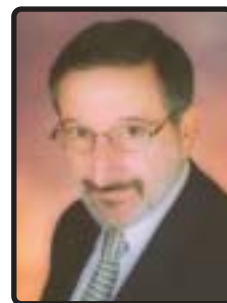


DO RESPIRATORY CARE PRACTITIONERS APPROPRIATELY SET ALARMS IN A VOLUME TARGETED MODE? *Herbert Patrick MD*



Our Respiratory Care and MICU staffs selected this PI project after purchasing software upgrades for our Puritan Bennett 840 ventilators incorporating "Volume +" as a new ventilation mode. This "Volume +" option is a pressure mode (ACPC) with an exhaled volume targeted (VT) to the set tidal volume. Our staffs named the "Volume +" mode "AC PC VT" to describe the initiation and termination of each breath: initiate as Assist Control (AC), terminate by inspiratory time as Pressure Control (PC). For each breath, the amount of pressure, in cmH₂O above PEEP, is automatically adjusted by the PB 840 to target the set tidal volume. If the previous exhaled tidal volume is below the set tidal volume, then increased pressure is applied for the next breath. If the previous exhaled tidal volume is at the set tidal volume, then no change in pressure is applied for the next breath. If the previous exhaled tidal

volume is above the set tidal volume, then decreased pressure is applied for the next breath. The "Volume +" mode was not difficult to understand by our staffs as they were already using Dräger Evita ventilators in the "AutoFlow" mode. "Volume +" and "AutoFlow" are similar "AC PC VT" modes.

Optimum operation of the "Volume +" mode requires that Respiratory Care Practitioners appropriately tailor the alarm settings for each patient. Alarms for "Volume +" include: inspiratory pressure, maximum, in cmH₂O, minute ventilation, maximum, in LPM, minute ventilation, minimum, in LPM, tidal volume, maximum, in L and tidal volume, minimum, in L.

This PI project was designed to measure whether these five PB 840 ventilator alarms were appropriately set by Respiratory Care Practitioners for each patient to assure optimum operation of the "Volume +" mode.

Before PI project data could be collected, an Institutional Review Board (IRB) application needed to be submitted and approved. If the project data were only to be discussed at our hospital's PI committee meetings, no IRB approval would be necessary. However, PI projects submitted for presentation at Respiratory Care meetings and/or planned for publication places the data into the public domain. All research data in the public domain must have IRB approval. The public domain not only includes publication of journal articles and book chapters, but also poster or slide presentations at local, national, or international conferences.

IRB approval consists of different categories such as Expedited Review or Standard Review, depending on the complexity of the project and risks to the subject. The difference between Expedited and Standard pertains to the length of time for review by the IRB with Expedited review requiring less time. A research project qualifying for Expedited review is straightforward and has minimal risks to the subject, such as a phlebotomy removing a tablespoon of blood or performing a flow volume loop. This PI project was categorized as minimal risk to the subject. The IRB also decides if the risks to the subject require a signature of informed consent. The IRB judged that no signature for informed consent would be needed. The IRB review was placed into the Expedited category and research project approval was obtained in two weeks. A research project with waived informed consent aids patient enrollment in the MICU area as patients receiving analgesia and/or sedation would never qualify as competent for providing informed consent. Even surrogate consent, where the subject's

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relative may give informed written consent instead of the research subject, was not deemed necessary for conducting this project. Now let's review all the steps of the project.

The Background (Introduction) explains interest and significance in the topic. For this project, alarm settings of the new "Volume+" mode would reflect a new Respiratory Care quality indicator. This project would determine if alarm settings were appropriate for optimum operation of the PB 840 in the "Volume +" mode.

The Question proposed is: Do Respiratory Care Practitioners appropriately set alarms on the PB 840 in the "Volume +" mode? (Note: The Question asked in every research project always has the possible answers: "yes" or "no.")

The Hypothesis is the preconceived answer by researchers to the Question. For this project, the Hypothesis was "Yes, Respiratory Care Practitioners appropriately set alarms on the PB 840 in the "Volume +" mode."

