

# Pediatric telemedicine and abdominal pain in children

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## Perspective

Telemedicine is a sub-area of telematics in healthcare and refers to diagnostics and therapy bridging a spatial or temporal distance between doctor, therapist, pharmacist, and patient or between two doctors consulting each other by means of telecommunications. Telemedicine is a collective term for various medical care concepts that have in common the principle approach of providing medical services for the health care of the population in the areas of diagnostics, therapy and rehabilitation as well as in medical decision-making consultation over spatial distances (or temporal offset). Information and communication technologies are used for this purpose. Telemedical methods are increasingly used worldwide. The spectrum of these modern forms of care now covers almost all medical specialties. For example, stroke patients in several countries are treated at so-called tele-stroke units if no regular stroke unit is within reach. In many other medical fields, telemedicine procedures are being scientifically investigated or tested on a pilot basis. The classification of the term “telemedicine” in the context of eHealth is defined as following: According to the WHO definition of 2005, the term eHealth (electronic Health) refers to the cost-effective and secure use of information and communication technologies (ICT) to promote general health and health-related areas (health systems, health reporting, health promotion, and general knowledge and research). The categories are not to be understood as completely separable - there are overlaps in terms of content. For example, electronic record systems are often an integral part of teleconsult or telemonitoring systems. However, in view of the objective of the outline (rough orientation for discussion processes in the topic area), a further subdivision does not currently seem necessary. Since telemedical methods are an integral part of almost every medical field, we should speak of telemedical methods in the health care of the population in order to avoid the impression of an independent field of “telemedicine”.

Acute abdominal pain in children is one of the most frequent reasons for presenting to pediatric emergency departments and doctors' offices, accounting for about 9% of all cases. In most cases, the attending physician is faced with the task of “filtering out” diseases requiring acute treatment and providing adequate therapy. This task is made more difficult by the abundance of possible differential diagnoses and the often missing or ambiguous information provided by the young patients and their parents. In addition, it is often difficult to examine children with acute abdominal pain, let alone in a “textbook” manner. The following article is therefore intended to serve as a practical working aid. Special emphasis is placed on possible diagnostic and therapeutic pitfalls. In addition, some important differential diagnoses are singled out and discussed in detail. Acute is generally defined as abdominal pain that has been present for less than 24 hours. The causes can be varied and can be of abdominal or extra-abdominal origin. Disease requiring surgical intervention is found in approximately 1% of all children with acute abdominal pain. This refers to a clinical picture in which there is unexplained acute or acute recurrent pain, usually with peritoneal involvement. The leading symptoms of acute abdomen are severe abdominal pain, peritoneal symptoms with disturbance of intestinal peristalsis, and poor general condition with acute circulatory disturbances up to circulatory shock. This is not a diagnostically distinct entity, but rather a “clinical condition.” As a rule, this should be evaluated by pediatric surgeons or surgeons so that further surgical clarification or therapy can be performed

promptly, if necessary. It is not uncommon for the patient's history to show that the presentation is not due to acute abdominal pain in the strict sense, but rather chronic or chronic recurrent abdominal pain by definition. On the one hand, this can be due to a clearly definable organic cause (classic example: chronic inflammatory bowel disease) or on the other hand - and much more frequently - be of a functional nature. In a descriptive study, Apley and Naish defined at least 3 activity-impairing attacks of abdominal pain in at least 3 months as the entry criterion for chronic or chronic-recurrent abdominal pain. This entry criterion was subsequently adopted by other authors as the definition of functional abdominal pain. In contrast, according to the later established and currently valid Rome III criteria for chronic functional abdominal pain, symptoms must occur at least once a week for at least 2 months. Since COVID-19 pandemic, telemedicine settings were used to examine, diagnose, and treat children with different diseases. We focused on an innovative approach of telemedicine to examine, diagnose, and treat 120 pediatric patients. Telemedicine setting was performed in 120 children by two medical assistants in the pediatric day center who were in contact with the patient, one of holding the telemedicine device (Apple iPhone 12 pro, face time setting) and the pediatrician placed at home. 120 children with an age range of 4 months to 16 years were examined. One of the two medical assistant had 15 years of pediatric experience in handling children in ambulances or pediatric day centers. Fever was measured before telemedicine examination. The parents gave uniform consent for telemedicine evaluation. Both assistants positioned the child on the examination table and placed both arms along the body. Abdominal examination started in a following manner: pressing left lower quadrant at first, then palpating left upper quadrant, epigastrium, right upper quadrant and at last right lower quadrant. Despite examination, face mask was removed to see any signs in relation to pain or unpleasant reaction of the patient. The telemedicine device was positioned from feet above to the head, that the pediatrician could see all examination steps and the facial pain emotions in the moment of abdominal palpation. 120 children were finally diagnosed in telemedicine setting and prescriptions or recommendations for next diagnostic steps were performed.

More and more everyday things are shifting into virtual space, and digitization is not stopping at medical care [1-10]. Since 2018, doctors in Germany, and also pediatricians, have been allowed to treat patients via video chat, and they are doing so more and more often [1-9]. The COVID-19 pandemic in particular has ensured that online consultations are becoming increasingly popular: Instead of crowded waiting rooms or long commutes, you can simply get treatment from home [11]. But will digital remote treatment options soon actually replace face-to-face contact? The term telemedicine refers to healthcare services using information and telecommunications technology. In other words, doctors and the people being treated use digital tools to communicate with each other. This makes it possible to bridge distances and save time. There are many examples of applications, such as the discussion of findings or the care of chronically ill people. But telemedicine is not just about electronic communication between doctors and their patients: Exchanges between several medical professionals also fall under the term telemedicine. Whether it's diagnostics and therapy for various diseases or, for example, rehabilitation measures after outpatient or inpatient treatment: we explain what is already possible today via telemedicine. Doctors and patients get in touch via video telephony.

Experts also refer to this as telediagnosics. In this way, an illness can be diagnosed even though the pediatrician is not in the same place as the person being treated. Children can describe their complaints or, for example, have skin irritations clarified. If necessary, examination data such as temperature, urine analysis, blood tests can also be transmitted. Subsequently, a discussion can be held about any necessary therapy and whether a personal visit to the doctor's office is still required. Telemedicine is location-independent medical care linked to the involvement of technology. This includes eHealth apps, video consultations or remote consultations. An important application of digital technologies is the care of acute wounds in children. These pose particular challenges for the medical team, affected individuals and nursing staff, as they require a great deal of care and are slow to heal. In addition, the quality of patient care is not comparable everywhere. Care is very dependent on where people live, on the expertise of the staff and on the right dressings. Especially in rural areas, where specialists are scarce, telemedicine is an excellent option for high-quality wound care.

Concerning pediatric abdominal examination, telemedicine virtual setting with a pediatrician was not performed yet. The future could be, in "fast track" pediatric departments like ambulances or pediatric day centers, that the pediatric doctors work as a virtual doctor in examining, diagnosing, and treating pediatric patients in urgency. Signs of appendicitis or epigastric pain can be found virtually as good as in normal setting. In conclusion, telemedicine management has high sensitivity to diagnose and treat correctly when examiner and doctor have much experience in treating children.

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