## *Appendix 6*

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# communications to the editor

## Airflow Obstruction and Roadside Breath Alcohol Testing

*To the Editor:*

We have frequently been asked to give a medicolegal opinion regarding claims of inability to provide an adequate breath sample to activate a portable roadside breath alcohol testing device because of asthma or chronic obstructive pulmonary disease (COPD). We examined the physical characteristics of a commonly used hand-held breath alcohol screening device (A.L.E.R.T., model J3A; Alcohol Countermeasures, Mississauga, Ont) and evaluated the ability of patients with asthma or COPD to perform an acceptable test.

The roadside testing device we used measures ethanol in exhaled gas; this reflects the blood alcohol level. It uses a disposable mouthpiece with orifice diameters of approximately 3.3 mm, and it has an outflow orifice of approximately 1.2 mm. It has a series of colored lights on the upper surface. The operational light indicates that the machine is ready to receive the exhaled sample. If an adequate flow of exhaled air passes across the inflow orifice over an adequate length of time, the operational light is replaced by a red, amber, or green light, indicating "fail," "warn," or "pass," respectively, regarding alcohol level. If critical flow is not maintained for the full time, no result is given. If a subject cannot provide an adequate sample in several attempts, he may be charged with "failure to provide a sample." We connected the testing device through a pressure transducer and flowmeter to a source of air. We found that at ambient room air temperature and pressure a critical flow of 6.6 L/min (110 ml/s) sustained for a period of 5.5 s at a critical pressure of 15 to 17 cm $H_2O$ was required for the machine to obtain an adequate sample of air for analysis.

We studied 102 patients with obstructive airways disease (68 with asthma and 34 with COPD) at the time of pulmonary function testing in the Royal University Hospital Pulmonary Function Lab, Saskatoon. Verbal consent was obtained. Patients were allowed up to three attempts at blowing into the testing device with instructions typical of those given by a police officer at the roadside. The patient was considered to have failed if he or she did not provide an adequate sample (red, amber, or green light) in three tries. Three patients were unable to provide an adequate sample of exhaled air in three attempts (although one of the three was successful at a subsequent attempt). The scatter diagram (Fig 1) shows the distribution of patients by FVC. All three patients who were unable to perform the test had COPD and were dyspneic at rest. From the characteristics of the machine, it appears that a minimum volume of 605 ml of exhaled air at a constant flow rate over 5.5 s would be the minimum acceptable for purposes of analysis. All patients studied had an FVC >605 ml. One patient with a clinical diagnosis of COPD and an FVC of 1.43 L was unable to pass the test, although six of eight patients with an FVC between 0.75 and 1.43 L could pass it. The other two patients who failed had FVC values of 0.81 and 0.78 L.

Similar studies have been conducted in Britain by Briggs et al.[1] The characteristics of the machine used in their study vary considerably from those of the machine we used. The British study concluded that, with the type of machine that they used, subjects with an $FEV_1$ <1.5 L were unlikely to be able to activate the machine. In our study we used a machine that was obtained from the local police force and was currently in use at the roadside. This machine is in widespread use across Canada.

Our study indicated that all patients with an FVC >1.43 L could perform the test. Many patients (75 percent) with an FVC <1.43 L could still do the test. Patients with an FVC <1.00 L caused by airways obstruction may not be able to provide an adequate sample

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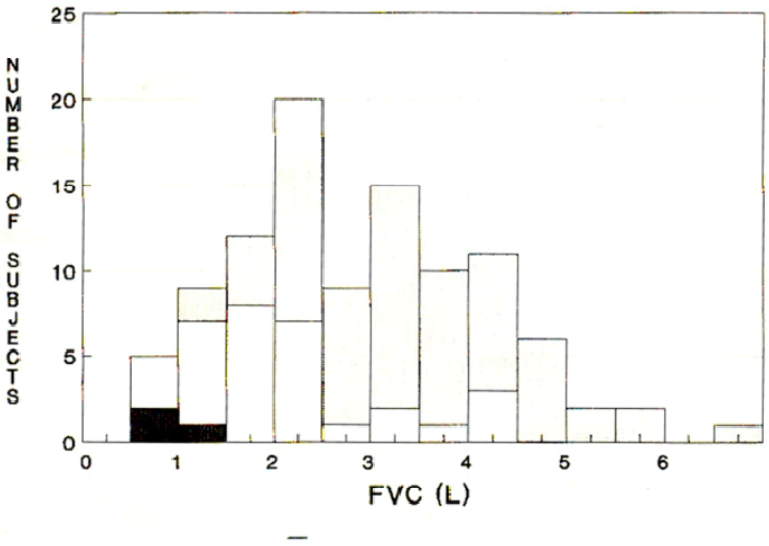


FIGURE 1. Bar graph showing distribution of FVC in study population. Heavily shaded sections represent the three subjects who could not do the test. Lightly shaded sections represent asthmatic patients. Clear sections represent COPD patients.

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for analysis, although one dyspneic and somewhat stubborn patient with an FVC of 0.75 L succeeded in doing the test on his third attempt.

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