Air Embolism Arterial Line Monitor

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Air embolism is a potentially fatal hazard of haemodialysis and in any form of unattended dialysis, whether in hospital or at home, it is desirable to provide a safety device to prevent ingress of air into the blood circuit reaching the patient.

A monitor for the arterial line has been developed, based on a sensitive
photo-transistor. The introduction of air into the system is detected by the photo-transistor, sets off an audible alarm, lights a visual alarm and immediately arrests the blood pump. The detector is shown in position on the arterial line, with its control box adjacent, in Figure 1. The circuit diagram is shown in Figure 2. The system has been in clinical use for over one year, through 550 fourteen hour haemodialyses, and has detected a number of alarm situations. No failures have occurred and it appears to be completely reliable in use. During infusion of saline an alarm situation is set up, but it is quite simple to remove the arterial tubing from the photo-electric field during saline infusion.

A modification of the device, suitable for use on the venous line between the bubble trap and the patient, has been developed. In an alarm situation the photo-electric cell clamps the venous line, as well as arresting the blood pump and setting off audible and visual alarms. It is satisfactory on bench testing and will shortly be available for clinical testing.

The arterial line monitor is available commercially as the Belfast Blood-line Monitor through the Coleraine Instrument Company, Coleraine, Northern Ireland.