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Electronic Monitoring of Hand Hygiene Compliance in an Inpatient Hospital Setting

Christopher M. Masek
University of Nebraska-Lincoln, Chris200@gmail.com

ELECTRONIC MONITORING OF HAND HYGIENE COMPLIANCE IN AN INPATIENT HOSPITAL SETTING

BY

CHRISTOPHER M. MASEK

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ELECTRONIC MONITORING OF HAND HYGIENE COMPLIANCE IN AN INPATIENT HOSPITAL SETTING

CHRISTOPHER M. MASEK M.S.

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Adviser: Paul Savory

Proper hand hygiene is known to reduce hospital acquired infections. Currently the most widely accepted method used to measure hand hygiene compliance is through direct observation. This method often provides data that may not accurately represent true hand hygiene compliance due to such factors such as the Hawthorne Effect. Perhaps a better approach is to use counting devices to capture hand hygiene opportunities and activities. This thesis focuses on the measurement of hand hygiene activities of all individuals that either work or visit an inpatient medical ward including healthcare workers, patients and visitors at the patient's bedside for non-isolation patients. The objective of this study is to determine if a reasonable measurement of hand hygiene compliance can be made that does not require the healthcare worker to interact with the technology. Two experiments were conducted in this study. The first experiment was to determine if an observer being present on a medical ward would increase the hand hygiene compliance compared to when the observer was not present. The second experiment looked at the use of counting devices as an alternative to direct observation to monitor hand hygiene compliance. Data was collected at a Veterans Affairs medical center in Omaha, NE over a 3-week period. The results show that compliance of hand hygiene increased during the observation

period. Results for the second experiment show that the compliance of the counters was well below what is typically found in non-ICU hospitals.

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Christopher M. Masek is an Industrial Engineer with the Midwest Mountain Veterans Engineering Resource Center, Department Of Veterans Affairs, Omaha, Nebraska.

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CHAPTER 1: INTRODUCTION

1.0 Problem Environment

The problem environment of this thesis is the sixth floor medical ward of the Veterans Affairs Nebraska Western Iowa medical center located in Omaha, NE. This medical ward serves as one of four medical/surgical wards at the facility. Other wards include a surgical ward, an overflow medical ward, and an intensive care ward. The sixth floor medical ward is often referred to as 6E or "sixth east". The types of patients that are cared for on the ward are general medicine patients. These patients are admitted to the hospital due to complications from chronic diseases, procedures or for observation. The ward is comprised of 15 rooms with 22 beds in three hallways. Of the 15 rooms, seven rooms are double rooms and the remaining eight rooms are single private rooms. Many of the single rooms can be used for isolation rooms where additional precautions can be taken if a patient has a contagious disease. Double rooms are seldom used for isolation rooms due to two patients occupying them at the same time.

1.1 Participants

The ward admits approximately 124 patients per month with an average length of stay of 3.25 days. Staffing of the sixth floor medical ward includes nurses and nursing aides that provide direct care to the patients. Other healthcare workers that visit patient rooms include physicians, housekeeping personnel, radiology technicians, dietitians, social workers, food services workers, and specialty nursing services. This thesis focuses on the measurement of hand hygiene activities of all individuals that either work or visit

the sixth floor ward including healthcare workers, patients and visitors at the patient's bedside for non-isolation patients. Because isolation patients require a more stringent protocol on entering the room, these rooms have been excluded from this study.

1.2 Scope and objective

There are several different techniques utilized to measure hand hygiene compliance, with many of them relying on a human to collect the data, or a human to interact with or be equipped with technology. This technology is often "visible" in that the human has to wear a special badge or the dispensers may flash or emit audible sounds when hand hygiene is required. The objective of this study is to determine if a reasonable measurement of hand hygiene compliance can be made that does not require the healthcare worker to interact with the technology. The intent is to make the technology "invisible" to the healthcare worker, thus not influencing their hand hygiene behavior during the course of their daily work. This will be done by:

1. Using product counters to determine hand hygiene activities.
2. Using people counters at patient room entries to estimate the number of hand hygiene opportunities.
3. Measuring influence of hand hygiene observer on hand hygiene activities collected by the product counters.

1.3 Research motivation

Hand Hygiene is known to reduce hospital acquired infections (E. Larson, 1988; Maki, 1989; Semmelweis & Classics of Medicine, 1981). Currently the most widely

accepted way of measuring hand hygiene compliance is through direct observation (World Health Organization., 2009). This method requires an observer to determine and count the number of hand hygiene opportunities and the number of hand hygiene events that occur over a period of time. A hand hygiene opportunity is a situation where hand hygiene should be completed right after the activity has ended. A hand hygiene event is the act of performing hand hygiene. The formula for calculating percent compliance is straightforward; it is the number of events divided by the number of opportunities:

Equation 1: Percent compliance calculation

$$Percent\ Compliance = \frac{Number\ of\ Hand\ Hygiene\ Activities}{Number\ of\ Hand\ Hygiene\ Opportunities}$$

The key disadvantage of direct observation is the need for an individual to observe. Observers often have other duties and responsibilities in the hospital that often take precedence over compliance observation tasks. This results in direct observation samples being made when it is convenient. Additionally, collecting observations during night shifts often do not occur since observers are not available, as well as there being drastically reduced hospital ward activities.

1.4 Hand hygiene opportunities

Hand hygiene opportunity counts can be difficult to collect by an observer. Unlike discrete data that can often be measured with an instrument, hand hygiene opportunities are attribute type data that require a judgment to be made whether or not an opportunity has occurred. Observer subjectivity that may occur when collecting attribute

data. One observer that is not trained properly may indicate that an opportunity has occurred, while another observer will indicate that an opportunity has not occurred. Proper training of the observers and evaluation of results ensure acceptable repeatability and reproducibility between observers.

Leading healthcare organizations have different definitions of hand hygiene opportunities. World Health Organization (WHO) guidelines for non-surgical hand preparation indications are found in Figure 1 (World Health Organization, 2009). In the diagram, the solid lines represent acceptable techniques for hand hygiene; the dashed lines represent acceptable alternatives if alcohol-based hand gel is not available. Where two solid lines from one indication point to both hand hygiene techniques, either technique is acceptable. Using soap and alcohol-based hand gel at the same time should not be done.

In a report published by Centers for Disease Control (CDC) indications for hand hygiene are in Figure 2 (Boyce, 2002). The CDC guidelines have one hand hygiene technique specified for each opportunity given, with no suggestions for alternative hand hygiene. For the most part, both sets of guidelines address a majority of hand hygiene opportunities. There are cases where one set of guidelines addresses a specific situation and the other does not. These guidelines are complex and could easily be confused by the healthcare worker, as well as the observer when measuring compliance.

