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Telephone consultation during Coronavirus outbreak in a Pediatric Emergency Department: methodological approach of a tertiary care center in a COVID-19 hospital setting

S. FERRETTI[1], A. GATTO[2], V. PANSINI[2], A. CURATOLA[1], L. CAPOSSELA[1], V. CURRÒ[1], A. CHIARETTI[1,2]

[1]Department of Woman and Child Health and Public Health, Università Cattolica del Sacro Cuore, Rome, Italy
[2]Department of Woman and Child Health and Public Health, Fondazione Policlinico Universitario A. Gemelli IRCCS, Rome, Italy

Abstract. – OBJECTIVE: A computerized system of telephone consultation has been experimented at the Pediatric Emergency Department (ED) of Policlinico Gemelli Hospital in Rome during the outbreak of Coronavirus Disease 2019 (COVID-19).

MATERIALS AND METHODS: Twenty monothematic items with a series of questions to evaluate child's clinical conditions have been set up in order to evaluate the different situations according to their severity. All items were highlighted according to conventional scores corresponding to the different answers (yes/no) given by the child's parents. This system has been implemented with large diffusion of computer programs and applications by the availability of a computer station in every ED room.

RESULTS: The system allows healthcare workers to establish the medical check-up urgency which may be immediate, within the next 24 hours or scheduled in the pediatric ward. Therefore, it has been implemented a telephone triage consultation with a standardized method.

CONCLUSIONS: Telephone consultation during outbreaks, considering the risks of contagion, allows healthcare workers to decrease the concern of families and to reduce indiscriminate access to ED. The remote approach will not solve logistic and setting problems related to COVID-19 outbreak17, but it would be a valid tool to improve medical evaluation without deep change in infrastructure and clinical organization.

Key Words:
Children, COVID-19, Emergency Department, Pediatric telephone consultation, Telephone triage.

Introduction

Telephone use in pediatrician activity has significantly increased in the last years, as shown by a growing scientific interest since the end of the last century[1-3]. Family and hospital pediatricians can confirm this trend because of two reasons: the first one is the immediacy and the comfort of the communication medium; the second one is the increasing demand from parents for qualified remote advice on management of their child.

A social general indicator of this re-evaluated possibility of consulting an expert and easily available consultant is given by the increasing number of telephone consultation activities. These ones have been designed to manage various current problems, such as violence against children, marginalization, loneliness or bullying. In pediatric practice, in particular in Pediatric Emergency Department (ED), telephone may be a very useful tool for advice and diagnostic orientation regarding common symptoms[4].

Since December 2019 novel Coronavirus Infection (2019-nCoV) spread all around the World, becoming a public health emergency. It has greatly involved the resources of the global healthcare system, as it affects in particular older adult and patients already burdened by a great number of comorbidities, but also younger individuals, and less frequently children[5]. On 11th March World Health Organization has declared COVID-19 outbreak. As COVID-19 was first reported in Italy (23rd January 2020), the government has progressively introduced restrictive measures. Containment measures at first had been the self-isolation of infected patients and the creation of a "red-

Corresponding Author: Antonio Gatto, MD; e-mail: antonio.gatto@policlinicogemelli.it

zone" in a limited area. Afterward, the government strategy changed into a severe mitigation response, up to the lockdown to all the country. Other mass-measures were introduced, such as a strong recommendation to avoid at-risk behaviors and the suspension of all non-essential national businesses[6]. On June 13th, 2020 the number of notified COVID-19 cases in Italy is 236,651, with 34,301 deaths[7].

The close recommendation to move only for very urgent needs has revealed the necessity to improve systems of remote consultations, especially in the EDs of hospitals dedicated to COVID-19 patients. To standardize the evaluation by remote consultations, we have tried to develop a system of telephone triage in our Pediatric ED. It has been inspired by the principles of telemedicine, a powerful means of health care assistance in the COVID-19 era[8]. The use of telemedicine has been already recognized by a number of official organizations worldwide. Parents may receive medical consultation from pediatricians beyond working hours and without moving to hospital. Telemedicine can be provided by telephone, computer or other multimedia devices of common use[9].

