condition during labor: basal heart rate, CTG decelerations, nature of amniotic fluid, fetal presentation, presence and nature of birth tumor and head configuration.
- The condition of the woman in labor: pulse, blood pressure, temperature, urine type.
- Progress of labor: whether contractions are frequent and long enough, cervical dilation, head advancement.

The AIST_PARTUS module generates signal lists (partograms with deviations) across the entire region for the purpose of monitoring labor.

The digital partograph also features automatic visual marking of critical indicators and pop-up tips when filling it out.

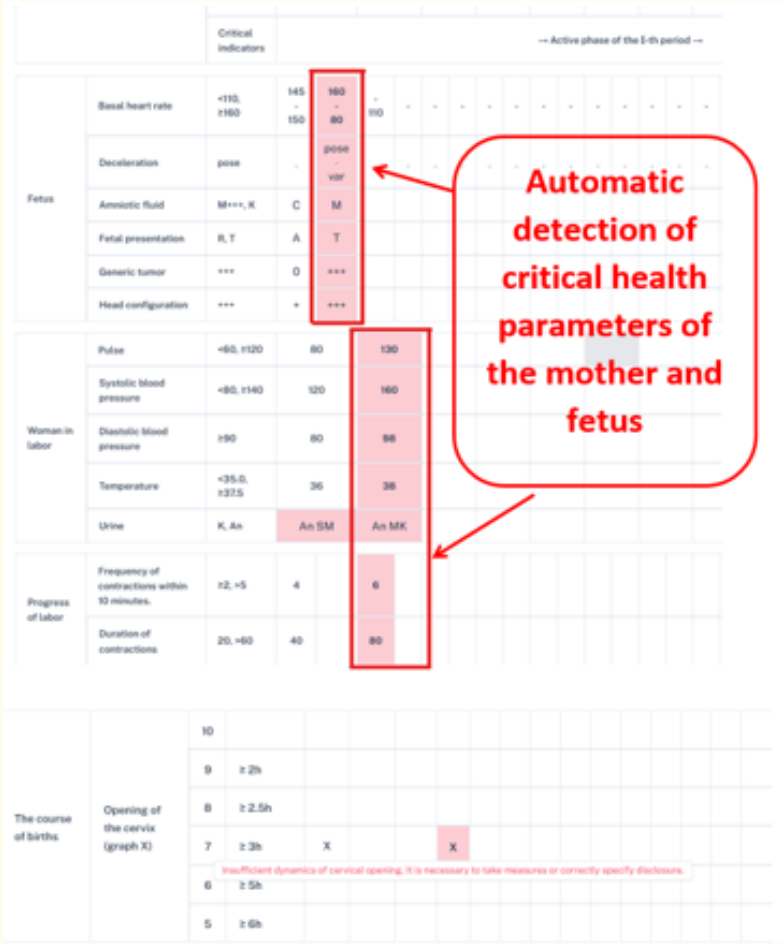

Figure 3

"AIST_PARTUS" helps the medical institution to fulfill the most important task - to provide high-quality and safe medical care to women in labor.

Information based on professional standards to improve collaboration

AIST_PARTUS is integrated with the electronic medical record in the medical information system AIST "RAM". The system is based on professional standards and supports integration with the general IT infrastructure of the maternity service in order to make the most effective use of existing technologies in improving the quality and safety of medical care for pregnant women and women in labor, as well as in organizing electronic document management in maternity care.

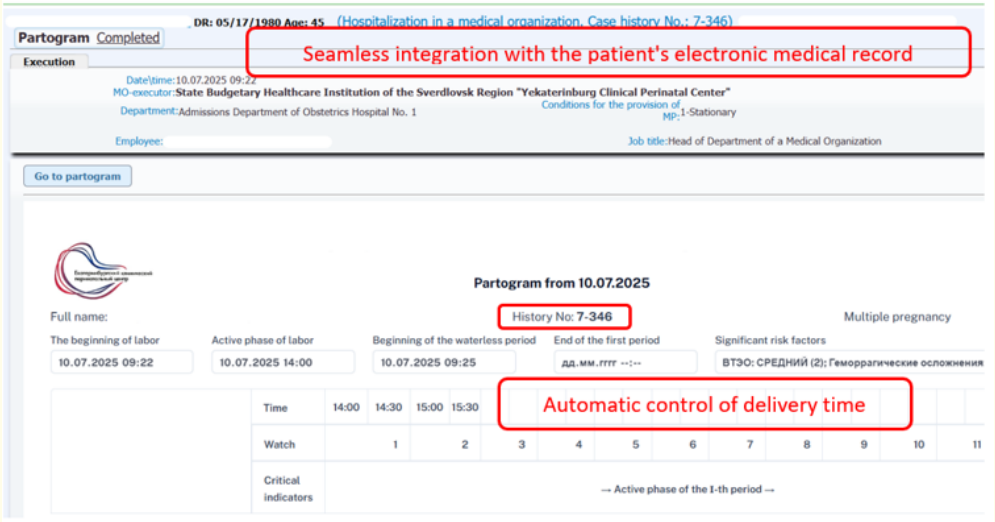

Figure 4

Real-time monitoring for quick interpretation

Quickly view, analyze indicators and take action based on the received clinical information. You can use AIST_PARTUS filters, in which partogram data will be displayed in real time individually depending on the condition of each woman in labor. The " drill-down " function allows you to view the full volume of data on each patient.

Online monitoring of childbirth has become possible...

Supervision for remote and centralized monitoring of childbirth in the context of one medical center or the entire region.

For ADCC curators and managers in the MO, data monitoring functionality has been implemented:

- Formation of signal lists for the entire region or for your own MO.
- Filtering partographs with deviations.
- Automatic output of the latest partogram values.
- Integration with EHR for telemedicine consultations.

Electronic document management in childbirth to optimize labor resources of obstetric hospital staff

1. The digital partogram replaces the patient's observation diary, except for recording changes in the delivery tactics with a vaginal examination.
2. The digital partogram is stored together with the electronic medical record for the entire regulated period.
3. Simultaneous management on a tablet and a computer, by a midwife and a doctor from anywhere in the obstetric hospital.
4. A digital partogram is one of the criteria for assessing the quality of both the provision of medical care in the field of obstetrics and gynecology and the organization of electronic document management in accordance with the vector of development of digital healthcare.

QR - identification of the patient's identity when maintaining a digital partograph

A QR code on the mother's identification bracelet is scanned from a mobile device to enter a digital partograph to gain access to the patient's EHR and subsequently maintain the partograph in the electronic birth history. This solution allows minimizing the impact of the human factor on the processes of identifying the patient's identity and their medical documentation. This is especially important in the context of a staff shortage in perinatal centers, the presence of people with the same last name, and a flow of patients who do not speak Russian.

The intelligent system of central monitoring of partograms "AIST_PARTUS" is a system for supporting clinical decision-making during labor management at any level of medical care.

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