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## EPINet Report:

# Glass Capillary Tubes Eliminating an Unnecessary Risk to Health Care Workers

by Janine Jagger, M.P.H., Ph.D., Melanie Bentley, B.S., and Jane Perry, M.A.

SINCE THE INTERNATIONAL HEALTH CARE WORKER Safety Center began tracking occupational exposures to bloodborne pathogens, microbore glass capillary tubes, most frequently used for hematocrit determination, have persistently shown up as a device causing injuries to health care workers.

The exact number of glass capillary tube injuries in the U.S. is not known. In 1992, when the University of Virginia was still using glass capillary tubes, we calculated that approximately 2.6 injuries occurred per 100,000 glass tubes purchased based on EPINet data. According to industry estimates, approximately 108 million glass capillary tubes are sold annually in the U.S. (personal communication, William Kendrick, 1998). Based on this figure, the U.Va. rate extrapolates nationally to approximately 2,800 glass capillary tube injuries per year in health care settings. The majority of such injuries probably occur outside of hospitals, in blood donation facilities, dialysis centers, private physicians' offices, and blood testing laboratories, where such exposures may not be carefully tracked.

Glass capillary tubes are both fragile and high risk. They can contain more blood than a needle, and can inflict a large laceration with the potential of introducing a large inoculum of blood into the wound.

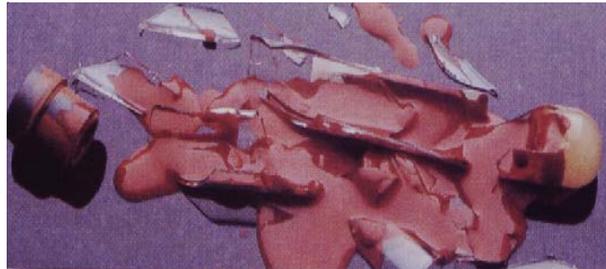
Often the glass fractures near the fingers while the tube is being pushed into sealing clay; this was the case with physician Hacib Aoun, who was infected with HIV in 1983. Dr. Aoun has since died of AIDS. Glass tubes also may shatter during centrifugation, posing a risk to staff when removing glass frag-

ments and cleaning spilled blood. All injuries from glass capillary tubes are preventable by the substitution of safer product alternatives on the market.

EPINet data from 81 hospitals for four years, 1993 through 1996, documented 38 injuries from glass capillary tubes. **Figure 1** (page 54) shows injuries by place of occurrence: 20 (53%) occurred in clinical laboratories, 6 (16%) in intensive or critical care units, 3 (8%) in outpatient clinics, and 9 (24%) in other areas that included emergency departments, blood banks, dialysis units, procedure rooms, utility areas, and labor and delivery units.<sup>1</sup>

Of the 38 injuries, 21 included descriptions of the exposure event. These descriptions are printed below. One point of interest is that 12 of the 21 injuries (57%) occurred while the health care worker was attempting to seal the tube; self-sealing capillary tubes would reduce the probability of tube breakage.

**The Center has previously recommended, and continues to recommend, that the use of microbore glass capillary tubes**



be immediately discontinued. Safer devices include plastic capillary tubes, mylar-wrapped glass capillary tubes, or alternative methods of measuring hematocrit such as hemoglobin readers, which do not require centrifugation of blood samples. The FDA has also recommended that “health professionals consider using safer alternatives to glass capillary tubes” (*FDA Medical Bulletin*, June 1993). The Center has requested that the FDA issue a safety alert or public health advisory on the risks of glass capillary tubes.

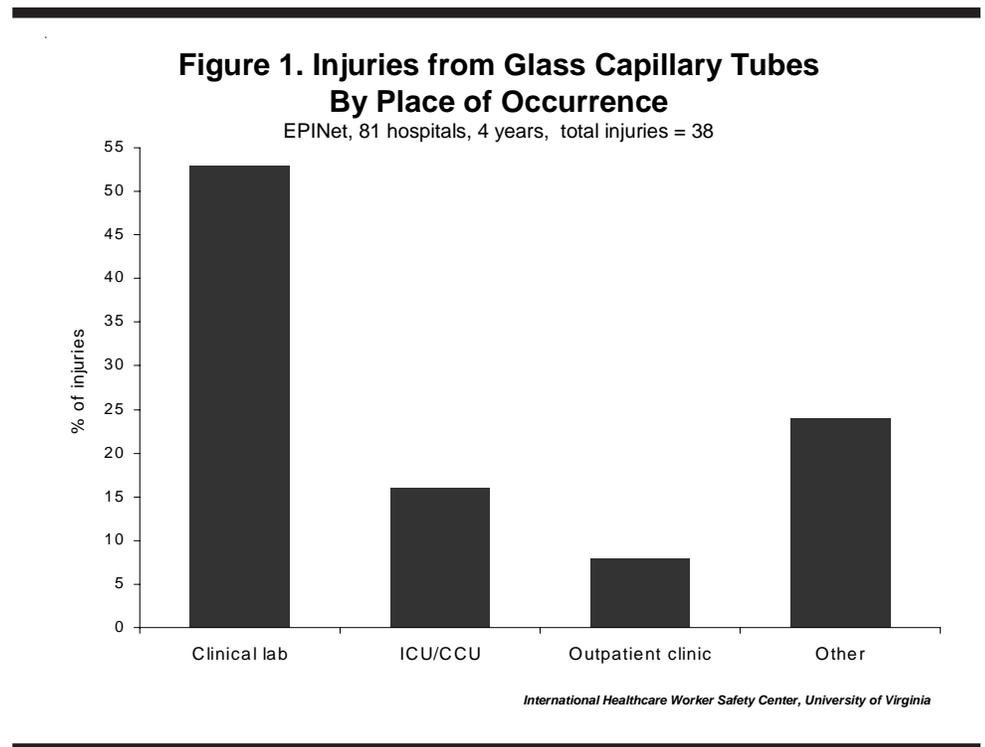
To help speed the transition from glass capillary tubes to safer alternatives, the Center is contacting manufacturers of glass capillary tubes and asking that they discontinue making them. To date, the response has been encouraging: most companies that make glass tubes also produce plastic or mylar-wrapped alternatives, and several manufacturers have said that the elimination of glass capillary tubes would not impact negatively upon their business. We are hopeful that with the cooperation of manufacturers and distributors, glass capillary tubes will soon be a thing of the past.