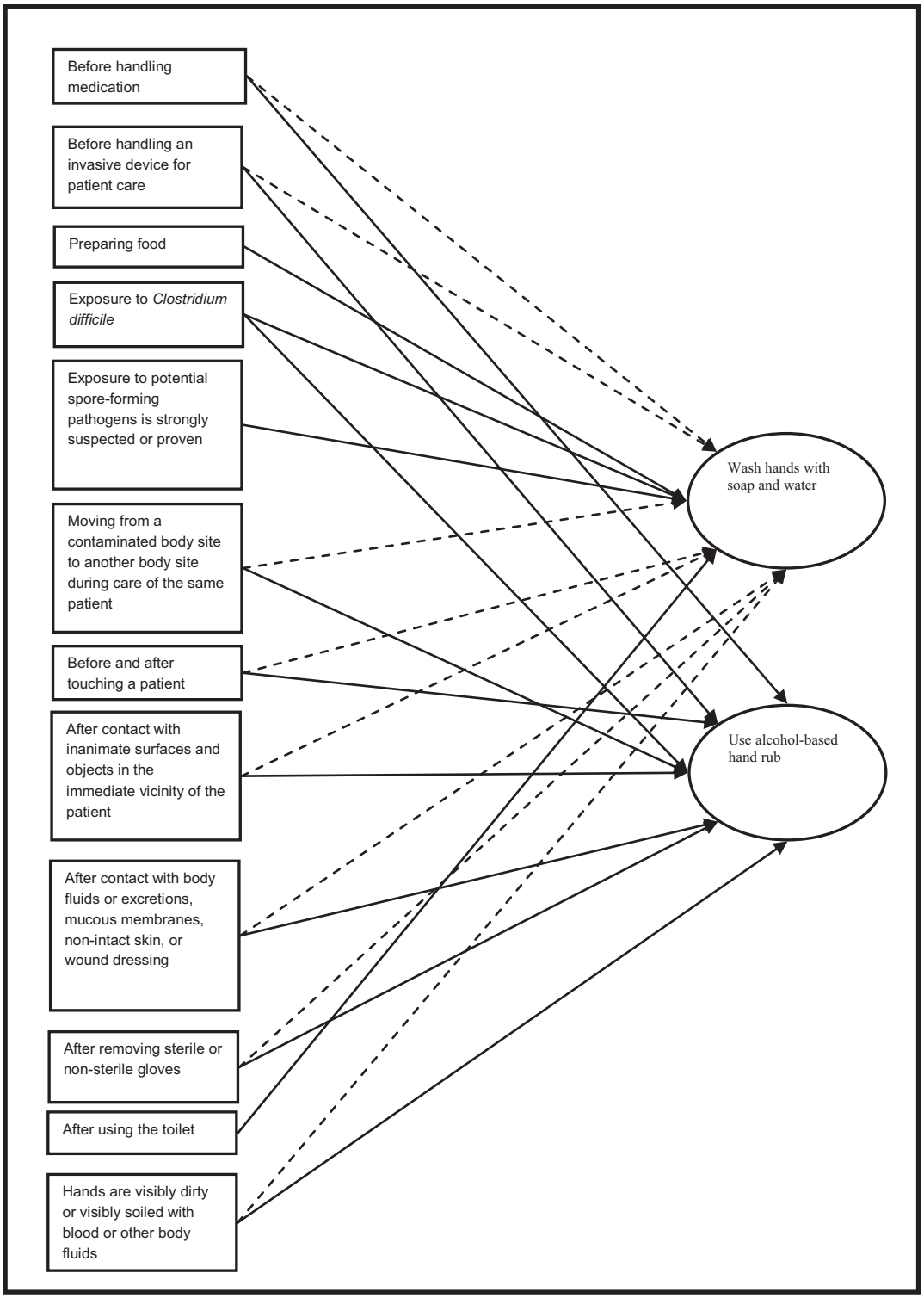

Figure 1: Indications and proper hand hygiene according to WHO guidelines

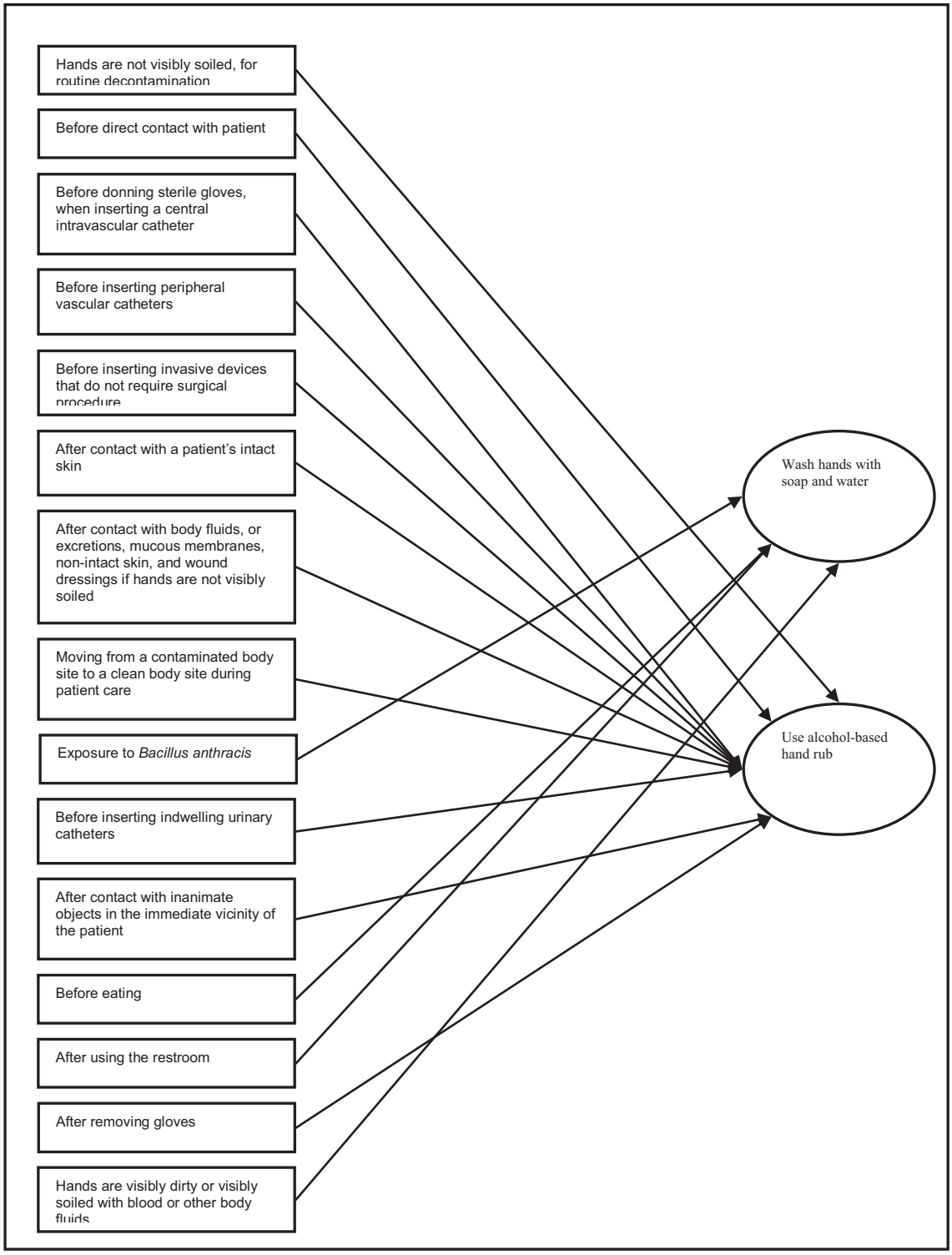

Figure 2: Indications and proper hand hygiene according to CDC guidelines

1.5 Hand hygiene activities

It can be difficult for an observer to determine that a hand hygiene opportunity has occurred followed by the proper hand hygiene activity. Depending on the procedure(s) set out for the observer to follow, the observer may be required to observe a large area that contains many healthcare workers at the same time. Depending on the type of work that is being conducted, hand hygiene events may be completed while hospital room doors are closed, at locations far away from the patient, or completely lacking.

Chapter 2: Literature Review

2.0 Background

Measurement systems that are unreliable will provide data that may not represent the current state of compliance. Many techniques used today to measure hand hygiene compliance are not reliable. Some of the techniques require judgment by an observer, while others require the healthcare worker to attach a device to their person. Descriptions and identified weaknesses of several measurement techniques are described in this section.

2.1 Direct observation

Detection of hand hygiene compliance by validated observers is considered an acceptable practice in hand hygiene compliance monitoring (Boyce, 2002). There are several advantages of direct observation. Details can be observed, and unforeseen qualitative issues can be detected while observing (World Health Organization, 2009). These items can be found to be advantageous only if there is a way to collect and quantify these details and qualitative issues. Disadvantages to this include time consumption, the requirement of training and validation of observers, and individual observer bias. Another disadvantage of direct observation is the Hawthorne effect (Kohli et al., 2009). When people are observed, their performance changes. Other possible disadvantages may be the sampling being conducted occurs at convenient times and with convenient environments (World Health Organization, 2009). This results in data that does not include samples for all times of the day or all patient care areas.

2.2 Video observation

Similar to direct observation, video cameras have been used to observe healthcare workers instantly at offsite centers to determine hand hygiene opportunities and events (Armellino et al., 2010). These observations can provide instant feedback to the area on hand hygiene compliance. This technique could possibly under count hand hygiene due to the viewable area of the cameras. In addition, this type of system is costly due to the amount of equipment installation, and resources needed to view the video. The privacy of the patient and healthcare workers becomes a concern with this type of system.

2.3 Technology attached to the human

There are many examples that require the healthcare worker to attach or carry a sensor that records hand hygiene events and remind the individual to complete hand hygiene when an opportunity is present. These technologies include RFID badges (Boyce, 2008) and wirelessly connected motes (Polgreen, 2010) worn by the healthcare worker. A disadvantage of these systems is that it depends on the individual to wear the device. If the device is not worn or attached, the person's hand hygiene activities will not be recorded. The ability to identify the healthcare worker and their activities throughout the day is another disadvantage to this type of system. When tracking a healthcare worker's every movement, unintended behaviors such as gaming of hand hygiene compliance may be produced (Bittner, Rich, Turner, & Arnold, 2002). Gaming occurs when the individuals manipulate the system to achieve a desired measurement outcome instead of using the system's rules and procedures put in place to protect the system.

2.4 Measurement of products

Measuring the usage of hand hygiene products has been shown to be an effective way to measure the amount of hand hygiene activities that are taking place over time. The weight of soap and alcohol hand rub, as well as paper towel usage, highly correlates with hand washing (Bittner & Rich, 1998). Unfortunately, collecting this data is effort intensive, requiring the removal of the soap and alcohol hand rub from the dispenser to measure (i.e., weigh) the contents and returning the product to the dispenser. Collecting data on paper towel use can be simplified by using a ruler to measure the differences in the stack height of the towels (Bittner & Rich, 1998), which could also be seen as effort intensive. The introduction of variation due to different techniques used by different healthcare workers is a large disadvantage to this technique. For example, different individuals may use different amounts of soap, alcohol hand rub or paper towels each time they use the products.

2.5 Counters

Counters have been used to record product uses over time (E. L. Larson, 2005; Larson, Early, Cloonan, Sugrue & Parides, 2000). The counter is mounted inside the dispenser and is not visible to the healthcare worker. When product is dispensed, the dispenser lever actuates a switch to index the counter by one. To differentiate between a hand hygiene event and multiple presses of the dispenser lever, some counters have a dwell period where the counter will not index until a certain amount of time has passed. The collection of counter data requires a large amount of effort. To collect the data, an individual visits each dispenser, opens the dispenser, records the date and time, dispenser

identification, and the count on the counter. One disadvantage to this technique is that the rate of use can only be calculated over time between the data collection events. To determine if variables such as shift, time of the day or week affect the use of soap or alcohol hand rub, this requires that data be collected at the same interval as the variable interval.

Chapter 3: EXPERIMENTAL DESIGN

3.0 Experimental design

This study contains two experiments. The first experiment is to determine if the presence of a hand hygiene observer influences the behavior of the healthcare worker on a medical ward. The second experiment is to determine if electronic counters could be a reasonable alternative to a hand hygiene observer.

Both experiments were performed in parallel over a three-week period. During each of the three weeks, data was collected from a defined set of alcohol hand rub dispenser counters, soap dispenser counters, and door counters. During Week 2, an observer spent time on the ward observing hand hygiene compliance.

The first experiment is to determine if a hand hygiene observer being present influence the hand hygiene compliance. Data of the counters for Weeks 1, 2, and 3 will be compared to see if there is an increase in compliance during Week 2 of the study. In addition, Week 3 will be compared to Week 2 to determine if there was a decline in compliance after the observer is no longer present on the ward. Finally, Week 1 and Week 3 will be compared to determine if the compliance in Week 3 returned to the same level that was found in Week 1.

The second experiment will compare the counter data for Week 2 compliance and the compliance data collected by the observer. The purpose of this comparison is to determine if an observed compliance was the same as the counter device compliance or if the two methods generated different results.

3.1 Participants

The key participants of interest in this study are the healthcare workers on the 6E hospital ward. The majority of healthcare workers found on this hospital ward are nurses, physicians, food services, social workers, housekeeping and dietitians. Admitted patients and visitors are also included in this study, but provide a smaller amount of hand hygiene opportunities and activities.

3.2 Rooms evaluated

The 6E ward being evaluated is broken into three wings; a north wing (6100 wing), an east wing (6200 wing), and a south wing (6300) (See Figure 3). Each wing has a different combination of hospital room types: single patient rooms and double patient rooms. Single rooms are often used for patients that require contact isolation (in which healthcare workers require additional procedures when entering and exiting the patient room). Double rooms were selected because they are less likely to be used for isolation patients. Double rooms are found in the east wing (3 double rooms) and a south wing (4 double rooms and 2 single rooms) of the ward. Each double room has one alcohol hand rub dispenser inside the patient room, one alcohol hand rub dispenser outside the patient room, and one soap dispenser located in the bathroom of the patient room.

There are two hand-washing alcoves found in each wing being evaluated that each have an alcohol hand rub dispenser and a soap dispenser. Figure 3 notes the location of all of the dispensers monitored during the study.

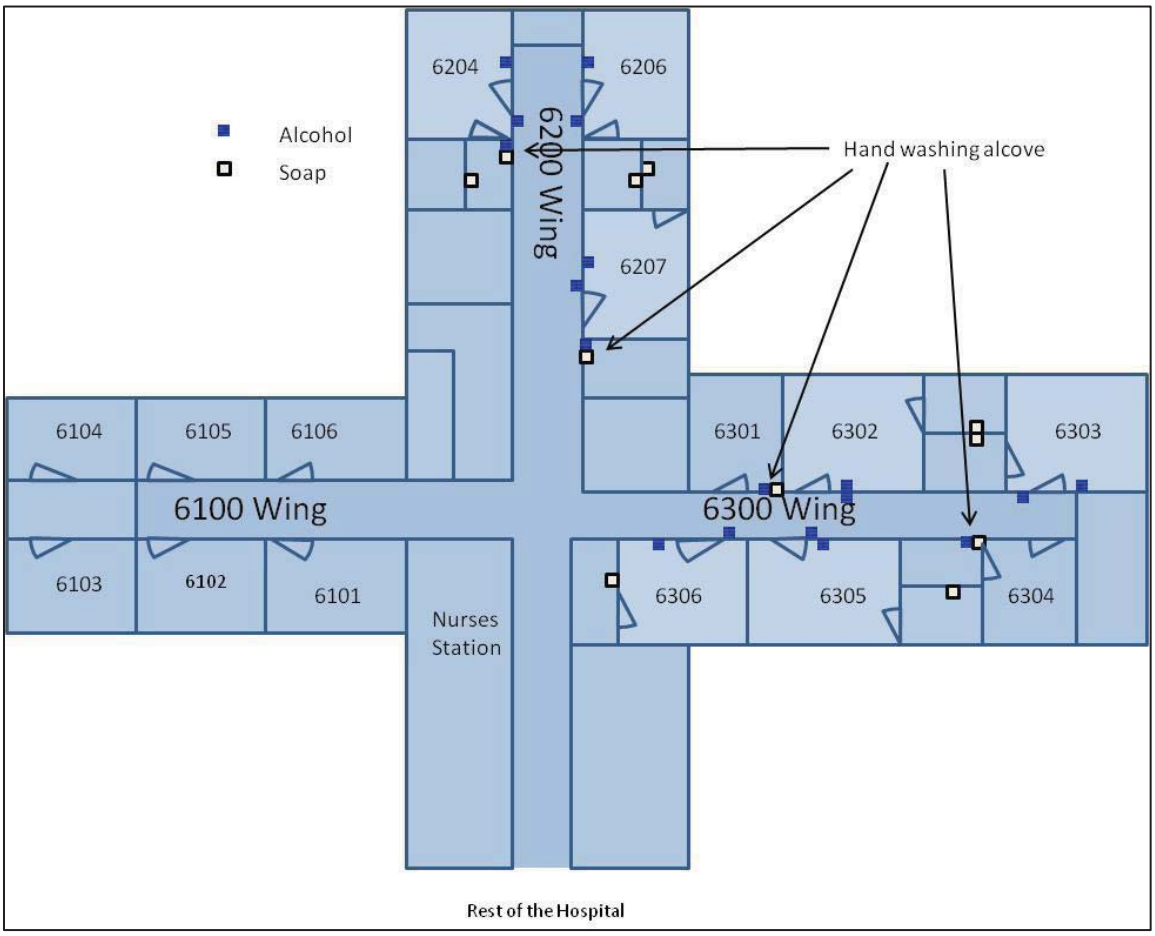

Figure 3: Map of hospital ward

3.3 Equipment: Door counters

The doorway to each room was equipped with a people counter. A counter consists of an emitter and a receiver that create an invisible beam of infrared light across the doorway. The devices were attached to the door frames using 3M Dual Lock™ re-closable fasteners. The devices were positioned between 31 inches and 54 inches from the floor to the bottom of the devices (See Table 1). In situations where the devices were

not protected by handrails, the devices were raised to prevent them from being knocked off the wall by carts and beds.