We believe that the telephone consultation must be improved to provide a diagnostic orientation with consequent early detection of serious diseases. This approach allows health care workers to give advices on the temporary managements, pending medical interventions, and advices on health care procedures for the healthy child. It is also useful in order to verify the problems exposed and to reduce anxiety, often unjustified, of parents and, consequently, indiscriminate access to ED[10-12].

To achieve this purpose, it is necessary to ask the parent precise and targeted questions regarding onset, duration and progression of symptoms, general clinical conditions of the child, presence or absence of other associated symptoms and eventual therapies. It is demonstrated that parents change their mind about going to the ED after a remote specialist consultation in nearly half cases[10].

Considering the necessity to standardize the use of the telephone, diagnostic protocols of telephone consultation have been developed at our Pediatric ED. These protocols use, for initial screening, a computer algorithm.

For didactic purposes, a comment was also developed for each of these protocols, aimed to explain the scientific rationale for each question.

Materials and Methods

Our system uses a telephone to receive calls, an operator and a computer program developed for use on Windows 7 or higher operating system. The operators authorized to access the program have an identification code that allows the activation of the protocol. The first operation consists in introducing the patient's name and searching for it in the existing archive. If the patient is already known, it is possible to consult the story and the summary of the last outpatient visit, ED access, hospitalization or telephone contact. Then, the list of all possible symptoms is displayed. Once the item concerning the problem has been selected, the first question of the series is displayed on the screen. The answer provided (YES/NO) is entered in a special space and it allows the second question and the suggestion relating to the previous answer to be displayed on the screen. If this is "Urgent check of the child", a flashing "I" will appear on the screen, indicating the interruption of the telephone consultation. If the consultation continues, in relation to some questions, some tips displayed in a "Notes field" will appear (for example, "Advice on fever"). At the end of the questionnaire, the application automatically builds the summary of the protocol. At this stage the operator can: recall another symptom and then answer the related questions; see the summary of the telephone consultation as soon as it occurs; write some notes (5 fields of 50 letters) which will be recorded; consult the story or the summary of the last visit if the patient's data is in the archive. At the end of the telephone consultation, this is automatically saved and archived. A detailed comment is available on each application for protocol, accompanied by updated bibliographic reports, which explains the rationale.

Results

The computer program we have created allows:

- to identify the child subject of the call (and the possible recognition as a patient of the Pediatric ED);
- to provide a complete list of symptoms that may have motivated the telephone consulta-

tion;
- to suggest, after the identification of the symptom, structured questions according to a logical sequence of gravity;
- to provide, according to the answers, a reliable suggestion which can be reported immediately to the parents;
- to perform a recording of the telephone consultation.

The system includes 20 protocols, 10 concerning some of the most frequent diseases in Pediatrics and 10 concerning emergencies and minor traumatology (**Supplementary Table I**).

Each protocol consists of a series of questions (minimum 2, maximum 17) on the clinical condition of the child. The logical sequence of the questions allows a rapid detection of the cases which need immediate medical evaluation. We report in Table I, as example, the list of questions relating to the protocol on headache. Each question includes YES/NO answers, structured according to an algorithm and predetermined conventional scores from 1 to 4, in increasing order of gravity (1 = continue the telephone consultation; 2 = scheduled outpatient assessment; 3 = medical evaluation within 24 hours; 4 = immediate medical evaluation and interruption of the telephone consultation) (Table I). These scores allow the operator to identify and quantify the gravity of referred symptoms. The system also provides a series of suggestions associated with some questions that offer indications on the temporary management of the exposed clinical condition.

According to the most recent data from international literature, it was considered appropriate to elaborate a detailed comment that could show the rationale for each question. Moreover, we illustrated the logical sequence of the questions for each protocol. Furthermore, the elements relating to the pathophysiology of symptoms, differential diagnosis and, in some cases, therapy were described.

Discussion

The aim of protocols was the development of a logical sequence of questions with standardized algorithms, the identification of severe cases and the system automation. This organization allows the interchangeability of the operators on the telephone and therefore also residents or qualified nursing staff can be recruited. The choice of topics was conducted based on greater frequency of problems arise during clinical observation or telephone consultation. The protocols were built considering main general pediatric conditions, such as fever, headache, abdominal pain, etc.

