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## The Importance of Continuous Blood Pressure Holter Monitoring Devices in the Correct Diagnosis of Arterial Hypertension in Pediatric Patients

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**Abstract:** Arterial hypertension in pediatric patients is still an underdiagnosed entity. There are described numerous factors that can potentially interfere with blood pressure values and therefore influence arterial blood pressure variations such as: strong emotions, emotional stress, all of which, under normal blood pressure measuring techniques, can be associated with high blood pressure values, thus being established the diagnosis of arterial hypertension. An extremely important step towards the correct diagnosis of arterial hypertension in pediatric patients as well as for adults is represented by continuous holter monitoring of arterial blood pressure devices. This paper presents the importance of such devices for diagnosing arterial hypertension, and “white-coat” hypertension, respectively, in pediatric patients.

**Keywords:** holter; blood pressure; “white-coat” hypertension; pediatric

**Abbreviations:** BP= blood pressure; HTN=hypertension; ABPM= ABPM=ambulatory blood pressure monitoring

### Introduction

Holter devices for continuous monitoring of blood pressure are modern electronic means by which blood pressure is automatically monitored, the measurement values being stored in the internal memory of the device, to be later downloaded into the computer and interpreted by the cardiologist specialist.

ABPM devices represent a fantastic progress in the field of cardiology, especially in terms of diagnosing arterial hypertension in the adult and pediatric patient.

The ABPM holter device consists of an electronic device which automatically measures and stores the BP measurements in its internal memory, with the possibility to download the results in the computer, then print them as a detailed report, and suitable cuffs for different types of patients: adult, obese, pediatric. The size of the cuff is extremely important, as an inadequate cuff may result in falsely modified blood pressure values).

The main advantages of ABPM Holter devices are: accurate measurements, the possibility of selecting the time intervals of monitoring and the frequency of monitoring, eliminates the risks of measurement errors, more accurate diagnosis of arterial hypertension, identifies situations of “white-coat”

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hypertension, Identifies the cases of “masked” hypertension, it identifies persistent hypotension, possibility to trigger a monitoring at the patient's command whenever the patient accuses any symptoms, is a simple method that requires a minimum of preparation, possibility of monitoring for at least 24 hours, accurately evaluates the effectiveness of antihypertensive therapy.

Other situations in which ABPM has been useful are: the assessment of secondary HTN, obesity, chronic kidney disease, sleep apnea.

Previously, “White-coat” hypertension could be diagnosed by comparing home blood pressure measurements (which are often normal) with those obtained at the doctor's office (which may differ in the sense of obtaining higher BP values at the doctor's office)- this method may be influenced by the device type, and using different devices may not reflect the real BP variations).

The most effective method to correctly diagnose variations in blood pressure (high blood pressure, masked hypertension, “white-coat” hypertension, hypotension), then integrating them into clinical context is by using ABPM Holter devices. This can shape a pattern of the blood pressure levels over a minimum time period of 24 hours.

Since the beginning of the COVID-19 pandemic, from March of 2020 until March of 2021, in the “Sf Ioan” Clinical Emergency Hospital for Children in Galati were admitted to the cardiology ward 16 children with high blood pressure at the time of admission, in the context of subjective manifestations such as chest pain, dyspnea, headache, 5 of which were diagnosed with “White-coat Hypertension”.

## **Material and Method**

The way of assessing the blood pressure levels in these patients was by using electronic devices at fixed intervals, then monitoring using ABPM Holter devices, which highlighted the evolutionary pattern of blood pressure, disproving in some cases the suspicion of arterial hypertension, while confirming it in other cases.

## **Results**

Of the 5 cases of “white-coat” hypertension diagnosed using ABPM holter monitoring devices, 4 of them were male patients, 1 was a female patient and were aged 11 to 18 years old, as follows: March 2020-1 male patient, April 2020-1 male patient, June 2020-1 male patient, October 2020-1 male patient, March 2021- 1 case (female).

BP at admission ranged between 133/89 mmHg and 162/102 mmHg. Although BP values were elevated at the moment of the admission, after confronting these values to the ones obtained after ABPM holter monitoring, it was established that none of these patients had arterial hypertension, but rather displayed “white coat” hypertension.

Although the “white-coat” hypertension cases were diagnosed during the COVID-19 pandemic, none of the patients were infected with the new coronavirus, but displayed subjective symptoms as a result of the restrictions imposed nationally.

While among adolescents' subjective symptoms were associated with variations in BP, and occasionally with transient tachycardia, in the age group of school children and preadolescents the main symptoms

were subjective sensation of dyspnea or chest pain, none of these symptoms being associated with abnormal values of BP.

An extremely important factor influencing blood pressure levels is the psychological status of these patients, as intense emotions, stress and anxiety can seriously interfere with BP values, in such cases ABPM holter devices being extremely important.

Since the beginning of the COVID-19 pandemic, safety measures have been taken to isolate the population in order to reduce the spread of the SARS-COV2 virus.

The effects of these measures were acutely felt among pediatric patients, which lead to an increase in the number of presentations at the hospital for subjective symptoms such as chest pains, tachycardia or hypertensive episodes.

The patients were psychologically counseled, and the common aspect observed in these cases was the emotional substrate amplified by the measures adopted world-wide in the current epidemiological context, which led to the externalization of different adaptive modalities.

## **Discussions**

In the “Sf Ioan” Clinical Emergency Hospital for Children in Galati it is proven the necessity and usefulness of holter devices for continuous monitoring of blood pressure because it accurately determines the type of BP variations over the course of at least 24 hours, eliminating the error factors caused by the patient's particularities. Such devices are a superior way of BP monitoring compared to the conventional methods because it is allowed real progress to be made in the correct diagnosis of blood pressure variations, while ensuring a more accurate diagnosis of arterial HTN, respectively the issuing of specific recommendations depending on the types of blood pressure variations.

## **Conclusions**

Often underestimated, psychological counseling is extremely important for these patients because it can highlight their emotional substrate as well as the tendency to somatization of subjective sufferings, which can lead to variations in blood pressure, or even hypertensive episodes in times of intense stress.

Communication between patients and parents, respectively specialists leads to early identification of the source of the disorders, thus facilitating the establishment of optimal solutions.

## **Aknowledgements**

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