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TITLE: Comparison of Self Powered EPC/ISO Compliant Tags with Real Time-RFID Systems and Impact on Asset Tracking


PRINCIPAL INVESTIGATOR: Tim Stettheimer


CONTRACTING ORGANIZATION: Providence Hospital
                              Mobile, AL 36608


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                  Fort Detrick, Maryland 21702-5012

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## 14. ABSTRACT

This research grant had 2 primary purposes and components:
1) To eliminate time and man hours that hospital personnel spent searching for equipment in a large health care facility. Asset tags were installed on hospital equipment to electronically locate the medical devices. This report will detail all findings of the use and equipment features.
2) To devise a system for Emergency Department staff to efficiently collect insurance co-payments. A wireless system to notify staff was installed for Emergency personnel to assist in the collection of insurance co-payments.
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# GRANT # W81X WH – 09 – 2 – 0125

## PROVIDENCE HOSPITAL

6801 Airport Boulevard

Mobile, Alabama

**PROVIDENCE**
*Health Ministry*

Providence Hospital is a full service, 349-bed medical/surgical facility.  Since its founding in 1854, Providence has been serving, caring for and healing the people of Mobile and surrounding areas.  Sponsored by Ascension Health, the nation's largest Catholic and largest nonprofit health care system, the hospital's mission is to extend the healing ministry of Jesus Christ to south Alabama and southeast Mississippi, with a special concern for persons who are poor and vulnerable.  Providence has been Mobile's most preferred hospital for nine consecutive years and admits more than 14,000 inpatients annually. Outpatient and emergency room registrations exceed 150,000 per year.

In 1987, in response to growth in western Mobile County, the hospital relocated to a 277-acre campus in west Mobile.  All patient rooms are private, and none is more than nine feet from a nurse's station. Specialized services offered at Providence include open-heart surgery, cardiac catheterization, cancer services, an obstetrics unit with labor/delivery/recovery/postpartum suites, a dedicated pediatrics unit, a freestanding rehabilitation and wellness center and a 100,000 square foot Outpatient Center with dedicated outpatient diagnostic services and surgical suites. The hospital's 550-plus-member medical staff includes representatives from every major medical specialty and subspecialty, with more than 200 physicians located in offices on the campus.

|  | FY 2011 (July 1, 2010 - June 30, 2011) | FY 2012 (July 1, 2011 - June 30, 2012) |
|---|---|---|
| Total Discharges | 14236 | 13979 |
| Emergency Room Visits | 44630 | 45154 |
| Total Surgeries | 15307 | 14779 |
| Newborn Births | 1902 | 1805 |
| GI Lab Cases | 8785 | 8861 |
| Radioation Oncology Cases | 34688 | 37106 |

Providence Hospital offers the latest in technology while honoring its long history of service to the poor and vulnerable.  In FY 2011, the hospital reported more than $12 million in community benefit and service with $23 million in community benefit reported in FY 2012.

# AeroScout MobileView and T2 RFID Tag Deployment

**Overview Summary:**

Providence Hospital was awarded GRANT # W81X WH – 09 – 2 – 0125 for 2 basic components:

1) To eliminate valuable time employees search for expensive equipment. The initial set up required Wireless infrastructure to be installed in the hospital. Then, various medical equipment: SCDs (sequential compression devices), wound vacs, CPMs (Continuous Passive Motion), epidural pumps and bladder scanners were tagged with asset monitors. When the machines and equipment are needed for patient care or cleaning, staff is able to easily locate these devices within the large 12 floor medical facility at room level. The primary focus of this part of the grant was on the main hospital tower and in PACU (Post Anesthesia Care Unit).

2) An alert system was installed in the Emergency Department in an effort to decrease lost insurance co-pays. An estimated $160,000 is not collected each month from the Emergency Department. A system was devised for physicians to press a button connected to our wireless infrastructure in the patient room of the Emergency Department. This would alert a discharge clerk to collect the insurance co-pay, thereby eliminating missed payments. It was also designed to act as a safeguard to obtain guarantor insurance information of patients.

