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TITLE: INTRALUMINAL GAUGE PRESSURE OF TRACHEAL TUBES AND RISK OF FIRE FROM CO₂ LASERS--SCIENTIFIC MODEL

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Intraluminal gauge pressure (IGP) > 196 pascal (Pa) (2 cm H₂O) decreases the risk of laser-induced polyvinylchloride (PVC) tracheal tube fires (1). This study was designed to determine the incidence of fire at various IGP's and the cutoff IGP (IGP above which ignition does not occur) for PVC tracheal tubes through which 6 different gas combinations flowed.

Nitrogen or helium in oxygen (40%, 50%, or 60% each) was directed in a constant, unidirectional flow of 20 L/min through PVC tubes with a 6.5-mm inner diameter. IGP was varied by varying the length of the tubing downstream from the test locus. For each test at each gas combination and each IGP, a carbon dioxide laser beam (10 W, 0.8-mm spot size) at a 90 degree angle was directed at the test locus on each tube (n = 8 at each combination of factors). If no fire occurred by 60 s, then a result of "no fire" was recorded. Laser output was measured before each day's tests, and gas flow rate, oxygen concentration, and IGP were monitored continuously during testing.

At 40%, 50%, and 60% oxygen, the cutoff IGP's (cm H₂O), respectively, for helium were 3.8, 8.1, and 15.2, and, for nitrogen, 3.1, 15.2, and 27.9. The incidence of fire decreased with increasing IGP for all gas mixtures (fig.).

Increasing IGP increases the flow of gas across the hole that a laser may produce in a PVC tube and, therefore, increases convective heat loss, which decreases the risk of fire. We postulate that the low density and high thermal conductivity of helium potentiate this heat loss. The increase in IGP of PVC tubes may augment the effect of helium in clinical situations (2).

References

1. ANESTHESIOLOGY 73:A1070, 1990.
2. ANESTHESIOLOGY 68:801-804, 1988.

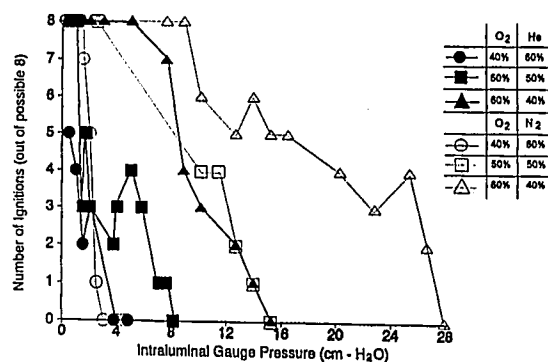


FIG. Number of times out of 8 trials that a carbon dioxide laser ignited polyvinyl chloride tubes with different intraluminal gauge pressures while helium or nitrogen in oxygen at different concentrations (%) flowed through the tube.

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TITLE: DISEASE DESCRIPTORS FOR A COMPUTERIZED PRE-ANESTHETIC EVALUATION SYSTEM

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We designed and implemented a computerized pre-anesthesia evaluation record system with 7 networked computers for use by physicians and other medical staff. To facilitate the characterization of medical problems, for each organ system category, we compiled lists of selectable text, that is, words and phrases that can be incorporated into the record by means of a single click on a mouse that is, the words and phrases do not have to be typed character by character. The organ systems were broken into 11 categories, and 60 subcategories were devised. To determine the effectiveness of this system of disease descriptors, we analyzed this aspect of the system.

We reviewed data from 4 months and 4 days of use of the computerized system. The total number of characters resulting from use of selectable text and from use of original, typed text was recorded. We searched automatically (Microsoft C program) for any occurrence of use of selectable text in the resulting problem description and subtracted the length of selected text from the total. The analysis attempted to correct for the occurrence of punctuation and other nontext characters. The percentage of selected text and the number of characters typed per subcategory per patient was grouped by ASA classification of patients. The percentage of original, typed text for the five most common problems was calculated.

Within the study period, evaluations on 1027 patients were entered into the system. The percentages of selectable text used for each ASA classification were similar (table). As the classification increased, however, the amount of original, typed text increased. For the five most common problems, the percentage of selectable text was 65%, 44.3%, 62.1%, 52.4%, and 52.5%.

The increasing amount of typed text as ASA classification increased likely resulted from increasing number of problems rather than inability to characterize problems with selectable text. Overall, the number of typed text was low. Our analysis revealed that, with the most common problems, more than 50% of text can be selected, which suggests that the percentage of selectable text for less common problems can be improved.

Table. Form of Text Used to Describe Medical Problems on a Computerized Preanesthesia Evaluation System

Characters in Words/Phrases	ASA 1	ASA 2	ASA 3	Overall
Total (n)	25,147	130,078	96,184	261,378
In typed text (n)	16,586	80,932	61,239	164,749
In selectable text				
Number	8,561	49,146	34,945	96,629
Percent	34.0	37.7	36.3	36.9