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Tracking Inmates and Locating Staff with Active Radio-Frequency Identification (RFID)

Early Lessons Learned in One U.S. Correctional Facility

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Summary

Introduction

Managing correctional populations is a challenging and expensive task for state and local jurisdictions. In recent years, a new technological tool has been offered to jurisdictions as a method of improving the efficiency and effectiveness of correctional management. This technology, active radio-frequency identification (RFID), consists of a device (or "tag") fitted with a programmable chip. This chip continually emits a signal to communicate, in near-real time (i.e., with a one- or two-second delay), radio waves within a network of RFID sensors, receivers, and monitors. The sensors' monitors record and display the tag's unique identity and location. This location information can then be displayed on computer monitors and can trigger near-real-time alerts if one of any number of preprogrammed conditions is triggered. The location information is also archived so it can be played back later for use in postincident investigations.

Active RFID technology has been marketed in the United States to correctional institutions to date primarily by two companies: TSI PRISM and Elmo-Tech. It has been offered as a tool to track the precise location of inmates and pinpoint staff location in duress situations, rather than just inventory. When fitting inmates with active RFID-tagged wristbands or ankle bracelets, RFID technology promises to provide near-real-time, centralized monitoring of inmate locations and movements throughout correctional institutions. Parameters for individual inmates can be set via programming for each wristband or ankle bracelet to generate an alert when its wearer moves into an unauthorized area or comes near inmates wearing specifically designated wrist or ankle bands. The latter function is offered as a way to help keep specific inmates or groups of inmates separate from each other within the institution. The real-time feature of the active RFID technology also promises to automate the time-intensive process of inmate head counts, which otherwise involve correctional officers visually confirming the presence and location of all inmates at regular intervals. The RFID bands are constructed with antitamper technology, which is designed to generate alerts if they are cut or if they lose contact with the skin.

Active RFID-tagged devices may also be worn on a belt by correctional officers and staff within the correctional institution. These devices allow near-real-time monitoring of staff location, and some contain an officer-down feature that will generate an alert if a staff member falls to a horizontal position during monitoring. These units also come enabled with a manual alarm function that staff can use to alert a central monitoring station of an immediate need for assistance. In addition to their use for increasing staff safety, tracking of real-time alerts may offer the possibility of more rapid deployment of staff to developing incidents within the facility or otherwise improve the efficiency of population management. Active RFID systems

also store inmate and staff location information over time for later playback. This function was designed primarily for use in investigation of incidents that may occur within the institution.

While active RFID technology has been offered as a correctional facility management tool, most of the accessible information about how well it works and its cost-effectiveness has been produced by the vendors, a source with a vested interest in promoting the adoption of their RFID products. Given the significant expense of purchasing and operating the technology, state and local jurisdictions could greatly benefit from an objective assessment of the early lessons learned in a jurisdiction already using RFID technology. The goal of the present report was to collect some of these early lessons learned to inform the corrections field.

Expectations for the Use of Active Radio-Frequency Identification Systems

Vendors of active RFID systems assert that adoption of the technology will produce a number of benefits within correctional environments when used for monitoring inmate and staff locations. Since there have been no independent evaluations of the outcomes of active RFID systems in correctional environments, there is no empirical foundation on which to make statements about the technology in practice.[1] Nonetheless, RFID vendors assert that the technology will increase the efficiency of managing inmate populations, thus saving staff time and increasing safety for both inmates and staff. By accomplishing these goals, active RFID systems are also purported to produce cost savings over the long term. Specifically, the vendors described benefits of active RFID systems that can be divided up into the following categories:

- improve monitoring and control of inmates and reduce staff time
- reduce violence and injuries
- reduce actual and attempted escapes
- reduce the number of investigations and improve investigative capabilities
- reduce inmate grievances, disciplinary actions, and lawsuits.

