

The CoughAssist / In-Exsufflator and How We Use It

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By Bill Miller, an 11.5+ year vent user who hasn't been suctioned since Nov. 1997

NOTE: Please read this document in its entirety (all 5 pages) before applying any of this info.

The CoughAssist is a newer version of a mechanical in-exsufflator, and the CoughAssist wasn't developed when I was discharged from rehab, so we have two mechanical in-exsufflators (one bedside, and one that usually sits on a stool in my computer room where I spend most of my time, but it can be moved wherever needed and it travels with me when I go somewhere in our van). For short, I call it an "in-exsufflator" and say "I need to be in-exsufflated please" etc.

My bedside in-exsufflator has both automatic and manual controls, but we only operate it in the manual mode (ditto for Shepherd Center's staff, at least when I was there, which is where we learned the basics). So, when we contacted JH Emerson Company (who was acquired by Respironics) to inquire about getting a second machine (if the one we have breaks, what do we do? Suctioning sucks, so we needed another / backup in-exsufflator) we learned they have a manual model, which is a little smaller, lighter, and less expensive (a bit about the cost: preventing just one hospitalization pays for the machine; and in my 11.5+ years as a ventilator dependent quadriplegic, I have been hospitalized exactly ZERO times for anything respiratory—knock on wood, and thank you to my in-exsufflators, caregivers, and the Good Lord. I've heard that many vent users are hospitalized with a respiratory infection, on average, once a year or more—so think about how much money my insurance company has saved the last 11.5 years. For more on why I advocate so strongly for the CoughAssist, please see my testimonial titled: "The Secret to Ventilator Health" on my "Life with an SCI (Spinal Cord Injury)" webpage on my website: http://www.lookmomnohands.net/Life_with_an_SCI.htm.)

Ok, so we in-exsufflate "manually" which just means that an able-bodied attendant is controlling the inhale/exhale switch, instead of the machine flipping the switch at timed intervals.

Before I describe how we in-exsufflate, I have to describe the tubing we use. When someone gets an in-exsufflator, Respironics sends quite a few circuits to get the person started. The piece I call an "in-exsufflator hose" is actually a "3-foot long flexible smooth-bore tube with a 22-mm inner diameter." It isn't segmented like my ventilator circuit, and it's more flexible than my vent circuit. But, speaking of my vent circuits, we use extra tubing from them as "in-exsufflator extensions" which catch the secretions.

We change both vent circuits (my bedside vent and wheelchair vent each have their own tubing) every two weeks, and with each circuit comes an extra three feet of segmented tubing (like the actual vent circuit). So between the two vent circuits, I get an extra 6 feet of segmented tubing every two weeks. We cut each 3ft piece into three 1ft pieces. These one-foot pieces become "in-exsufflator extensions." (Actually, 5 of the one-foot pieces become in-exsufflator extensions; one gets cut in half to make two 6-inch pieces, which go into my tubing rotation and are used on my wheelchair vent circuit, ambu bag, and when using the nebulizer machine.) All the new tubing is dated (with a Sharpie marker) when we put it in the rotation, and we discard corresponding pieces that have the oldest dates on them. Incidentally, we usually keep 10 in-exsufflator extensions (one-foot pieces) and 5 six-inch pieces in a rotation (clean and reuse until

rotated out; I described our respiratory equipment cleaning process on my “Overview of My Care” page on my “Life with an SCI” page of my website, see above address).

