Electromagnetic interference from some identification devices may pose hazards to medical equipment

June 25 2008

The use of radio frequency identification devices appears to have the potential to cause critical care medical equipment to malfunction, according to a study in the June 25 issue of *JAMA*.

"Applications of autoidentification technologies such as radio frequency identification (RFID) in everyday life include security access cards, electronic toll collection, and antitheft clips in retail clothing. RFID applications in health care have received increasing attention because of the potentially positive effect on patient safety and also on tracking and tracing of medical equipment and devices. The current expenditure levels on RFID systems within health care in the United States are estimated to be approximately $90 million per year with 10-year growth projections to $2 billion," the authors write.

Possible applications of RFID include drug blister packs, which could be marked to prevent drug counterfeiting; and the quality of blood products being monitored with temperature-sensitive RFID tags. The decreasing size and cost of RFID tags also permits use in surgical sponges, endoscopic capsules and endotracheal tubes, according to background information in the article. The potential for harmful electromagnetic interference (EMI) by electronic anti-theft surveillance systems on implantable pacemakers and defibrillators is known, but the effect on critical care devices in not certain.

Remko van der Togt, M.Sc., of Vrije University, Amsterdam, the Netherlands, and colleagues conducted a study in a controlled, non-clinical setting to assess and classify incidents of electromagnetic interference by RFID on critical care equipment. The tests were performed in a one-bed patient room in an intensive care unit (ICU) and with no patients present. Electromagnetic interference by two RFID systems (active [with batteries and ability to transmit information] and passive [without batteries, information retrieved by RFID reader] was assessed in the proximity of 41 medical devices (in 17 categories, 22 different manufacturers). The devices included items such as external pacemakers, mechanical ventilators, infusion/syringe pumps, dialysis devices, defibrillators, monitors and anesthesia devices. Incidents of EMI were classified according to a critical care adverse events scale as hazardous, significant, or light.

All 41 medical devices were submitted to 3 EMI tests resulting in 123 EMI tests. A total of 34 EMI incidents were found; 22 were classified as hazardous, 2 as significant, and 10 as light. The passive signal induced a higher number of incidents (26 in 41 EMI tests; 63 percent), and hazardous incidents (17), compared with the active signal.

Hazardous incidents included: total switch-off and change in set ventilation rate of mechanical ventilators; complete stoppage of syringe pumps; malfunction of external pacemakers; complete stoppage of renal replacement devices, and interference in the atrial and ventricular electrogram curve read by the pacemaker programmer.

The median (midpoint) distance between reader and device at which all types of incidents occurred was 11.8 inches. Hazardous incidents occurred at a median distance of 9.8 inches.

"The lack of standardization of RFID in health care permits RFID systems originally designed for logistics to enter the medical arena on the

basis of requirements such as the range at which medical tagged items or individuals are to be detected. However, the economic benefits of optimal health care logistics, including a supply chain of RFID-tagged disposables or pharmaceuticals, could face barriers in the critical care environment. The intensity of electronic life-supporting medical devices in this area requires careful management of the introduction of new wireless communications such as RFID," the authors write.

Source: JAMA and Archives Journals