Historical Article

The art of diagnostic approach of a child

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Abstract
While trying to approach a child diagnostically, the child has to be relieved from *"white coat anxiety"* as well as being in awe of the *doctor-ogre*. The clinicians need to establish a suitable environment in which the child's fears will be appeased and the parents will be re assured in order for them to be content and fulfilled. The diagnostic approach of the child is not always easy. Finding the true cause of a child's symptoms is not as simple as following a cookbook recipe as there are no specific ingredients or measurements that will lead to a safe result.

Keywords: child; diagnosis; medical history; clinical examination; radiographs

Introduction
The diagnostic approach of the sick child needs to be broken down into many components. In addition, the underlying analysis will take into account many factors in order to establish the true causes.

There are few publications dealing with the issue [1, 2]. As far as the clinician is concerned, experience may lead to hurried conclusions, which are subjective and not based on evidence. We live in an era characterized by inconsistency and pluralism therefore this should not be a surprise. Recanting is a part of human nature.

Medicine as both a science and an art needs to overcome these hurdles [3]. The achievements of technology can aid to this end. Artificial intelligence also offers solutions. Scientific breakthroughs have offered therapies for ailments formerly considered incurable. In addition, the mapping of the human genome has established the pathogenesis of several diseases thus opening the door to personalized treatment.

Human willpower is the backbone of resistance. Machines cannot and must not replace humans. The artificial intelligence of a robot is subject to programming and cannot evolve and feel in the same way as a human being. Even when the relationship between a doctor and a patient has been disrupted, it can always be mended. The art of the diagnostic approach to the sick child gives the clinician the opportunity to develop virtues that may have been in a state of hibernation.

Welcome
As the child enters the examination room, a new experience begins. Everything is relevant, ranging from the color of the walls, the pictures, the proper ventilation as well as the temperature, which all contribute to making a positive impression on the child's psyche. Overall, the physician's attitude is the cornerstone of this experience [4].

The doctor's smile and positive attitude will initial-

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VOLUME 75 | ISSUE 1 | JANUARY - MARCH 2024

ize an optimistic beginning. Just by saying an honest *"welcome"*, the doctor will minimize the child's anxiety and eliminate possible pre-existing stereotypes. In order to establish a positive climate there is no need for excessive compliments. The doctor should be brief and precise. He should be himself and avoid pretending. The child has intuition and is able to judge as well as compare (**Figure 1**). However, the doctors are good actors when they manage to hide their exhaustion and manage to appear sober and generous. This is required of the circumstances.

This can be achieved by drawing attention to an unimportant detail such as the child's shoes, hair or bag. Phrases such as *"What wonderful shoes you are wearing!"* or *"Those pigtails match your face"* or *"I'd like to know what you're treasuring in that delightful bag of yours!"* could prove calming for the child even though they may not be entirely true. It does not need too much effort to break the ice. The child will be occupied by trying to respond and will forget its fear regarding the consultation.

The archetype of a doctor is that of an individual in a white coat. White coats are connected to seriousness, expertise, authority and a protagonist role. This of course applies to the adult world but is not the case in the world of pediatrics. Children feel threatened by the white coat and this can be an obstacle in any attempt to approach the child [5, 6]. The alternative would be for the physicians to wear a badge with their credentials.

Children, however, cannot be fooled. If there is going to be unpleasantness during the examination the doctor should warn both the parents and the child beforehand. Otherwise, the child's initial fears will be justified.

The first steps of approaching

The climate, which will be established in the following moments between the clinician and the parents, is the next step. Without trying to ignore the child, we need let the parents explain the reason of the consultation.

The clinician needs to show his concern for the child by asking questions which relate to the child's life, his or her school, friends, schoolmates and outdoor activities. The clinician should seek the parents' approval.

The child may promptly show unwillingness to be examined. Its mood should be taken into account, seriously (**Figure 2**). However, the doctor may use tricks in order to distract the child. One way would be mention someone the child respects and say something like *"What would grandpa say if he knew you didn't let the doctor examine you?"* for instance.

