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Paper Title: Designing Ambulatory Ventilator for Ambulance Department and Homecare in Thailand

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Abstract

This paper aims to introduce how ambulatory ventilator is effectively designed and economically constructed for the use in ambulance and homecare. The operating principle and system design including gas mixer, microcontroller and safety were proposed. Unlike the general ambulatory ventilator, the microcontroller of the proposed prototype systematically integrates tidal volume, respiratory rate, pressure profile and patient safety. Whenever there is below or over pressure, low oxygen supply or leak of breathing tube, the microcontroller is programmed to notify by alarming and displaying on monitor. The implementation and testing method including the performance, accuracy of data transmission and patient safety have a good agreement with the safety standard of lung ventilator (IEC 60601-2-12). Comparing the means of tidal volume, respiratory rate, and pressure from the developed prototype to the standard at the significance level of 0.05, it was found that the means are indifferent, i.e., the developed prototyping model of ambulatory ventilator satisfied the standard of ventilator. Continuous mandatory ventilation and continuous positive airway pressure were investigated and they were in line with the function testing. Setting 10 trials of each irregular situations, the below or over pressure and low oxygen supply were successfully detected and notified. Therefore, our developed prototyping model of ambulatory ventilator can be considered as an economical alternative for ambulance and homecare, especially in Thailand.