Table 1: Door counters heights

Door	Height from floor
6204	41 inches
6206	44 inches
6207	48 inches
6302	52 inches
6303	31 inches
6305	52 inches
6306	54 inches

3.4 Equipment: Dispenser counters

There are two types of product dispensers in the system: soap and alcohol hand rub. Each of these dispensers can be defined by location (See Table 2). Alcohol hand rub dispensers can be found at hand washing alcoves in the ward hallways, just outside the patient room, and inside the patient room. Soap dispensers can be found at the hand washing alcoves in the ward hallways and inside the patient room bathrooms.

Dispensers in this study have been equipped with counters that record the number of uses of product. There is a small time delay after the counter has been activated to prevent counting of multiple presses to the dispenser as more than one hand hygiene event.

Table 2: Types of dispensers and locations

Dispenser Type	Location
Alcohol Hand Rub	Inside Patient Room
	Outside Patient Room
	Hand Washing Alcove
Soap	Inside Patient Bathroom
	Hand Washing Alcove

3.5 Electric counter method

For three consecutive weeks, each weekday morning, between the hours of 8:00 a.m. and 11:00 a.m., the date, time, identification and count of each counter device was recorded manually using a paper form (see Appendix C).

There were several situations where counts could not be recorded. One such condition was because the bathroom was occupied by a patient. Another is when a counter was discovered to have a dead battery. Furthermore, there was a double room being used as a contact isolation room; the counters inside those rooms were not recorded and were noted as being an isolation room. Information on how to retrieve the counts from the product dispensers can be found in Appendix B.

3.6 Observation method

An observer recorded hand hygiene opportunities when a person(s) entered a patient room. Each individual was recorded as a separate event. All persons entering the patient room were counted as an opportunity, regardless of role, including visitors and patients. Opportunity events were not recorded when a person exited the room.

For hand hygiene event that occurred outside the patient room, an event was recorded when a person applied alcohol hand rub to their hands using the dispensers located outside the patient rooms. When an individual performed hand hygiene using soap and water at the hand hygiene alcove, a hand hygiene event was recorded. Due to the difficulty of observing hand hygiene events that occurred within the patient room, a hand hygiene event was recorded when an individual was found to be rubbing their hands upon exiting the room.

Data was collected for two hours on four days and one hour on the fifth day. For each two-hour session, one hallway was observed at a time. During the one-hour session, both hallways were observed (see Figure 4). All observations occurred during the day between the hours of 8:00 a.m. and 3:00 p.m. Each hallway was observed in morning and afternoon hours. The one-hour session of observation took place in the afternoon (see Table 3).

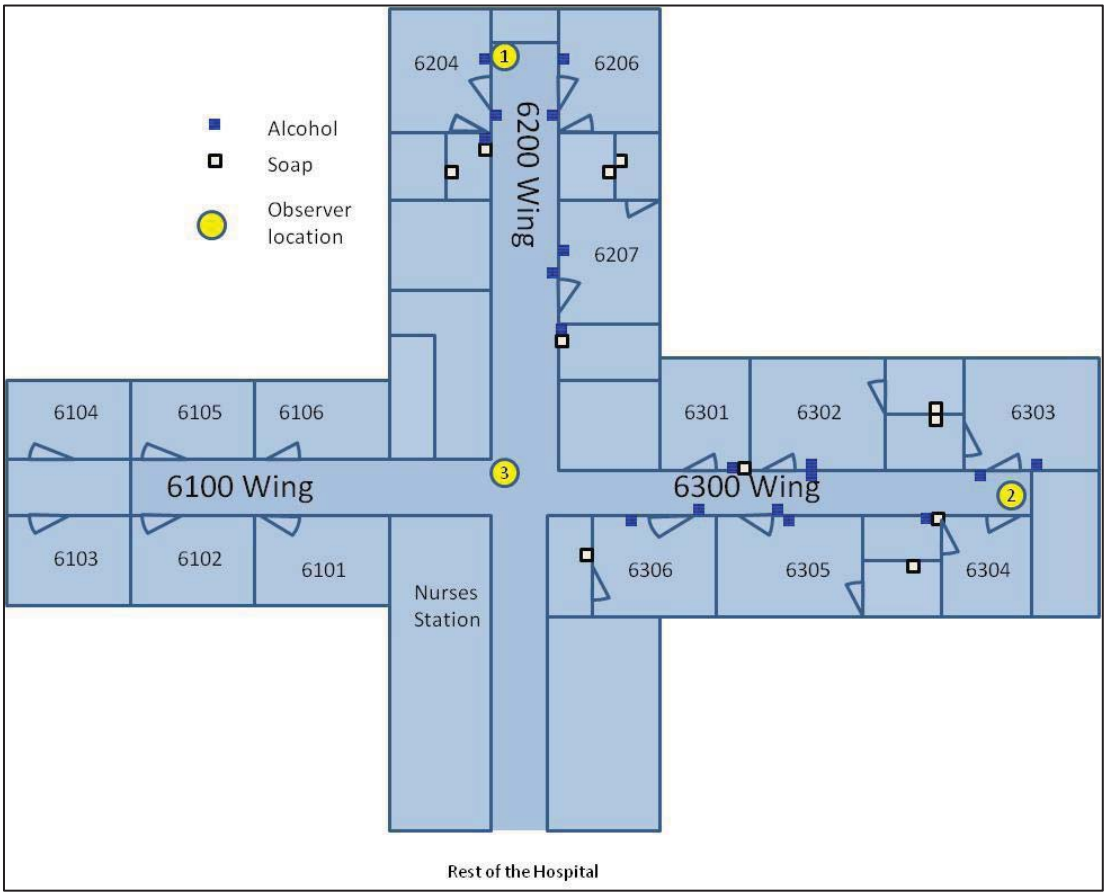

Figure 4: Observer locations

Table 3: Observation schedule

Day	Location on Figure 4	Location	Time Observed
1	1	6200 wing/hallway	1:00 p.m. to 3:00 p.m.
2	2	6300 wing/hallway	8:00 a.m. to 10:00 a.m.
3	1	6200 wing/hallway	10:00 a.m. to 12:00 p.m.
4	2	6300 wing or hallway	12:00 p.m. to 2:00 p.m.
5	3	Both 6200 and 6300 wings or hallways	1:00 p.m. to 2:00 p.m.

The data collection for hand hygiene opportunities and events was recorded using a paper form (see Appendix D). The form was separated into 15-minute sections where

observations for each room could be collected. Each time an opportunity or event occurred a mark was made in the appropriate time sections for the room. When the observer was approached and asked what they were doing, a standard response was given. The response was “Observing hand hygiene compliance.” No information on how the observations were being conducted or what observations were being collected was given.

CHAPTER 4: RESULTS

4.0 Results

This chapter presents the statistical analysis outcomes from the data collection. For the first experiment, a Z test was used to determine if there was a difference in proportions of hand hygiene activities over opportunities for the different weeks. To determine a difference between the counter data and the observer data a Z test was used for the second experiment. The rejection criterion was an Alpha value of .05 in both experiments.

4.1 Device data

During the three-weeks, 532 entries for door counters and dispenser counters were collected (see Appendix E for details on each counter entry). The number of entries collected each week varied. The variation is due to the devices not being present or inaccessible due to activities inside the room at the time the data was to be collected (see Table 4). The number of events was calculated by subtracting the last entry from the previous entry. Over the three-week period, there were a total of 11,030 alcohol dispenser activities, 932 soap dispenser activities, and 57,331 door opportunities captured (see Table 5). A detailed breakdown of events and opportunities captured by types of devices can be found in Table 6.

Table 4: Device data points collected

Week	Number of data points collected
Week 1	164
Week 2	173
Week 3	195
Total	**532**

Table 5: Number of device events captured over the study period

Type of Event	Number of Events
Alcohol	3,907
Soap	932
Door	57,331
Total	**69,293**

Table 6: Number of device events captured by type of dispenser

Type Of Device	Number of Events
Alcohol Inside	1,980
Alcohol Out	1,816
Alcohol Alcove	111
Soap Alcove	706
Soap	176

4.2 Observation data

Hand hygiene compliance was observed for a total of nine hours during Week 2. A total of 170 hand hygiene activities and 389 hand hygiene opportunities were recorded. See Appendix F for observation data entry details. Table 7 shows a detailed breakdown of activities and opportunities captured.

Table 7: Number of observational activities and opportunities captured

Row Labels	Time Observations Made	Number of Hours Observed	Number of Activities	Number of Opportunities
8/22/2011	1:00 p.m. to 3:00 p.m.	2	19	60
8/23/2011	8:00 a.m. to 10:00 a.m.	2	79	119
8/24/2011	10:00 a.m. to 12:00 p.m.	2	28	67
8/25/2011	12:00 p.m. to 2:00 p.m.	2	19	88
8/26/2011	1:00 p.m. to 2:00 p.m.	1	25	55
	Totals	**9**	**170**	**389**

4.3 Experiment 1: Hand hygiene compliance influenced by observer being present

The first hypothesis to test was whether the influence of a hand hygiene observer could be detected using electronic counters. Table 8 lists the number of alcohol and door counts recorded for each week of the study. When a starting or ending point for a week for a room was not available, results for that room were excluded (see Table 9). Soap counts were not included in the analysis due to the small number of events recorded compared to the alcohol hand rub. The data collected from the hand hygiene alcoves are not included in the analysis because the events recorded at those locations cannot be associated with the rooms being monitored for door entries.

Table 8: Study hand hygiene activities and opportunities

Data Set	Alcohol Uses	Door Counts Recorded	Percent Compliance	Note
Week 1	408	5,537	7.4%	Rooms 6204, 6206,6302, 6305
Week 2	755	8,656	8.7%	Rooms 6204, 6206, 6302, 6303, 6305
Week 3	665	10,344	6.4%	Rooms 6207, 6302, 6303, 6305, 6306
Observations	170	389	43.7%	

Table 9: Reasons data excluded from analysis

Period	Room	Dispenser Description	Reason
Week 1	6207	Alcohol hand rub dispenser outside the room	Counter not counting properly
Week 1	6303	Alcohol hand rub dispenser outside the room	Counter not available at beginning of the week
Week 1	6306	Alcohol hand rub dispenser outside the room	Counter not available during the week
Week 2	6207	Alcohol hand rub dispenser outside the room	Counter not counting properly
Week 2	6306	Alcohol hand rub dispenser outside the room	Counter not available first day of the week
Week 3	6204	Alcohol hand rub dispenser inside the room	Bathroom occupied last day of period
Week 3	6206	Alcohol hand rub dispenser inside the room	Bathroom occupied last day of the period

Comparing the proportion of Weeks 1 and 2 shows the value $Z_0 = -2.868$ (p-value < 0.01) which indicates that the proportion for Week 1 is significantly less than the

proportion for Week 2. Therefore, Week 1 was less compliant than Week 2 when an observer was present. A value of $Z_0 = 5.987$ (p-value < 0.01) when comparing the proportion of Week 2 and Week 3 indicates that Week 2 was significantly greater than Week 3, thus Week 2 compliance was greater than that of Week 3. When comparing Week 1 and Week 3 proportions the value $Z_0 = 2.248$ (p-value $\leq$ 0.01) indicates that the Week 1 proportion was significantly larger than that of Week 3, thus Week 1 compliance was greater than Week 3.

The results of the first experiment demonstrate that an observer might influence hand hygiene compliance by increasing the compliance when the observer is present. The results also suggest that the compliance decreased once the observer was removed.

4.4 Experiment 2: Electronic counters as an alternative to a hand hygiene observer

The second hypothesis to test was to determine if counter device data are an alternative to observation compliance data. During the observational data collection, only room entries were recorded as an opportunity. Therefore the door counts are divided by two because the door counter records both a room entry and an exit.

The Z_0 value comparing the proportion of counter data collected during Week 2 and the observer data is 20.631 (p-value < 0.01) which indicated that counter proportion was significantly less than the proportion of the observer data. This suggests that the compliance captured by the device counters is less than that of the observation compliance. The proportion of the observer data was 44%, which is within the range of compliance (36% - 54%) found in US healthcare facilities for non-ICU patient care areas (McGuckin, Waterman, & Govednik, 2009).