The Methods are the mechanism to gather, tabulate and analyze data to answer the Question. The standard MICU bedside ventilator flow sheet, with existing designated areas to enter alarm settings, would be reviewed for data. The data collection tool would be one sheet of paper per patient, with spaces for: date of data collection, name of data collector, subject age, height, and weight, PB 840 serial number, "Volume +" settings, and five alarm settings. The appropriateness of each alarm setting was determined by comparison with criteria agreed to by a subgroup of the Respiratory Care Practitioners. Daily data collection took place for every MICU patient receiving the "Volume +" mode. The goal was to study 15 adult patients in our 20 bed MICU. For data analyses, a Table was constructed by listing patients in the first column and alarm in each of five subsequent columns: inspiratory pressure, maximum, MV, maximum, MV, minimum, TV, maximum and TV, minimum. All five alarms had to be appropriate for the Respiratory Care Practitioner to be graded satisfactory. The statistical comparison of satisfactory and unsatisfactory totals for the 25 subjects was performed by the rank sum test. A p value less than 0.05 meant there was only one chance in 20 that the difference between the two groups was due to chance alone.

The Results are a final analysis of the data. For this project, twenty five patients were studied as research subjects. The Respiratory Care Practitioners set all five alarms appropriately in 18 subjects. The remaining 7 subjects had some alarms not set appropriately. The rank sum test for 18 versus 7 was statistically significant at p less than 0.05.

The Conclusion was Respiratory Care Practitioners appropriately set alarms on the PB 840 in the "Volume +" mode." Therefore, in this project, the Hypothesis was supported, corresponding to a "yes" answer to the Question. (Note: When writing the Conclusions, the Hypothesis must be addressed whether it was supported or not.)

The Reflections offers an opportunity to critique the project by suggesting possible modifications that would improve research quality. For example, even though the results were statistically significant, many PI projects aim for 100% correct results. For this project, 18/25 equals only 72%, suggesting this project should be repeated for a new group of 25 patients. During this time, the Respiratory Care Practitioners could receive in-services. This project could be discontinued when the new group of 25 subjects has 100% appropriate alarms. Reflections can also include a comparison with other similar research projects.

Future Research follows Reflections as research completed should lead to new research. For example, this project led to a

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If you lose, you'll alienate enough people to fill the Superdome. Unfortunately, even when told, "You're right, but we're not going to do it," some people fight on, unable to get closure. The best technique we've seen for getting the courage to walk away is to record your arguments on video. Explain your side of the argument, theirs, what you want, what they want and then play it back.

One client reported, "It was scary. I became furious and red-faced over incidents that, when seen on video, seemed insignificant. I was complaining that my boss didn't like me. Of course he doesn't. I can't stand him either! At that moment I realized only a nut would keep trying to persuade someone he despised."

If you're still convinced a lawsuit is the only way to go, don't consider filing before you get a new job. Your company can trash you in a reference check (there are subtle ways, all legal), and you'll have a hard time convincing prospective employers that you are not a troublemaker.

Once you find another position, work at it until you're reasonably comfortable and then file. If this seems one-sided, it is. The good news is the company may settle because it's cheaper than going to court. The bad news is the CEO may decide he must fight to discourage other such charges.

If you decide to cut your losses and leave, there are other things you can do. Never miss an opportunity to tell the facts to people who may contemplate working for that company in the future. If one star turns down an offer and says why, the company may see a different reality. You must stick to verifiable facts, no conjecture or speculation, or you could get hit with a slander or libel suit. Write to the CEO. You have nothing to lose. She may be

unaware of whatever problem is driving you to greener - and saner - pastures.

Fighting for your rights should benefit your peace of mind, bank account and career. But it rarely does. That's an excellent reason to consider other options first.

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Respiratory Research... Continued from page 17

new PI project to examine "AutoFlow" using Dräger Evita ventilators in the MICU.

The Bibliography lists references from similar research and should include the reference for statistical methods.

The Acknowledgement lists financial support and special assistance provided to the project. There was no financial support for this project.

Conflicts of Interest are listed for all Respiratory Care Practitioners and others, such as the Medical Director of Respiratory Care or the statistician for the project. Conflicts include being a member of a speaker's bureau, consultant, and owner of stock or receiver of services or gifts from any companies related to the project.

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