We think that the questions of each protocol could improve the expertise of healthcare workers in the search for severe symptoms and signs in telephone consultation. In the various clinical conditions configured during the questionnaire there is a complete and detailed commentary to explain the diagnostic and therapeutic algorithm proposed.

The system has been easily improved considering the large diffusion of computer programs and applications and the availability of a computer station in every ED room. Therefore, it can enable telephone triage to be standardized. Telephone consultation, during outbreaks, allows healthcare workers to manage the concern of families about the risks of contagion and to reduce indiscrimi-

Table I. Complete structure of one of the available protocols (Headache).

1)	Does the child have severe headache and vomiting after a head injury?	Yes (4) / No (1)
2)	Is the child confused, acting abnormally, or is he sleeping too much?	Yes (4) / No (1)
3)	Does he keep his head rigid and his neck fixed?	Yes (4) / No (1)
4)	Does the child have enough headaches to prevent his common activities?	Yes (4) / No (1)
5)	Do you think the child feels particularly sick?	Yes (3) / No (1)
6)	Does the child have a fever between 38.5 and 40.5°C?	Yes (3) / No (1) (Advice on fever)
7)	Does the child have a cold and a sore throat?	Yes (2) / No (1) (Advice on cold)
8)	Does the child have allergy symptoms (burning eyes or nose)?	Yes (2) / No (1) (Advices on allergy)
9)	Has the child had other headaches in the past?	Yes (1) / No (Stop)
10)	Is headache associated with nausea and vomiting and occurs after sleep?	Yes (3) / No (1)

nate access to ED.

An interesting potentiality of our program is the introduction of standardized general approach also for the patients follow-up, as already suggested by other authors[13,14]; we found this opportunity useful especially in the post-discharge management of our pediatric patients with suspected SARS-CoV-2 infection not confirmed by laboratory tests.

We think that this system can be used in a University setting by residents, who can critically verify the logical steps for the diagnostic assistance framework of each disease. In this way, they can unify the learning activities with the clinical practice in a period with a significant drop in the number of visits to our Pediatric ED due to the COVID-19 outbreak[15]. The algorithm of each protocol allows residents to conduct a clinical reasoning according to a precise methodological approach. The sequence of questions shown in Table I is an example.

The comment relating to each question was conceived with a dual purpose. The first one is to provide an update and consultation tool to the pediatricians who deal with child outpatient care. The second one is to provide to students and residents a new methodological approach for the most frequent pediatric conditions. This way of teaching, with a standardized approach to the clinical conditions, can improve comprehension of topics treated through logical learning schemes. Everyone thus may evaluate their own acquisitions and verify the acquired knowledge. For the acquisition of the first objective, the monothematic item structure is advantageous: it allows anyone to focus attention on a single problem, giving hints for differential diagnosis. It is possible to evaluate acquisitions, through a self-assessment process, verifying the proposed logical steps; the critical analysis of the commentary relating to each step can be targeted towards this aim. It is important to highlight the need for a specific training in remote specialist consultation and telephone triage. A regulatory framework should also be developed by pediatricians to ensure the safety of both patients and healthcare providers, mainly in children with previous comorbidity[2,16-18].

Conclusions

In Pediatric ED telephone, consultation should be implemented to perform a standardized remote triage, to avoid the inappropriate access to ED and to reduce exposing children to risk of contagion. Considering the general approach of this system it can be also suitable for the patients' follow-up, especially in the post-discharge management of children with suspected SARS-CoV-2 infection not confirmed by laboratory tests. Moreover, even in times of significant drop in the number of visits, this system may be useful for residents to improve training and specific expertise in remote consultation. Our proposal, therefore, represents an attempt to unify the anamnestic and diagnostic algorithm with a new teaching methodology.

The remote approach will not solve logistic and setting problems related to COVID-19 outbreak[17], but it would be a valid tool to improve medical evaluation without deep change in infrastructure and clinical organization.

Conflict of Interest

The Authors declare that they have no conflict of interests.

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