CHAPTER 5: DISCUSSION

5.0 Summary of results

Two experiments were conducted in this study. The first experiment was to determine if an observer being present on a medical ward would increase the hand hygiene compliance compared to when the observer was not present. The second experiment looked at the use of counting devices as an alternative to direct observation to monitor hand hygiene compliance.

5.1 Experiment 1

In the first experiment, it was found that the compliance of hand hygiene increased after the first week and decreased after the second week. The second week compliance increased 18% compared to the first week. When the observer was removed, the compliance decreased 26% compared to the second week. This can be attributed to several reasons. The Hawthorne Effect (Kohli et al., 2009) may have affected these results. Performance may increase when a worker knows there is an observer present. Once the observer is removed, the performance often returns to pre-observation level. Another reason for the increase in performance could be a worker's own perception of possible incentives or perhaps even discipline. If at any time in the past an incentive or disciplinary action was carried out following hand hygiene observation, an increase in performance may be noticed. This is a result of organizational culture that manages behavior using either negative or positive reinforcement. Compliance interventions that may have followed hand hygiene observation in the past may be an additional reason. To

prevent the execution of additional hand hygiene interventions, the group may increase performance, therefore avoiding having to participate in hand hygiene interventions.

There could be additional factors that contribute to the changes in performance. There may have been a different mix of patients present each week. For example, during the first week, the level of care needed for the patients was lower than found in the second week. The level of care needed in the third week was less than found in the first week. It should be noted that the third week was not a typical workweek, due to a holiday weekend. This week may have had more opportunity events recorded than hand hygiene events simply due to the type of work being completed that week. Typically, before a holiday weekend patients will encourage their physicians to discharge them from the hospital to avoid being hospitalized.

5.2 Experiment 2

In the second experiment, the proportion of the counter data was greatly different from the data of the observed data. The proportion of the observer data was more than 2.5 times greater than that of the counter device proportion. This could be attributed to the door counters collecting counts that do not represent hand hygiene opportunities. The devices do not differentiate between hand hygiene opportunities and other events. Activities such as preparing for dismissal or procedures may be reasons for the extraordinary number of door counts being collected (Thomas et al., 2011). Another reason the opportunity counts are greater is that the door counters are recording activity taking place when the room was not occupied by a patient. When patients have been discharged, housekeeping performs a comprehensive cleaning of the room that requires

the staff to make many room entries and exits. This activity is unrelated to hand hygiene opportunities. Additionally, the observed data was collected during the daytime hours. There may be distinct differences in activities that occurred during other shifts. For example, though data was not collected, the number of observed patient visitors was relatively low or non-existent during the observation periods. This activity may increase in the evening and nighttime hours when visitors might be more likely to visit a hospitalized patient. Another reason for the proportions of the counter data being low is that the hand hygiene activities were not taking place at the patient room, but elsewhere on the ward. In this study, dispensers found in staff restrooms, the nursing station and hallway 6100 were not monitored. Finally, door counters were observed to be indexed multiple times as a healthcare worker was working in or close to the doorway. The activity they were completing did not necessarily involve direct patient care, but it did cause the counter to index repeatedly as they moved about at the door entrance.

There may be reasons associated with the observer's technique in collecting data. The observer may be understating the number of opportunities due to human error. Observation of hand hygiene compliance is a monotonous task that requires great vigilance on the part of the observer. Activities on the ward may have been sporadic and large amounts of time passed that did not provide many opportunities for hand hygiene. Other times, large amounts of hand hygiene opportunities occurred in a short amount of time in many different places on the ward. The times many activities occurred at once could result in the observer not capturing hand hygiene opportunities or activities.

One last result to note is that the observer proportion of compliance was 44%. This is within the range typically found in hospitals for non-ICU care areas (Bischoff, Reynolds, Sessler, Edmond, & Wenzel, 2000; Pittet, 2001).

5.3 Limitation

This study was limited to double rooms on one hospital ward over a three-week period. To further understanding of the use of counters as hand hygiene measurements, more data collection is required. Increasing the number and types of rooms to include single patient rooms and isolation rooms would be more representative of the activity that takes place on a typical ward. The length of the study should also be increased. By increasing the length of the study, changes in compliance could be detected for seasonality, epidemics, and results of interventions taking place.

A validation study of the electronic door counters is needed to determine the effectiveness of their counts. During the observation week of this study, it was noted that carts and equipment were often parked in the doorway of the patient room. This resulted in a situation where the electronic beam was broken causing the counter not to index when people crossed the threshold of the room. This could greatly reduce the number of door counts recorded over a long period. It was also observed several times that a person entered the room and the door counter light did not illuminate and did not record a count. This occurred when a person entered the room at a high rate of speed. To improve the accuracy of the hand hygiene opportunities, adjustment factors could be developed to adjust total door counts to better represent hand hygiene opportunities. Activities that

occur when a patient does not occupy the room could be cataloged. For each activity, data could be collected on frequency of the activity, the amount of time the activity consumed, and the number of door counts recorded during the activity. With this data, standard adjustments in the form of percents could be applied to door counts captured over a period of time to provide a better estimation of hand hygiene opportunities. The same approach could also be used to determine the number of door entries not recorded due to equipment blocking the counters.

In order to conserve battery life, the door counter circuit switches the infrared beam on and off a given number of times per second (see Table 10). In this study, the default setting of 8 times per second was used. Unfortunately if a person passes completely through the doorway while the infrared beam is switched off, the counter will not record the event. Adjusting the door counter frequency settings could capture room entries and exits that occur at a high rate of speed. To determine the maximum speed, a minimum object width to pass through the beam is needed, as well as the frequency the beam is switched on and off. Using anthropometric data for the 5th percentile waist depth for women (14.8 cm) provides a suitable minimum object width (Department of Defense, 1991). This width would cover approximately 95% of all women and 100% of men that might pass through the doorway. The maximum speed detectable for objects greater than 14.8 cm at each frequency setting can be found in Table 10.

The maximum speed a person crosses a door sensor can be determined by conducting an experiment. The experiment would require two door counters. Each door counter would have frequency settings one interval apart. For example, one counter is set at a frequency of 8 times per second, and the second counter is set at a frequency of 15

times per second. Trials would be set up so that a person would cross the two counters at their highest walking rate of speed. The data collected during each trial would include the frequency setting for each door counter, whether the counter recorded a count after the person crossed the counter, and the width of the person's body at the point where they crossed through the infrared beam. For all frequency settings, each trial would require each door counter to be indexed by one. To provide statistical validity, each trial would have a minimum of 35 samples. Each sample would require adequate time for the person to recover from exertion before the next sample is taken.

In analyzing the data, the objective will be to find the pair of frequency settings where one door counter recorded the crossing and the other did not. Using the frequencies and the person's body width, the person's maximum speed can be placed within a range of speeds. Repeating this experiment with other participants would be recommended to provide additional data since not all people have the same maximum walking speed. Once a maximum walking speed has been determined the counters could be set with the most appropriate frequency setting to capture door entries that occur at a high rate of speed.

Table 10: Frequency settings available for door counter circuit, detection intervals, and maximum speed detectable for objects greater than 14.8 cm

Times per second infrared beam is switched on and off	Seconds between detections	Max speed M/sec
2	0.250	0.6
3	0.167	0.9
4	0.125	1.2
8	0.063	2.3
15	0.033	4.5
25	0.020	7.4
50	0.020	7.4
200	0.0025	59.2

5.4 Contributions

This study contributes to the body of knowledge of hand hygiene measurement by providing an alternative to direct observation measurement. It is not known how reliable hand hygiene observation is. In the study, it was shown that the compliance increased over the observation period. Perhaps the observation method should be classified as an intervention instead of a measurement method. The counting device method provides a relatively straightforward and unobtrusive way of collecting data. It also relieves the burden of the ward staff with managing and wearing devices that are required by other systems. However, it provides compliance proportions far below what is currently being reported using other methods.

As an alternative to other electronic monitoring systems, this system is currently a lower cost alternative. The devices used in this study are not as sophisticated as those devices that are explored in other studies. The counting devices for the soap and alcohol

dispensers have been widely available and are relatively inexpensive. The door counting devices are used in the retail industry and have many different configurations. They are primarily used to track customer traffic at store entries. The ability to use battery-powered devices greatly reduces the amount of infrastructure needed to implement these devices. In other systems, such as radio frequency identification (RFID) systems, an antenna infrastructure must be put in place before devices may be rolled out. The infrastructure, the RFID devices and systems are costly. It is often cost prohibitive to explore this type of system unless hand hygiene monitoring can be piggybacked onto a system that is used for other purposes (i.e. inventory tracking, real time location systems).

This system does have disadvantages to take into consideration. This system still requires a person to collect the counter data manually. The data should be collected at prescribed intervals to provide meaningful data. Finding and training a person to do this type of consistent data collection may be difficult. The data also needs to be managed appropriately. This requires an infrastructure in which to place the data after it is collected so that the data may be analyzed appropriately. With the battery-powered devices, the batteries must also be periodically monitored for replacement. The estimated battery life for both types of counters is around 12 months. The variation in battery manufacturing and the climate the batteries are exposed to increases the variability of the battery life, often decreasing it.

An iterative step in improving the system used in this study would be the ability to timestamp the individual opportunities and events that were recorded by the devices. The ability to associate opportunities to activities would greatly improve the understanding of hand hygiene behavior. The ability to understand the activity as

individual data points would provide opportunities to analyze the data in ways that are not possible using the current devices. Looking at the activity over the course of the day would provide information on times of the day when hand hygiene is occurring, or should be occurring. Using non-aggregated data sets would also lend itself to compare hand hygiene data to other metrics, such as patient census, patient care acuity, staff training and staffing levels.

5.5 Recommendations

The use of hand hygiene observation is a complicated and poor method of measuring hand hygiene compliance. It is often used to measure the effectiveness of improvement efforts. To improve the correct use of soap or alcohol based hand rub, a simplification of the indications could be put in place. Table 11 shows a simplified set of indications for hand hygiene for non-isolation patients. Rooms containing isolation patients require an enhanced level of hand hygiene and often require signage at the room entry. The indications and products to be used to complete hand hygiene could be noted on the signage of the room.

Table 11: VA Nebraska Western Iowa simplified indication for use of soap or alcohol based hand rub

Indications on when to use Soap to complete Hand Hygiene	Indications on when to use Alcohol Hand Rub to complete Hand Hygiene
• Before Eating • After using the restroom • Visible soiled hands • Diarrheal illness	• Before touching a patient • After touching a patient • After removing gloves • After touching objects near a patient • During patient care, moving from contaminated to a clean site

Before improving hand hygiene compliance, a reliable measurement system should be used. The use of electronic monitoring provides a reasonable alternative but more investigation in the use and type of devices needs to be done.

Many electronic monitoring devices are complicated systems. Simplification of these systems and devices needs to be investigated to provide users the ability to utilize these systems. These systems should also provide non-aggregated data to provide the best understanding of the data.

Using an electronic counter system to measure hand hygiene as it is prescribed by the current guidelines may not be feasible. The counter system, as with every measurement system has inherent error associated with it. For example, the door counters in this study were recording behaviors that were not associated with hand hygiene. There needs to be more understanding on the errors a counter system records. Once this is better understood, counter systems could provide an indication of the actual hand hygiene compliance.

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APPENDICES

Appendix A: Emitter device and pedestrian counter features and settings

Emitter device features and settings model EPC-IRD1e

Emitter intensity

Depending on the distance between the emitter and the receiver, the intensity of the emitter can be changed by placing a jumper across sets of pins found on the main circuit board of the emitter. "Level 1" is appropriate for distances under 6 feet between the emitter and the receiver. "Level 2" is used for distances between 6 feet and 10 feet. "Level 3" is for distances between 10 feet and 15 feet, "Level 4" is for distances between 15 feet and 25 feet and "Level 5" is for distances between 25 feet and 35 feet. The factory presets the device to "Level 1" so no adjustment may be required.

Resetting the device

In the event that the emitter is not functioning properly, a straightened paperclip can be inserted into the reset hole, held down for approximately three seconds, and then released. Once the device has been reset, the red LED on the device will blink two long flashes and one short flash.

