**The AnaConDa® and Sevoflurane in the ICU: data on ambient pollution and staff exposure**

A.T. Bos MD, Anesthesiologist-Intensivist
Dept. of Intensive Care, VieCuri Medical Center Venlo, the Netherlands
alexbos@viecuri.nl

**Introduction**

The AnaConDa® (Sedana Medical, Uppsala, Sweden) is a reflection filter that can be used to administer volatile anesthetics to intubated patients on a conventional ventilator outside the OR. We have recently implemented sevoflurane as a sedative in our ICU and found that little data are available on staff exposure and ambient pollution when using the AnaConDa® (Fig. 1). A risk analysis was performed, as requested by our occupational health service. We have measured ambient pollution, staff exposure and peak values of sevoflurane on all connection points of the AnaConDa® system and FlurAbsorb scavenger in a Critical Care setting (Fig. 2). Aim of this study was to quantify ambient pollution and staff exposure to sevoflurane while using the AnaConDa® and relate it to current safety standards.

**Methods**

Since pollution data are patient independent and relate to the integrity of the breathing circuit, only one intubated subject was used to perform sampling. Air sampling was performed by an independent institute (RPS). A Miran SaphiRe portal ambient analyzer was used for realtime measurements on eight different connecting points of the breathing circuit and AnaConDa® system, including the FlurAbsorb scavenger. Charcoal sorbent tubes (SKC226-01) were used for stationary and personal measurements and were analyzed in a laboratory (OSHA 103 method). Stationary 8 hour measurements were performed on two different locations in an ICU room (fig 2). These measurements were repeated with new sampling tubes.

An air sampling kit was worn by a nurse to measure direct exposure during an 8-hour shift. This was repeated by a second nurse on a consecutive 8-hour shift with a new sampling tube. In this way, a total of four stationary, two personal and eight real time measurements were performed. Analyzers were calibrated before and after sampling. Laboratory analyses were according to ISO/NEN standards. The Swedish occupational exposure guidelines were used as a reference, since no national guidelines are available. The exposure limit is 5ppm (time weighted average (TWA) 42mg/m³ over an 8-hour period). North American guidelines are more strict, with a maximum of 2ppm, while in the United Kingdom it is more liberal, allowing exposure limits of up to 50ppm.

**Results**

Our results are summarized in table 1. Time weighted measurements are expressed as a percentage of exposure limits (NEN 689 model). An exceeding can be ruled out if concentrations are <10% of exposure limits. We clearly show that peak concentrations and TWA are far below the allowed occupational exposure limits.

**Discussion**

The exposure to volatile anesthetics should be reduced to ‘a level as low as reasonably achievable’ (ALARA). Local differences in ICU’s necessitate quantification of exposure prior to routine use, in order to guarantee a safe work environment. Furthermore, protocols should be used to ensure a standard way of care when using volatile anesthetics.

**Conclusion**

We concluded that sedation with sevoflurane and the AnaConDa® system with the FlurAbsorb scavenger is safe in an ICU setting. Occupational exposure is negligible and meets international standards. These data highly contributed to staff safety perception and awareness. Our data may be helpful to those who want to implement volatile anesthetics in their ICU.