Passive Patient Tracking
From a report dated Feb. 23, 2005:

… as per our meeting two weeks ago, I've looked further into the issue of passive tracking of patients, staff, etc. As mentioned, this technology is still in its infancy (though intuitively it shouldn't be), and there is no EDIS solution as yet that offers passive tracking as a core component. A third-party product, *Amelior EDTracker* by Patient Care Technology Systems, does exist, and integrates with various EDIS packages (though how well, I don't know).

Two passive tracking technologies exist, at present:

Infra-red tracking

Used by the aforementioned *Amelior EDTracker*. Patients and staff wear badges that emit infrared signals every three seconds or so; the signal uniquely identifies the individual. Sensors are located in ceilings throughout the ED, radiology, ultrasound, etc. For specifics on their system, see http://www.healthcareit.com/solutions/emergency/howWorks.asp.

Problems:

- requires line-of-sight from badge to sensor. This is a *major* issue - where on the patient do you place the badge? the forehead?
- transmitters require batteries; either the entire unit or the battery will need to be replaced regularly. Costs for active battery-operated transmitters, even purchased in volume, will quickly become prohibitive. While I cannot give an exact cost, I was quoted $12 U.S. per unit at EDIS 2004 in Chicago: at 150 units/day (or more), costs upward of $2000 Canadian, per day. This cost is in keeping with that for other commercially available IR transmitters
- *if batteries can be replaced*, who does the replacing? at what cost per battery?
- transmitters will need to be sterilized before re-use; *if they can be resterilized.* Autoclaving is not an option for electronics; chemical sterilization would have to be proven 100% effective (and for all disease vectors, including prion-based disease i.e. CJD). Even if possible, what's the cost?

Radio-frequency Identification (RFID)

In theory, a far better passive tracking approach than IR - radio waves do not care how many blankets are piled onto the patient, or whether they're sleeping face-down on the stretcher, or whether a care provider is actually facing a sensor at any given time. But this technology, in the hospital environment, is still in its infancy: for a fairly comprehensive review of the current state-of-the-art, check out the 2nd Annual RFID, Tracking & Barcoding for Hospitals: Innovative Solutions for Reducing Medical Errors, Increasing Patient Safety and Improving Processes conference (Jan. 25-26, 2005, Las Vegas).

Experience with RFID in the ED is still very limited:

- Washington Hospital Center. Planned for deployment in Oct. 2004; results not yet reported. This represent the first commercial installation of Parco Merged Media Corporation's ultra-wide band or UWB technology. See RFID Journal, Aug. 19, 2004.

- Shelby County Regional Medical Center's Trauma Emergency Department (Memphis, TN). Pilot trial, relatively small scale (60 patients/day, total over 5000 tracked), reported in RFID Journal, Apr. 22, 2004.
- in addition, apparently the North Bronx HealthCare Network uses RF identification bracelets, fitted to patients *on admission.* However, I could get no further information on their system, and presumably it is not implemented for the ED. With far lower patient turnovers than the ED, and the fact that it's much easier to lose a patient over an entire hospital than a single (chaotic) department - their solution might be cost-effective on a hospital basis, even if not for the ED.

Problems:

- true passive, i.e. unpowered and therefore cheaper, potentially disposable, tags have only a 3-meter range
- active tags or powered transmitters again require batteries; these share all the concerns mentioned for IR tracking, above. Active tags have a range of up to 600 feet, and will last approx. 1 year if it emits its signature once per second. Batteries are not replaceable (at least, at present)
- again, I have no idea as to cost, sterilizability, etc.

Note: passive *equipment* tracking is being implemented elsewhere, and is potentially much more cost-effective: far fewer tags are required, and tag costs are recouped the first time the system alarms when a thousand-dollar piece of machinery 'leaves' the building. See Hospitals Get Healthy Dose of RFID, RFID Journal, Apr. 27, 2004, which *announces* a five-year deal to implement such a system at three Virginia hospitals. Note again that no information on the actual implementation and ongoing use of the system has as yet been reported.

Amazing how we're still in the dark ages, with the technology that currently exists ... RFID Journal, available free of charge on-line, is a good starting point for further information.

I would recommend that we ask vendors whether they currently support, or intend to support, passive tracking - but do not think that it is realistic to make this a sticking point for selecting an EDIS.