Preventing the Worst Case Scenario: An Analysis of RFID Technology and Infant Protection in Hospitals

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Abstract

In a typical year, five infants are abducted by strangers from hospitals. These are devastating events for the families involved and for the health care facilities' staff and executives. This article looks at the nature of newborn and infant abductions, analyzing data on these kidnappings from the FBI and from the National Center for Missing & Exploited Children. Then, the article examines the potential for RFID (radio frequency identification) based systems to improve security in the pediatric area of hospitals, providing an overview of the technology on the market today for infant protection. The article concludes with an analysis of the ROI (return on investment) equation for health care administrators to consider in weighing their options on how to prevent a statistically unlikely, but potentially cataclysmic occurrence, at their facility. In the end, RFID-based infant protection systems can be seen as a form of "security theater," serving as a "palliative countermeasure" that will indeed work – both substantively and psychologically – to promote a more secure hospital environment for moms and their newborns.

INTRODUCTION

THE "WORST CASE SCENARIO"

The new mom is elated, holding her new daughter in her arms in the hospital's birthing center. Her husband is down in the hospital gift shop buying batteries for his digital camera, having shot dozens of pictures to document their little girl's first 24 hours of life. After a shift change, a new nurse comes in and chats with the mom, offering to take the newborn back to the nursery to allow her to take her first shower since the delivery yesterday morning. The new mom gives her baby girl a kiss on her rosy cheek and hands the baby over to the nurse. She then proceeds to take a long, luxurious (as can be in a hospital) shower, dressing as a refreshed, new woman. When hubby finally gets back from the gift shop, with flowers, a stuffed animal, and, oh yes, batteries, the couple decide to walk down to the nursery to see their daughter. When they pass the nurses station, the wife does not spot the nurse who carried her daughter out of her room fifteen minutes ago. When they arrive in the nursery, they spot three babies – but not their precious child. The couple both blurt out almost simultaneously to the nurse there "Where's our daughter?" They see the nurse instantly become very pale, racing to grab the phone. In an instant, alarms are whirring – but it's all too late. That "nurse" had a fifteen minute head start, heading somewhere with their

most precious treasure. This has got to be every new mother's nightmare – and that of every hospital administrator as well. And it does happen….all too often.

BABY SNATCHING

According to statistical data from the National Center for Missing & Exploited Children (NCMEC) (2008) show that there have been 252 infants abducted in the United States over the past 25 years, with just under half of these kidnappings – 123 in all - taking place in the hospital environment. As can be seen in Figure 1, the scenario above is the most common type of in-hospital infant abduction. The U.S. Department of Justice reports that on average each year, 115 children become the victims of "stereotypical" kidnapping – where crimes involve someone the child does not know or someone of slight acquaintance, who holds the child overnight, transports the child 50 miles or more, kills the child, demands ransom, or intends to keep the child permanently (Sedlak, Finkelhor, Hammer & Schultz, 2002). Thus, on average, the "nightmare scenario" of in-hospital abductions of newborns have been occurring at the rate of 5 each year.

