Gas pipeline error: Time to verify all the terminal central outlets?

Sir,

We witnessed a rare yet potentially dangerous error of central gas pipeline system in an emergency department (EMD) of a newly renovated corporate hospital. The event started after a patient required intubation in EMD and was put on ventilator support with 50% oxygen. Oxygen saturation improved to 92% after ventilator support. In view of plenty of secretions, endotracheal tube suction was planned. As a routine protocol 100% oxygen was given for 1 min before attempting for endotracheal suction. However, the patient immediately desaturated and low oxygen alarm was detected in ventilator. The delivered oxygen concentration was detected to be 20–25% with a setting of 100% fraction of inspired oxygen (FiO2). First impression was low supply, but there was no issue related to supply as it was checked near central oxygen outlet and good oxygen flow at all the other central gas terminal outlets. Assuming some sensor related issue with high concentration of oxygen, the Fio2 was changed to 60% and we found that the delivery concentration of oxygen increased. As the set FiO2 decreased gradually, we were surprised to detect 100% oxygen delivery at 21% of set FiO2 with immediate improvement in patient’s oxygen saturation. With the assumption of wrong gas supply in the pipe lines, oxygen supply in other beds of EMD were checked and we did not find any abnormality. The patient was shifted with ventilator to another bed for further management. On evaluation, it was found that the central pipe line was concealed inside the wall and false ceiling [Figure 1]. The gas
pipelines were not color coded; however, color coding bands were present at specific intervals, which were not visible near the concealed part at the terminal outlet. Though the terminal outlets were correct types, the oxygen and air pipelines were cross-connected to the terminal outlet. The wrong doing was corrected and many possible future hazards prevented. Such a rare error was a result of non-adherence to safety standards of usage of pipeline and failure to verify medical gas outlets before open to use.

Central pipelines should be of copper seamless pipes with fluxless silver brazing as per American Society for Testing and Materials (ASTM) standards and Lloyd’s certification.[1-2] All pipelines should be color coded with colored bands put at intervals of every 3 m.[1] Periodic maintenance of the medical gas supply system, verification of supply and leakages in medical gases after renovations especially public works department (PWD) works or natural disasters as suggested in literature are mandatory to be followed to prevent such errors.[3,4] Wrong gas in central pipeline system is life threatening. Some case reports have been published in the past though many might have gone unreported.[5-7] Operation theatre is usually a well-equipped area with the workforce quite familiar with the safety standards and gas supply system to detect such errors. The situation is not identical in units elsewhere in the hospital where such a problem may remain undetected for a very long time. The concealed pipeline system though not recommended is done in many set-ups which adds to the problem. The ventilator saved us from possible hazard; had it been in some other area with less frequent usage of ventilator then it would have been almost impossible to find the mistake.

This incident happened because of error during the renovation of the unit which went undetected and makes a stronger case of FiO2 monitoring in critical areas. Private practitioners move around multiple hospitals and face unfamiliar surroundings and most of the time are either unaware or not informed regarding the hospitals having undergone any renovation, making them prone for facing such difficulties. All the hospitals should verify the terminal outlets after every repair work on pipelines. The management of private nursing homes can also be encouraged to keep all anaesthesiologists attending that hospital informed of any repair work in pipelines through mail/electronic communication so that vigilance is increased and diligent checks can be done.

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