Correctional Facilities Currently Adopting or Using Active Radio-Frequency Identification

The extent to which U.S. correctional facilities have acquired active RFID technology is not readily accessible information. As part of the present study, we set out to document the current use of active RFID in U.S. correctional facilities. In this effort, we conducted an extensive Internet search seeking references to (1) prisons or jails that had acquired or were in the process of acquiring active RFID systems and (2) specific vendors selling active RFID systems within the United States. We contacted the two identified vendors of active RFID technology, TSI PRISM and Elmo-Tech, to obtain a list of U.S. prison or jail facilities to which they had sold active RFID systems. In this process, we also sought to verify and update a list of RFID facilities provided in an appendix of the 2007 NIJ Criminal Justice Technology Evaluation solicitation for proposals (NIJ, 2007). We identified 14 U.S. correctional facilities, with five systems used for tracking inmates, three systems used for locating staff, and six systems used

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[1]   One exception is the Urban Institute's recent evaluation of the implementation of RFID in a women's prison (the Northeast Pre-Release Center, or NEPRC, in Cleveland, Ohio). Although the technology was not fully implemented at the NEPRC, later in this report, we comment on some worthwhile lessons learned about the implementation process.

for monitoring the locations of both inmates and staff. The first installation took place in 1997. This was one of only four systems installed prior to 2004. Of the 14 total facilities identified, at the time of this writing, the three adopting the technology in 2008 and 2009 were in the process of installing or testing the systems prior to full operation.

Case Study of the Early Implementation of Active Radio-Frequency Identification in One Facility

We conducted a case study of one large jail facility in the process of installing an active RFID system to manage its inmate population. This case study capitalized on an opportunity to gather contemporaneous information about the issues and lessons learned of a facility in the process of designing, installing, and preparing the system for operation. At this facility, we conducted a site visit to observe the retrofitting of the existing facility to accommodate the installation of the RFID equipment, as well as semistructured interviews with key staff involved in all phases of the acquisition, installation, training, and other activities in preparation for system's operations.

Specifically, the case study site was the Central Detention Facility (CDF) operated by the District of Columbia Department of Corrections (DC DOC). The CDF has a full-time correctional staff of nearly 700 officers and a male-only population that averages 1,900 inmates per day. We first conducted initial semistructured telephone interviews with senior leadership and project managers to collect some general information about the overall effort. For example, we asked about the overall goals and expected benefits of implementing an active RFID system in the facility, overall strategy and timelines for implementation of the technology, and how the technology fits into the facility's existing and planned safety and security strategies. We conducted these initial interviews after the department had decided to adopt an active system but before it had moved forward to select an RFID vendor and issue a contract to purchase the system. Approximately 12 months after the department had issued a contract, we then conducted a two-day site visit to the CDF. At the time of the site visit, the "design" phase, involving the detailed development of the facility installation plan, was complete, and actual installation of software and equipment was substantially under way.

DC DOC intends to use the RFID system as an inmate management tool and as a tool for enhancing the security of correctional officers and other staff in the jail. When the RFID system is ready for launch, DC DOC intends to fit each inmate with a tamper-resistant wristband containing an RFID transmitting device during the jail booking process. Communication between the jail's information management system and the RFID system software allows the signals from a specific bracelet to be linked to a specific inmate. The bracelet is removed from each inmate at the time of facility discharge. Each correctional officer is also required to wear, on his or her belt, an RFID device during his or her shift that will help in identifying his or her location and generate safety-related alerts. The RFID monitoring function will be integrated into a correctional surveillance center, or CSC, which is being established in the facility. The sole function of the CSC personnel will be to monitor the RFID signals and alerts, as well as other surveillance technology, such as the closed-circuit television (CCTV) system and a telephone monitoring system.

Overall Findings

Implementation Timeline. At the time of our data-collection window (June 2009 site visit), the department was in the network installation process. At that time, the following were the key milestones for the system:

- June 2008: The contract was awarded to TSI PRISM (completed).
- June 2008–November 2008: Design phase (completed)
- August 25, 2008–May 1, 2009: Construction phase (completed)
- June 2009: Network installation phase (under way at the time of the site visit)
- Future plans
  - Late summer 2009: Integration, calibration, and testing of system
  - Late 2009/early 2010: Full system operation.