**Contracting and Startup:**

The project commencement was delayed initially. AT&T and G.E. were the original companies to deploy the wireless infrastructure and the sensor tags throughout the complex, but they were unable to obtain equipment and get a system launched for Providence Hospital. After a year of failed negotiations, AeroScout was selected as the wireless tag system and Aruba was selected to launch the wireless network installation at Providence Hospital.

**Initial Deployment: June 20, 2011**

Initial deployment of Mobileview and Radio-Frequency Identification (RFID) tags began the week of June 20, 2011 with the wireless infrastructure installation completed in July, 2011. Approximately 325 assets, including SCD pumps, wound vacs, EKG machines, epi pain pumps, and bladder scanners, were identified as assets that needed to be tagged with T2 RFID asset tracking tags. Along with those assets, every room within the Emergency Department and Chest Pain Center also had T2 tags configured as stationary push buttons mounted on the wall in the room for the ED co-pay process. Training was delivered to nursing education and material handling managers during this time. Room level locating was not available at this point because exciters and antennas still needed to be deployed within the hospital. AeroScout Instant Notifier was installed on all financial counselors' PCs in the Emergency Department.

**First Tag Replacement: September 13, 2011 – September 17, 2011**

Within 4 weeks of tag deployment, T2 batteries began to rapidly deplete, and then fail. This created a massive number of system alerts that were completely unmanageable by the staff. The lithium ion batteries which were promised by AeroScout to function for 2-3 years of

service before replacement was necessary, were failing. AeroScout was contacted, and after a month of troubleshooting, a firmware issue was discovered in the T2 tags. In order to correct this issue, all tags within the hospital required replacement. This process was extremely difficult, as all tag batteries had been completely depleted before replacement tags arrived. Tag/asset location was difficult because the batteries were dead. Battery replacement was conducted the week of September 13, 2011 with personnel from hospital I.T. and AeroScout working together to resolve the issue.

### Exciter Deployment: October 2011 – November 2011

Patient room level asset location began to be deployed and tuned during the month of October 2011. All exciters and antennas were deployed and tuned by the end of November 2011. Both of these steps were necessary in order to provide room level site location of the equipment that had been tagged.

### Second Tag Replacement: December 12, 2011 – December 22, 2011

Soon after room level asset locating began to come online, a Battery Level Report was run on October 27, 2011 by Providence Hospital I.T. personnel, and the data showed batteries were again being depleted and started expiring on October 11, 2011, just three weeks after replacement. AeroScout was sent the report and an e-mail asking for assistance on October 27, 2011. Official acknowledgement was received on November 11, 2011 from AeroScout R&D that there was an unknown problem causing batteries to deplete prematurely. On November 23, 2011 AeroScout reported that there was a problem in the tag firmware and that the fix would be completed on December 1, 2011. AeroScout R&D personnel arrived on December 13, 2011 to perform another full tag replacement, and they also spent several days gathering performance logs from tags that were in service. During this visit, two tag replacements took place because the initial firmware upgrade was not successful in rectifying the issue with battery performance.

### Continuing Battery Issues: February 2011 – Present

February 27, 2012 reports from AeroScout indicated that battery issues were still present and that causes at that time were still unknown. Batteries were only rendering 3-4 months of service instead of the 2-3 years that was promised. AeroScout agreed to provide free resources on a continuing basis until the tag battery issues could be resolved. On April 16, 2012 AeroScout provided the analysis of the performance logs that were captured during the December visit. This analysis indicated that four things needed to be changed to correct the battery issues that the tags were displaying. They were as follows:

1. Exciter firmware upgraded and LF component disabled
2. Removal of low frequency antennas outside of the patient rooms
3. Patient room exciter relocation
4. T2 firmware upgrade and tag replacement

Item 1 and tag battery replacement were conducted during the week of May 14, 2012 by AeroScout personnel. Items 2, 3, and 4 will be completed in Q1 2013 when AeroScout releases the fix for the Exciter and firmware interaction that is causing the battery problems.