If you don't use a vent circuit, or your circuits don't come with extra segmented tubing, you can buy 100ft rolls of the exact same segmented tubing I describe above. Here's a link to a good price on the tubing: <http://www.qualitymedicalsupplies.com/page/QMS/PROD/RE-CT/92-1680>

OK, we take a large ziplock bag (we don't actually close it) and tie it to the in-exsufflator. It holds the clean, ready-to-use in-exsufflator extensions like a quiver holds arrows. We add a standard coupling/adaptor (15mm inside diameter and a 22mm outside diameter; here's a good price on them: http://www.jrsmedical.com/RESP_MISC/HUD1422/product.aspx) to attach each in-exsufflator extension, which is what will actually go over my trach when we pull the vent circuit off to in-exsufflate. The other end of the in-exsufflator extension connects to the in-exsufflator hose. The advantage of using the one-foot in-exsufflator extensions is that usually all the secretions that come out of me, they collect in the extension, and it's significantly easier to clean the extensions than it is to clean the in-exsufflator circuits (in talking with Respironics' Respiratory Therapist, our extensions were a good idea he thought users would like—it really is much easier to clean them; plus the in-exsufflator hoses will probably last longer this way).

OK, so now you know about the in-exsufflator, its circuit/hose, and our in-exsufflator extensions. Before handling respiratory tubing or equipment, caregivers need to have clean hands. Either wash, sanitize, or use a baby wipe (depending on what the caregiver has been doing since last hand-washing). Incidentally, a good habit for caregivers, is whenever your nose or face itches, use the back of your hand to itch yourself. That way your hands (the part you use to touch things like tubing) stay clean. Also, if you have to cough, try to cough into your shoulder or elbow, and always away from the vent user and away from any respiratory equipment and/or supplies. If a caregiver has a cold or is sick in some possibly contagious way, it's best if they wear a disposable mask when performing caregiving activities (here's an excellent price on 50 disposable masks: http://www.jrsmedical.com/PROTECTIVE_WEAR/AMD2117/product.aspx).

OK... ready to in-exsufflate!

With clean hands, put an in-exsufflator extension on the in-exsufflator circuit. Turn the machine (power) on and test the inhale and exhale pressures. Do this by the caregiver placing his/her clean thumb over the end of the in-exsufflator extension (seal it off). Then flip the switch to inhale, and read the pressure gauge. For me, I like it to go up to a pressure reading of about 50. There should be a knob or some way to adjust the pressure, if it's too high or too low. For “beginners” or children, I would NOT do 50 on pressure. Adult beginners, I'd probably start about 30 or 35 on the gauge—it might not be very effective at removing secretions at 30 or 35, but the low starting point is good for a first time user to get used to the air going in and out. If the person tolerates it well (and is reasonably comfortable) then try higher pressures (go up maybe 5 at a time) and see what the person prefers. Fifty should be a maximum for adults. I have no idea what an appropriate starting pressure would be for a child; it would depend on his/her age, size, and ability to understand what is going on and “work” with the in-exsufflator. A new feature on the CoughAssist is the “full” or “reduced” inhale flow option. The in-exsufflator is full-flow only, which I'm comfortable with, but beginners might prefer reduced flow (especially when trying the CoughAssist for the first few times). Anyway, once the gauge reads the correct number on inhale, keep your thumb covering the end, and switch to exhale. It should read about the same (I like both about 50). Adjust as necessary.

A caregiver should check the pressure every time, but if that same caregiver just used the machine a short while ago and there is no chance that the pressure knob was bumped or inadvertently adjusted, it should be fine (I can tell by the sound if it's right). But using a different power source can make an adjustment necessary (we have a power converter in my van that we can plug the in-exsufflator in to, but the converter doesn't give the amount of power a standard household outlet does, and we generally have to turn the power/pressure all the way up to get it reading near 50).

Ok, caregiver ready, tubing ready, machine ready.

At Shepherd, they in-exsufflate in two-person teams (or they used to when I was there). One person runs the machine, and one person pushes on the patient's chest to assist the removal of the secretions. Notice I never mentioned needing another person. Really, one person can do it just fine, and sometimes better than two. I'll try to quickly explain what Shepherd did with two people, and then I'll explain how we do it.

