

# The Management of a Pandemic within a Moroccan Pediatric Oncology and Hematology Department the Example of Coronavirus Disease 2019

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## Abstract

**Introduction:** The Coronavirus Disease 2019 (COVID-19) pandemic has caused a complete upheaval of healthcare systems across the world. As children with cancer are considered to be at greater risk, the organization of oncological care had to be adapted.

**Objective:** We report our strategy in the face of the Delta wave of COVID-19 within our establishment, describing the measures put in place to limit its transmission while ensuring the continuation of anti-cancer treatments. We also present the main epidemiological, clinical and para-clinical characteristics as well as the outcome of our patients.

**Materials and methods:** This is a prospective study descriptive spread over three months from August 1, 2021 to October 31, 2021, concerning all children with cancer and diagnosed positive for SARS-CoV-2 infection, hospitalized or followed in the day hospital of the pediatric hemato-oncology department of the Hospital Center University of Marrakech. We collected 15 patients.

**Results:** The average age of our patients was 6 and 6 years. The underlying cancer was acute lymphoblastic leukemia in 5 cases (33.3%), neuroblastoma in 4 cases (26.7%), osteosarcoma and lymphoma in 2 patients (13.3%). Patients were symptomatic in 68.75% of cases. The main clinical signs were fever in 67% of cases, cough and rhinorrhea in 34%. The inflammatory syndrome was present in two thirds of cases, there was lymphopenia in 38.46%, and anemia in half of the cases. Severe forms represented 6.6% of cases. All of our patients benefited from geographic isolation with application of hygienic rules. Azithromycin was used in all our patients for 5 days. The Chemotherapy was postponed with a delay of 1 week in patients with cytopenia (53.3%). The evolution was favorable in 14 children and we noted the death of a single case presenting post-chemotherapy aplasia.

**Conclusion:** Children with cancer are more vulnerable to pandemic infectious diseases. Therefore, we must take all preventive measures to ensure adequate care.

**Keywords:** Child; Cancer; Chemotherapy; COVID-19; PCR; Prevention

## Introduction

Children with cancer are susceptible to infections due to immunosuppression, making children more vulnerable to infections and disease. This is why it is crucial to take additional precautions to protect these fragile patients and to provide them with appropriate medical care [1]. The COVID-19 pandemic has triggered a significant restructuring of health care systems worldwide. Particularly vulnerable groups, such as children with cancer, face increased risks that require reassessment of cancer care practices. Faced with the rise of the Delta variant, our institution has implemented a global strategy to meet these challenges. Our approach includes a detailed account of the measures adopted to curb the spread of the virus, while preserving the uninterrupted supply of life-saving cancer therapies. We also present the main epidemiological, clinical and para-clinical features as well as the outcome of our patients.

## Materials and methods

This is a prospective descriptive and observational study spread over three months, from August 1, 2021 to October 31, 2021. This study concerned all patients aged 0 to 18 years with cancer and diagnosed positive for SARS-CoV-2 infection. These patients were either hospitalized or followed in the day hospital of the pediatric hemato-oncology department of the Marrakech University Hospital Center. The diagnosis of COVID-19 infection was confirmed by molecular biology based on Polymerase Chain Reaction (PCR) tests carried out in the Microbiology department of the same hospital center. Data collection was based on an anonymous operating sheet including the sociodemographic, clinical, para-clinical, therapeutic and evolving parameters of the patients. Statistical analysis of the data was carried out with Microsoft Office Excel 2016. Qualitative variables are expressed as percentages and quantitative variables are expressed as means with limits.

## Results

In total, we gathered a sample of 15 patients among 135 PCRs carried out, i.e. 11%, including 11 boys and 4 girls. Among them, 6 patients had to be hospitalized, while the other 11 were monitored in the day hospital. The average age of patients was 6 years and 6 months, with extreme ages ranging from 1 year and 4 months to 15 years. The predominant cancer type observed in our patients was acute lymphoblastic leukemia, accounting for 5 cases (33.3%). Next came neuroblastoma, diagnosed in 4 cases (26.7%), osteosarcoma and lymphoma, each in 2 patients (13.3%). In addition, there was one case of nephroblastoma and another of renal sarcoma. In addition, it was observed that in 60% of cases, the source of contamination was identified as nosocomial. Most patients (68.75%) presented symptoms, with fever being the most common (67% of cases), followed by cough and rhinorrhea (34%), and digestive symptoms in 33% of cases. Biologically, two thirds of the patients presented an inflammatory syndrome (positive CRP), 38.46% had lymphopenia and half had neutropenia associated with anemia. THED-dimers were requested in a single patient, aged 14 years, tall, presenting chest pain and they were returned increased even though his chest CT was without abnormality. Severe cases represented 6.6% of the total, this concerning an infant aged 1 year and 4 months followed for clear cell renal sarcoma, hospitalized for post-chemotherapy aplasia. Therapeutically, all patients were subject to geographic isolation, strict hygiene rules and compulsory wearing of a mask. Azithromycin was administered for 5 days in all our patients, with dual antibiotic therapy used for febrile neutropenia in 9 patients. No case received chloroquine and the rest of the therapies recommended for adults. Chemotherapy was postponed for one week in patients with cytopenia (53.3%). The average time to PCR negative was 17 days, ranging from 2 to 5 weeks. A favorable outcome was noted in 14 children, while the patient with post-chemotherapy aplasia died due to septic shock complicated by multi-organ failure.

