

Creation of a specific and separated pediatric intra-hospital pathway in primary level hospitals during the era of COVID-19

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Abstract

Every new pandemic forces us to start new specific behaviors both in the civil life and within the hospitals trying to contain the spreading of the infection and preserve the more fragile people. In this regard, at the debut of Severe Acute Respiratory Syndrome-CoronaVirus-2 (SARS-CoV-2) pandemic, our Local Health Agency had drastically modified every clinical and organizational pathways in order to limit the diffusion of the infection as well as to maintain a good quality of care and preserve healthcare workers. We report how we have modified the usual pediatric intra-hospital pathways in our primary level hospital to avoid mixing children with suspected and non-suspected symptoms of SARS-CoV-2 infection. Before every hospitalization, regardless of symptoms, each child and him/her parent/caregiver are undergone to rapid antigenic and molecular swab to rule out a SARS-CoV-2 infection; hence, positive patients are transferred to Pediatric Unit of third level hospital equipped by a Pediatric COVID Intensive Unit. We think the healthcare behaviors described in this manuscript can help to reduce the intra-hospital spreading of SARS-CoV-2, although children seem to have a minimal role in the dissemination, but we cannot let down your guard. Simultaneously we observed that the overall children requiring inpatient pediatric evaluation and hospitalization have dramatically decreased from the beginning of pandemic.

Keywords

children, safety COVID-19 negative children, SARS-CoV-2 infection, separated intra-hospital pathways

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The Severe Acute Respiratory Syndrome-CoronaVirus 2 (SARS-CoV-2) pandemic, undoubtedly forced us to completely change our social and professional habits, especially those concerning the health system as we have never been used to before.

Humans were totally devoid of previous specific immunity against SARS-CoV-2, therefore it is continuing to have full freedom of spreading across people. So far we have had hundreds of millions of confirmed cases including millions of deaths, although the exact number of infected and dead people is constantly evolving.^{1,2} Coronavirus Disease-19 (COVID-19) morbidity and mortality exhibits significant variation across age groups and the infection occurring in children has a milder

disease course and a better prognosis than adults and usually does not require hospitalization. In fact, children represent less than 2% of the total confirmed COVID-19 cases and deaths are

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extremely rare.^{2,3} Although SARS-CoV-2 disseminates globally and chains of transmission are becoming increasingly recognized, children do not appear to be efficient transmitters of infection, but they can be “silent spreaders.”^{3–5} However collectively, data suggest that children with SARS-CoV-2 acquire their infection from an adult contact, with minimal secondary transmission from children.^{6,7} But recently, the so-called SARS-CoV-2 variants, such as the English one, seem to have higher contagiousness even in pediatric age.^{8,9}

Fever with rhinorrhea, cough, gastrointestinal symptoms, headache, and myalgia are reported as the most common symptoms in children affected by SARS-CoV-2 infection.¹⁰

The Local Health Agency (LHA) of province of Reggio Emilia, located in Northern Italy, consists of five first level hospitals and one third level central hospital. Two out of these five spoke hospitals include a primary level Pediatric Unit. Our hospital is located on the Apennines and provides healthcare to a very large mountain district of 795.6 km² with a population of about 34,000 people of whom nearly 4,000 in pediatric age (0–14 years).

From the beginning of pandemic and in accordance with the WHO and Italian Ministry of Health Guidelines on the prevention of SARS-CoV-2 infection in the population and in the healthcare workers,¹¹ our LHA activated a special task force who have developed specific protocols regarding the access to the hospitals and the admission to every ward. In particular a special protocol regarding the Maternal and Child Department was formulated. All these protocols regarding the pandemic are updated and modified in real time in according to the evolution of the epidemic. Following these new guidelines, the intra-hospital pathways of children were drastically changed in all the Pediatric Units of our LHA's hospitals.

Novelli et al. well described the completely reorganization and adaption of a Pediatric Unit in a third level hospital.¹² On the contrary of Fondazione IRCCS Policlinico San Matteo in Pavia, our hospital is a first level hospital with a unique triage point in general Emergency Department (gED) which serves both adult and pediatric patients.

In the pre-pandemic era, a dedicated nurse performed a triage of every child arriving at gED. Then the doctor of gED carried out a first assessment and, whether the child needed a pediatric evaluation, a healthcare worker accompanied the

child together with one or two parents or caregivers to the Pediatric ward. At this point, after the examination, the pediatrician decided whether to return the child with parent(s) or caregiver(s) to gED for the discharge or admit him to the ward. In the pre-pandemic era, at the end of each evaluation, the sanitization of pediatric outpatient room occurred roughly.

