Point-of-Care in the Emergency Department: Better Decisions or Too Much Information?

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The pediatric emergency department has unique peculiarities regarding the medical decision. The main goal is to identify life-threatening conditions and promptly provide appropriate treatment. Pediatric emergency physicians must make diagnosis based on undifferentiated symptoms, without previous relationship or knowledge about the patient. The priority must be to rule out worst case scenarios although this is often not the parents priority.[1] The pressure caused by the great turnover, the parents expectations, the impossibility of reassessment are some of the factors that make the decision harder.[2]

Sometimes there is a need to assess the evolution of the disease, after excluding life-threatening conditions, to make the correct diagnosis and some cannot be made in the emergency department at all. The resources have necessary constraints and are not always immediately available.

The main objective of any point-of-care technology is to improve clinical decision-making capacity quickly, efficiently, and affordably with excellent sensitivity and specificity. In the past years, the search for this has increased. Searching PubMed for "point of care", we find an exponential increase in the number of entries in the last years: 9204 articles in 2019.

Point-of-care testing (POCT)

Point-of-care tests refers to the possibility of obtaining relevant results of biochemical or hematological markers near the patient, in a shorter period: minutes rather than hours.[3]

There are several POCT in use in pediatric emergency department for years, namely blood glucose, ketonemia and blood gases.

In recent years there has been intense research around POCT that contributes for the quick identification of potentially serious bacterial infections.

The advantages of POCT are the equipment mobility, the shorter turnaround, the smaller volume of biological product and blood samples, generally obtained by a finger prick.[4] This means faster decisions in critical patients, reduce length of stay in health services, and less invasive procedures: capillary blood sampling rather than venipuncture.

There are also some risks that we must be aware of. Point-of-care testing devices may not be as reliable as laboratory-based tests, and the team must be sure that calibration and maintenance of the equipment is taken care of. In labs there are trained professionals for this job. There is little literature validating these new POCT markers.

Another risk that we should be aware of is that easier and faster tests can be a stimulus to a greater prescription of tests than clinical judgement would recommend. It could increase health care costs and, perniciously, making decisions worse by reducing the focus on careful physical examination and clinical history as well as precipitating decisions that could and should await the patient clinical evolution. in addition, there are fewer parameters available in POCT, so decisions are less informed.

A study published in this Portuguese Journal of Pediatrics edition validates two types of POCT (white blood cell count with differential ant C reactive protein).[5] This validation is fundamental to make sure that the values are reliable. But we should also evaluate how POCT impact on costs, emergency department patient flow and on medical decisions.

Point-of-care ultrasonography (POCUS)

Point-of-care ultrasonography is another technique increasingly used in the context of pediatric emergency department. It is portable, accessible, provides immediate results in real time and, if used for certain purposes, is reliable and easy to use with some targeted training.[6] Diagnostic POCUS is dynamic, that is, the same

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provider can perform and interpret the study, integrate this information in the clinical decision, and then repeat the study to identify changes.

Point-of-care ultrasonography supports clinical history and physical examination to answer specific clinical questions, helping narrowing differentials or guiding therapeutics. It should not be used to establish, by itself, a definitive diagnosis.[6] As a general rule POCUS can support a diagnosis suspected by clinical workout when the right findings occur, but it should not rule out a diagnosis raised by clinical history and physical examination.[7]

We cannot neglect the risk of bad decisions due to lack of qualifications in ultrasound, so it is mandatory that our practice is supported by specific scientific evidence in the context we are working.

Literature supports POCUS in several clinical settings, such as:

- Hemodynamic POCUS (or focused echocardiography) provides physiologic information regarding preload, contractility, and afterload conditions to understand pathophysiology and target therapies. Assessment of cardiac function establish etiology of shock and identify signs of pulmonary hypertension have good support in the literature. It should not be used to identify congenital heart defects or complex anomalies which requires a pediatric cardiologist.[6]
- Lung POCUS is a growing field with great clinical utility. It can be used to support the diagnosis of pneumonia, pneumothorax or pleural effusions and guide procedures.
- Abdominal POCUS: appendicitis, pyloric stenosis, intussusception are examples of pediatric emergencies in which POCUS can be used to help diagnosis. In children with blunt abdominal trauma, the focused assessment with sonography for trauma (FAST) protocol can help identify hemorrhage.
- Vascular POCUS can be used for the identification of thrombosis, using color flow or spectral doppler.
- Soft tissue POCUS distinguishes soft tissue abscess from cellulitis and helps in the identification of foreign bodies.
- Musculoskeletal POCUS: several studies established a role for POCUS in screening and diagnosing bone fractures, especially of the long bones. Joint effusions can be identified and evaluated with POCUS helping in the differential diagnosis of septic arthritis. Lately, POCUS has been used for osteomyelitis as well.[6-9]

The safe use of POCUS requires knowledge of its applicability and limitations, as well as structured training focused on clear objectives.

Final remarks

The number of tools available for quick and immediate assistance to the pediatrician decision in an emergency context is likely to increase rapidly in the coming years. We must know and master them to guarantee the best possible decision in the shortest time and with rational consumption of resources.

There is a risk that we are increasing the complexity of the medical decision process by integrating several new data to the equation. In order to prevent this, it is essential that we always keep the main focus on the clinical evaluation which is the basis of any diagnostic reasoning from which doubts arise that perhaps can be answered with the aid of complementary diagnostic tests. Point-of-care solutions are more accessible and quick complementary diagnostic tests but must be used in well-defined situations.

These new techniques need validation in our specific reality, so more studies like the one published in this edition are needed.

In all fields of knowledge big data analysis, deep learning and artificial intelligence are being integrated in the decision process, turning human decisions better, faster, and more assertive. We will probably see this happen in emergency department as well.

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Conflicts of Interest

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