## Discussion

COVID-19 has spread rapidly internationally. It was responsible for devastating consequences by generating a significant number of infected people and deaths as well as a negative impact on the socio-economic level. Therefore, the World Health Organization (WHO) sounded the alarm on March 11, 2020 by declaring the COVID-19 disease a global pandemic [2]. The first confirmed cases of SARS-CoV-2 infection in children were reported from January 2020 in China. And since then, several pediatric cases have been reported throughout the world [3]. Unlike adults, COVID-19 in the pediatric population is characterized by a less severe picture, with fewer serious cases observed or hospitalized in intensive care and intensive care settings. Several hypotheses can explain this remarkable difference [4]. This pandemic has had a considerable impact on treatment strategies for patients with cancer because they were quickly considered more at risk of developing severe forms of COVID-19 [5]. All the work carried out in this sense concerns the adult hence the interest of our work which is a pilot in this field.

Analysis of COVID-19 cases among our patients indicates that the infection rate is not significantly higher than that observed in the general population, despite the high prevalence of the disease in our region. It is possible that these figures underestimate the true scale of the epidemic, in particular due to the cases of COVID-19 treated outside our establishment. However, other factors must be taken into consideration. Cancer patients, aware of the risks through the media and our internal communications, may have been more diligent in respecting containment measures and barrier gestures, perceiving themselves as particularly vulnerable. This low incidence could also testify to the effectiveness of the protocols implemented in our institute, in accordance with the directives of the health authorities and our own initiatives. Following the activation of the health crisis plan by the Moroccan government in March 2020, the systematic wearing of masks by hospital staff, patients and authorized visitors was made compulsory, as were "barrier" gestures. (in particular physical distancing in offices, treatment rooms and break rooms, with dematerialization of all meetings by videoconference). Visits have been prohibited except in special circumstances. A circuit to identify patients suspected of COVID-19 has been set up. In the event of symptoms suggestive of COVID-19, patients were redirected to an unscheduled consultation area with examination rooms and dedicated medical and paramedical staff. Hospitalization units have also been dedicated to the care of patients with suspected or confirmed COVID-19, including an intensive care unit. In accordance with national recommendations, the search for SARS-CoV-2 by RT-PCR on nasopharyngeal swabs was generalized in all suspected patients as well as their families.

In our series, we observed that patients with both active cancer and COVID-19 were more frequently infected in hospital. This situation could be linked to their increased need for hospital care and frequent medical appointments. Studies of patients with active cancer hospitalized for COVID-19 at the time of diagnosis indicated that the demographic and clinical characteristics of this group were similar to individuals in the non-oncology group as well as the general population. risk highlighted in previous observational studies of COVID-19. This suggests that people with active cancer may face a comparable level of risk to other high-risk groups in the context of COVID-19 infection [6]. In a French cohort study, cancer patients were found to be more immunocompromised, with 53.2% receiving chronic immunosuppressive treatment on admission, including corticosteroids, and having significantly lower lymphocyte counts [6]. However, patients with cancer and COVID-19 did not have a worse prognosis than non-cancer patients in this study. The reported therapeutic effects of corticosteroids could partly explain this good result in the group of cancer patients [7].

Increased risk of clotting disorders and thrombosis is another important concern among COVID-19 patients. In accordance with published retrospective studies in adults, on the subject, we observed a high rate of 7.9% of pulmonary embolism and 6.7% of hemorrhage, with no significant difference between oncological and non-oncological patients. Clotting protein levels were similar in both groups, with elevated levels of D-dimer, fibrinogen, and CRP, and normal prothrombin time and platelet counts. In our series we did not observe any coagulation disorders or thromboses in our patients. All the studies concerning this subject have not been able to determine associated risk factors, such as recent antibiotic therapy or the use of chemotherapy, nor to demonstrate a significant difference between solid tumors and diseases. hematological. It would be interesting to conduct a multicenter study on the vulnerability factors to SARS. On the therapeutic level, The different scientific research teams agree that patients suffering from COVID-19, whether they have active cancer or not, present similar results and should benefit from equivalent treatments, particularly in terms of access to care.

intensive. Decisions regarding possible modifications or interruptions of oncological treatments must be made on an individualized basis taking into account the patient's age, possible concomitant diseases and drug interactions with COVID-19 treatments [7]. Concerning the severity of COVID-19 in children with cancer, the frequency of severe and lethal forms that we observed also does not seem to differ from the figures observed in the general population. Furthermore, we did not identify any cancer-related severity predictors in our analyses. However, while cancer patients do not appear to be at greater risk of developing SARS-CoV-2 infection, including severe ones, the long-term impact of COVID-19 for oncology patients, including those without having not contracted the infection, remains unknown [8]. This crisis has also led to a reduction in diagnoses of new cancers, which risks leading to a delay in treatment with cancers at a more advanced stage and therefore further aggravating the burden on the health system. Thus, several models suggest an increase in cancer-related mortality in the coming years, with up to 20% excess mortality in the United Kingdom for example [9, 10] (diagnosis delay due to confinement).

## Conclusion

During the COVID-19 period, the pediatric hematology-oncology department of Marrakech University Hospital has taken all infection prevention measures to ensure adequate care and complete and secure oncological therapeutic continuation. Early detection and rapid treatment are essential to guarantee the well-being of these children during these difficult times.

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