First off, Shepherd used a lot of sterile saline when in-exsufflating. That can be a good thing, but how we do it, a lot of saline generally isn't required. Anyway, they use the pink 5-ml sterile bullets with the twist-off tops, to squirt saline in the trach when in-exsufflating. If I remember correctly, they would start with one 5-ml bullet, run an in-exsufflating (inhale/exhale) cycle, then add another 5 ml bullet, and I think they may add a third and even a fourth bullet after additional cycles. I wouldn't do more than 4 bullets (20 ml) at a time, and really, two bullets (10 ml) should be enough for most in-exsufflating situations (I wouldn't add more than two bullets unless something is really sticky, and isn't coming out, like perhaps a really sticky secretion that could be almost blocking the end of the inner canula/trach (which you can hear; it will sound like an angry wheezing noise), then maybe use up to 4 bullets to try to loosen it so it will come out).

Anyway, by adding generally two or three bullets, the secretions that Shepherd would get out, they usually were pretty wet. This is gross, but true... the machine operator at Shepherd, after an in-exsufflating cycle, he/she would take a wash cloth (or maybe paper towels) and place it on the patient's stomach (usually) and when the wet secretion was in the tube, they would flip the switch to exhale and try to blow it onto the wash cloth! That's part of the reason why they needed two people, because the machine operator might spend up to a minute trying to clear the in-exsufflator hose (I don't remember if they used extensions or anything like that).

While the machine operator was "cleaning" the hose, the other person would use the ambu bag, and give the patient breaths in between in-exsufflating cycles. The other thing the non-machine person would do is push. There are differences of opinion as to where and how to push, but with me, when I am filled up with a big breath of air (machine on inhale) I will nod my head to indicate it's time to flip the switch to exhale and basically push 3 times on my chest before taking the hose off. A cycle is: inhale... then exhale & push (3 times on my chest) and take the hose off—while leaving the machine on exhale. When you're doing a cycle, the caregiver shouldn't let the machine slip to neutral until the hose is off. If it slips back to neutral while you're pulling the hose off, the junk won't come out easily/cleanly.

When I'm put in bed, and before I get out of bed, I receive a total of 15 ml of saline (three 5 ml bullets). I get one bullet both before and after my nebulizer treatment (again, see "an overview of my care") and when getting out of bed, we put the third bullet in before my caregiver dresses me. That's because when I'm getting dressed, I am turned from side to side, and the saline can "roll around" with me. When I'm being put in bed, I receive a saline bullet before I'm taken out of my chair (before the transfer). I am usually in-exsufflated within a couple minutes after the

transfer. I believe that's enough to loosen my secretions. I also stay pretty well hydrated which helps make my secretions easy enough to get out without adding saline when in-exsufflating (sometimes we do, but not often). That keeps my secretions from being so wet that they want to leave the in-exsufflator extension and go back inside me with the next cycle, and keeps us from having to blow the secretions out onto a cloth or paper towels like Shepherd does (or used to). If an in-exsufflator tube gets filled with a large quantity of secretions, or if secretions seem like they won't stay in the extension as you do another cycle, then go ahead and change the in-exsufflator extension before doing another cycle.

Incidentally, we always clean the secretions out of the in-exsufflator extensions after in-exsufflating. If they dry to the extension tubing, they are almost impossible to clean, and we'll have to throw that tube away. Also, take the coupling off of the extension when cleaning. If the coupling isn't separated, that becomes a possible place where bacteria could proliferate.

Back to the discussion of saline, adding all that saline (like Shepherd does) that kinda "cleans" the inner canula. Sometimes secretions don't come through my inner canula clean, so we often change the inner canula after in-exsufflating. Changing the inner canula is simple to do, and we wash and reuse them as described in my aforementioned "An Overview of My Care."

By the way, it's pretty humid where I live (in Central Florida). If the air is real dry where you live, more saline, or saline more than twice a day may be necessary. Here's the website with the best deals I've seen on saline: http://www.jrsmedical.com/RESP_IRRIG_SOLUTIONS/nav.aspx.

OK, I've pretty much described everything, and with that knowledge...