Figure 1. *The child has intuition and is able to judge as well as compare.*

Figure 2. *The child may promptly show unwillingness to be examined.*

The pediatrician who initially examined the child is usually the doctor who has referred the child. In other cases, this could be a doctor of the same specialty who lacks experience with children. In every case, one needs to be careful and respect the reason for the referral. It is not advised to underestimate the view of the referring physician. It is always a good idea to be polite. The parents should be reassured that they are on the right track in order to find a solution for their child and have the impression that the doctors are in collaboration between them.

Even if the previous treatment did not work or the

VOLUME 75 | ISSUE 1 | JANUARY - MARCH 2024

Figure 3. *The child may reveal the truth.*

Figure 4. *The clinical examination should not appear to be so.*

diagnostic approach was not right, it is useless to criticize colleagues. Being subtle and polite may not be mentioned in the Hippocratic Oath [7]; however, it is an essential part of good practice.

History, as the keystone of diagnosis

One must of course allow the child to speak for itself. Children as well as adolescents are often considered unreliable however; we need to listen to their point of view. We need to be resilient if both sides tell a different story while paying attention to the parents' comments. The child may reveal the truth (**Figure 3**). If, for instance, it tells us that during a fall on its outstretched hand it received a kick on the lateral side of its elbow from an obese schoolmate, we assume that the injury could be that of an avulsion fracture of the medial epicondyle. In conclusion, we need to weigh the information given by both the child and the parents against our clinical findings.

We also need to establish who is in closer contact with the child and therefore more likely to notice a problem [8]. Is it the parent, grandparent or baby sitter? The grandma, for instance, may notice an intoeing gait; the teacher may sign a kyphosis or scoliosis of the spine. Establishing what the initial complaint is, leads us to the following questions:

a) Was the child treated in the past, by whom, and what were the outcomes?

b) Are there any other members of the family with similar problems?

The answers might help with the establishment of a diagnosis but also could reveal the caregiver who is closest to the child [9].

Words that may frighten the child, such as *"injection"*, *"aspiration"* or *"operation"*, should be avoided especially if they do not bare any relevance to the situation other than to intimidate the child. In addition, certain phrases should be avoided such as telling the child *"This will not hurt"* because:

- We introduce the subject of pain into the conversation
- The child focuses on the potential pain, anyway
- There are fears of escalating painful activities

It is also good to avoid the presence of siblings or friends while examining the child. They can be told politely to stay in the waiting area.

The art of clinical examination

The embarrassment experienced by the child when seeing the clinician who is about to examine it can be paired to the awkwardness felt by the examiner. In this case, confusion and stress only make things worse. There is no need to be antagonizing. One should rather be gentle and patient. The doctors should use their ingenuity in order to overcome the dead ends [10, 11]. The following advice may prove helpful.

One should not touch the child from the very beginning. It is better to watch the child while recording the personal history. The child should be allowed to walk or run in the corridor. The physician can establish whether the child is walking in a coordinated manner or not. Are the hands hanging or is there spasticity? One can ask the child to walk on its toes and heels and hop on each leg.

When starting the physical examination, it is advised to start by the arm or leg, which is not painful.

VOLUME 75 | ISSUE 1 | JANUARY - MARCH 2024

Figure 5. *Try to have a parent present always, especially when examining the spine in adolescents.*

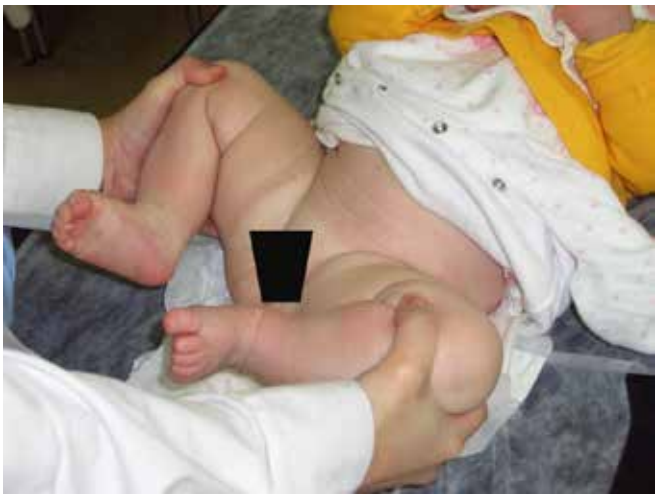

Figure 6. *When testing for DDH by performing the Ortolani and Barlow tests, the baby must be calm and fed.*

