

1 **Retinoblastoma management during the COVID-19 pandemic: a report by the Global**
2 **Retinoblastoma Study Group including 194 centers from 94 countries**

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4 The Global Retinoblastoma Study Group – byline and affiliations are shown on a separate
5 document

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Abbreviations key table	
COVID-19	Corona virus disease 2019
EUAs	Examinations under anesthesia
IVC	intravenous chemotherapy
IAC	intra-arterial chemotherapy

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21 **To the Editor:**

22 In December 2019, cases of pneumonia of unknown origin were reported in Wuhan, Hubei,
23 China.[1] Investigations showed that the cause was a novel RNA virus belonging to the
24 Coronaviridae family. Since the first reported cases, the disease, termed Corona virus disease
25 2019 (COVID-19), has spread widely resulting in the World Health Organization, on January 30
26 2020, declaring COVID-19 a Public Health Emergency of International Concern.[2]

27 As of the last week of March 2020, many countries are under lockdown, medical services are
28 changing priorities and policies, and health care resources have been shifted to focus on outbreak
29 management. These new circumstances, which continue to evolve, may impact negatively on the
30 treatment of other diseases. Of particular interest is the effect on oncology patients,[3] and more
31 specifically pediatric oncology patients,[4] where disease poses a threat to life.

32 Retinoblastoma is the most common ocular malignancy of childhood.[5] Early diagnosis and
33 treatment have improved the prognosis for children with retinoblastoma in high income countries
34 now reaching >90% disease-free survival rate.[6, 7] We aimed to investigate the impact of the
35 COVID-19 pandemic on retinoblastoma management in treatment centers across the world, and
36 indirectly on patients' prognosis. This information is important for policy and healthcare
37 planning at national and international levels, during the pandemic, and for better preparation in
38 future.

39 A survey focusing on retinoblastoma management during the pandemic was sent on March 29
40 2020 to members of the Global Retinoblastoma Study Group.[8] Participants were asked to
41 return the completed survey before April 4 2020. During this week, daily COVID-19 data at
42 country and global levels were retrieved from the World Health Organization database.[9]

43 Overall, 194 centers from 94 countries were included in the analysis. Of the participating centers,
44 73 (37.6%) were from Asia, 34 (17.5%) from Europe, 40 (20.6%) from Africa, 6 (3.1%) from
45 Australasia, 17 (8.8%) from Latin America and the Caribbean, and 24 (12.4%) from North
46 America.

47 Globally, the total number of COVID-19 positive patients reported on March 29 and April 4
48 2020, respectively, was 723,390 and 1,201,483, and reported deaths were 34,065 and 64,690.
49 The total number of reported COVID-19 positive patients in the 94 participating countries on
50 March 29 and April 4 2020, respectively, was 702,559 (97.1%) and 1,165,380 (97.0%), and
51 reported deaths were 33,660 (98.8%) and 63,720 (98.5%) (**Figure 1**).

52 Supplemental **Table S1** shows the COVID-19 data per participating country during the study
53 period, data on travel restrictions, and policy for retinoblastoma patients. In 51 countries
54 (54.3%), there were less than 100 COVID-19 positive cases per average day, in 30 countries
55 (31.9%) there were between 100 and 999 new positive cases, and in 9 (9.6%) countries there
56 were between 1,000 and 10,000 new positive cases per day. In terms of deaths, no cases were
57 reported in 23 (24.5%) of the participating countries, in 50 (53.2%) countries there were 1 to 9
58 deaths per day on average, and in 17 (18.1%) countries there were between 10 and 499 deaths
59 per day on average. In France, Italy, Spain and the USA there were 500-1000 new deaths, on
60 average per day in each country.

61 Of the 194 participating centers, 82 (42.3%) reported that families are restricted from travelling
62 to the retinoblastoma center. Most centers (170 (87.7%)) reported that they accept new referrals
63 for examination and treatment, and most (185 (95.4%)) reported that they continue treating
64 active cases. Of the 194 participating centers, 112 (57.7%) reported a policy of deferring stable
65 cases. Six (3.1%) centers reported that they are not providing any services.

66 Overall, 16 (8.3%) centers reported that retinoblastoma management was disrupted due to
67 personnel being quarantined or sick (i.e. COVID-19 positive), 11 (5.7%) due to personnel being
68 needed elsewhere, 7 (3.6%) due to equipment being needed elsewhere/missing, 40 (20.6%) due
69 to a combination of factors, and 120 (61.9%) reported no disruption.

70 **Table 1** shows the modalities available in treatment centers before and during the pandemic.
71 Examinations under anesthesia (EUAs), enucleation, intravenous chemotherapy (IVC) and intra-
72 arterial chemotherapy (IAC) were available in 186 (95.9%), 193 (100.0%), 187 (96.9%) and 96
73 (49.7%), respectively, of the centers before the outbreak. During the pandemic, EUAs were fully
74 available in 107 (55.2%) of the centers. In terms of treatment modalities, enucleation was
75 available in 173 (89.6%), IVC in 181 (93.8) and IAC in 73 (37.8) of the centers.

76 Overall, 104 (53.6%) of the centers have reported that changes and restrictions outside or within
77 the center due to the COVID-19 pandemic are potentially affecting the lives of retinoblastoma
78 patients. A summary of the impact of the COVID-19 pandemic on retinoblastoma management
79 as reported by the participating centers is shown in <https://retinoblastoma.world/>.

80 Findings of the present survey indicate that, according to most centers, changes and restrictions
81 related to the COVID-19 pandemic potentially risk the lives of retinoblastoma patients.

82 Approximately 40% of the participating centers reported that families are restricted from
83 reaching a retinoblastoma center. Moreover, nearly 40% of centers reported disruption in
84 retinoblastoma management during the outbreak related to personnel or equipment.

85 Enucleation can save lives. IVC can save lives and result in globe salvage when patients are
86 diagnosed and treated before extraocular spread.[10, 11] During the study period, most centers
87 were able to continue to provide these life-saving treatment modalities. Conversely, availability

88 of IAC reduced to just over one third of the centers from about half of the centers pre-COVID-
89 19. Whilst IAC can be useful for globe salvage,[12] as a treatment modality it is not as critical
90 as IVC or enucleation surgery for survival. However, continued provision of any treatment
91 modalities is irrelevant if patients are precluded from reaching the treatment center.

92 In summary, findings of the present survey from 194 treatment centers, which was conducted
93 while the pandemic escalates across the world, indicate that, globally, management of children
94 with retinoblastoma is compromised, jeopardizing their lives. There is a delicate balance of risk
95 management during a global pandemic. Treating patients, especially children, with a highly
96 curable disease but potentially fatal when no treatment is delivered, remains a priority even in the
97 face of a dangerous global viral outbreak. Decision makers should be aware of the effects of
98 broad sweeping policies and take them into account when weighing all the risks and benefits of
99 the situation.

100 **Conflict of Interest Disclosures**

101 We declare no competing interests relevant to the present work.

102

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104 **Author contributions**

105 Ido Didi Fabian had full access to all the data in the study and takes responsibility for the
106 integrity of the data and the accuracy of the data analysis.

107 All authors comply with ICMJE criteria for authorship. Authors are listed in alphabetical order.

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109 **Acquisition, analysis or interpretation of data:** All co-authors.

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113 All co-authors approved the final version for publication.

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154 **Figure legend**

155 **Figure 1**

156 Covid-19 positive cases (A) and deaths cases (B) in 94 countries as of April 4 2020 (end of
157 survey).