

Peer Review File

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Reviewer A

This is an interesting and practical sharing of the experiences of the management of the ED in a children's hospital during the Omicron COVID-19 pandemic.

Comment 1: in the title please also indicated the preliminary evaluation of the effectiveness of the management measures.

Reply 1: We appreciate the reviewer's kind recommendation, we have modified our title as advised (see Page 1, line 1-3)

Changes in the text: Effective multidimensional approach for practical management of the emergency department in a COVID-19 designated children's hospital in East China during the Omicron pandemic: a cross-sectional study

Comments 2: the abstract is not adequate and needs further revisions. In the background, the authors need to review the challenges and difficulties in managing the pandemic in the ED of a children's hospital, which should link to the clinical needs of pediatric patients and the characteristics of the Omicron COVID-19. In the methods, the authors need to have more detailed information on the multidimensional management measures and how the effectiveness was evaluated. The conclusion cannot be simple like this. Please have more detailed comments on the clinical experiences in handling the pandemic and limitation or further work needs to be done.

Reply 2: We appreciate the reviewer's kind recommendation, we have rewritten the background, methods, and conclusions of the "Abstract" section as advised (see Page 2, line 27-57)

Changes in the text:

Background: Characterized by rapid transmission but lower severity, the new Omicron wave brought about an acute increase in local COVID-19 cases in Shanghai, followed by stricter infection prevention and control strategies. Inevitably, more time was required for emergency consultation and treatment of children with critical illnesses. Therefore, a multidimensional approach was designed to streamline the emergency service and reduce the incidence of nosocomial infection of SARS-CoV-2 during the Omicron wave for the emergency department (ED) at Children's Hospital of Fudan University (CHFU).

Methods: The multidimensional approach was implemented in the ED to help achieve a balance between demands for emergency service and pandemic control, consisting of ED layout adjustment, electronic screening (E-screening) measures, standard management processes for patients, medical staff, and goods transfer, reliable disinfection measures and a surveillance

system for infection prevention and control. To evaluate the effect of the management strategy, the data on nosocomial infection cases and occupational exposure episodes among staff in the ED were collected. Demographic and clinical characteristics of Level I/II children by the five-level pediatric triage tool and their mean stay of length in resuscitation room were extracted.

Results: There were 12,114 ED visitors from March 1 to May 31 in 2022 with 53.24% of medical emergencies (6,449/12,114) and 46.76% of surgical emergencies (5,665/12,114). Twenty-nine patients were sent to the buffer zone, 4 of whom were transferred to PICU because of the critical situation. Six patients were tested positive for COVID-19 after entering ED, with 3 in the buffer zone and 3 in the ED clinic, causing a temporary closure of the ED for disinfection. There were no reports on medical care delays, unintended deaths, staff of COVID-19 infection, or occupational exposures to COVID-19.

Conclusions: Our findings supported the multidimensional approach's effectiveness, which may simultaneously meet emergency care needs and pandemic prevention and control. However, the results were obtained against the proportional decrease in clinic visitors due to the Shanghai lockdown. Dynamic assessment and further optimization may be adopted to cope with the pre-pandemic visit volume.

Comments 3: in the introduction, it would be interesting to briefly review the literature on the in-hospital infection control measures during the pandemic and what the challenges and opportunities for a Children's hospital to cope with this crisis situation, which should link to the healthcare services to the pediatric patients.

Reply 3: We appreciate the reviewer's insightful advisement. We have revised the "Introduction" section of introduction and added a brief literature review on in-hospital infection control measures (see page4, line83-94), challenges, and opportunities in the revised section (see Page 4, line 72-81 and line 95-98).

Changes in the text:

The brief literature review in the revised section: "In China, a two-wing model was devised in a designated hospital to address both needs for COVID-19 treatment and emergency service, including a safe treatment environment for patients, an on duty/on standby workflow for medical staff, and a reliable surveillance system. In the United States, an ordering pathway to facilitate COVID-19 testing of caregivers of patients from the pediatric emergency department was implemented for infection prevention and bed management decisions at a tertiary children's hospital. A temperature and symptom screening process was established for staff and visitors in a pediatric ED to guarantee their safety during the pandemic while minimizing unintended consequences. In France, respiratory panel-based testing was implemented for the rapid differentiation between SARS-CoV-2 and other viral infections when children attended the ED."