The physician's touch is therefore innocent and the child is encouraged. As long as it is not afraid, it tries to cooperate. If it still does not respond positively, one must change tactics. The parents may help by opening a mobile or tablet and trying to engage the child by playing videos with the child's favorite cartoon characters to calm it. Alternatively, they might try singing a familiar song and trying to get the child to participate (*"Donkey, donkey, old and gray/Open your mouth and gently bray/Lift your ears and blow your horn/to wake the world this sleepy morn"*).

The clinical examination has now taken off; however, it should not appear to be so (**Figure 4**). The clinician should not be in a hurry to examine both legs in their entirety. Rather, he should focus on the nails, bruises from previous injuries, bites from insects. A useful dialogue may evolve. In the meantime, muscle tone as well as range of motion of hips, knees and ankles are examined. Parents understand what is going on and contribute [12-15].

To many children the examining bed appears to be intimidating. In this situation, one must not insist that the child lies down, as this will probably end in a boxing match! It is best to ask the mother to take the child in her arms, in order to examine it. Always start with the normal limb. Do not be intimidated by the usual comment: *"but doctor, it's the other leg"*. Explain why you are doing this. While doing the Thomas test, hold the side that hurts, still. If nothing works, instruct the parent on how to examine the child. Usually this works in cases of irritable hip [16, 17].

Try to have a parent present always, especially when examining the spine in adolescents (**Figure 5**). Otherwise, be sure at least a nurse is present. This is essential for both medical and legal reasons.

While trying to reach conclusions, try to get the parent involved as well. Parents usually have their own opinion based on observation of the child's gait while at home. Consider everything, finish your physical examination and base your conclusion on established criteria centered on the literature. Try to earn the parents' trust by using science instead of trying to generalize and simplify. For example, in the matter of flatfoot, do not get carried away by the parent's observation of the child's flat foot arch. Instead, do a proper clinical examination, perform the relevant tests and try to re assure the parents and rid them of the prejudice they may have.

Do not hesitate to repeat clinical tests if they are not performed correctly the first time. For instance, when testing for DDH by performing the Ortolani and Barlow tests, the baby must be calm and fed (**Figure 6**). Postpone the tests until the circumstances are right.

Try to be calm and do not hurry. Being in hurry leads to a disorganized process of thought. Parents can understand when you are not listening carefully to the clinical history and when you are not being thorough in your clinical examination. When you address the

VOLUME 75 | ISSUE 1 | JANUARY - MARCH 2024

Figure 7. *When examining X-Rays, the doctor should always take into consideration normal variations so that there is no confusion.*

Figure 8. *While facing a diagnostic challenge, the doctor will have to explain to the parents that he needs time to process the findings.*

parents, do it sitting down. Listen to their questions and try to answer them while being calm and patient.

The study of images

Often, the parents arrive at the consultation already holding blood test results, X-Rays, and CDs of CT scans and MRI scans. They have had previous consultations and are seeking a second opinion.

While studying the results one can understand the working diagnosis of the colleagues who have previously examined the child. When results are positive it could be helpful to let them know.

When examining X-Rays the doctor should always take into consideration normal variations so that there is no confusion (**Figure 7**). When discovering a fibrous cortical defect by chance, one should not hold it responsible for causing any symptoms provided it is limited and is not close to an articular surface [18]. When examining a scoliosis curve we need to be prudent. If the curve is considerable, both parents and child will not be prepared to accept treatment with a brace. We need to re assure them.

CT scans show the bones in detail and the doctor should be prepared to explain the results to the parents in detail. When examining images of a MRI scan, the doctor should be prepared to discuss common finding such as bone edema in a simple way to the parents. The parents are often anxious when reading the results of tests and have already embarked on a journey of upsetting thoughts.