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### Overall Findings of First Grant Initiative:  Saving Employee Time

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**RFID Material Management/ Central Distribution Report (Main Tower)**

In spite of the chronic battery failures, the RFID project has been and continues to be very successful for Materials Management and the Central Distribution department. This system has substantially decreased the amount of time employees spend searching for SCDs, wound vacs and CPMs. It has prevented several CPMs and wound vacs from leaving the facility. Costs of lost equipment are itemized below. It has been beneficial to patients, by having fewer delays in getting the equipment they need for therapy or DVT (Deep Vein Thrombosis) prevention.

Before Providence Hospital had the RFIDs, there was no way to efficiently track equipment used by patients for therapy and DVT prevention. Various departments spent many hours each week searching the hospital for misplaced equipment. A patient's therapy for knee surgery or DVT prevention was delayed due to unavailable or "missing" equipment. Two wound vacs were to be thrown out with hazardous disposal (accidently). Since the equipment was tagged, they were able to be located and not permanently lost. SCD replacement cost is $1,100/device, wound vac replacement cost is $28,000/device and CPM replacement cost is $3,500/device.

The RFIDs have been effective to assist employees finding misplaced equipment and thereby keeping the equipment in circulation. This in turn, has decreased the amount of time employees spent searching and has made this equipment readily available for patients. The ability to locate equipment quickly saves the hospital the daily expense ($64.00/day in leasing costs) of the equipment sitting unused and the overall cost of having to replace the leased equipment that was lost. There have been no failures for this department with this project, only positive outcomes. The only challenge has been getting enough devices to cover the occasional additional equipment over normal consignments. Providence Hospital estimates that there are 1,500 more movable assets that would benefit the institution by tagging.

Due to recent schedule and staffing changes, retraining courses for employees with the AeroScout program is necessary. This will reinforce protocol and use for the department while increasing the knowledge base for new users and new staff. The hospital is confident that there are more future cost saving systems to protect hospital assets through Materials Management and Central Distribution.

Challenges:

- Inferior Batteries
- Retraining for new and other staff

Benefits:

- Benefits are tremendous for Materials Management and Central Distribution. Time looking for equipment has been decreased dramatically. In some months, there were no man-hours spent searching for equipment.
- Equipment is not lost
- Inventory levels are improved/lowered

**Data Analysis of Materials Management Component:**

The asset tag system was completed and fully operational in July, 2011. Note that upon installation, expense associated with staff man hours searching for equipment decreased significantly (See Chart A below). In comparing the data, there was no month post installation that did not have a savings over the prior comparison period. The hourly time spent associated with search for equipment decreased. There was also a decrease in lost equipment. During the monitoring period pre-installation, a wound vac device was lost in December of 2010 and the Hospital had to repay the vendor thirty percent of its replacement cost per contract. At no time in the post installation period were any devices lost, saving the hospital the capital expense associated with its loss.

Asset tags have enabled Providence Hospital to keep an ideal and efficient number of assets in inventory, thus reducing inventory of equipment. The hospital has experienced reduced expense due to saved staff time and savings in not having to purchase replacement devices.