The original plan called for the design phase to last several months, with construction beginning in August 2008. However, for several reasons, the design phase took substantially longer than was originally anticipated, lasting until November 2008. For example, the inmate housing component ended up taking the longest to design and configure. A key reason was that the vendor's initial time estimate did not account for the unique architecture of the facility's 18 individual housing units. The patchwork nature of the facility's construction meant that the installation of the RFID equipment needed to be tailored to each of the 18 housing units' unique construction materials and floor space layouts. The department also desired a relatively high level of accuracy, with the ability to identify, in real time and in a multistory facility with two-tiered housing units, the location of an inmate within 2 to 5 feet indoors (and within 10 to 15 feet outdoors). The initial design produced an unacceptable level of accuracy, leading to the need to conduct a series of tests of modifications until the desired level of accuracy could be achieved.

Anticipated Staffing Needs. The planned use of the RFID system by DC DOC involves a number of administrative activities, including analysis of data and report generation, analysis of incident patterns to inform management decisions, analysis to inform investigations, and real-time tracking of inmate location. These activities will be largely conducted within a newly established CSC. Once the RFID is fully operational, the CSC will monitor and integrate this source of data into the range of other surveillance tools it has to monitor inmates' activities. Archived RFID records may also be subpoenaed for use in investigations. Some interviewees postulated that the new technology might result in "fishing expeditions" by prosecutors or defense attorneys. Most of the CCTV footage requests to date were based on active criminal cases. Aside from performing the monitoring and analysis tasks, the department also anticipates needing full-time staff for the work associated with maintaining the inmate- and officer-worn RFID devices. This is expected to be an ongoing and busy process, given the continual turnover of the jail inmate population and the large number of officers going through shift changes.

Anticipated Need to Develop RFID-Related Policies and Operating Procedures. The facility anticipated a need to develop written RFID policies and operating procedures, addressing such topics as when personnel are required to wear an RFID unit, procedures for using RFID to control access privileges to specific areas throughout the facility, directions for inmates wearing RFID devices, and how to report problems with the RFID units. Facility-specific response protocols will also need to be developed to provide decision rules as to whether, and what type

of, action should be taken when an RFID-generated alert is received. The written policies and procedures will represent the CDF's rules governing response decisions. Our interviewees reported that the vendor played an important role in offering some initial guidance on developing these written policies and operating procedures, drawing on its previous experience. The response protocols will need to be further developed and tailored by departmental staff for the CDF, particularly those involved in the operation of the RFID system and the technical staff providing analytic support in analyzing the volume of data generated by the system. The interviewees reported that, when the system was close to implementation, they would move forward in developing its initial set of protocols and refine them, with experience using the system.

Expected Staff Responses to the RFID System. DC DOC intends to use the RFID system as an inmate management tool and as a tool to enhance the security of correctional officers and other staff in the jail. A number of interviewees commented that some officers and union representatives were concerned that the RFID system would lead to excessive surveillance of officers in the performance of their duties. Thus, officers may resent the use of the system, resist compliance with RFID-related procedures, and even try to circumvent the system. On the other hand, some interviewees expected the RFID experience to be comparable to the staff acceptance of other technology upgrades. There was initial resistance to previous upgrades, but these additions came to be seen as positive, as they actually proved to be useful in identifying inmate and officer misconduct and in investigations. Our interviewees also anticipated that the reliability of the system after implementation will be critical to staff acceptance. If the system has a number of false alerts or stops functioning, it could undermine the staff's confidence in the system and affect their willingness to rely on it. In order to help promote staff acceptance of the RFID system, several interviewees underscored the importance of education and training, as well as gaining the support of key staff members within the department to champion the technology and its benefits.

Expected Response of Inmates to RFID. When the RFID system is fully installed and wristband devices are fitted to inmates, our interviewees expect inmates to initially "test" the system, including attempts to remove or destroy the RFID wristbands and the antennae and to try to identify "dead zones" where the RFID signals may not be transmitted. This inmate testing activity is expected to produce a large number of alerts initially, but the interviewees expect that these alerts will diminish over time. From management's perspective, the initial rollout phase will be important for training staff and monitoring of inmate movements and for gaining insights on what attempts inmates may make to circumvent the system. This initial period was seen as critical in order to establish the system's credibility to both staff and inmates. Following the initial "testing" period, interviewees hoped that inmates would soon begin to see the RFID system as adding a layer of protection for them, especially for those individuals who feel particularly at risk for violence from other inmates.