Pedestrian counter device features and settings model EPC-1RD1

View Traffic

Pressing the view traffic button will display the total count recorded by the device since the counter had been last reset.

Toggle Buzzer

The Toggle Buzzer button is used to turn on/off the internal buzzer of the device. With the buzzer turned on, every time a count is recorded, an audible beep will be emitted from the device. By pressing the Toggle Buzzer button, the display will change between "Tog Buz Buz Off" and "Tog Buz Buz On". To set the buzzer press the Toggle Buzzer button until the display shows the desired setting. Then press and hold the "View Traffic" button for approximately 3 seconds. To confirm the setting has been saved the device will display "Tog Buz Saved".

Resetting the device

In the event that the emitter is not functioning properly a straightened paperclip can be inserted into the reset hole, held down for approximately 3 seconds, and then released. Once the device has been reset the red LED on the device will blink, an audible beep will occur and the display will begin displaying information of the device settings.

Resetting counter to zero using the "Clear Traffic Button"

There are two ways to return the counter to a value of zero.

1. Insert a straightened paperclip into the "Clear Traffic" hole found on the front of the ECP-1RD1 and hold the button down until the display shows "Clr Traf No".
2. Press the Toggle Buzzer button until "Clr Traf Yes" is displayed. Then press and hold the "View traffic" button for approximately 3 seconds. "Traffic Cleared" will be displayed once the device has reset the counter back to zero.

Menu Mode

The EPC-IDR1 is controlled by a microprocessor that determines how the device will operate based on the changeable parameters. These parameters are changed using the Menu Model of the EPC-IRD1.

Entering the Menu Mode is accomplished by pressing and holding the "View Traffic" button followed by pressing and holding the "Toggle Buzzer" button. Once the display shows "Sec Code 11111", release the buttons. A valid five-digit security code must be entered in order to enter the "Menu Mode". The default security code is "12345". To enter the appropriate code the "Toggle Buzzer" button is pressed and held until the first number of the security code is displayed. To index the next digit in the security code, press the "View Traffic" button. Again, set the digit using the "Toggle Buzzer" button to display the correct digit. Continue using the "View Traffic" button and the "Toggle Buzzer" button to enter the remainder of the digits of the security code. Once all digits of the security code are set press and hold the "View traffic" button until "Release Button" is displayed. The device is now in "Menu Mode". To cycle through the options that can be changed press and release the "View Traffic" button.

Toggle Buzzer

The "Toggle Buzzer" setting turns the buzzer either on or off. Once in the "Menu mode" press and release the "View Traffic" button until "Toggle Buzzer" is displayed. Press and hold the "View Traffic" button until the screen displays the current status of the setting. Press the "Toggle Buzzer" button until the desired setting is displayed ("Tog Buz Buz Off" or "Tog Buz Buz On"). To save the

selected setting press and hold the “View Traffic” button until unit beeps two short beeps and one long beep and displays “Tog Buz Saved”. After the option has been saved, the device returns to normal operational mode.

Adjust Frequency

In order to increase the life of the EPC-IDR1 battery, the infrared beam is turned off and on several times per second. In order to capture faster moving pedestrians the frequency may need to be increased. The default value from the factory is set to 8 times per second. Other options include 2 times per second, 3 times per second, 4 times per second, 15 times per second, 25 times per second, 50 times per second and 200 times per second. To change the frequency value, enter into the “Menu mode” as describe above. Press the “View Traffic” button to select the “Adjust Freq” option. Press and hold the “View traffic” button until the current value is displayed. Press the “Toggle Buzzer” button to select the desired frequency. Press and hold the “View Traffic” button for 3 seconds until “New Freq Saved” is displayed.

Clear Traffic

To prevent the counter from being reset by using the “Clear Traffic” button the device can be set up to have the traffic only be cleared by entering the menu mode. To disable the “Clear Traffic” button function, reference the “Toggle Clr Btn” section. To clear the traffic in the menu mode enter the menu mode as describe above. Press and release the “View Traffic” button until “Clear Traffic” is displayed. Press and hold the “View Traffic” button until “Clr Traf Yes” is displayed. Next press the “Toggle Buzzer” button to select the option to be

executed. Press and hold the “View Traffic” button for 3 seconds until the display reads “Traffic Cleared” if “Clr Traf Yes” was selected or “Aborted” if “Clr Traffic No” was selected.

Adjust Sensitivity

The amount of time the sensor is placed into dwell mode after detecting a pedestrian can be adjusted by using the “Adjust Sens” option found in the “Menu Mode”. By default, the “Adjust Sens” is set at 1.5 seconds. This setting is useful if the desired result is to capture individual pedestrians or groups of pedestrians. The device can be set to dwell from .5 up to 10 seconds, in 1/10 of a second interval.

To adjust the dwell time or sensitivity, enter the menu mode as described above. Press the “View Traffic” button until “Adjust Sens” is displayed. Press and hold the “View Traffic” button to display the current setting. Press the “Toggle Buzzer” button until the desired dwell time is displayed. Next press and hold the “View Traffic” button for 3 seconds until “Sens Saved” is displayed.

Emitter Status

The EPC-IRD1 can be used as both an emitter and a sensor if the doorway is approximately 30 inches or less. If the doorway to be monitored is greater than 30 inches, a separate emitter (EPC-IRDe) must be used. In order for the EPC-IRD1 to function properly, the emitter must be turned off in this device. To turn off the emitter in the EPC-IRD1 enter the “Menu Mode” as described above. Press the “View Traffic” button until “Emitter Status” is displayed. Press and hold the “View Traffic” button to display the current setting of the emitter. Next

press the “Toggle Buzzer” button to either “E Status On” to turn on the emitter, or “E Status Off” to turn off the emitter. Once the appropriate option is displayed, press and hold the “View Traffic” button for 3 seconds until “E Status Saved” is displayed.

Change security code

The default security code of the device is “12345”. To change this to a different set of values enter the “Menu Mode” as described above. Press the “View Traffic” button until “Change Sec Code” is displayed. Next, press and hold the “View Traffic” button to display the current security code. A cursor will be displayed on the first character of the security code. To change the first digit press the “Toggle Buzzer” button until the desired value is displayed. Press the “View Traffic” button to move the cursor to the next character. Continue using the “Toggle Buzzer” and “View Traffic” buttons until all of the desired values of the security code have been changed. To save the new security code press and hold the “View Traffic” button for 3 seconds until “Sec Code Save” is displayed. Be sure to remember or record the new security code, as the default security code will no longer work.

Reset defaults

To reset the EPC-IRD1 back to the factory default setting, enter the menu mode as described as above. Press the “View Traffic” button until “Reset Defaults” is displayed, then press and hold “View Traffic” button until “Defaults No” is displayed. Press the “Toggle Buzzer” button to display “Defaults Yes”. Next press and hold the “View Traffic” for 3 seconds until “Defaults Reset” is

displayed. By resetting the default setting, the security code used to enter the "Menu Mode" will return to the default value of "12345".

Adjust trigger

The "Adjust trigger" option is needed when using the EPC-IRD1 to detect pedestrians at a very long distance. It is recommended to contact the manufacturer if it is believed this option needs to be changed.

Toggle Clear Button

The "Toggle Clr Btn" option is used to turn off the recessed "Clear Traffic" button found on the front of the device. This will only allow the traffic count to be reset using the "Menu mode". To change the "Toggle Clr Btn" option enter the "Menu Mode" as described above. Press and release the "View Traffic" button until "Toggle Clr Btn" is displayed. Next press and hold the "View Traffic" button until the status is displayed. To change the status press the "Toggle Buzzer" button to the desired option. Next press and hold the "View Traffic Button" until "Clr Btn Saved" is displayed.

Alignment

When mounting the EPC-IRD1e and the EPC-IRD1 to detect pedestrians, both units must be aligned with each other. To determine if both units are aligned, the red LED on the EPC-IRD1 will not be lit when there is nothing breaking the beam from the emitter. If the red LED is lit, the emitter or receiver should be adjusted until the red LED is no longer lit. To test that the devices are sensing pedestrians, walk through the beam while watching the EPC-IRD1 to see if the red LED lights up briefly. Each time the device senses a pedestrian the red LED will light up,

indicating that the counter has been indexed. If it is believed that both devices are aligned properly and the red LED remains lit, check to make sure there are not any other objects breaking the beam. If no other objects are blocking the beam, ensure that the batteries have been properly installed in the emitter. While checking the batteries for proper installation, check to make sure all four contact points of the battery holder are making contact with the battery. If contact is not being made, remove the batteries and gently bend the contact point toward the center of the circuit board. Reinstall the batteries and ensure that contact is being made at all four points.

Appendix B: Recording the product counters

Instructions and Explanations	Photos
1. Push in lever that is underneath dispenser near the wall.	
2. With lever pushed in, pull the face of the dispenser forward revealing soap/alcohol bag and counter	
3. Counter will be located on the inside of the dispenser face that swung forward	
4. Orient your body so that the digital display is in toward the bottom and the battery is toward the top.	

5. Record the following: • Dispenser id • Counter id • Count value	
6. Swing the dispenser front forward until it snaps securely in place.	

Appendix C: Data collection sheet for counter data

Index	Date	Time	Room	Unit	Type	Count
1			**6306**	NA	AL Out	
2				14	Door	
3				242	AL Inside	
4				248	Soap	
5			**6305**	309	AL Out	
6				11	Door	
7				295	AL Inside	
8				243	Soap	
9			**Alcove 6304**	271	Soap	
10				236	Alcohol	
11			**6303**	NA	AL Out	
12				8	Door	
13				277	AL Inside	
14				283	Soap	
15			**6302**	265	AL Out	
16				10	Door	
17				267	AL Inside	
18				241	Soap	
19			**Alcove 6301**	255	Soap	
20				249	Alcohol	

Index	Date	Time	Room	Unit	Type	Count
21			**Alcove 6204**	230	Soap	
22				224	Alcohol	
23			**6204**	21	AL Out	
24				9	Door	
25				291	AL Inside	
26				297	Soap	
27			**6206**	311	AL Out	
28				13	Door	
29				212	AL Inside	
30				218	Soap	
31			**6207**	272	AL Out	
32				12	Door	
33				2	AL Inside	
34				8	Soap	
35			**Alcove 6207**	285	Soap	
36				279	Alcohol	

Appendix D: Data collection sheet for observer data

		Opportunity	Activity			Opportunity	Activity
Room	:00			Room	:00		
	:15				:15		
	:30				:30		
	:45				:45		
Room	:00			Room	:00		
	:15				:15		
	:30				:30		
	:45				:45		
Room	:00			Room	:00		
	:15				:15		
	:30				:30		
	:45				:45		
Room	:00			Room	:00		
	:15				:15		
	:30				:30		
	:45				:45		
Room	:00			Room	:00		
	:15				:15		
	:30				:30		
	:45				:45		
Room	:00			Room	:00		
	:15				:15		
	:30				:30		
	:45				:45		