Chart A:

**MATERIALS MANAGEMENT**
**CENTRAL DISTRIBUTION**

| | Pre-Installed Data | | | | | | | Post Installed Data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Dec-10 | Jan-11 | Feb-11 | Mar-11 | Apr-11 | May-11 | Jun-11 | Jul-11 | Aug-11 | Sep-11 | Oct-11 | Nov-11 | Dec-11 | Jan-12 | TOTAL |
| WOUND VACS | $7,600 | $0 | $0 | $45 | $90 | $43 | $73 | $0 | $4 | $0 | $0 | $16 | $0 | $0 | $7,871 |
| SCD'S | $260 | $360 | $300 | $200 | $230 | $296 | $260 | $100 | $110 | $160 | $360 | $40 | $80 | $64 | $2,820 |
| CPM'S | $128 | $128 | $64 | $64 | $32 | $64 | $64 | $0 | $0 | $32 | $0 | $16 | $0 | $0 | $592 |
| PAIN PUMPS | $60 | $90 | $90 | $90 | $60 | $60 | $30 | $0 | $30 | $30 | $30 | $0 | $0 | $0 | $570 |
| Total | $8,048 | $578 | $454 | $399 | $412 | $463 | $427 | $100 | $144 | $222 | $390 | $72 | $80 | $64 | $11,853 |

Average Cost Pre-Installation = $1,540          Average Cost Post-Installation= $153

AVG Cost Savings Of $1387 per month

Data used to calculate savings:
Average Associate Wage of $8.00 an hour
Time staff spent search for equipment
Replacement Cost of equipment

Note, month of December 2010, a wound vac was lost and vendor was paid 30% of its replacement cost per contract.

**RFID Post Anesthesia Care Unit (PACU) Report**


Initial Focus for PACU:

The post anesthesia care unit was to utilize tracking devices for the purpose of decreasing difficulty locating sequential compression devices (SCD).

Project Launch:

Tracking devices were placed on the sequential compression devices (SCD) in order to locate the equipment. The importance was placed on the SCDs because surgical patients are required to have SCDs in place following operations to help prevent a deep vein thrombus (DVT). The SCDs devices are included in the Surgical Care Improvement Project (SCIP) with guidelines set by the Centers of Medicare and Medicaid Services (CMS).

Before the asset tags were utilized, the recovery unit began tracking the hours spent by staff to get the SCDs and the amount of time a patient was delayed due to misplaced equipment in December 2010. The desired outcome was to decrease the amount of time locating the device. Prior to installation of the tracking device, the patients were allowed to go upstairs without a SCD. Immediately after installation the recovery area changed the procedure and the patients had to wait in the recovery department until a SCD was available. The decision to make the patients wait caused the delay time and staff hours to increase. After implementing the tracking device, an increase of 16.9% was noticed in staff time lost and a 51.9% increase was noticed in patient delay. There was a drastic decrease in November for staff hours and patient delay due to the addition of thirty (30) new SCD pumps. It was then determined that more equipment was needed to operate efficiently.

The recovery staff fully utilizes the Providence AeroScout Mobile tracking system to see where the SCD pumps are located within the large facility. The recovery staff calls sterile processing to have a staff member from the department to retrieve the SCD pumps. If no one is available, the recovery staff retrieves the device from the floor or location.

Challenges:

- Procedure changed and patients were not allowed to go to their room without an SCD pump.

- Staffing issues in the sterile processing department.

- Increase of inpatient census.

- Inferior batteries

Benefits:

- Central Distribution and Materials Management has successfully integrated the asset tag system into daily use. Staff is easily able to locate equipment in patient rooms of the 349 bed acute care hospital.
- Patients no longer wait for SCDs. This further insures patient safety as a result of the process changes and ensures lower cost of care in that patients are getting better care.

Conclusion:

Initially, the tracking devices helped Providence Hospital realize there were not enough SCD pumps for the department to operate efficiently. Thirty new SCD pumps were ordered. After the additional pumps arrived, tagged, and placed into circulation, there was a downward trend by approximately 75% of staff hours and delay with patients. Currently, it is rare that a patient is held up in the post anesthesia care unit due to a need for a SCD pump.

## Overall Findings of Second Grant Initiative: Reduction in Lost Co-Pays in the E.D.

**Initial Focus of Project:**

The use of sensor buttons for the purpose of increasing collections in the emergency department.

