KEYED VAPORIZER REFILLING NOT INFALLIBLE

To the Editor:

Modern volatile anesthetic vaporizers have many safety features incorporated into their design. For example, a ball valve in the air line occludes the air port after the vaporizer is filled. This prevents overfilling and flooding of the air line with liquid anesthetic. The American Society for Testing and Materials International machine standard recommends, but does not require, that a vaporizer designed for a single agent be fitted with a permanently attached, agent-specific device (keyed or agent-specific filling system, filler system or devices, pin safety system) to prevent accidental filling with the wrong agent (Figure 1).1,2 These measures have been taken to prevent anesthesia providers from filling vaporizers with the incorrect agent and to protect patients from accidental anesthetic overdose or underdose.

Older vaporizers are filled using labeled bottles of agent poured through funnel-type filling devices. Agent-specific filling systems are routinely used, but investigations have revealed 2 potential problems: the use of improper filling adaptors and the filling adaptor not being properly screwed onto the anesthetic agent bottle.3 For the commonly used agents, the color-coding system is yellow for sevoflurane, purple for isoflurane, and red for halothane. These colors correspond to bottle label, bottle collar, bottle adaptor, and markings on the vaporizers.1 The Tec9 desflurane vaporizer is an exception to this discussion.

Flaws in this keyed system have been identified.1,4 One case has been reported in which the bead of the filler receptacle on the vaporizer was too small to prevent incorrect filling.5 Normally, the groove on the male adaptor corresponds to a projection on the vaporizer filler receptacle. Sharp edges or wrong dimensions of the filling adaptor could lead to damage of the seal inside the filling fixture. In another case, the bottle adaptor for one agent fits a bottle for another agent that did not have a collar.6

The authors identified another flaw in a keyed filler device. Without excessive force, the bottle adaptor for isoflurane can be screwed onto the bottle collar for sevoflurane (Figure 2). This can lead to accidental filling of a Dräger Vapor 2000 isoflurane vaporizer with sevoflurane (Dräger Medical, Telford, Pa). No patient harm occurred because the discrepancy in colors, and medication labels was noted immediately. The vaporizer was removed from the machine and sent for servicing.

Despite safety features such as keyed filling devices and color coding of vaporizers, filler devices, and medication bottles, the hazards of delivering an inappropriate dose of volatile anesthetic agent are avoidable only using automatic agent identification.7 A solution to this ability to mismatch adaptors and collars might be a change in the threading of the bottle top. Another measure would be for the manufacturers to change the angles of the notches on the bottle collar and keyed adaptor (Figure 3). A report has been submitted to MedWatch notifying the US Food and Drug Administration of this potential medication error.

Thank you for consideration of this subject and the opportunity to inform our colleagues of the potential for mishaps in everyday practice.
REFERENCES


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