Appendix E: Device data set

Index	Week	Date	Time	Room	Unit #	Type	Door Counter/Dispenser	Count	Notes
1	1	8/15/2011	11:25:00 AM	6206	212	AL Inside	Dispenser	5782	
2	1	8/15/2011	11:25:00 AM	6206	218	Soap	Dispenser	1028	
3	1	8/15/2011	11:25:00 AM	6207	8	Soap	Dispenser	202	
4	1	8/15/2011	11:25:00 AM	6306	NA	AL Out	Dispenser	NA	
5	1	8/15/2011	11:25:00 AM	6207	2	AL Inside	Dispenser	5176	
6	1	8/15/2011	11:25:00 AM	6207	272	AL Out	Dispenser	1214	
7	1	8/15/2011	11:25:00 AM	6207	12	Door	Door	70	
8	1	8/15/2011	11:25:00 AM	6306	248	Soap	Dispenser	1507	
9	1	8/15/2011	11:25:00 AM	6306	242	AL Inside	Dispenser	5801	
10	1	8/15/2011	11:25:00 AM	6306	14	Door	Door	4225	
11	1	8/15/2011	11:25:00 AM	6305	243	Soap	Dispenser	1339	
12	1	8/15/2011	11:25:00 AM	6305	295	AL Inside	Dispenser	6719	
13	1	8/15/2011	11:25:00 AM	6305	309	AL Out	Dispenser	3159	
14	1	8/15/2011	11:25:00 AM	6305	11	Door	Door	108	
15	1	8/15/2011	11:25:00 AM	6303	283	Soap	Dispenser	1415	
16	1	8/15/2011	11:25:00 AM	6303	277	AL Inside	Dispenser	4599	
17	1	8/15/2011	11:25:00 AM	6303	8	Door	Door	4852	
18	1	8/15/2011	11:25:00 AM	6302	241	Soap	Dispenser	1368	
19	1	8/15/2011	11:25:00 AM	6302	267	AL Inside	Dispenser	7064	
20	1	8/15/2011	11:25:00 AM	6302	265	AL Out	Dispenser	771	
21	1	8/15/2011	11:25:00 AM	6302	10	Door	Door	3799	
22	1	8/15/2011	11:25:00 AM	6204	297	Soap	Dispenser	1530	
23	1	8/15/2011	11:25:00 AM	6204	291	AL Inside	Dispenser	3282	
24	1	8/15/2011	11:25:00 AM	6204	9	Door	Door	5521	
25	1	8/15/2011	11:25:00 AM	6204	21	AL Out	Dispenser	680	
26	1	8/15/2011	11:25:00 AM	Alcove 6204	230	Soap	Dispenser	2288	
27	1	8/15/2011	11:25:00 AM	Alcove 6204	224	Alcohol	Dispenser	389	
28	1	8/15/2011	11:25:00 AM	Alcove 6207	285	Soap	Dispenser	1766	
29	1	8/15/2011	11:25:00 AM	Alcove 6207	279	Alcohol	Dispenser	451	
30	1	8/15/2011	11:25:00 AM	Alcove 6301	255	Soap	Dispenser	2191	
31	1	8/15/2011	11:25:00 AM	Alcove 6301	249	Alcohol	Dispenser	717	
32	1	8/15/2011	11:25:00 AM	Alcove 6304	271	Soap	Dispenser	2144	
33	1	8/15/2011	11:25:00 AM	Alcove 6304	236	Alcohol	Dispenser	1341	
34	1	8/16/2011	9:42:00 AM	6303	8	Door	Door	5070	

35	1	8/16/2011	9:42:00 AM	6303	277	AL Inside	Dispenser	4614	
36	1	8/16/2011	9:42:00 AM	6303	283	Soap	Dispenser	1415	
37	1	8/16/2011	9:42:00 AM	6303	NA	AL Out	Dispenser	NA	
38	1	8/16/2011	9:42:00 AM	6302	10	Door	Door	4183	
39	1	8/16/2011	9:42:00 AM	6302	265	AL Out	Dispenser	785	
40	1	8/16/2011	9:42:00 AM	6302	267	AL Inside	Dispenser	7079	
41	1	8/16/2011	9:42:00 AM	6302	241	Soap	Dispenser	1369	
42	1	8/16/2011	9:42:00 AM	6305	309	AL Out	Dispenser	3160	
43	1	8/16/2011	9:42:00 AM	6305	11	Door	Door	417	
44	1	8/16/2011	9:42:00 AM	6305	295	AL Inside	Dispenser	6731	
45	1	8/16/2011	9:42:00 AM	6305	243	Soap	Dispenser	1339	
46	1	8/16/2011	9:42:00 AM	6306	14	Door	Door	5024	
47	1	8/16/2011	9:42:00 AM	6306	242	AL Inside	Dispenser	5818	
48	1	8/16/2011	9:42:00 AM	6306	248	Soap	Dispenser	1508	
49	1	8/16/2011	9:42:00 AM	6306	NA	AL Out	Dispenser	NA	
50	1	8/16/2011	9:42:00 AM	6206	13	Door	Door	286	
51	1	8/16/2011	9:42:00 AM	6206	212	AL Inside	Dispenser	5787	
52	1	8/16/2011	9:42:00 AM	6206	218	Soap	Dispenser	dead	Dead battery
53	1	8/16/2011	9:42:00 AM	6206	311	AL Out	Dispenser	10	
54	1	8/16/2011	9:42:00 AM	6204	21	AL Out	Dispenser	703	
55	1	8/16/2011	9:42:00 AM	6204	9	Door	Door	5933	
56	1	8/16/2011	9:42:00 AM	6204	291	AL Inside	Dispenser	3314	
57	1	8/16/2011	9:42:00 AM	6204	297	Soap	Dispenser	1531	
58	1	8/16/2011	9:42:00 AM	6207	12	Door	Door	401	
59	1	8/16/2011	9:42:00 AM	6207	272	AL Out	Dispenser	1214	
60	1	8/16/2011	9:42:00 AM	6207	2	AL Inside	Dispenser	5183	
61	1	8/16/2011	9:42:00 AM	6207	8	Soap	Dispenser	202	
62	1	8/16/2011	9:42:00 AM	Alcove 6204	230	Soap	Dispenser	2295	
63	1	8/16/2011	9:42:00 AM	Alcove 6204	224	Alcohol	Dispenser	389	
64	1	8/16/2011	9:42:00 AM	Alcove 6207	285	Soap	Dispenser	1770	
65	1	8/16/2011	9:42:00 AM	Alcove 6207	279	Alcohol	Dispenser	451	
66	1	8/16/2011	9:42:00 AM	Alcove 6301	255	Soap	Dispenser	2208	
67	1	8/16/2011	9:42:00 AM	Alcove 6301	249	Alcohol	Dispenser	719	
68	1	8/16/2011	9:42:00 AM	Alcove 6304	271	Soap	Dispenser	2155	
69	1	8/16/2011	9:42:00 AM	Alcove 6304	236	Alcohol	Dispenser	1342	
70	1	8/15/2011	11:25:00 AM	6303	NA	AL Out	Dispenser	NA	
71	1	8/15/2011	11:25:00 AM	6206	311	AL Out	Dispenser	0	
72	1	8/15/2011	11:25:00 AM	6206	13	Door	Door	49	

73	1	8/17/2011	9:30:00 AM	6306	NA	AL Out	Dispenser	NA	
74	1	8/17/2011	9:30:00 AM	6306	14	Door	Door	5622	
75	1	8/17/2011	9:30:00 AM	6306	242	AL Inside	Dispenser	5828	
76	1	8/17/2011	9:30:00 AM	6306	248	Soap	Dispenser	NA	
77	1	8/17/2011	9:30:00 AM	6305	309	AL Out	Dispenser	3167	
78	1	8/17/2011	9:30:00 AM	6305	11	Door	Door	795	knocked off
79	1	8/17/2011	9:30:00 AM	6305	295	AL Inside	Dispenser	6743	
80	1	8/17/2011	9:30:00 AM	6305	243	Soap	Dispenser	1339	
81	1	8/17/2011	9:30:00 AM	Alcove 6304	271	Soap	Dispenser	2164	
82	1	8/17/2011	9:30:00 AM	Alcove 6304	236	Alcohol	Dispenser	1346	
83	1	8/17/2011	9:30:00 AM	6303	NA	AL Out	Dispenser	NA	
84	1	8/17/2011	9:30:00 AM	6303	8	Door	Door	5347	
85	1	8/17/2011	9:30:00 AM	6303	277	AL Inside	Dispenser	4642	
86	1	8/17/2011	9:30:00 AM	6303	283	Soap	Dispenser	1419	
87	1	8/17/2011	9:30:00 AM	6302	265	AL Out	Dispenser	802	
88	1	8/17/2011	9:30:00 AM	6302	10	Door	Door	4587	
89	1	8/17/2011	9:30:00 AM	6302	267	AL Inside	Dispenser	7099	
90	1	8/17/2011	9:30:00 AM	6302	241	Soap	Dispenser	1373	
91	1	8/17/2011	9:30:00 AM	Alcove 6301	255	Soap	Dispenser	2224	
92	1	8/17/2011	9:30:00 AM	Alcove 6301	249	Alcohol	Dispenser	721	
93	1	8/17/2011	9:30:00 AM	Alcove 6204	230	Soap	Dispenser	2301	
94	1	8/17/2011	9:30:00 AM	Alcove 6204	224	Alcohol	Dispenser	393	
95	1	8/17/2011	9:30:00 AM	6204	21	AL Out	Dispenser	714	
96	1	8/17/2011	9:30:00 AM	6204	9	Door	Door	6271	
97	1	8/17/2011	9:30:00 AM	6204	291	AL Inside	Dispenser	3332	
98	1	8/17/2011	9:30:00 AM	6204	297	Soap	Dispenser	1531	
99	1	8/17/2011	9:30:00 AM	6206	311	AL Out	Dispenser	26	Contact Precaution
100	1	8/17/2011	9:30:00 AM	6206	13	Door	Door	570	Contact Precaution
101	1	8/17/2011	9:30:00 AM	6206	212	AL Inside	Dispenser	5788	Contact Precaution
102	1	8/17/2011	9:30:00 AM	6206	218	Soap	Dispenser	NA	Contact Precaution
103	1	8/17/2011	9:30:00 AM	6207	272	AL Out	Dispenser	1214	
104	1	8/17/2011	9:30:00 AM	6207	12	Door	Door	757	
105	1	8/17/2011	9:30:00 AM	6207	2	AL Inside	Dispenser	5189	
106	1	8/17/2011	9:30:00 AM	6207	8	Soap	Dispenser	205	
107	1	8/17/2011	9:30:00 AM	Alcove 6207	285	Soap	Dispenser	1773	
108	1	8/17/2011	9:30:00 AM	Alcove 6207	279	Alcohol	Dispenser	451	
109	1	8/18/2011	9:30:00 AM	6306	NA	AL Out	Dispenser	NA	

110	1	8/18/2011	9:30:00 AM	6306	14	Door	Door	6302	
111	1	8/18/2011	9:30:00 AM	6306	242	AL Inside	Dispenser	5850	
112	1	8/18/2011	9:30:00 AM	6306	248	Soap	Dispenser	0	
113	1	8/18/2011	9:30:00 AM	6305	309	AL Out	Dispenser	3172	
114	1	8/18/2011	9:30:00 AM	6305	11	Door	Door	804	Knocked off
115	1	8/18/2011	9:30:00 AM	6305	295	AL Inside	Dispenser	6751	
116	1	8/18/2011	9:30:00 AM	6305	243	Soap	Dispenser	1341	
117	1	8/18/2011	9:30:00 AM	Alcove 6304	271	Soap	Dispenser	2165	
118	1	8/18/2011	9:30:00 AM	Alcove 6304	236	Alcohol	Dispenser	1348	
119	1	8/18/2011	9:30:00 AM	6303	NA	AL Out	Dispenser	0	
120	1	8/18/2011	9:30:00 AM	6303	8	Door	Door	5567	
121	1	8/18/2011	9:30:00 AM	6303	277	AL Inside	Dispenser	4669	
122	1	8/18/2011	9:30:00 AM	6303	283	Soap	Dispenser	1419	
123	1	8/18/2011	9:30:00 AM	6302	265	AL Out	Dispenser	812	
124	1	8/18/2011	9:30:00 AM	6302	10	Door	Door	4891	
125	1	8/18/2011	9:30:00 AM	6302	267	AL Inside	Dispenser	7111	
126	1	8/18/2011	9:30:00 AM	6302	241	Soap	Dispenser	1376	
127	1	8/18/2011	9:30:00 AM	Alcove 6301	255	Soap	Dispenser	2231	
128	1	8/18/2011	9:30:00 AM	Alcove 6301	249	Alcohol	Dispenser	722	
129	1	8/18/2011	9:30:00 AM	Alcove 6204	230	Soap	Dispenser	2309	
130	1	8/18/2011	9:30:00 AM	Alcove 6204	224	Alcohol	Dispenser	393	
131	1	8/18/2011	9:30:00 AM	6204	21	AL Out	Dispenser	735	
132	1	8/18/2011	9:30:00 AM	6204	9	Door	Door	6705	
133	1	8/18/2011	9:30:00 AM	6204	291	AL Inside	Dispenser	3355	
134	1	8/18/2011	9:30:00 AM	6204	297	Soap	Dispenser	1533	
135	1	8/18/2011	9:30:00 AM	6206	311	AL Out	Dispenser	41	
136	1	8/18/2011	9:30:00 AM	6206	13	Door	Door	1177	
137	1	8/18/2011	9:30:00 AM	6206	212	AL Inside	Dispenser	5795	
138	1	8/18/2011	9:30:00 AM	6206	218	Soap	Dispenser	0	
139	1	8/18/2011	9:30:00 AM	6207	272	AL Out	Dispenser	1214	
140	1	8/18/2011	9:30:00 AM	6207	12	Door	Door	1203	
141	1	8/18/2011	9:30:00 AM	6207	2	AL Inside	Dispenser	5204	
142	1	8/18/2011	9:30:00 AM	6207	8	Soap	Dispenser	208	
143	1	8/18/2011	9:30:00 AM	Alcove 6207	285	Soap	Dispenser	1785	
144	1	8/18/2011	9:30:00 AM	Alcove 6207	279	Alcohol	Dispenser	452	
145	1	8/19/2011	9:30:00 AM	6306	NA	AL Out	Dispenser	NA	
146	1	8/19/2011	9:30:00 AM	6306	14	Door	Door	6946	
147	1	8/19/2011	9:30:00 AM	6306	242	AL Inside	Dispenser	5862	

