Exposure to isopropyl alcohol in the air during disinfection
Report I: Distance between the disinfection area and breathing zone

Yasushi Sakuma¹, Hiroki Shibata¹, Masayo Nakata² and Yoshihiro Momota³

¹Department of Anesthesiology and ²Graduate School of Dentistry (Department of Anesthesiology), Osaka Dental University, 8-1 Kuzuhahanazono-cho, Hirakata-shi, Osaka 573-1121, Japan

In this study, as part of investigations on the exposure concentration of isopropyl alcohol, which is used for disinfection at the time of intravenous catheterization, in the breathing zone, we surveyed the distance between the disinfection area and breathing zone. The mean distance between the patient’s vein and the nasal cavities of dental anesthesiologists was 50.3 cm, which is 5 cm greater than that during reading. This distance was not affected by the subject’s age, years of experience, or sex. (J Osaka Dent Univ 2015; 49: 225–227)

Key words: Isopropyl alcohol, Breathing zone, Working environment air

INTRODUCTION

Highly volatile organic compounds, such as isopropyl alcohol, are commonly used in hospitals and clinics.¹ To prevent health hazards, the law states that the organic solvent concentration in the air should be equal to or below the reference value. However, attention has not been given to their concentration in the air. We evaluated the concentrations of volatile anesthetics as organic solvents in medical institutions. In this study, as part of investigations on the exposure concentration of isopropyl alcohol, which is used for disinfection at the time of intravenous catheterization, in the breathing zone, we surveyed the distance between the disinfection area and breathing zone.

MATERIALS AND METHODS

Dental anesthesiologists assume a normal posture for intravenous catheterization, and insert the intravenous catheter into the dorsal vein of the left hand of the patient. We measured the distance between the anesthesiologist’s nasal cavities and the patient’s vein using a laser distance meter GLM7000 (Robert Bosch GmbH, Stuttgart, Germany) (Fig. 1). Measurements were performed three times for each anesthesiologist, and the mean was recorded. The background factors were the dental anesthesiologist’s age, years of experience as a dental anesthesiologist, and sex. Based on measurement data, the correlation between the distance and age or years of experience was analyzed. In addition, the association between the distance and sex was evaluated using the t-test, with p < 0.05 regarded as significant.

RESULTS

The participants used in this study comprised 11 males and 8 females. The mean distance between the patient’s vein and anesthesiologist’s nasal cavities
was 50.3 cm, and the standard deviation was 7.3 cm. There was no association between the distance and age (Fig. 2) or years of experience (Fig. 3). In addition, the distance was not associated with the sex (Fig. 4).

**DISCUSSION**

High-level disinfection is crucial in preventing instrument-related infections. However, inadequate procedures and practice may expose medical workers to chemicals and other hazards. In medical institutions, many organic solvents are used. Chronic organic solvent exposure can cause health hazards for medical workers. The reproductive toxicity of isopropyl alcohol, such as an increase in the fetal death rate at a high concentration in rats, has been reported. Isopropanol is rapidly absorbed following ingestion with peak plasma concentrations occurring within 30 min. It can also be absorbed following inhalation or dermal exposure. To evaluate isopropyl alcohol exposure in daily clinical practice, we measured the distance between the place of its use and the medical worker’s respiration zone during its use, and also evaluated factors affecting the distance.

We found the mean distance between the patient’s vein and breathing zone was 50.3 cm. Since the mean distance between the eyes and a book during reading has been reported to be 45 cm, the distance during venous catheterization was slightly greater than that during reading despite a difference in the level between the nasal cavities and eyes. This may be because the catheterization procedure can be more readily performed when the patient is slightly farther away.

The distance was not affected by the age, years of experience, or sex. Near vision decreases with age resulting in presbyopia such as hyperopia. In this study, the oldest subject was 57 years old. The subjects’ age, as it relates to presbyopia, may affect the results.

**REFERENCES**