Figure 1

Figure 1

Abductions of Infants from U.S. Health Care Facilities, 1983-2008
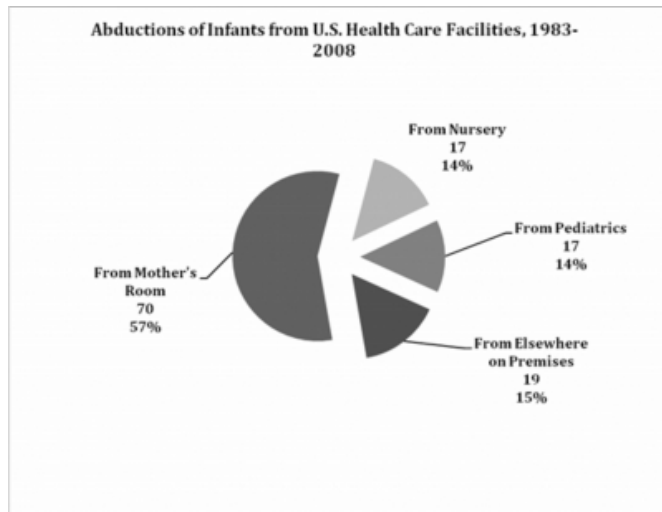
Two recent cases illustrate the gravity of the problem when it does occur, both in the U.S. and abroad. In March, at Covenant Lakeside Hospital in Lubbock, Texas, newborn Mychael Darthard-Dawodu was taken from his mother's room by a woman posing as a hospital employee on the pretense of taking the baby for some tests. The child was located a day later by police in Clovis, New Mexico – over 300 miles away. The accused kidnapper was Rayshaun Parson, a 21 year-old woman, who was described by relatives as being deeply depressed following a miscarriage (Brickley, 2007). Likewise, in November 2007, in Sudbury, Ontario Canada, Brenda Batisse stands accused of kidnapping an unidentified newborn by posing as a nurse and slipping out of the hospital room when the new mother was distracted in conversation. In this case, the credit for alerting the staff to the incident went to a member of the hospital's cleaning staff, who took note of the fact that the kidnapper was carrying the baby in her arms down a hallway, rather than transporting it in a bassinet, which would have been the protocol for any nurse or staff member at the facility. After a massive search, the child was found unharmed in Elliot Lake, Ontario a town almost 200 miles away. Again, the young woman accused of committing the crime was believed to have recently suffered a miscarriage. When police arrived at her home, she attempted to convince the police that the child was her own, even showing the officers what she claimed were suture marks from a recent cesarean section (Cowan, 2007).

Some have criticized the need for RFID-based in-hospital protection systems due to the relatively low instance of such crimes. Katherine Albrecht, the founder and director of

CASPIAN - Consumers Against Supermarket Privacy Invasion and Numbering – recently observed that "Baby snatching from hospital facilities is a diaper full of nonsense" (quoted in Corsi, 2008, n.p.). However, hospital executives – and their patient/customers – are finding unique value from this unique RFID application. While statistics showing the rarity of infant abductions from health care facilities should be comforting to hospital administrators and reassuring to parents, they still represent a significant, perceived risk – especially in the 24-hour news environment in which we live. Breaking news alerts scream out to us on CNN, Fox News, MSNBC, and every other news outlet when such cases do occur. As Dr. Manny Alvarez (2007), Chief Medical Editor for Fox News, recently commented: "The impact of just one little baby being abducted from its parents is enough to spark a nation-wide manhunt" (n.p.).

The open environment of the today's hospitals – with patients, family members, visitors and large numbers of workers – not just staff, but delivery, vendor, and construction personnel – constantly coming and going from the facility 24 hours a day – make these facilities nothing less than a security nightmare from the perspective of both law enforcement and security professionals (Aldridge, 2008). Thus, even as a great deal of effort is being made to emphasize security in the design and layout of new facilities, most hospitals have to deal with the campuses that are not intended to provide a modern airport-level equivalent level of security (Slahor, 2001). However, security can be vastly improved – both in reality and in the realm of what might best be called "security theater."

RADIO FREQUENCY IDENTIFICATION (RFID)

A new technology – RFID (radio frequency identification) - is being introduced across a variety of industries to better identify, track and control individual items, ranging from airlines (Wyld, 2008a) to the food service and gaming industries (Wyld, 2008b). Major retailers, such as Wal-Mart and Target in the U.S. and Metro and TESCO in Europe are making major investments in RFID technology, believing that this is the future of retail inventory control, supplanting the venerable bar code method of item identification (Wyld, 2007a). Conceptually, these technologies are quite similar; both bar codes and RFID are automatic identification technologies intended to provide rapid and reliable item identification and tracking capabilities. The primary difference between the two technologies is the way in which they "read" objects. With bar coding, the reading device scans a printed label with optical laser or imaging

technology. However, with RFID, the reading device scans, or interrogates, a small electronic tag or label, using radio frequency signals.

The specific differences between bar code technology and RFID are summarized in Table 1. There are five primary advantages that RFID has over bar codes. These are:

- Each RFID tag can have a unique code that ultimately allows every tagged item to be individually accounted for,

- RFID allows for information to be read by radio waves from a tag, without requiring line of sight scanning or human intervention,

- RFID allows for virtually simultaneous and instantaneous reading of multiple tags,

- RFID tags can hold far greater amounts of information, which can be updated, and

- RFID tags are far more durable (Wyld, 2005).