148	1	8/19/2011	9:30:00 AM	6306	248	Soap	Dispenser	1511	
149	1	8/19/2011	9:30:00 AM	6305	309	AL Out	Dispenser	3174	
150	1	8/19/2011	9:30:00 AM	6305	11	Door	Door	982	
151	1	8/19/2011	9:30:00 AM	6305	295	AL Inside	Dispenser	6758	
152	1	8/19/2011	9:30:00 AM	6305	243	Soap	Dispenser	1341	
153	1	8/19/2011	9:30:00 AM	Alcove 6304	271	Soap	Dispenser	2171	
154	1	8/19/2011	9:30:00 AM	Alcove 6304	236	Alcohol	Dispenser	1348	
155	1	8/19/2011	9:30:00 AM	6303	319	AL Out	Dispenser	49	New dispenser mounted
156	1	8/19/2011	9:30:00 AM	6303	8	Door	Door	6029	
157	1	8/19/2011	9:30:00 AM	6303	277	AL Inside	Dispenser	4679	
158	1	8/19/2011	9:30:00 AM	6303	283	Soap	Dispenser	1419	
159	1	8/19/2011	9:30:00 AM	6302	265	AL Out	Dispenser	818	
160	1	8/19/2011	9:30:00 AM	6302	10	Door	Door	5192	
161	1	8/19/2011	9:30:00 AM	6302	267	AL Inside	Dispenser	7129	
162	1	8/19/2011	9:30:00 AM	6302	241	Soap	Dispenser	1379	
163	1	8/19/2011	9:30:00 AM	Alcove 6301	255	Soap	Dispenser	2236	
164	1	8/19/2011	9:30:00 AM	Alcove 6301	249	Alcohol	Dispenser	724	
165	1	8/19/2011	9:30:00 AM	Alcove 6204	230	Soap	Dispenser	2322	
166	1	8/19/2011	9:30:00 AM	Alcove 6204	224	Alcohol	Dispenser	394	
167	1	8/19/2011	9:30:00 AM	6204	21	AL Out	Dispenser	752	
168	1	8/19/2011	9:30:00 AM	6204	9	Door	Door	7150	
169	1	8/19/2011	9:30:00 AM	6204	291	AL Inside	Dispenser	3368	
170	1	8/19/2011	9:30:00 AM	6204	297	Soap	Dispenser	1536	
171	1	8/19/2011	9:30:00 AM	6206	311	AL Out	Dispenser	60	
172	1	8/19/2011	9:30:00 AM	6206	13	Door	Door	1690	
173	1	8/19/2011	9:30:00 AM	6206	212	AL Inside	Dispenser	5806	
174	1	8/19/2011	9:30:00 AM	6206	218	Soap	Dispenser	NA	Dead Battery
175	1	8/19/2011	9:30:00 AM	6207	272	AL Out	Dispenser	1214	
176	1	8/19/2011	9:30:00 AM	6207	12	Door	Door	1583	
177	1	8/19/2011	9:30:00 AM	6207	2	AL Inside	Dispenser	5212	
178	1	8/19/2011	9:30:00 AM	6207	8	Soap	Dispenser	NA	Occupied
179	1	8/19/2011	9:30:00 AM	Alcove 6207	285	Soap	Dispenser	1793	
180	1	8/19/2011	9:30:00 AM	Alcove 6207	279	Alcohol	Dispenser	452	
181	2	8/22/2011	9:45:00 AM	6306	NA	AL Out	Dispenser	NA	
182	2	8/22/2011	9:45:00 AM	6306	14	Door	Door	8026	Knocked off
183	2	8/22/2011	9:45:00 AM	6306	242	AL Inside	Dispenser	5900	
184	2	8/22/2011	9:45:00 AM	6306	248	Soap	Dispenser	NA	Occupied

185	2	8/22/2011	9:45:00 AM	6305	309	AL Out	Dispenser	3197	
186	2	8/22/2011	9:45:00 AM	6305	11	Door	Door	1941	
187	2	8/22/2011	9:45:00 AM	6305	295	AL Inside	Dispenser	6834	
188	2	8/22/2011	9:45:00 AM	6305	243	Soap	Dispenser	1346	
189	2	8/22/2011	9:45:00 AM	Alcove 6304	271	Soap	Dispenser	2174	
190	2	8/22/2011	9:45:00 AM	Alcove 6304	236	Alcohol	Dispenser	1348	
191	2	8/22/2011	9:45:00 AM	6303	319	AL Out	Dispenser	73	
192	2	8/22/2011	9:45:00 AM	6303	8	Door	Door	6858	
193	2	8/22/2011	9:45:00 AM	6303	277	AL Inside	Dispenser	4719	
194	2	8/22/2011	9:45:00 AM	6303	283	Soap	Dispenser	1420	
195	2	8/22/2011	9:45:00 AM	6302	265	AL Out	Dispenser	840	
196	2	8/22/2011	9:45:00 AM	6302	10	Door	Door	5927	
197	2	8/22/2011	9:45:00 AM	6302	267	AL Inside	Dispenser	7160	
198	2	8/22/2011	9:45:00 AM	6302	241	Soap	Dispenser	1380	
199	2	8/22/2011	9:45:00 AM	Alcove 6301	255	Soap	Dispenser	2256	
200	2	8/22/2011	9:45:00 AM	Alcove 6301	249	Alcohol	Dispenser	726	
201	2	8/22/2011	9:45:00 AM	Alcove 6204	230	Soap	Dispenser	2364	
202	2	8/22/2011	9:45:00 AM	Alcove 6204	224	Alcohol	Dispenser	397	
203	2	8/22/2011	9:45:00 AM	6204	21	AL Out	Dispenser	786	
204	2	8/22/2011	9:45:00 AM	6204	9	Door	Door	8422	
205	2	8/22/2011	9:45:00 AM	6204	291	AL Inside	Dispenser	3412	
206	2	8/22/2011	9:45:00 AM	6204	297	Soap	Dispenser	NA	Occupied
207	2	8/22/2011	9:45:00 AM	6206	311	AL Out	Dispenser	97	
208	2	8/22/2011	9:45:00 AM	6206	13	Door	Door	2772	
209	2	8/22/2011	9:45:00 AM	6206	212	AL Inside	Dispenser	5832	
210	2	8/22/2011	9:45:00 AM	6206	218	Soap	Dispenser	NA	Dead Battery
211	2	8/22/2011	9:45:00 AM	6207	272	AL Out	Dispenser	1214	
212	2	8/22/2011	9:45:00 AM	6207	12	Door	Door	2673	
213	2	8/22/2011	9:45:00 AM	6207	2	AL Inside	Dispenser	5236	
214	2	8/22/2011	9:45:00 AM	6207	8	Soap	Dispenser	210	
215	2	8/22/2011	9:45:00 AM	Alcove 6207	285	Soap	Dispenser	1813	
216	2	8/22/2011	9:45:00 AM	Alcove 6207	279	Alcohol	Dispenser	459	
217	2	8/23/2011	10:10:00 AM	6306	6306	AL Out	Dispenser	7123	Mounted
218	2	8/23/2011	10:10:00 AM	6306	14	Door	Door	8676	
219	2	8/23/2011	10:10:00 AM	6306	242	AL Inside	Dispenser	5921	
220	2	8/23/2011	10:10:00 AM	6306	248	Soap	Dispenser	1518	
221	2	8/23/2011	10:10:00 AM	6305	309	AL Out	Dispenser	3239	
222	2	8/23/2011	10:10:00 AM	6305	11	Door	Door	2398	

223	2	8/23/2011	10:10:00 AM	6305	295	AL Inside	Dispenser	6884	
224	2	8/23/2011	10:10:00 AM	6305	243	Soap	Dispenser	1346	
225	2	8/23/2011	10:10:00 AM	Alcove 6304	271	Soap	Dispenser	2185	
226	2	8/23/2011	10:10:00 AM	Alcove 6304	236	Alcohol	Dispenser	1349	
227	2	8/23/2011	10:10:00 AM	6303	319	AL Out	Dispenser	96	
228	2	8/23/2011	10:10:00 AM	6303	8	Door	Door	7274	
229	2	8/23/2011	10:10:00 AM	6303	277	AL Inside	Dispenser	4736	
230	2	8/23/2011	10:10:00 AM	6303	283	Soap	Dispenser	1420	
231	2	8/23/2011	10:10:00 AM	6302	265	AL Out	Dispenser	864	
232	2	8/23/2011	10:10:00 AM	6302	10	Door	Door	6306	
233	2	8/23/2011	10:10:00 AM	6302	267	AL Inside	Dispenser	7197	
234	2	8/23/2011	10:10:00 AM	6302	241	Soap	Dispenser	1381	
235	2	8/23/2011	10:10:00 AM	Alcove 6301	255	Soap	Dispenser	2277	
236	2	8/23/2011	10:10:00 AM	Alcove 6301	249	Alcohol	Dispenser	727	
237	2	8/23/2011	10:10:00 AM	Alcove 6204	230	Soap	Dispenser	2372	
238	2	8/23/2011	10:10:00 AM	Alcove 6204	224	Alcohol	Dispenser	400	
239	2	8/23/2011	10:10:00 AM	6204	21	AL Out	Dispenser	813	
240	2	8/23/2011	10:10:00 AM	6204	9	Door	Door	8968	
241	2	8/23/2011	10:10:00 AM	6204	291	AL Inside	Dispenser	3430	
242	2	8/23/2011	10:10:00 AM	6204	297	Soap	Dispenser	1538	
243	2	8/23/2011	10:10:00 AM	6206	311	AL Out	Dispenser	120	
244	2	8/23/2011	10:10:00 AM	6206	13	Door	Door	3295	
245	2	8/23/2011	10:10:00 AM	6206	212	AL Inside	Dispenser	5837	
246	2	8/23/2011	10:10:00 AM	6206	218	Soap	Dispenser	0	replaced battery
247	2	8/23/2011	10:10:00 AM	6207	272	AL Out	Dispenser	1214	
248	2	8/23/2011	10:10:00 AM	6207	12	Door	Door	3055	
249	2	8/23/2011	10:10:00 AM	6207	2	AL Inside	Dispenser	5246	
250	2	8/23/2011	10:10:00 AM	6207	8	Soap	Dispenser	210	
251	2	8/23/2011	10:10:00 AM	Alcove 6207	285	Soap	Dispenser	1820	
252	2	8/23/2011	10:10:00 AM	Alcove 6207	279	Alcohol	Dispenser	461	
253	2	8/24/2011	9:30:00 AM	6306	6306	AL Out	Dispenser	7143	
254	2	8/24/2011	9:30:00 AM	6306	14	Door	Door	9339	
255	2	8/24/2011	9:30:00 AM	6306	242	AL Inside	Dispenser	5938	
256	2	8/24/2011	9:30:00 AM	6306	248	Soap	Dispenser	1519	
257	2	8/24/2011	9:30:00 AM	6305	309	AL Out	Dispenser	3255	
258	2	8/24/2011	9:30:00 AM	6305	11	Door	Door	2818	
259	2	8/24/2011	9:30:00 AM	6305	295	AL Inside	Dispenser	6899	
260	2	8/24/2011	9:30:00 AM	6305	243	Soap	Dispenser	1347	

