# A flowchart strategy for children with leukemia during COVID-19: a non-designated hospital's experience

Hongbo Chen[1], Hui Li[2], Yining Qiu[1], Zhujun Wang[3], Hui Yu[1], jiawei xu[1], Yun Peng[1], Xia Wan[1], Bingyu Zhang[1], Tiantian Song[1], Fen Zhou[1], Runming Jin[4], and Xiaoyan Wu[1]

[1]Wuhan Union Hospital
[2]Wuhan Childrens Hospital
[3]Children's Hospital of Zhejiang University School of Medicine
[4]Department of Pediatrics, Union Hospital,Tongji Medical College,Huazhong University of Science and Technology,Wuhan,Hubei,China

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| Abbreviations | Full term |
|---|---|
| COVID-19 | coronavirus disease 2019 |
| SARS-CoV-2 | Severe acute respiratory syndrome corona virus 2 |

To the Editor,

Severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) has been spreading worldwide.1-4 Since sustained and timely courses of chemotherapy are exceedingly critical for children with leukemia, any interruption may lead to an unfavorable prognosis.5 It is an urgent demand to establish a strategy of the coronavirus disease 2019 (COVID-19) detection in children with leukemia.6,7 Based on the experience, we have developed a flowchart involving an innovative scoring system to help pediatric hematologists to evaluate each outpatient before admission for the further chemotherapy (Figure 1).

All patients should be surveyed for epidemiological history at first. Patients without symptoms such as cough, fever, shortness of breath or other concerning symptoms, or without exposure to COVID-19 could receive planned chemotherapy.8,9 Otherwise further tests should be carried out before any chemotherapy. These include complete blood counts, C-reactive protein, chest CT scans and tests for common respiratory pathogens, including influenza virus, respiratory syncytial virus, adenovirus, parainfluenza virus, *mycoplasma pneumoniae* , and *chlamydia pneumoniae* . As the weight of each test differs, an innovative scoring system is applied to help doctors to identify the suspected COVID-19 cases. The complete blood count is not included in this scoring system as it is not applicable for differentiating diagnosis of COVID-19 in leukemia patients.

Patients scoring less than 5 are at low risk for COVID-19 and should receive chemotherapy on schedule. Patients scoring equal to or larger than 5 are considered as suspected cases and at high risk for COVID-19. For these patients, chemotherapy should be postponed and nuclear acid tests for SARS-CoV-2 be ordered. Confirmed COVID-19 cases would be transferred to a designated hospital for further treatment under the cooperation of pediatric hematologist, infectious disease specialist and intensive care specialist. Consecutive negative results (at least twice) of SARS-CoV-2 without viral pneumonia could be excluded from COVID-19 and should receive timely chemotherapy, while a finding of viral pneumonia deserves relevant treatment and continuous monitoring until excluding or confirming COVID-19 eventually.

During the early phase of COVID-19 pandemic in Wuhan, we had 88 patients throughout this flowchart. All the patients had epidemiological history as they were all from Wuhan. And they were evaluated by the scoring system. 68 patients had a score less than 5 and underwent timely chemotherapy or anti- infection therapy if present. The other 20 patients scoring not less than 5 were considered suspected cases. Chemotherapy were postponed and they got SARS-CoV-2 tests. Two patients were tested positive and transferred to the designated hospital for further treatment of COVID-19. The other 18 ones were tested negative twice and continued the chemotherapy, or were treated for present infections.

This flowchart strategy successfully screened out two cases of COVID-19 for us in pediatric leukemia patients without any missed diagnosis or nosocomial infections. Our strategy is especially useful for non-designated hospitals for COVID-19 in areas who are in shortage of personal protective materials and SARS-CoV-2 test reagents. 10

Author's contributions: Hongbo Chen, Hui Li and Yining Qiu wrote the manuscript. They contributed equally as the co-first authors. Zhujun Wang, Hui Yu, Jiawei Xu, Yun Peng, Xia Wan, Bingyu Zhang, Tiantian Song and Fen Zhou collected the data. Runming Jin and Xiaoyan Wu designed the study and finalized the manuscript.

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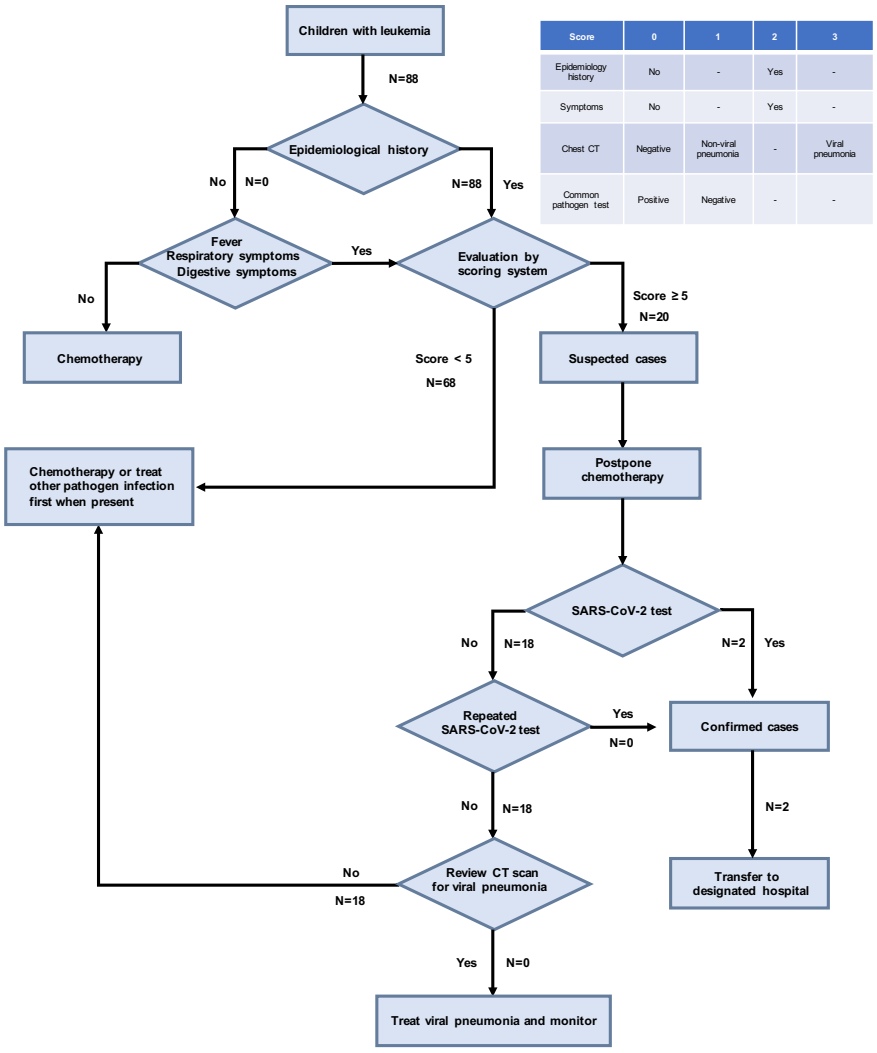
Figure 1. The flowchart for the management of pediatric outpatients with leukemia




| Score | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| Epidemiology history | No | - | Yes | - |
| Symptoms | No | - | Yes | - |
| Chest CT | Negative | Non-viral pneumonia | - | Viral pneumonia |
| Common pathogen test | Positive | Negative | - | - |