Challenges and opportunities in the revised section: "The Omicron variant is more transmissible and has a higher risk of reinfection. Its possible transmission pathways may

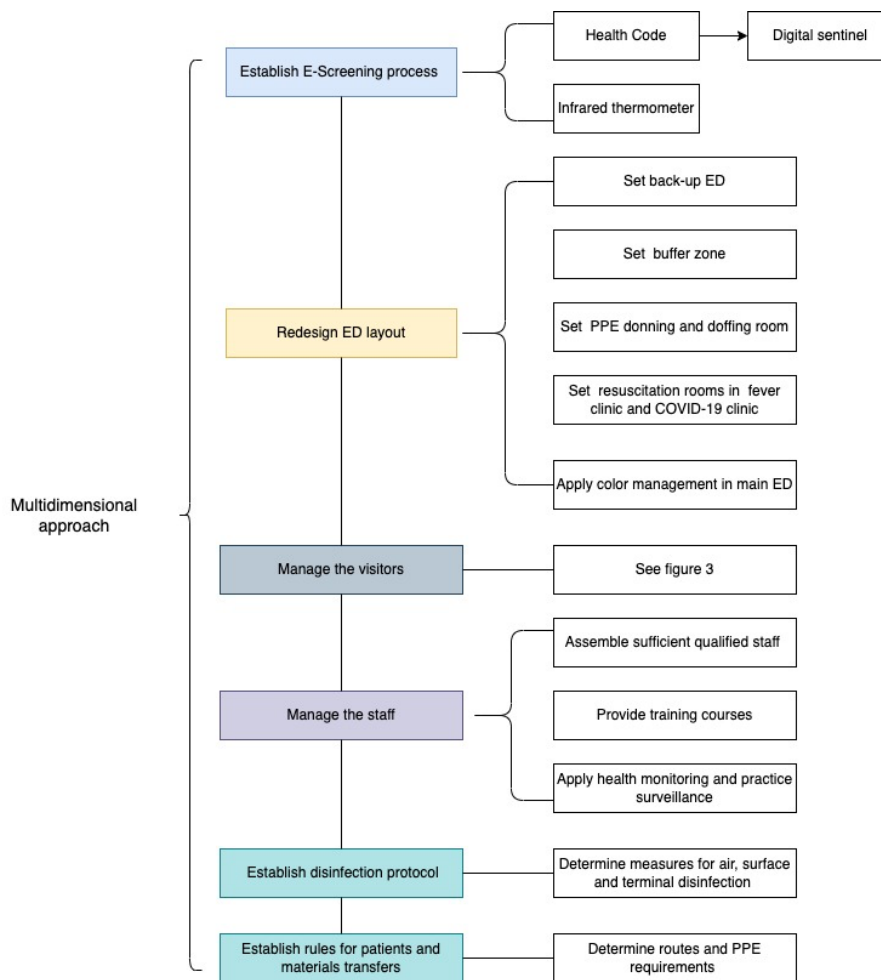
include droplets, aerosols, physical contacts, and the digestive tract. An exponential increase in COVID-19 cases and a sharp rise in pediatric hospitalizations were observed. Though some children infected with Omicron developed severe conditions (requiring invasive ventilation, vasopressors, or extracorporeal membrane oxygenation) or death, the strain was less virulent than previous ones in terms of the ratio of severe cases to the total number of infected children. Besides COVID-19, children were always susceptible to other microbial infections at the same time due to their immature immune system, which may also cause severe symptoms.”

Comments 4: in the methodology of the main text, please use a flowchart or a figure to describe these measures. Please also specify the management of medical staff, the transfer of goods, the organization and health monitoring the medical staff, and supervision of staff from department of in-hospital infection control.

Reply 4: We are appreciative of the reviewer’s kind suggestion. We have added a flowchart to describe the multidimensional measure (see page 6, Figure 1), specified the management of medical staff, the transfer of goods, the organization and health monitoring the medical staff, and supervision of staff from department of in-hospital infection control in the “Methods” section as advised (see Page 13, line 219-243).