Here are the 10 actual steps for in-exsufflating:

(The in-exsufflator is already in place and plugged in)

1. Caregiver cleans hands.
2. Caregiver adds in-exsufflator extension to in-exsufflator circuit/hose (which is already on the machine).
3. Caregiver tests inhale and exhale pressures (unless certain they're unchanged).
4. Caregiver takes my vent off at trach attach point.
5. Caregiver puts extension on at trach attach point and places his/her hand on my chest to get ready to push.
6. Caregiver flips switch to inhale (and I quickly fill up with a big, comfortable breath of air).
7. After about three seconds on inhale (I think three seconds is probably appropriate for most adults, especially if on full flow like me, but sometimes I'll have phlegm in my throat and I'll use an extended inhale time to cough it up—but any inhale time over 3 seconds is ONLY for patients who don't have an inflated cuff sealing their airway; without a cuff, I let some of the air go out my mouth as I cough) after I've filled up and I'm not trying to clear my throat, I nod, and that signals my caregiver to flip the switch from inhale directly to exhale (don't stop at neutral) with his/her machine hand, and simultaneously begin to push with their chest hand.

8. Caregiver pushes 3 to 5 times (it depends on how quickly the caregiver pushes; the idea is to push down on my chest, almost like CPR, then let up, and do that 2, 3 or 4 more times; sometimes I kinda bounce from the pushing, and that helps expel the secretions).

9. Immediately after pushing, with the machine still on exhale, caregiver uses chest hand to pull the tubing off the trach (try to brace the trach while pulling the tubing off, again, all with one hand—from the beginning inhale until the tubing is pulled off, do not let the machine switch go back to neutral, otherwise the secretions won't come out cleanly/effectively; sometimes the caregiver needs to kinda slowly pull the tubing off (over 2 or 3 seconds) to kinda pull the secretions through the inner canula, but usually they will fly up into the extension while the caregiver is pushing; if you hear secretions moving around when pushing, keep pushing until they come out or you don't hear them—but once the tubing is pulled off, even if the caregiver sees something near the end of the inner canula, do NOT try to “vacuum” it using exhale—just do another cycle, or if you've already done several cycles, then change the inner canula).

10. Repeat steps 5-9 as needed (that's a cycle, and we usually do two or three cycles per session, although sometimes five or six are needed; it depends if I still feel stuff inside, or if we still hear stuff that apparently doesn't want out yet, in which case sometimes we'll add 5 ml saline, or just wait and in-exsufflate later if what isn't coming out isn't really bothering me) if finished in-exsufflating, change the inner canula if needed, and put vent back on.

That describes pretty much everything about how we in-exsufflate and why we do it like we do. If you want or need to use a lot of saline, and consequently the secretions come out very wet and so you want/need to “blow them out” on paper towels like Shepherd, instead of needing a second person to ambu bag the patient while “cleaning” the extension, you can put the vent back on in between cycles. (I'm mentioning this because it's another way to in-exsufflate without needing a second caregiver; one could also just change in-exsufflating extensions, and keep more than 10 extensions in a typical rotation so you always have plenty.)

If you have any questions, feel free to ask, but please read “An Overview of My Care” first (the respiratory care portion at least; see the first page of this document for the relevant link).

DISCLAIMER: I am NOT a doctor and what I shared in this document is not intended to replace your doctor's instruction for your care. Please share my info with your doctor if you want to do things how I have described. It works for me, but may not work for you—and I cannot be held liable if you choose to utilize my information. One thing you'll want to do if you are new to the CoughAssist is to start the inhale and exhale pressures SIGNIFICANTLY LOWER than I like (see page 2—BUT this document needs to be read in its ENTIRETY before applying the info I shared—and PLEASE check with your doctor!).

May God bless any person who can't expel secretions on their own, i.e. people who need to be in-exsufflated when secretions form inside their chest.

Sincerely,

Bill Miller ☺

C1-2 Quadriplegic with a 206 High Bowling Game

Co-founder of Manufacturing Genuine Thrills Inc. d/b/a MGT

My blog: <http://powerwheelchairusers.blogspot.com>

Business website: <http://www.ikanbowler.com>

Personal website: <http://www.lookmomnohands.net>