### Descriptions of injuries from glass capillary tubes: EPINet, 1993-1996

-A unit clerk in the ICU/CCU was picking up a broken blood-filled capillary tube. A sliver of glass penetrated the unit clerk’s right gloved thumb. The injury was superficial.

-A clinical lab worker in the hematology laboratory was attempting to seal one end of a glass capillary tube with clay so that it could be spun down for daily quality control. The microhematocrit tube broke, injuring the clinical lab worker’s right index finger. The injury was moderate.

-A clinical lab worker in the outpatient dental clinic was sealing a glass hematocrit tube with clay and pushing the tube to make sure the



clay was tightly packed to avoid leakage. The tube broke, cutting the clinical lab worker’s right index finger. The injury was superficial.

- A clinical lab worker in the stat lab was cleaning off counters with a cloth when a piece of broken microhematocrit capillary tube punctured the gloves in the palm of the right hand, causing bleeding. The injury was moderate.

- A clinical lab worker in the hematology laboratory was making up capillary tubes for spun HCT. After putting blood in the capillary tubes, the clinical lab worker was pressing the tubes into the sealant when the tubes broke in half. The glass went through the gloves of the clinical lab worker’s right middle finger. The injury was superficial.

- A nurse in labor and delivery was doing fetal scalp samples. When the nurse went to put the “flea” in the capillary tube, the tube broke. Glass went through the glove and into the nurse’s left thumb. The injury was moderate.

- A clinical lab coordinator in the stat lab was reviewing reports and was stuck by a contaminated fetal scalp capillary tube that had been taped to

the lab slip. The broken capillary tube stuck the coordinator’s right thumb. The injury was moderate.

- A clinical lab worker was in the lab sealing a capillary tube when the tube broke and cut his right index finger through a single pair of gloves. The injury was superficial.

- A blood gas technician was preparing to do a blood gas analysis. The capillary tube broke when the technician was attaching the clot catcher to it. The technician cut his right middle finger through his glove. The injury was moderate.

- A resident was in the ICU/CCU when a capillary tube broke during use, causing glass fragments to become embedded in his left thumb. The injury was moderate.

- A non-lab technician in the service/utility area was testing and cleaning the blood warming machine. Some water spilled, and while cleaning up, the technician was cut by a capillary tube on his right middle finger. The injury was superficial.

- A patient hematocrit needed verification by spun hematocrit procedure. A clinical lab worker in the clinical laboratory drew patient

blood into a capillary tube from an EDTA tube and went to plug one end of the tube with clay. When placing the tube in the clay, it snapped in her hand and glass penetrated her left ring finger. The injury was superficial.

- A technologist in clinical labs was attempting to seal a capillary tube filled with blood. The tube broke and punctured the technologist's right thumb, which bled. The injury was moderate.

- A clinical lab worker in the clinical laboratories was preparing to spin a hematocrit. The capillary tube broke as it was being sealed. The broken tube pierced the glove and cut the lab worker's right thumb. The injury was moderate.

- A clinical lab worker was cleaning a countertop in the clinical laboratory with a germicidal wipe. As she was wiping in the corner, her right ring finger was cut by a glass capillary tube that had missed being dropped into the waste container. The injury was moderate.

- A respiratory therapist in the nursery was handed a capillary tube by a nurse. While the RT was in the process of sealing the capillary tube in order to do a blood gas, the tube broke and superficially injured the RT's right thumb.

- A nurse in the emergency department was completing a hematocrit reading while disposing of two capillary tubes. She dropped one; after looking and not being able to find it, she removed her gloves and started to leave the room. She then saw the capillary tube at the entrance of the door and picked it up. It had broken and glass punctured her finger. The injury was moderate.

- A clinical lab worker was in the clinical laboratories running a batch of stats (CBCs) from the ER, NICU, and Kidney Center. The clinical lab worker's left index finger was cut on a glass capillary tube. The injury was moderate.

- A clinical lab worker at an off-site clinic lab performed a fingerstick

and drew blood into a non-teflon capillary tube. As she was putting the end into clay, the tube broke and lacerated her right thumb. The injury was moderate.

- A technologist in the dialysis facility was preparing to spin a patient's hematocrit. The capillary tube containing the patient's blood shattered while the technologist was sealing one end of the tube. A shard from the broken tube pierced her glove and right index finger. The injury was moderate.

- A clinical lab worker was in an outpatient office doing a donor fingerstick. As the worker was putting the capillary tube into clay, the tube broke and pierced the clinical lab worker's glove and right thumb. The injury was moderate. □

## Reference

1. Jagger J, Deitchman S. The hazards of glass capillary tubes to health care workers. [letter] *JAMA*. 1998;vol. 280 (in press).