From March 2020, all people arriving to each hospital of our LHA must pass a health check point where healthcare personnel, proper trained and endowed with personal protective equipment (PPE),¹³ check the body temperature, recommends wearing a surgical mask (if they do not have yet), and performing alcoholic hand washing.

Because of pandemic we have created a differentiation of the pediatric intra-hospital pathways (see Figure 1). After the first pre-triage at gED, whether the child presents suspected symptoms of SARS-CoV-2 infection¹⁴ or is a close contact of a COVID-19-positive patient, without any critical clinical situation, he will take a new dedicated pathway, called “infected pathway” and he will stay in the isolated “grey area” within gED, together with only one parent/caregiver wearing facial mask. Hence the child not needing hospitalization, is undergone to a molecular nasopharynx swab, the international gold standard for the diagnosis of SARS-CoV-2 infection by RT-PCR (*Reverse Transcription-Polymerase Chain Reaction*) and then discharged from gED to home, recommending an accurate quarantine up to result of the swab and to come back if any clinical worsening appears. The follow-up of the COVID-19 positive discharged patients will be performed at home by special territorial units called SUCC (Special Units of Continuity of Care) as per national legislative decree of March 9th, 2020.¹⁵ These SUCC prevent crowding at gED and outpatient setting of general physicians, keeping an accurate taking care of patients. Instead whether children discharged will prove to be COVID-19 negative, their family pediatrician will deal with the follow-up.

On the contrary, whether the child arriving to gED needs to be hospitalized, a rapid antigenic and molecular nasopharynx swab against SARS-CoV-2 are performed to child and him/her parent or caregiver. Then they are accompanied to the “grey room” close to Pediatric Unit but far from the other rooms where they stay isolated awaiting