Changes in the text:

The newly added Figure 1: Measures of the multidimensional approach



We also specified the management of medical staff, the organization and health monitoring the medical staff: “In order to ensure the safety of staff working in the ED, PPEs of level II protection were for a buffer zone, level I+4 protection for other workplaces, and level III protection for applying high-risk practices such as trachea intubation or central venous catheterization (Table 1). All ED staff needed to collect and report health information of themselves and family members daily to the nosocomial infection control department by Dingding applet before work. The required information included temperature, respiratory symptoms, and travel history. A designated nurse was assigned to test temperature for every staff by using a touchless handheld thermometer before every shift and recorded the results in a structured table sheet. All on-duty staff were required to accept daily PCR tests and were not allowed to leave the ED before negative results were reported. The staff with fever or respiratory symptoms had to stay at home or come to an adult hospital. Medical observation or further treatment was followed by the doctor’s orders there. All information should be then promptly reported to the department of nosocomial infection control. Those who were excluded from COVID-19 symptoms were allowed to return to work. The staff who was judged as a close contact or a secondary contact at work were placed under medical observation. If he or she becomes a suspected or confirmed case of COVID-19 at work, he or she would be transferred to a designated adult hospital.”

Table1 PPE* for different protection levels

PPE	Level I protection						Level II protection	Level III Protection
	(0)	(1)	(+1)	(+2)	(+3)	(+4)		
Overalls		✓	✓	✓	✓	✓	✓	✓
Medical masks								
Surgical masks		✓	✓	✓	✓			
N95 respirators						✓	✓	✓
Medical hats		✓	✓	✓	✓	✓	✓	✓
Goggles/face shields					✓	✓	✓	
Full facepiece elastomeric respirators/powerd air-purifying respirators								✓
fluid-resistant gowns				✓	✓	✓		
Protective suits							✓	✓
Shoe covers						✓	✓	✓
Medical gloves			✓	✓	✓	✓	✓	✓

*PPE: personal protective equipment

Transfers of goods: “All the supplies (PPEs, antiseptic solutions, gauze pads, stickers, dressings, syringes, etc.) and specimens were all sealed in plastic boxes. A designated logistical worker with PPEs of level I+4 protection delivered them by a cart. Specialized routes were designed for clean materials and waste or contaminated ones respectively.”

Supervision of staff from department of in-hospital infection control: “Adequate electronic monitors were installed in the ED to supervise staff’s daily practice such as hand hygiene, PPE donning and doffing, and environment disinfection. A spy nurse in the ED and two staff from department of nosocomial infection control cooperated to supervise the daily practices through the assembled monitor every day and on site twice a week.”

Reviewer B

The main object of this study is to evaluate the effect of ED Management for COVID-19 omicron variation in pediatric emergency. This study object and theme could be interest to emergency physicians.

English is not my mother language. Therefore, I cannot checkup the grammar of manuscript. However, I think that authors should clarify some points in manuscript.

Reply: We apologize for the grammatical and tone problems in our manuscript, we have rechecked the whole article once again and revised them based on your recommendations. In addition, we have asked native English editors to polish and modify the manuscript.

Minor:

Comment 1: Line 28

In abstract, there was no explain of 'a multidimensional approach'. In this study this new approach system is most important. I think the brief explain of this approach system in abstract will be helpful to understand this study.

Reply 1: We appreciate the reviewer's kind recommendation. We have added the brief explain of this multidimensional approach system in the "Abstract" section as advised (see Page 2, line 35-40).

Changes in the text:

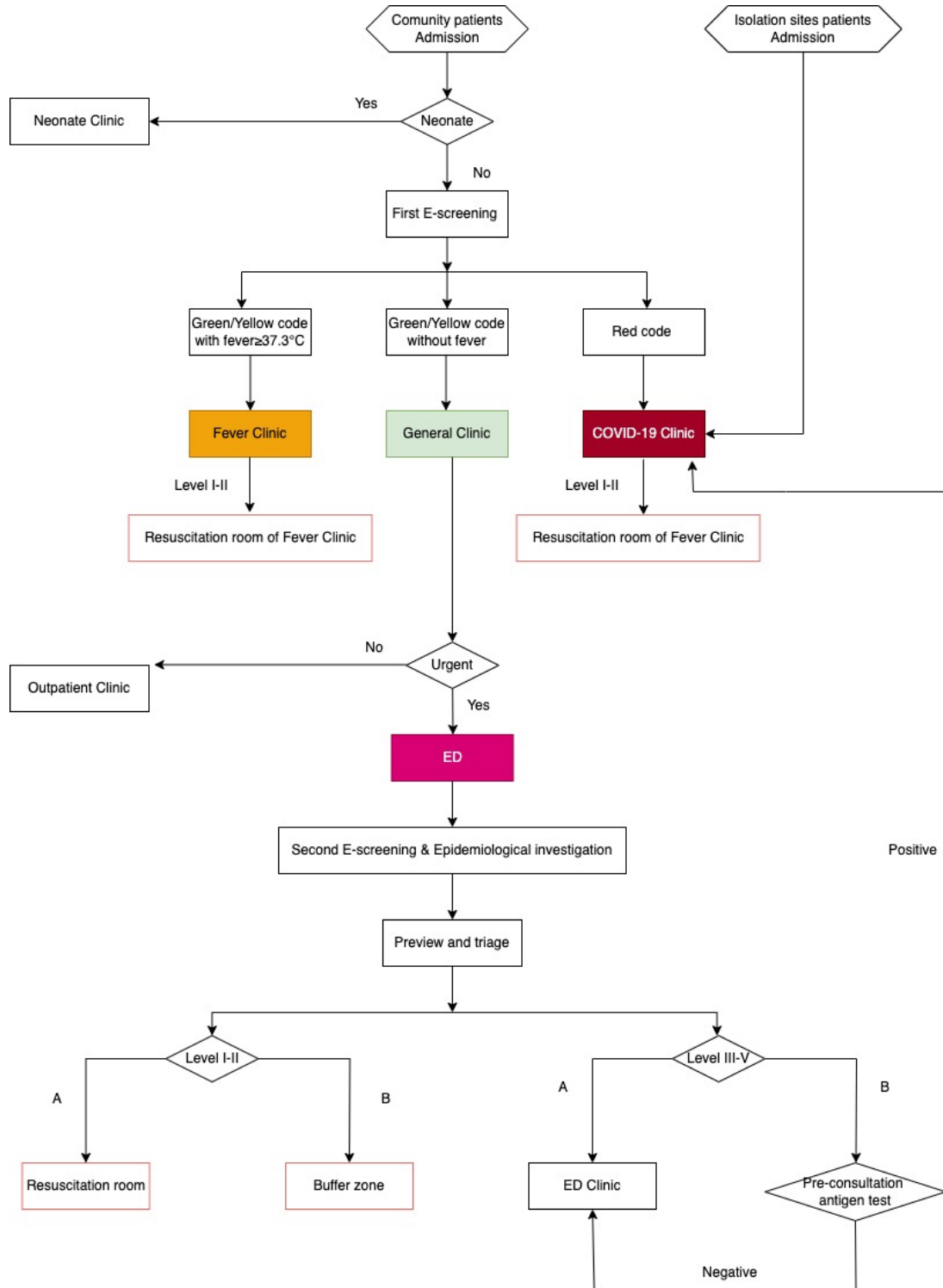
Methods: The multidimensional approach was implemented in the ED to help achieve a balance between demands for emergency service and pandemic control, consisting of ED layout adjustment, electronic screening (E-screening) measures, standard management processes for patients, medical staff, and goods transfer, reliable disinfection measures and a surveillance system for infection prevention and control.

Comment 2: Line 76, Figure 2

In first E-screening, what is cut-off value of 'fever'? Please clarify this in method section.

Reply 1: We appreciate you for this kind recommendation, we have clarified the cut-ff value of 'fever' in the "Methods" section and in the figure as advised (see page7, line141 and page 12, revised Figure 3)

Changes in the text: "children with fever (greater than or equal to 37.3°C) and a green/yellow health code were referred to the fever clinic". The revised Figure is shown as below.



Revised Figure 3 Flowchart for screen, preview, and triage of the patients

A: Patients with 48-hour negative PCR test report; B: Patients without 48-hour negative PCR test report

Major:

The main content of this study was redesigning and replacing ED for pediatric patients with green or yellow code and without fever. After implementation of this system, the risk control for nosocomial infection of COVID-19.