**Project Launch:**

In order to reduce the enormous cost of lost/foregone insurance co-pays, the original proposal was to have the Emergency Department Physicians push a wireless sensor button once the physicians had completed a medical screening exam on Emergency Patients. The sensors sent a wireless signal to the registration clerk's computer indicating it was clear to approach patients regarding insurance information. Physicians were educated on the process by the interim director of the Emergency Department and the project was launched May 2011. During the initial phase of the project the emergency department leadership was in transition with both an interim director and interim manager. In August of 2011 the leadership changed once again. The project manager approached new leadership regarding the existing project. Interviews with the physicians revealed that there was no engagement from the physician group. The project manager redirected the focus of the button alert system to include the emergency department nursing staff. The new leadership team coordinated education efforts to include the emergency department nursing staff.

**Redesigned Approach:**

In August 2011 the leadership team launched education for the emergency department registered nurses. The proposed redesign incorporated the use of the button as a means to alert registration staff that patients were cleared for approach after the medical screen by the physician was completed. One

of the most challenging aspects for our staff was the work flow design. The challenge was that there were multiple steps taking place during the first thirty minutes of the initial encounter with the patients.

The added expectations of tracking the physician and pushing the button to alert the registration staff of physician's completion of medical screening exam were not viewed as a priority by the staff due to the intense medical needs of the hospital emergency department patients.

**Multiple initiatives:**

In August of 2011, a hospital steering committee was formed with the task of leading the implementation for the Emergency Department. This required extensive training and education for the emergency room leadership team.

In September of 2011, the new stroke coordinator joined the ED team. Another hospital based initiative to become an accredited stroke center was launched. Also in September the leadership team and staff conducted multiple interviews for 10 vacant staff positions. The recruitment of additional staff was time consuming and labor intensive.

In October 2011 multiple new hires along with changes in the charge nurse positions disrupted the routine of all of the emergency room staff. The staff was also involved in preparation for a repeat Joint Commission survey in October. A large corporate initiative was launched during the month of October which was a system wide initiative and required an enormous amount of the ED leadership time.

In November 2011, the emergency department staff began multiple education sessions regarding another new initiative called Project Symphony. This was to educate staff on the Hospital's new Human Resources, Financial, and Supply Chain systems. The orientation of new staff continued along with the focus on upcoming Joint Commission survey.

In December 2011, the emergency department met challenges of increasing volumes and staff turnover.

**Compliance with Button Initiative:**

Throughout this initiative the button project was monitored for compliance. The Areoscout tracking system displayed the daily number of buttons pushed. The peak button compliance was 25 pushes a day which fell short of the goal for 120 pushes per day. The project manager and the ED leadership met and discussed compliance of this initiative. The emergency department experienced numerous distractions during the prior months and the project was not meeting expectations. The goal to increase collections remained a priority.

The use of the button alert system as it related to this busy emergency department could be of value but the priority for use was not a priority for the busy staff. The staff's priority focused on the patient's physical needs. The added steps for the staff nurse did not complement patient care priorities. The emergency department leadership met with registration leadership to discuss the goals for increased collections in the emergency department.

The consensus was that the use of the buttons in the front end of the patient encounter was not contributing to the overall collection goals. The front end was perhaps not the place for adding steps to an already hectic evaluation and stabilization process as it related to the emergency department nursing staff. The leadership team focused efforts on collection at the time of discharge. The planning phase of the future design of the check out process will begin in December 2012.

**New Design:**

After months of monitoring compliance with existing button project, the leadership team met with the project manager and the decision to change the focus was made. Attempts at collections after the medical screen at the front end of the patient's visit were self defeating. The emergency room staff would concentrate efforts for collections at the time of discharge. A pilot was launched in January of 2012 whereby all patients in the main ED consisting of 16 rooms would pilot the program before full implementation of the remaining 27 rooms.

The new process called for the emergency department nursing staff to call a central number to alert registration staff, now centrally located at a check out room, that the patient was ready for discharge. The new process would allow for a more efficient workflow. The workflow for the nurse at time of discharge is typically a less intense process.

