

Abstract Category: Epidemiology & Population-based research

Title: Changing face of pediatric pulmonary exacerbations in CF

Authors:

Mohamoud Ahmed, University of Colorado Anschutz Medical Campus

Yaron Fireizen, Rady Children's Hospital-San Diego, University of California San Diego

Tim Vigers, University of Colorado Anschutz Medical Campus

Kathryn Akong, Rady Children's Hospital-San Diego, University of California San Diego

Julie Ryu, Rady Children's Hospital-San Diego, University of California San Diego

Andrea Hahn, Children's National Hospital, George Washington University School of Medicine and Health Sciences

Anastassios Koumbourlis, Children's National Hospital, George Washington University School of Medicine and Health Sciences

Pornchai Tirakitsoontorn, Children's Hospital of Orange County, University of California Irvine

Antonio Arrieta, Children's Hospital of Orange County, University of California Irvine

Elizabeth Burgener, Lucile Packard Children's Hospital, Center for Excellence in Pulmonary Biology, Stanford University

Elin Towler, Children's Hospital Colorado

Allison Keck, Children's Hospital Colorado

Dayna Stout, Rady Children's Hospital-San Diego

John Bradley, Rady Children's Hospital-San Diego, University of California San Diego

Scott Sagel, Children's Hospital Colorado, University of Colorado Anschutz Medical Campus

Background: The approval and availability of highly effective CFTR modulator therapy (HEMT) coupled with the COVID-19 pandemic led to a remarkable decrease in pulmonary exacerbations (PEX) requiring hospitalization among children with CF. The purpose of this study is to determine the characteristics of children with CF who are now requiring hospitalization for PEX.

Methods: Retrospective medical chart review at five pediatric sites to collect data from all children with CF (ages from birth and older) who were hospitalized and received IV antibiotics for treatment of PEX over two 12-month time periods (2018 and 2022).

Results: The number of hospitalizations for PEX decreased from 414 in 2018, involving 226 unique individuals, to 164 in 2022, involving 113 unique individuals. Children were more likely to be hospitalized more than once in 2018 than in 2022 ($p < 0.001$). While there were not age differences between 2018 and 2022 (mean 13 years vs 12, $p = 0.2$), nor sex differences between 2018 and 2022 (54% female vs 47%, $p = 0.2$), nor racial differences between 2018 and 2022 (4.9% Black vs 5.3%, $p = 0.2$), there was a trend towards more people identifying as Hispanic requiring hospitalization in 2022 (47%) compared to 2018 (35%) ($p = 0.072$). Children hospitalized in 2022 were more likely to have two non-F508del mutations (45%) compared with children hospitalized in 2018 (21%) ($p < 0.001$). Lengths of hospitalizations were similar in 2018 and 2022 (mean 11 days vs 10 days, $p = 0.14$). Improvements in lung function, in those old enough to perform spirometry, were similar in both time periods. In 2018, ppFEV₁ improved 11 percentage points (95% CI, 9.4, 12) from 69 (SD 21; 95% CI, 66, 72) at beginning of hospitalization to 80 (SD 21; 95% CI, 77, 83) at the end of hospitalization; in 2022, ppFEV₁ improved 13 percentage points (95% CI, 10, 16) from 72 (SD 19; 95% CI, 68, 76) at beginning of hospitalization to 84 (SD 22; 95% CI, 79, 89) at the end of hospitalization. There were no differences in the percentages of those hospitalized infected with *P. aeruginosa* and methicillin-susceptible *S. aureus* between 2018 and 2022, but a lower percentage of hospitalized children in 2022 (2.7%) were infected with methicillin-resistant *S. aureus* (MRSA) than in 2018 (10%) ($p = 0.014$).

Conclusions: Across our five pediatric sites, hospitalizations for PEx decreased by 60% from 2018 to 2022. We believe this reduction reflects the benefits of HEMT, as a higher percentage of children who were hospitalized in 2022 had two non-F508del mutations and were not eligible for HEMT compared with children hospitalized in 2018. A lower percentage of children hospitalized in 2022 were infected with MRSA compared with 2018. These data draw attention to children who currently are being hospitalized for PEx and justify the development of novel treatment strategies to improve outcomes of PEx treatment for children who do not qualify for HEMT.