



Cystic Fibrosis Research News

Title:

Repeated Hot Water and Steam Disinfection of Pari LC Plus® Nebulizers Alters Nebulizer Output

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What was your research question?

Our research question arose when one of the researchers seriously deformed her asthmatic daughter's nebulizer in a pot of boiling water while attempting to disinfect it after the CF Foundation cleaning/disinfection guidelines came out. This incident made us wonder if different disinfection methods cause small changes that we can't see, and if any small, unseeable changes could affect how a nebulizer works.

Why is this important?

Every day, many important medicines and therapies are delivered by nebulizers to people with CF. While these treatments help keep people healthy, they also take up a large amount of time. Proper cleaning and disinfection of the nebulizers are essential to keep them working properly and to prevent them from getting contaminated with harmful bacteria such as *Pseudomonas aeruginosa*, methicillin resistant *Staphylococcus aureus* (MRSA), and atypical mycobacteria. With so much time and good health at stake, it is important to know if the process of cleaning/disinfection alters how the nebulizer delivers medications to people with CF.

What did you do?

In a laboratory setting, we nebulized regular ("normal") saline until we heard a "sputter" using new nebulizers and compressors. We timed and weighed each nebulizer with saline before and after the "sputter" to see how much saline was nebulized (output). We then cleaned and

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disinfected the nebulizers according to the CF Foundation guidelines using heat (boiling or baby bottle steam sterilizer) and cold (70% isopropyl alcohol soak) methods. We tracked how each nebulizer worked after many cleaning and disinfection cycles. We then calculated how much time an “average” daily CF treatment regimen takes and how nebulizer function can affect the length of treatment time.

What did you find?

We found that after two months (60 cycles) of cleaning/disinfection, heat methods (boiling/baby bottle steam sterilizer) significantly decreased nebulizer output. This translates into an increase in treatment time of approximately 37 minutes per day if you disinfect by boiling or 57 minutes per day if you disinfect using a steam sterilizer for those on an “average” daily CF treatment regimen (twice daily albuterol, hypertonic saline, inhaled tobramycin and once daily dornase alpha). Conversely, alcohol soaking did not decrease nebulizer output or affect treatment time.

What does this mean and reasons for caution?

This study demonstrates that disinfection methods may significantly affect the way a nebulizer works. In this study, we used PARI LC Plus® nebulizers which are approved for use with medications for CF. Other types of nebulizers may be affected differently by disinfection because they could be made with different plastic or metal materials. As different medications have various weights and sizes, this study could not determine the amount of medication nebulized. We encourage individuals to follow the guidelines and nebulize their medications until they hear a “sputter” rather than for a pre-set amount of time.

What’s next?

We would like to do another disinfection study in the home setting. As time is so precious and disinfection takes a lot of effort, we need families/patients’ perspectives to find the ideal method. Lastly, our previous study looked at an ozone-based disinfection method that did not affect nebulizer function and seems, to us, to be less messy/time consuming than other disinfection methods so we would like to include that method in our home study as well. We would like to use our results to inspire insurance companies to provide nebulizers more frequently to people with CF as well as pay for disinfection supplies.

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