# A Simple Inspiratory Safety Valve

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Most volume-cycled ventilators in common use function as closed units and have no provision for an emergency relief valve in case of complete equipment failure and/or asynchronous breathing of the patient. When malfunction of a respirator with a closed breathing unit occurs, the end result is complete airway obstruction. To avoid this complication, we have modified a Slater–Stevens nonrebreathing valve so that it can be inserted quickly and easily as a relief valve in the inspiratory limb of volume ventilators.

The nonrebreathing valve was modified by removing the internal unidirectional valve. The exhalation valve was then gently removed from its housing, turned over, and inserted back into the same housing from the inside of the adapter. The direction of this one-way valve system is thereby reversed (fig. 1).

The modified valve is then placed into the inspiratory limb of the patient's breathing circuit and left there (fig. 2). The inspiratory opening pressure of this valve is approximately ¼ cm $H_2O$ subambient. It will withstand internal positive pressures in excess of 150 cm $H_2O$. This modification has been in use in our intensive care unit for three months without any recognizable hazard.

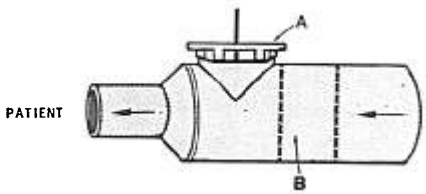


FIG. 1. Conversion of the Slater–Stevens nonrebreathing valve to a simple inspiratory safety valve. *A*, exhalation valve—this valve is gently removed and replaced from the inside of the adapter so that its direction of flow is reversed. *B*, unidirectional valve—this part is permanently removed for this conversion.

This should not be construed as an alternate form of assisted ventilation, but rather as an added safety factor during controlled ventilation when a patient's inspiratory effort occurs during the machine's expiratory phase. Also, when positive end-expiratory pressure (PEEP) is being utilized, the patient effort needed to open the relief valve will increase by the amount of PEEP being employed. Despite these limitations, this device may prevent a respiratory malfunction from being a disaster when no other relief mechanism is available. It also may be useful for pediatric patients whose weak inspiratory efforts prevent normal tripping of assist modes on some respirators.

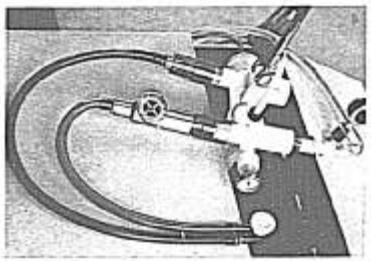

FIG. 2. The safety valve is shown in the inspiratory limb of a Bennett MA-1 Ventilator adapted for use in infants.

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