Providence Hospital has identified that the use of the wireless notification buttons may be practical in this new design. The nursing staff have worked with the new design for 4 months and they are in agreement that this design is a better workflow. The collections goals for registration have been met post design change. The checkout process has been evaluated with modifications implemented. The use of buttons can still be of benefit to our emergency department. Providence has determined that the button alert system may save time in lieu of making a phone call which is more labor intensive. This proposal will be discussed with the staff as implementation go live in August 2012. Our check out process has expanded to the minor care area which discharges approximately 1000 visits per month. The staff in minor care moves at a faster pace and the concept of pushing a button instead of making a phone call seems more practical.

**Conclusions:**

1. The Emergency department is an extremely complex system with multiple processes requiring clinical staff to focus on clinical processes and acute patients rather than registration related functions.
2. The design of the initial project underestimated the process change that would be required.
3. Multiple hospital initiatives diluted the focus of this project.
4. Staff turnover and the vacancy rate at peak times of this project presented challenges for the leadership team.
5. The emergency department experienced increased volumes and increased acuity of patients during the life of this project. It was necessary for medical and clinical staff to concentrate on clinical priorities.
6. The focus of using this system on the front end proved to be a challenge for a busy clinical staff.
7. The use of the button alert system may be beneficial at the time of discharge. Buttons may be used as an alert system in lieu of making a phone call.

## Laboratory

As discussed previously, the batteries in the AeroScout asset tags have been a tremendous disappointment. After several attempts to replace the inferior batteries, AeroScout gave Providence Hospital complimentary temperature monitors as a goodwill gesture.

The temperature monitors have been extremely useful in the hospital blood bank and all refrigerators that are used for patient care and patient medications.

Joint Commission Accreditation, a strict governing body required by all hospitals to maintain licensure, mandates that refrigerators used for patient care and patient medications must have temperatures monitored for patient safety. Before the AeroScout temperature monitors, countless man hours were spent maintaining temperature logs to ensure refrigerators are at safe levels with no deviations. The AeroScout temperature monitors have become invaluable and further use is extremely desirable.

- The devices work very well and no problems have been diagnosed.
- The monitoring program that is used to review the charts is user friendly and works as described.
- The monitoring helps meet hospital requirements for remote monitoring required by the CAP and AABB.
- An expansion of use of the devices to other departments is considered to increase productivity.
- No fault in the devices or the system.
- Providence Hospital would like to double current usage for the hospital laboratory.

## Future Recommendations:

In the future, all hospital laboratories and other medical facilities that require refrigeration to be carefully/precisely monitored will benefit from this technology.

## Current System State and the Future

## Current State:

Mobileview is currently deployed and running on the hospital's intranet. Nurse Managers, material management, clinical engineering, hospital administration, and IT have full access to

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the system for locating tagged assets. Clinical Engineering is managing tag replacement and provisioning on new assets. Patient room level asset location locating is highly accurate with little to no erroneous data being reported, however, Wi-Fi triangulation is much more error prone with tags "jumping" from floor to floor. This issue is expected to be rectified when the next version of the AeroScout Wi-Fi Engine is released in the near future. Battery issues are still present, but performance has been extended from 3-4 weeks to 3-4 months depending on the asset.

Provide Hospital will work with AeroScout upon the release of the permanent fix to the tag battery issues to implement this as quickly as possible. Push button tags in the Emergency Department and Chest Pain Center proved to be an ineffective solution to assist with co-pay collection. A new process for patient discharge has been developed based partly upon the experience with the push buttons.

Uses for these buttons are currently being re-evaluated with several options on the table. Hospital personnel have been slow to embrace the system due to the continuing issues with tag performance. Due to the various issues encountered during implementation, AeroScout has provided temperature monitoring tags for testing in the hospital lab. Twenty-five temperature tags were deployed in January 2012. This trial has proven highly successful and the hospital is moving toward a site wide temperature monitoring solution in Q4 2012 or Q1 2013.

