*Therefore, there are errors with the gold standard within this context, and the nature of clinical boundaries for estimate acceptance is arbitrary.*

*We do agree with Hardy et al. and, as stated by Bland and Altman,[2] that measurement methods may only be used interchangeably if the raw data is within ± 2 standard deviations of the mean of the differences (differences between the gold standard and the estimates) and this would not be clinically important.*

*We appreciate the clinical interpretation of Hardy et al. and believe that the readers will benefit from their comments. We do not recommend aborting the thermodilution method for measuring cardiac output. However, we shall continue to inspect the heart visually after cardiopulmonary bypass.*

Margaret Ballantyne MD
Brian Milne MD
Kingston, Ontario

REFERENCES

1 *Aye T, Milne B, Ballantyne M.* Cardiac output estimation by visual inspection *vs* thermodilution during cardiac surgery. Can J Anaesth 1997; 44: 126–30.
2 *DG Altman, Bland JM.* Measurement in medicine: the analysis of method comparison studies. The Statistician 1983; 32: 307–17.
3 *Bland JM, Altman DG.* Statistical methods for assessing agreement between two methods of clinical measurement. Lancet 1986; 1: 307–10.
4 *Latson TW, Whitten CW, O'Flaherty D.* Ventilation, thermal noise, and errors in cardiac output measurements after cardiopulmonary bypass. Anesthesiology 1993; 79: 1233–43.

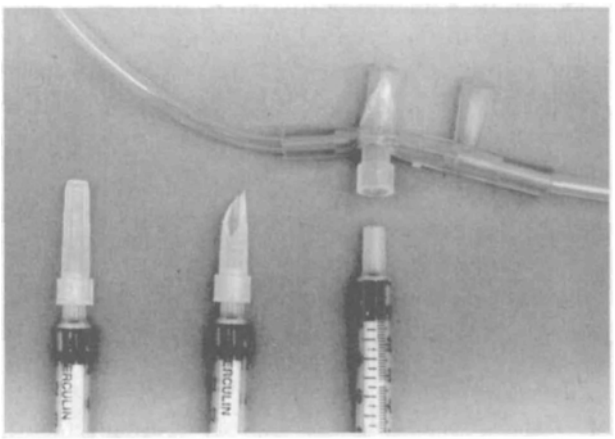

FIGURE 1 Required equipment

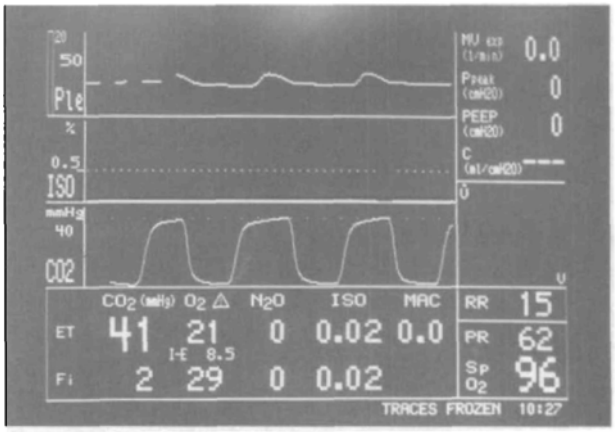


FIGURE 2 $ETCO_2$ waveform

## *A simple method with no additional cost for monitoring $ETCO_2$ using a standard nasal cannulae*

The monitoring of end-tidal $CO_2$ ($ETCO_2$) can provide useful information about respiratory rate and rhythm in a spontaneously breathing sedated patient. Commercially produced special nasal cannulas offer the ability to simultaneously measure carbon dioxide during administration of oxygen (Salter Labs). Although previously described modified standard nasal cannulas for this purpose were already relatively simple and inexpensive,[1,2] the method described here is even easier to modify with no additional material cost involved.

Figure 1 illustrates the simple steps to utilize any clean unused syringe cap in modifying a standard nasal prong set. The tip of syringe cap is cut at 45 degree to provide a sharp opening. This cap is simply inserted perpendicularly through the plastic tubing and threaded into the lumen of one cannula with the help of any syringe. The $CO_2$ sampling tube is then easily fitted on to the cap. The waveform showed in Figure 2 was obtained during quiet breathing with 3 L. 2 flow in a sedated patient. This waveform was almost identical to the one obtained using the commercial product in the same patient. This device is found to be simple to prepare using a readily available syringe cap. The size of cap is large enough to fit tightly in the lumen to allow good $CO_2$ sampling from this lumen during oxygen administration to the other nostril. The relatively large opening of the cap can reduce occlusion of the sampling tubing due to water droplets or kinking when compared to use other smaller size IV catheter as previously described.[1] The monitoring also does not

appear to be significantly affected by moderate mouth breathing. However, complete obstruction of one or both nostrils may prevent its use. After completed monitoring $ETCO_2$, the device can also be used to administrate oxygen by simply removing the cut cap from the nasal cannulae.

Ban C.H. Tsui MSc MD
Department of Anaesthesia
University of Alberta Hospitals
Edmonton, Alberta

REFERENCES

1 *Goldman JM.* A simple, easy and inexpensive method for monitoring $ETCO_2$ through nasal cannulae (Letter). Anesthesiology 1987; 67: 606.
2 *Zimmerman D, Loken RG.* Modified nasal cannula to monitor $ETCO_2$ (Letter). Can J Anaesth 1992; 39: 1119.