I agree that this system is very effective method for emergent pediatric patients who need immediately medical assessments and managements. There were only six patients who conformed COVID 19 lately. However, these patients were well controlled and managed properly.

Comment 1:

I think this finding is key result and this approach system is effect and safe. **However, in conclusion I could not find this comment. It will be better to correct conclusion for clarify key result of this study.**

Reply 1: We appreciate the reviewer's insightful advisement. We have revised the "Conclusion" section for clarify this key result as advised (see page 22, line 370-377).

Changes in the text: "This wave of the Omicron pandemic has been a big challenge to Shanghai's public health system, especially to the pediatric system. Adjusting the layout of the ED and optimizing the approaches of management in ED are positive responses to it. Based on the strategic management, all the patients in emergency conditions accepted immediately medical assessments and treatments, and pandemic was well controlled while there were only six patients who were conformed with COVID-19 lately. In addition, neither nosocomial infection nor occupational exposure was related to COVID-19 occurred".

Comment 2:

Although this study was investigated the effectiveness of new approach for low and no risk patient associated to COVID-19, clinician also wonder how high-risk pediatric patients who were needed emergency care were managed and triaged in your system. According to your paper in figure 2, during first E-screening patients who assigned Green or Yellow code with fever were sent to fever clinic.

Reply: We appreciate the reviewer's nice question. We have clarified how to manage high-risk patients who were needed emergency care were managed and triaged our system (see page 19, line 168-173 and page19, line 204-207), and revised the figure2 (shown as Figure3).

Changes in the text: "At the beginning of the COVID-19 pandemic in December 2019, there were only one outpatient clinic and one emergency department in the hospital. Subsequently, the fever clinic and COVID-19 clinic were set up. A resuscitation room was set in both of them, considering the emergency patients might be triaged to either. A rapid response team comprising of anesthetists, nurses and doctors with emergency and critical care experiences was established to ensure the safety of our patients" and "Children directly transferred to the COVID-19 clinic, or the fever clinic were also previewed and triaged by nurses using the five-

level pediatric triage tool. Level I/II children were immediately sent to the resuscitation room for rapid assessment and treatment”. The revised Figure 3 is shown as above.

However, in pediatric ED fever is very common symptoms and could be a symptom of severe disease. Therefore, it is necessary to prepare assessment system for these pediatric patients. I cannot understand the number of enrolled patients (12,114 in Line 198) is total screened patients or after E-screening patients with Yellow or Green code without fever were. In line 227, the resuscitation stay time was shorter than last year. However, the patient’s number who managed in resuscitation room was decreased from 1364 to 704. I think that because patients with fever could not enter ED space in your system, the number of patients could be decreased. Therefore, if possible, I think additional investigation how about the high-risk patients for COVID19 who were categorized Yellow or green with fever and red code could strength this study.

During COVID19 pandemic it is common problem that patient with febrile sense or respiratory symptoms is hard to access ED easily because of the fear and risk for infection COVID 19. Therefore, I think clinician wonder pediatric emergency patients were managed properly during COVID-19 regardless associated symptom. In this study the patients with low or no risk were well managed without risk of additional infection. This finding is also very important and impressive.

Additionally, how to manage the other patients in moderate or high risk group is also important issue

Reply: We appreciate the reviewer’s nice question and kind recommendations. The observation period was the two-month lock down of Shanghai, our results showed that the overall number of ED visitors declined (31,867 ED visitors from March to May 2021 and 12,114 ED visitors during the same period of 2022). But we also found the proportions of Level I/II patients were not changed notably in the ED and fever clinic, inferring regular emergency healthcare service should be guaranteed. we have added data of the high-risk patients from fever clinic with yellow or green code and COVID-19 clinic with red code (see page17, line 306-313). We also clarified the management of ED visitors in the section of methods and revised Figure 3 to strength our study.

Changes in the text: “A total of 8,328 visitors were consulted in the fever clinic from March1, 2022 to May 31, 2022, the corresponding figure was 12,594 in the same period of 2021. Among them, Level I/II patients were 20 in 2022 and 43 in 2021. Four hundred and thirty-two patients were referred to the COVID-19 clinic in the same period of 2022, and 3 of them were Level I/II patients. There were no medical care delays or unintended deaths at both sites”.