Figure 2

Table 1 - RFID and Bar Codes Compared

Bar Code Technology	RFID Technology
• Bar Codes require line of sight to be read	• RFID tags can be read or updated without line of sight
• Bar Codes can only be read individually	• Multiple RFID tags can be read simultaneously
• Bar Codes cannot be read if they become dirty or damaged	• RFID tags are able to cope with harsh and dirty environments
• Bar Codes must be visible to be logged	• RFID tags are ultra thin and can be printed on a label, and they can be read even when concealed within an item
• Bar Codes can only identify the type of item	• RFID tags can identify a specific item
• Bar Code information cannot be updated	• Electronic information can be over-written repeatedly on RFID tags
• Bar Codes must be manually tracked for item identification, making human error an issue	• RFID tags can be automatically tracked, eliminating human error

RFID SECURITY SOLUTIONS

RFID is presently being used all around today's hospitals, with increasing use for protecting and locating both high-dollar medical and electronic equipment (Bacheldor, 2006) and highly valued patients (including those suffering from Alzheimer's and dementia) (Swedberg, 2007). It has also seen use in tracking orthopedic implants (Wyld, 2008c) and blood products (Wyld, 2008d). In point of fact however, one of the most long-standing RFID applications is in the pediatric area of hospitals (Baldwin, 2005). Yet, the overall penetration of such RFID systems is still low, and there is a great deal of potential for using these systems to not just provide security for newborns, but to provide value-adds to

both the hospital and – most importantly – to new Moms and Dads.

The most established brand in the market today is the "Hugs" system. It is marketed by Ottawa, Ontario-based Xmark, which today is a wholly-owned subsidiary of VeriChip. The Hugs system works by having an active, tamper-proof RFID tag attached as an ankle bracelet on the baby's leg. The tag constantly checks in with readers, reporting every ten seconds that it is present and functioning. The Hugs system can be tied into the hospital's security system, set to activate security cameras, trip electronic door locks, and shutdown elevators for a "lockdown" of the facility in the event of an alarm. The Hugs bracelet is also designed to set-off an alarm if it is loosened or cut-off from the newborn's ankle (Corsi, 2008). The Hugs system garnered a great deal of media attention in 2005, when it was credited with helping hospital security personnel prevent a couple attempting to pull-off an infant abduction from the nursery at Presbyterian Hospital in Charlotte, North Carolina. When the baby was removed from the nursery in an unauthorized manner, the Hugs system set-off a "Code Pink" alert in the hospital that prevented the kidnappers from succeeding (Sullivan, 2005).

The complimentary, optional "Kisses" component for the Hugs system adds another level of security to prevent the occasional "mismatch" between mother and child. With this add-on, a "Kisses" bracelet is attached to the mother's wrist. Then, when the baby is given to its Mom and the two bracelets come within range, the signal that all is "OK" and that the right baby had been given to her is the sound of a lullaby that automatically plays. On the other hand, in the event of a mismatch, where the wrong baby is brought to the mother, an audible alarm sounds (Baldwin, 2005). In Detroit, Michigan, the Hugs and Kisses system is being used at St. Joseph Mercy Hospital. New mother Michelle McKinney, who had delivered a child two years earlier at the facility, prior to the system being put in place, recently commented to the Detroit News on the security and psychological benefits of the system, saying: "You always feel safer knowing they are bringing you the right kid especially when they're gone for an hour or so. Who wants to chance it?" Plus, Mrs. McKinney said the whole lullaby thing was comforting, reporting that: "It was kind of cute. I looked at him (her newborn son, Colin) and said, 'It's nice to know you belong to me'" (Stolarz, 2007, n.p.).

