



ACCIDENTAL EXTUBATIONS CAN CLEAR YOUR HEAD

by John Salyer RRT-NPS, MBA, FAARC

The unexpected dislodgement of a neonatal or pediatric endotracheal tube can be one of those clarifying events; sort of like a wave of crystallization that really clears your head. It can get you rapidly focused on sorting your priorities. Suddenly, you know right where you are supposed to be, and the world can seem, at least for a few minutes, crystal clear. Working in some parts of the health care system can be described as long periods of tedious routine on the edge of boredom, separated by occasional moments of stark terror. While one of these events can give you a satisfying rush of adrenalin, there can be some pretty unhappy consequences of accidental extubations. An accidental extubation and subsequent emergency re-intubation can cause huge variations in cerebral blood flow in neonates, which can increase the risk of periventricular leukomalacia or intraventricular hemorrhage. If there is a prolonged period of deep hypoxemia, other brain functions might be permanently affected. The airway can be damaged during reintubation, leading to post-intubation airway problems. And finally, reintubation can introduce lots of pathogens from the oral cavity or the environment, or the hands of practitioners into the lower respiratory tract, which,

as my grandfather would say "ain't good". Thus, accidental extubations can be a marker of bad care. Improper securing of endotracheal tubes, inadequate or inconsistent sedation policy, or lack of

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slow methodical attention to detail when moving patients can all contribute to accidental extubations. Of course, not all of these unhappy events are preventable, but some (maybe most) are.

So how is your NICU doing with accidental extubations? This can be hard to figure out. First, you need to actually be measuring it. I think this duty ought to fall on the respiratory therapy department. It really is a perfect organizational fit. And it shows that you and your RT colleagues are committed to continuous improvement of clinical operations. If accidental extubations are not now being measured in the NICU, suggest it. Present a plan on how to measure it and what you will do with the measures once you get them. I have seen a number of systems for measuring these events. Some have a person review the medical record daily looking for evidence from the previous 24 hours. Others have a separate paper form that is filled out by the bedside staff when dislodgement occurs. Still others use the hospitals incident reporting system, which can be paper or electronic. Whatever system you develop, it should be tested for accuracy (the ability to capture all the events) by running two parallel measurement systems for a while. If you are using episodic,

voluntary incident reporting by the bedside staff, do a study where this is compared to detailed medical record review.

A funny thing about measures is that they have the nasty habit of requiring interpretation. Data is crucial, but it can be useless unless turned into information. And having data almost always results in the ability to compare. Data on accidental extubations in the NICU are out there. A PubMed search will find it. Like all topics, papers vary in quality and applicability, but they can give you a starting point for analyzing your data.

There are also benchmarking data out there. There are commercial companies that your hospital can join that track things like neonatal and pediatric accidental extubation rates from many hospitals. Medical Management and Planning Inc (www.mmpcorp.com) is one of these. They have data broken out between adult, pediatric and neonatal environments and have many years of measures from lots of hospitals.

Accidental extubation rates are typically indexed to number of events per 100 ventilator days. I know of a hospital that has data for a 4 year period that shows the mean NICU accidental extubation rate to be 0.47 per 100 ventilator days with a standard deviation of 0.38. The range for any given quarter is from 0.0 to 0.88. Note the high degree of variation. Data that have a high degree of variability have to be looked at over time. Don't over react to one bad quarter. In fact, once you get enough accidental extubation data you should analyze in by using process control charts which show you how your process is doing over time.

When you look at this metric over many hospitals reported by quarter it gets even more variable. Data from MMP from a few years back shows the mean rate of 11 NICU's over 5 quarters to be 1.14 per 100 ventilator days with a standard deviation of 0.8 and a range of 0.38 to 2.2 for any given hospital. You can see that there is a lot variation. Some is probably normal (or warranted) and some is unwarranted and the result of practice variation. So analyzing your own data must be done with an eye towards understanding variation in measurements and how to account for that. The best book I know about for clinicians to help them understand the concept of analyzing and managing a highly variable process is, "Understanding Variation: The Key to Managing Chaos", by Donald J. Wheeler (SPC Press, Knoxville TN).

Once you have built a reliable measurement system for accidental extubations and you have enough data over time you can start thinking about changes to your practice that might improve the rates of accidental extubations.

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