

Patient Safety Tip of the Week

June 17, 2014

SO2S Confirms Routine Oxygen of No Benefit in Stroke

In several of our prior columns on use of oxygen (see our Patient Safety Tips of the Week April 8, 2008 “[Oxygen as a Medication](#)” and January 27, 2009 “[Oxygen Therapy: Everything You Wanted to Know and More!](#)”) we have commented that in the past we often routinely gave oxygen to patients with myocardial infarction or stroke. But such use was more reflexive in nature and not evidence-based.

In our What’s New in the Patient Safety World columns for July 2010 “[Cochrane Review: Oxygen in MI](#)” and February 2012 “[More Evidence of Harm from Oxygen](#)” we discussed the lack of evidence to support the routine use of oxygen in the acute MI patient and the possible deleterious effects in these and some other cardiac patients.

Then in our March 2014 What’s New in the Patient Safety World column “[Another Strike Against Hyperoxia](#)” we noted a study ([Rincon 2014](#)) showing that hyperoxia was independently associated with in-hospital death as compared with either normoxia or hypoxia in ventilated stroke patients admitted to ICU’s.

Such studies have called for large randomized controlled trials to answer the important questions about if and when to use oxygen in patients with stroke or MI. Well, one such study has now been done in stroke patients. The [Stroke Oxygen Study](#) (SO2S) in the UK was established to determine whether routine use of oxygen acutely in stroke patients is of value. The Stroke Oxygen Study website has a video of the recent presentation of preliminary findings at the European Stroke Conference.

The video notes that many stroke patients have nocturnal hypoxia. Over half (52%) have nocturnal hypoxia for 5 minutes or more, 23% for 30 minutes or more, and 15% for an hour or more. The study included over 8000 patients at 136 centers. Patients were randomized to one of three arms: (1) routine continuous oxygen for 72 hours (2) nocturnal oxygen for 72 hours and (3) no routine oxygen (O2 only as needed). The primary outcome was functional status (disability as measured by a modified Rankin

Score) at 90 days. Secondary outcome was survival. The study showed no difference in the primary outcome between the combined oxygen groups and the control group and no difference between the continuous vs. nocturnal oxygen groups. Similarly, there was no difference in the secondary outcome of survival. Subgroup analysis has yet to be done but the message is clear: routine supplemental oxygen does not benefit stroke patients.

As we've recommended before, hospitals need to look at their existing protocols (and actual practices) for managing a variety of medical conditions where oxygen use may be considered. How many of you have standardized order sets that directly (or indirectly by poor use of checkboxes) encourage inappropriate use of oxygen in MI or stroke patients? Going back to our Patient Safety Tips of the Week April 8, 2008 "[Oxygen as a Medication](#)" and January 27, 2009 "[Oxygen Therapy: Everything You Wanted to Know and More!](#)" we strongly support facilities doing audits of their oxygen practices. You'll probably be surprised at the opportunities you uncover to improve practices (and save money at the same time!).

And don't forget that in many cases high doses of oxygen are administered by the pre-hospital emergency response teams. Making them aware of the potential dangers is also important.

The other important consideration, in view of the high incidence of nocturnal hypoxia in stroke patients, is sleep-disordered breathing and obstructive sleep apnea (OSA) in particular. While we screen all stroke patients for swallowing dysfunction prior to feeding them by mouth, there are likely many stroke patients who have subclinical weakness of pharyngeal muscles and may be prone to OSA. In fact, in a meta-analysis of the frequency of sleep apnea in stroke and TIA patients, Johnson and Johnson found 72% of stroke patients had sleep disordered breathing and almost all were due to obstructive sleep apnea rather than central sleep apnea or Cheyne-Stokes respirations ([Johnson 2010](#)). This was independent of the type of stroke or timing of the stroke and there was little correlation with traditional symptoms of OSA such as snoring. So clearly a high index of suspicion for OSA is needed in patients with acute stroke.

If the cause of the nocturnal hypoxia in stroke patients is OSA, it is not surprising that supplemental oxygen does not lead to improvement. We've noted in many of our columns on OSA that oxygen supplementation in OSA patients may provide a false sense of security and actually mask the occurrence of apneic spells, particularly if the only monitoring is oximetry. So it is imperative that you monitor such patients not just with pulse oximetry but also with capnography and/or some other monitoring for apnea.

So the purported lesson from the SO2S study is "don't routinely use oxygen in stroke patients". But we are taking away a second, perhaps more important, lesson: you need to consider stroke patients as being at risk for obstructive sleep apnea and its potential acute and long-term consequences.

Kudos to the UK researchers who did the SO2S study. Recruiting patients for the study must have been difficult given that so many physicians have followed the time-honored tradition of using oxygen in stroke patients. This study has done a valuable service for all.

Some of our prior columns on potential harmful effects of oxygen:

April 8, 2008 “[Oxygen as a Medication](#)”

January 27, 2009 “[Oxygen Therapy: Everything You Wanted to Know and More!](#)”

July 2010 “[Cochrane Review: Oxygen in MI](#)”

February 2012 “[More Evidence of Harm from Oxygen](#)”

March 2014 “[Another Strike Against Hyperoxia](#)”

References:

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Stroke Oxygen Study website
<http://www.so2s.co.uk/>

Johnson KG, Johnson DC. Frequency of sleep apnea in stroke and TIA patients: a meta-analysis. J Clin Sleep Med 2010; 6: 131-137
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