Last year, the Hugs system protected over 1 million newborns in American hospitals, and it is used by over 5,000

facilities globally (VeriChip Corporation, 2007). Still, with many facilities not having adopted RFID-based security measures, the market potential for growth is quite significant. Industry estimates show that market penetration may be as low as half of all pediatric and newborn wings of hospitals have such RFID-based systems in place. This is drawing competitors into the hospital infant protection market. These include the BlueTag system, created by the French firm, BlueLinea, and marketed in North America by RFID ProSolutions, which is installing its first infant protection systems in the U.S. this spring. The start-up's BlueTag system, which can also be used to track Alzheimer's and dementia patients in health care facilities, holds many of the same operational characteristics as the Xmark offering. Based on BlueLinea's installations of the system in Paris hospitals, the system also provides another significant benefit for hospitals, combating problems with what is termed "premature leaving." According to Jebb Nucci, RFID ProSolutions' Vice President of RFID: "Both [of the French] hospitals had experienced a high level of mothers and babies who would leave the ward before being properly discharged," Nucci explains. "This was a major problem for nurses, because they would spend so much time looking for mothers and babies that were already gone. With the system in place, a mother and her baby must go see the nurses before leaving so they can deactivate and remove the baby's tag to avoid sounding the alert on their way out" (Bacheldor, 2008, n.p.).

Another significant competitor is the Safe Place Infant Security System, marketed by RF Technologies. The system is in place in numerous facilities, including Shawnee Mission Medical Center in Kansas City, Missouri. Recently, this hospital installed the RF Technologies system to actually upgrade its prior infant security system. Because it makes use of high frequency RFID signals (operating at 262 kHz and 318 MHz), the system experiences less interference with the vast array of other electronic medical devices and personal electronics (including cell phones and even electric toothbrushes). This has led to far less frequent false alarms from the new system. In fact, according to administrators at Shawnee Mission, the false alarm rate fell from up to a hundred a day to approximately five. This significant decline means that when a baby is brought too near a monitored doorway or another cause to trigger an alarm, staff responds much more earnestly to all alarms generated by the system, rather than seeing them as likely false and a "nuisance" alarm (Swedberg, 2008).

ANALYSIS: THE REAL ROI FOR INFANT SECURITY

What is the ROI for such infant security measures? This is one instance where it is very difficult to speak just in terms of "hard" numbers, due to the nature of the threat of infant abduction. With the incidence being rare (computed by experts as being a 1 in 375,000 chance of abduction), the likelihood of any individual facility and their moms and babies falling victim to an infant abduction case is exceedingly small (Goodman, 2005). And, the price of such security systems can range into the hundreds of thousands of dollars, with costs varying substantially depending on a variety of factors. These include the layout, size, and birth volume of the facility, as well as the level desired for integration with other security and asset/patient tracking RFID systems at the health care facility.

However, as we have seen here, it only takes one case. One baby kidnapped from a facility can not just devastate the family involved and terrify the staff, but as more than one health care executive pointed out, it can cause long-lasting damage to the reputation and regard for the hospital itself. It can devastate the hospital's "brand" – causing spillover effects far beyond its maternity and pediatric wings, discouraging parents who have a choice from "choosing" that facility for their births, even perhaps raising not-so-subtle questions about the security of the entire facility due to a single case. Thus, when health care executives come to make decisions on whether or not RFID-based security for infants – and as increasingly common now, for their entire pediatric patient population, they must ask themselves whether they and their facility could stand – both monetarily and psychologically – the "worst case scenario" for their youngest patients and their families. And today, they must also look at the intrinsic legal issues, for without the implementation of proven technology to safeguard their infant population, legal counsel would surely advise that a facility and its executives could face substantial liability concerns for not being vigilant in safeguarding the newborns in their care.

Security expert Robert Schneier (2007) recently categorized the RFID-enabled bracelets worn by newborns and their moms in more and more hospitals today as the ultimate example of what might he dubbed "security theater" - security taken against an unlikely threat that is primarily designed to make you feel more secure. He compared the security theater of the pediatric ward to that of tamper-resistant pharmaceutical packaging and airport security after

September 11th. The dollars and cents ROI behind security theater is that it provides a very real way to simultaneously heighten security and curb the legal threat (assuming staff remain trained and vigilant and not over reliant on the technology of protection). However, the true, even more tangible benefit of such infant protection systems is that they are a "palliative countermeasure," visibly making the new mom feel more secure in her bed, knowing that her new baby is better protected when she hands-off her newborn baby to the nurse for the night.

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