In the event, that additional imaging is needed for the portrayal of certain obscure fractures (radial head or coronoid process) we order a new referral and even speak to the radiologist ourselves. We may do the same if we notice something in the images, which is not referred to in the report. For example in the event of a calcaneonavicular coalition, which is fibrous, it may be hard for the radiologist to diagnose it. The pairing of imaging with clinical examination aids the diagnosis [16-18].

The power of words

Several years ago, German classicist Bruno Snell had said, "*The man should listen to the echo of his own voice before knowing himself*". The doctors need to be careful with the words they use during the diagnostic approach of a child, because the words reflect their personality, reveal the level of knowledge and create an impression on the parents [19, 20].

The physician need not hold back. All sentences need to be precise. Phrases follow one another in logical sequence. If there is a need for repetition, this must be done without complaint.

Parents are full of questions. Their mental

VOLUME 75 | ISSUE 1 | JANUARY - MARCH 2024

state of mind depends on the doctor's reaction. Everything may be relayed in different way. Even bad news can be delivered in a calm and controlled manner, leaving a door open to hope for a positive outcome.

A doctor should never swank. However, he should try to use medical terms when having to explain things. He should not try to use simplifications. When patients refer to a "break" this is actually a fracture. The doctor should make an effort to familiarize the parents with the proper terminology [21].

The use of key words leads the parents to a google search. This could prove dangerous. While surfing on the net, the algorithms will lead the parent to unpredictable findings. It is almost certain that they will not find the answers they seek. They will be overcome by the generalization. The doctor will have to step in.

The weakness of numbers

Man is weak when it comes to numbers. How much can he trust in statistics? The following example will portray this.

The incidence of DDH has both a racial and geographical parameter. The incidence is 1.7 in 1000 births in Sweden, 75 in former Yugoslavia and 188.5 in Manitoba Canada. The incidence in China and Africa is close to zero [17].

It is hard to make headway with statistics. Especially because of immigration, it is difficult to draw safe conclusions.

A question often asked by the parents is the percentage of positive outcome connected with the operative technique we are proposing. The dialogue between doctor and parent could go like this:

Parent: *What is the success rate, doctor?*

Doctor: *Between 17% and 67% depending on the authors.*

Parent: *Which percentage would you trust?*

Doctor: *I do not trust any of the percentages even if there are a product of meta-analysis. I only trust my own experience.*

Parent: *And what does your experience say, doctor?*

At this point, the conversation takes a hazardous turn. Experience is acquired after making mistakes and is constructed on trying not to repeat them. The doctor knows of the possible complications and tries to avoid them. Nevertheless, this all exists in his conscience and cannot be published. It should not be the doctor's alibi since it produces confusion to the parent.

The doctor could answer: *"The success rate is 100%"*. This of course is bold and frivolous. However, it is not far from the truth. It creates optimism and acts in a dual way. It holds the doctor responsible for living up to his promises while giving the patient the trust he requires in order to proceed.

Some important points

While facing a diagnostic challenge the clinician will have to explain to the parents that he needs time to process the findings (**Figure 8**). The orthopedist should not think it shameful to have to reexamine the history and clinical findings as well as collaborate with the pediatrician. Reexamine the lab results and imaging. Parents usually like this [22-24].

If the problem is complicated, it might help if the doctor were to write a few things down for the parents including the treatment options and pros and cons of each choice.

Baron Munchhausen used to say, *"Luck often corrects our mistakes"* [25]. Even if this does occur, we should not rely on luck for the treatment of our patients. We should take responsibility in order to resolve the problem, however hard that may be. We should always be alert and communicate with our colleagues who can help.

Conclusions

The diagnostic approach of a child might seem hard since there are no specific rules; however, it is not impossible when it is based on knowledge and experience. Only when there is collaboration between humans the purpose of being is acknowledged. A wonderful mechanism of back-and-forth feedback prevails in the fight of humans for humanity. It is definitely worth the while and the prize is that of human dignity.

Conflict of interest

The authors declare no conflicts of interest.

VOLUME 75 | ISSUE 1 | JANUARY - MARCH 2024

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