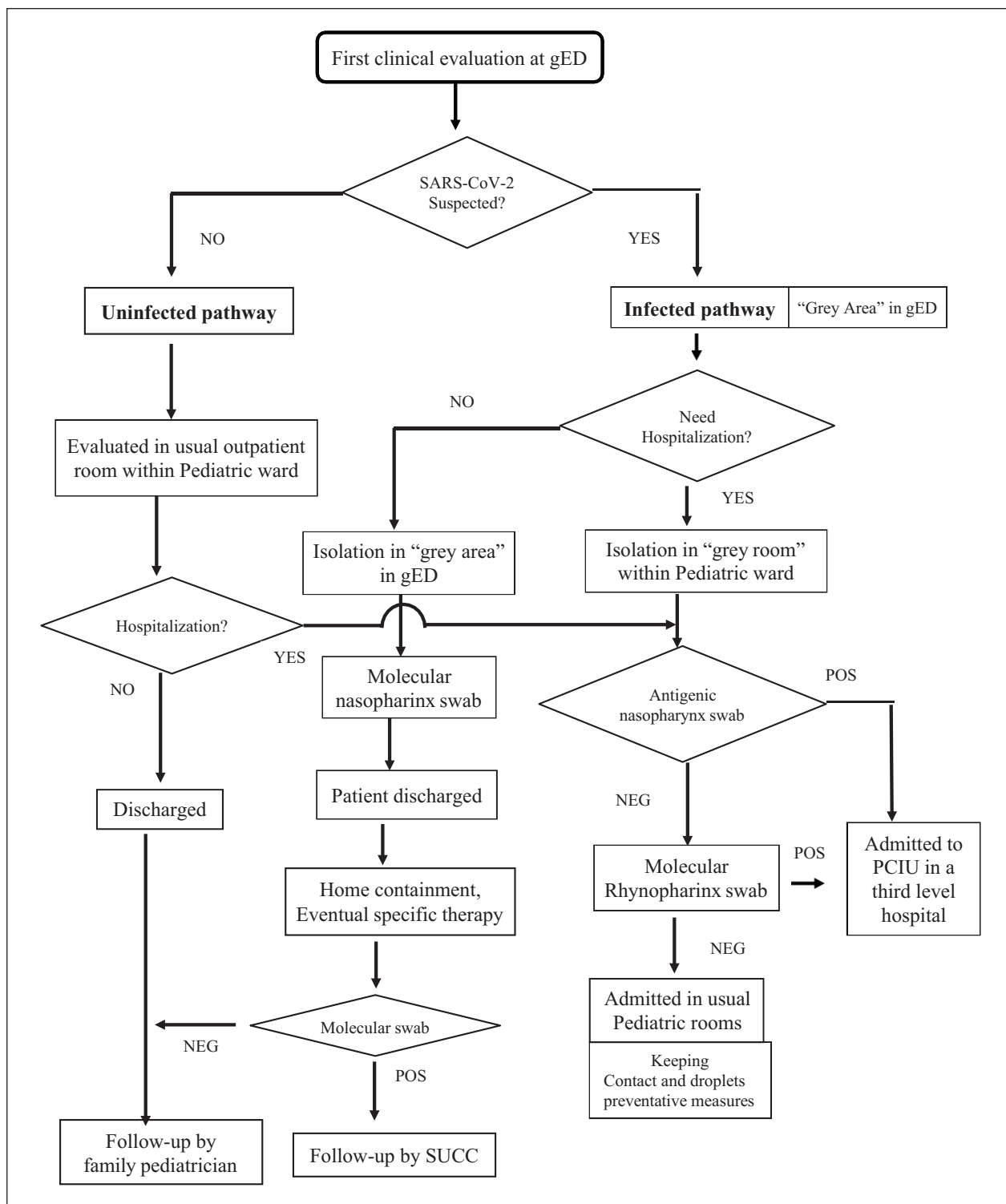


Figure 1. Diagram of the two specific and separated pediatric pathways in first level hospital.

the antigenic result and assisted by healthcare personnel properly dressed with PPE. Whether the child results positive to rapid antigenic swab, he will be transferred to Pediatric Covid Intensive Unit (PCIU) located in the Pediatric Unit of the

third level hospital. Instead, child and him/her parent/caregiver with negative antigenic swab stay in the “grey room” until the result of molecular swab. Therefore, at the same way, if the molecular swab is positive, the child will be transferred

to PCIU at third level hospital. On the other hand, if both the rapid antigenic and molecular swab will be negative, the child can entry in usual rooms of our Pediatric Unit, keeping the contacts and droplets preventative measures; then the “grey room” is cleared and thoroughly sanitized. The same parent/caregiver must be with the child throughout the course of hospitalization and the change of parent/caregiver as well as the visit to hospitalized children are not allowed.

Instead, whether the child arriving to gED has no suspicious symptoms for SARS-CoV-2 infection, he will follow the same “uninfected pathway” as in the pre-COVID-19 pandemic. Even child belonging to “uninfected pathway” who will need hospitalization, will be undergone to rapid antigenic and molecular swab and whether positive, they will be transferred to PCIU at third level hospital, as though children belonging to “infected pathway.” Otherwise, they are admitted to usual rooms in our Pediatric Unit. The child not requiring hospitalization is discharged and entrusted to him/her family pediatrician.

We well know that inappropriate health care settings seem to increase the risk of viral transmission, while appropriate hospital hygiene practices are certainly decisive to limit nosocomial outbreaks.¹⁶

Actually the weight of evidence suggesting children are not major drivers of transmission of SARS-CoV-2 and they have been relatively spared by severe COVID-19; in addition we do not know yet the proportion of children who are truly asymptomatic or pre-symptomatic.^{3,5} For these reasons, we cannot let down your guard and we need to rearrange the hospital organization in “clean” and “COVID”-dedicated areas (or “grey rooms”) to separate “clean” and “COVID” children pathways to reduce the contamination and transmission risks,¹² as well as to safeguard the healthcare personnel who, however, must always wear PPE.

Furthermore, since we do not yet fully know the SARS-CoV-2 infection, the adjustment of everyday clinical practice may have a significant positive effect in fighting this terrible pandemic.

To wear facial masks and to allow only one parent/caregiver to accompany the child throughout the intra-hospital pathway, reduces the risk of spreading of the infection from supposed asymptomatic or pre-symptomatic carriers.

Table 1. Summarizes the differences between inpatient pediatric evaluations and admissions from March 2020 to February 28, 2021 compared to the same period in 2019–2020.

	Inpatient pediatric evaluations	Patients admitted
	March, –	February, 28
2019–2020	1398	197
2020–2021	422	92

The possibility to perform the rapid antigenic swab allows to have a first response in a few hours, so that we can guide the children in a more correct pathway avoiding the intra-hospital contamination.

Moreover, the choice to centralize any COVID-19 positive children permits to guarantee the more appropriate care to these patients in a third level hospital equipped by a PCIU.

In addition, we would like to highlight the importance of SUCC which play an essential role in deal with COVID-19 positive patients at home, confining the access to hospital only for the severe cases.

COVID-19 is upsetting our world and, for now, the main active and effective measures we can adopt, beyond vaccination, remain always the same: social distancing, wearing facial masks, avoiding crowding, and hand washing.

Simultaneously, we would like to point out that from March 2020 to February 28, 2021, the children coming to our gED needing a pediatric evaluation are drastically decreased as well as the pediatric admissions (Table 1) compared to the same period of the previous year because of the great reduction of the usual seasonal infectious disease, due to the nearly continuous lockdown and the constant use of preventative measures.

Author contributions

MM conceived the manuscript and wrote it together with GG. PR critically revised the final version. All authors approved the final version of the manuscript.

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