**Future Recommendations:**

In the wireless infrastructure installation process, receivers were symmetrically placed on each floor. (The receiver on the 6th floor was directly under the 7th floor receiver, etc.) This configuration occasionally caused the asset tags to send a false signal, indicating the equipment is on the wrong floor – either a floor above or below the true location. It is recommended that the wireless infrastructure receivers be installed in a staggered pattern to prevent false signals.

Loss prevention is another area where the hospital could realize significant savings. A small investment of hardware at each exit would provide notification to hospital personnel when tagged assets exited the premises. This would allow the recovery of costly assets before they left the premises.

In any medical environment, costly equipment often leaves with discharged patients. A team here at Providence will install a system to further utilize the asset tags to end this dilemma.

Providence Hospital continues to battle the problem of inferior batteries, but the asset tags are very useful in the medical environment. It is certainly reasonable that a universal system be in place in the future for all hospitals.


**Overall Summary and Conclusion**

Providence Hospital is fortunate to benefit and be included in this research grant.

The hospital benefited immensely from the Wireless infrastructure installation. A Wireless infrastructure system is crucial for a hospital to remain current with technology and prepare for future advances. This alone promotes sustainability of the project.

The Central Distribution and Materials Management Department fully integrated the asset tag locator system. The first month the system was in operation, hospital staff eliminated time looking for equipment in the large hospital facility which is comprised of 12 floors and 349 beds, numerous surgery rooms and various diagnostic rooms. Providence Hospital is comprised of more than one million square feet. The appropriate staff and departments are able to efficiently operate and keep inventory at an economically efficient level.

Patient care, in general, has improved. New Medicare reimbursement for health care facilities is based on high quality patient care and patient satisfaction. The hospital anticipates that the new AeroScout system will generate high patient satisfaction and therefore overall pay improvements. SCDS, which were tagged with the Areoscout locator devices, are vital to quality patient care and often a lifesaving procedure. The asset tags enable hospital staff to quickly and efficiently locate SCDS. This has lifesaving implications since the device is so very vital to preventing potentially deadly deep vein thrombosis.

The installation of the wireless notification system in the Emergency Department was, in theory, a good way to recoup lost money from missing insurance co-pays. The problem is deeper and more complex since an Emergency Department is extremely busy with stressful life and death situations. In short, The Emergency Department initiative was unsuccessful. The Gulf Coast was negatively impacted by The British Petroleum (B.P.) oil spill during this time. This, combined with the national economic downturn, has caused an increase in Emergency Department volume and patient acuity.

Other recommendations for future use include patient tracking, infant tracking and employee tracking. Involving AeroScout in all of these elements will improve patient care, patient safety and overall hospital efficiency.

The future of this device technology will require more integration among device manufacturers. Ideally, these device tags should be regulated to work across the numerous software/hardware RFID system manufacturers (G.E. , AeroScout, Teletracking, etc.). A central data repository of tagged devices would allow movement of these devices across city and state lines and allow hospitals in the event of emergencies to track equipment that would be shipped in an effort to shore up impacted facilities. This type of technology could be useful in the event of hurricane or tornado damage to facilities to track generator movement, water tanks, Operating Room Equipment, Ventilators and other critical equipment necessary in hospital operations. However, at this time, the technology is vendor specific and does not allow for vendor to vendor transfer of technology.

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# PROVIDENCE HOSPITAL

To Whom It May Concern:

Regarding Grant # W81xWH – 09-2-0125.

All property through this grant award is titled to this institution.

Nonexpendable/permanent property from this grant is vested to Providence Hospital.

*C. Susan Cornejo*

8/1/12

Susan Cornejo

Chief Financial Officer

Providence Hospital

Mobile, Alabama   36608

Mydocuments\: nonexpendable