Costs of Implementing and Operating the RFID System. The RFID system was purchased on a fixed-priced contract.[2] We were unable to quantify the potential costs of operating the system because the RFID system was still in the implementation phase. Interviewees did discuss the issue of costs based on their experience to date and offered advice for other jurisdictions to consider if they are deciding whether to acquire an active RFID system. For example, a department may need to take into account the possibility of an extended design phase in

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[2]   The initial estimate for the RFID fixed-price contract was $2.3 million, which DC DOC requested through the budget process. The department also received a $440,000 grant from the U.S. Department of Justice.

order to tailor the RFID system to the unique architecture of the correctional institution or the amount of system testing needed to ensure the level of accuracy desired. For the case study of the department, adjustments were needed to the initial design to take into account differences in the materials of the various housing units versus the vendor's initial assumption of uniform construction throughout the facility. Upon full implementation, one senior interviewee advised that it would also be easy for other jurisdictions to underestimate the resources and staff needed to actually operate the system, particularly in a high-turnover jail environment. Another potential cost concern is a facility's computerized inmate data management system and the ability to merge the RFID data with that system. This potentially can be a costly prospect if the institution does not have the resources needed to implement such a data merger or software that is compatible. Among the potential costs that our interviewees pointed out that other facilities should consider are the long-term maintenance and upgrade costs for hardware and software, costs for maintaining an adequate staff to monitor and analyze RFID data, and resolving software compatibility issues that may arise with upgrades to other surveillance and information systems in use.

Summary and Conclusions

The recent experiences described in this report highlight some key lessons that may be of interest to other jurisdictions considering the use of active RFID systems in a correctional institution. Among these observations are that it is important for correctional administrators to clearly identify their objectives and the type of system that will best meet these objectives. Moreover, it seems most beneficial for a correctional facility to consider having its own in-house expertise or contracting with outside expertise (preferably with corrections experience) to give the facility the guidance (independent of the vendor) it will need to specify the requirements and details of its intended use of the technology, oversee the design process, and facilitate the implementation of the technology. This may be an area in which the National Law Enforcement and Corrections Technology Center can play a role in providing guidance and expertise that correctional facilities can tap into as part of the design and implementation process. In the installation process, RFID contractors and subcontractors need to have a good understanding of the environment of the correctional facility and know what is appropriate in it, especially when considering the materials and techniques for installation of an RFID system.

Training and education of staff will be critical to the successful implementation of the RFID system. Staff will require training on what to expect, on the actual implementation of the technology, on how to use the system, and on how to fine-tune alert response protocols and whether and how to analyze the data to inform management decisions. There is also a clear need to ensure successful integration of an active RFID system with the inmate management and other information technology systems (both software and hardware infrastructure) that a department currently uses or anticipated upgrades. Incompatibility can significantly increase the cost of the RFID project or limit its utility. Getting the buy-in of departmental leadership and of high-level government officials is crucial to getting the project funded initially and fully implemented as intended.

Lastly, and if at all possible, a pilot study in one area of a facility is important to undertake in order to understand how the RFID system can be effectively utilized and how to fine-tune the system and response protocols, train staff on monitoring RFID signals, understand

inmates' reaction to RFID wristbands, and determine what outcome measures will be valuable to track over time. Implementation of RFID systems is expensive, so a pilot-test will allow a facility to understand how RFID technology can meet their overall goals and gather the information and data necessary to inform decisions regarding full implementation within the facility.

An active RFID system appears to hold promise as a valuable correctional tool in ensuring that a prison or jail population is both safely and appropriately managed and in contributing to the improved safety of the correctional staff and inmates. The lessons identified in this report are informative as to the types of issues that a correctional facility may want to take into account when considering whether to deploy an active RFID system within the institution. Because the experience of correctional institutions with RFID is still fairly limited, this report represents an early look at the experiences of one of the few facilities that have invested in active RFID. It provides important information and insights on issues to consider in the conceptualization, design, and implementation of an RFID system in a correctional setting. Yet, more independent assessments of RFID systems' impacts are needed to fully assess the promise and limitations of this technology and to understand how it can be most cost-effectively utilized in correctional facilities.