261	2	8/24/2011	9:30:00 AM	Alcove 6304	271	Soap	Dispenser	2189	
262	2	8/24/2011	9:30:00 AM	Alcove 6304	236	Alcohol	Dispenser	1354	
263	2	8/24/2011	9:30:00 AM	6303	319	AL Out	Dispenser	112	
264	2	8/24/2011	9:30:00 AM	6303	8	Door	Door	7637	
265	2	8/24/2011	9:30:00 AM	6303	277	AL Inside	Dispenser	4748	
266	2	8/24/2011	9:30:00 AM	6303	283	Soap	Dispenser	1420	
267	2	8/24/2011	9:30:00 AM	6302	265	AL Out	Dispenser	877	
268	2	8/24/2011	9:30:00 AM	6302	10	Door	Door	6654	
269	2	8/24/2011	9:30:00 AM	6302	267	AL Inside	Dispenser	7228	
270	2	8/24/2011	9:30:00 AM	6302	241	Soap	Dispenser	1381	
271	2	8/24/2011	9:30:00 AM	Alcove 6301	255	Soap	Dispenser	2295	
272	2	8/24/2011	9:30:00 AM	Alcove 6301	249	Alcohol	Dispenser	727	
273	2	8/24/2011	9:30:00 AM	Alcove 6204	230	Soap	Dispenser	2376	
274	2	8/24/2011	9:30:00 AM	Alcove 6204	224	Alcohol	Dispenser	401	
275	2	8/24/2011	9:30:00 AM	6204	21	AL Out	Dispenser	825	
276	2	8/24/2011	9:30:00 AM	6204	9	Door	Door	9297	
277	2	8/24/2011	9:30:00 AM	6204	291	AL Inside	Dispenser	3435	
278	2	8/24/2011	9:30:00 AM	6204	297	Soap	Dispenser	1539	
279	2	8/24/2011	9:30:00 AM	6206	311	AL Out	Dispenser	143	
280	2	8/24/2011	9:30:00 AM	6206	13	Door	Door	3717	
281	2	8/24/2011	9:30:00 AM	6206	212	AL Inside	Dispenser	5842	
282	2	8/24/2011	9:30:00 AM	6206	218	Soap	Dispenser	0	
283	2	8/24/2011	9:30:00 AM	6207	272	AL Out	Dispenser	1214	
284	2	8/24/2011	9:30:00 AM	6207	12	Door	Door	3511	
285	2	8/24/2011	9:30:00 AM	6207	2	AL Inside	Dispenser	5256	
286	2	8/24/2011	9:30:00 AM	6207	8	Soap	Dispenser	211	
287	2	8/24/2011	9:30:00 AM	Alcove 6207	285	Soap	Dispenser	1825	
288	2	8/24/2011	9:30:00 AM	Alcove 6207	279	Alcohol	Dispenser	466	
289	2	8/25/2011	8:30:00 AM	6306	6306	AL Out	Dispenser	7162	
290	2	8/25/2011	8:30:00 AM	6306	14	Door	Dispenser	9763	
291	2	8/25/2011	8:30:00 AM	6306	242	AL Inside	Dispenser	5948	
292	2	8/25/2011	8:30:00 AM	6306	248	Soap	Dispenser	1522	
293	2	8/25/2011	8:30:00 AM	6305	309	AL Out	Dispenser	3269	
294	2	8/25/2011	8:30:00 AM	6305	11	Door	Dispenser	3103	
295	2	8/25/2011	8:30:00 AM	6305	295	AL Inside	Door	6907	
296	2	8/25/2011	8:30:00 AM	6305	243	Soap	Dispenser	NA	Occupied
297	2	8/25/2011	8:30:00 AM	Alcove 6304	271	Soap	Dispenser	2193	
298	2	8/25/2011	8:30:00 AM	Alcove	236	Alcohol	Door	1354	

				6304					
299	2	8/25/2011	8:30:00 AM	6303	319	AL Out	Dispenser	128	
300	2	8/25/2011	8:30:00 AM	6303	8	Door	Dispenser	8015	
301	2	8/25/2011	8:30:00 AM	6303	277	AL Inside	Dispenser	4766	
302	2	8/25/2011	8:30:00 AM	6303	283	Soap	Door	1420	
303	2	8/25/2011	8:30:00 AM	6302	265	AL Out	Dispenser	903	
304	2	8/25/2011	8:30:00 AM	6302	10	Door	Dispenser	7285	
305	2	8/25/2011	8:30:00 AM	6302	267	AL Inside	Door	7250	
306	2	8/25/2011	8:30:00 AM	6302	241	Soap	Dispenser	1384	
307	2	8/25/2011	8:30:00 AM	Alcove 6301	255	Soap	Dispenser	2307	
308	2	8/25/2011	8:30:00 AM	Alcove 6301	249	Alcohol	Dispenser	730	
309	2	8/25/2011	8:30:00 AM	Alcove 6204	230	Soap	Door	2380	
310	2	8/25/2011	8:30:00 AM	Alcove 6204	224	Alcohol	Dispenser	402	
311	2	8/25/2011	8:30:00 AM	6204	21	AL Out	Dispenser	841	
312	2	8/25/2011	8:30:00 AM	6204	9	Door	Door	9733	
313	2	8/25/2011	8:30:00 AM	6204	291	AL Inside	Dispenser	3442	
314	2	8/25/2011	8:30:00 AM	6204	297	Soap	Dispenser	1539	
315	2	8/25/2011	8:30:00 AM	6206	311	AL Out	Dispenser	168	
316	2	8/25/2011	8:30:00 AM	6206	13	Door	Dispenser	4048	
317	2	8/25/2011	8:30:00 AM	6206	212	AL Inside	Dispenser	5849	
318	2	8/25/2011	8:30:00 AM	6206	218	Soap	Dispenser	6	
319	2	8/25/2011	8:30:00 AM	6207	272	AL Out	Dispenser	1214	remounted counter in unit
320	2	8/25/2011	8:30:00 AM	6207	12	Door	Dispenser	3847	
321	2	8/25/2011	8:30:00 AM	6207	2	AL Inside	Dispenser	5262	
322	2	8/25/2011	8:30:00 AM	6207	8	Soap	Door	215	
323	2	8/25/2011	8:30:00 AM	Alcove 6207	285	Soap	Dispenser	1831	
324	2	8/25/2011	8:30:00 AM	Alcove 6207	279	Alcohol	Dispenser	469	
325	2	8/26/2011	9:50:00 AM	6306	6306	AL Out	Dispenser	7173	
326	2	8/26/2011	9:50:00 AM	6306	14	Door	Door	10200	
327	2	8/26/2011	9:50:00 AM	6306	242	AL Inside	Dispenser	5950	
328	2	8/26/2011	9:50:00 AM	6306	248	Soap	Dispenser	1523	
329	2	8/26/2011	9:50:00 AM	6305	309	AL Out	Dispenser	3276	
330	2	8/26/2011	9:50:00 AM	6305	11	Door	Dispenser	3302	
331	2	8/26/2011	9:50:00 AM	6305	295	AL Inside	Door	6919	
332	2	8/26/2011	9:50:00 AM	6305	243	Soap	Dispenser	1352	
333	2	8/26/2011	9:50:00 AM	Alcove 6304	271	Soap	Dispenser	2198	
334	2	8/26/2011	9:50:00 AM	Alcove 6304	236	Alcohol	Door	1354	

335	2	8/26/2011	9:50:00 AM	6303	319	AL Out	Dispenser	153	
336	2	8/26/2011	9:50:00 AM	6303	8	Door	Dispenser	8413	
337	2	8/26/2011	9:50:00 AM	6303	277	AL Inside	Dispenser	4788	
338	2	8/26/2011	9:50:00 AM	6303	283	Soap	Door	1421	
339	2	8/26/2011	9:50:00 AM	6302	265	AL Out	Dispenser	919	
340	2	8/26/2011	9:50:00 AM	6302	10	Door	Dispenser	7919	
341	2	8/26/2011	9:50:00 AM	6302	267	AL Inside	Dispenser	7289	
342	2	8/26/2011	9:50:00 AM	6302	241	Soap	Dispenser	1384	
343	2	8/26/2011	9:50:00 AM	Alcove 6301	255	Soap	Door	2319	
344	2	8/26/2011	9:50:00 AM	Alcove 6301	249	Alcohol	Dispenser	730	
345	2	8/26/2011	9:50:00 AM	Alcove 6204	230	Soap	Dispenser	2387	
346	2	8/26/2011	9:50:00 AM	Alcove 6204	224	Alcohol	Door	402	
347	2	8/26/2011	9:50:00 AM	6204	21	AL Out	Dispenser	863	
348	2	8/26/2011	9:50:00 AM	6204	9	Door	Dispenser	10302	
349	2	8/26/2011	9:50:00 AM	6204	291	AL Inside	Dispenser	3451	
350	2	8/26/2011	9:50:00 AM	6204	297	Soap	Dispenser	NA	Occupied
351	2	8/26/2011	9:50:00 AM	6206	311	AL Out	Dispenser	190	
352	2	8/26/2011	9:50:00 AM	6206	13	Door	Dispenser	4640	
353	2	8/26/2011	9:50:00 AM	6206	212	AL Inside	Dispenser	5857	
354	2	8/26/2011	9:50:00 AM	6206	218	Soap	Dispenser	6	
355	2	8/26/2011	9:50:00 AM	6207	272	AL Out	Dispenser	1222	
356	2	8/26/2011	9:50:00 AM	6207	12	Door	Dispenser	4265	
357	2	8/26/2011	9:50:00 AM	6207	2	AL Inside	Dispenser	5264	
358	2	8/26/2011	9:50:00 AM	6207	8	Soap	Dispenser	219	
359	2	8/26/2011	9:50:00 AM	Alcove 6207	285	Soap	Dispenser	1838	
360	2	8/26/2011	9:50:00 AM	Alcove 6207	279	Alcohol	Door	470	
361	3	8/29/2011	9:40:00 AM	6306	6306	AL Out	Dispenser	7250	
362	3	8/29/2011	9:40:00 AM	6306	14	Door	Door	10932	
363	3	8/29/2011	9:40:00 AM	6306	242	AL Inside	Dispenser	5959	
364	3	8/29/2011	9:40:00 AM	6306	248	Soap	Dispenser	1528	
365	3	8/29/2011	9:40:00 AM	6305	309	AL Out	Dispenser	3312	
366	3	8/29/2011	9:40:00 AM	6305	11	Door	Door	4356	
367	3	8/29/2011	9:40:00 AM	6305	295	AL Inside	Dispenser	6986	
368	3	8/29/2011	9:40:00 AM	6305	243	Soap	Dispenser	1358	
369	3	8/29/2011	9:40:00 AM	Alcove 6304	271	Soap	Dispenser	2217	
370	3	8/29/2011	9:40:00 AM	Alcove 6304	236	Alcohol	Dispenser	1357	
371	3	8/29/2011	9:40:00 AM	6303	319	AL Out	Dispenser	190	
372	3	8/29/2011	9:40:00 AM	6303	8	Door	Door	9517	

373	3	8/29/2011	9:40:00 AM	6303	277	AL Inside	Dispenser	4854	
374	3	8/29/2011	9:40:00 AM	6303	283	Soap	Dispenser	1422	
375	3	8/29/2011	9:40:00 AM	6302	265	AL Out	Dispenser	942	
376	3	8/29/2011	9:40:00 AM	6302	10	Door	Door	8971	
377	3	8/29/2011	9:40:00 AM	6302	267	AL Inside	Dispenser	7318	
378	3	8/29/2011	9:40:00 AM	6302	241	Soap	Dispenser	NA	Occupied
379	3	8/29/2011	9:40:00 AM	Alcove 6301	255	Soap	Dispenser	2370	
380	3	8/29/2011	9:40:00 AM	Alcove 6301	249	Alcohol	Dispenser	735	
381	3	8/29/2011	9:40:00 AM	Alcove 6204	230	Soap	Dispenser	2401	
382	3	8/29/2011	9:40:00 AM	Alcove 6204	224	Alcohol	Dispenser	408	
383	3	8/29/2011	9:40:00 AM	6204	21	AL Out	Dispenser	908	
384	3	8/29/2011	9:40:00 AM	6204	9	Door	Door	11363	
385	3	8/29/2011	9:40:00 AM	6204	291	AL Inside	Dispenser	3477	
386	3	8/29/2011	9:40:00 AM	6204	297	Soap	Dispenser	NA	Dead Battery
387	3	8/29/2011	9:40:00 AM	6206	311	AL Out	Dispenser	223	
388	3	8/29/2011	9:40:00 AM	6206	13	Door	Door	5724	
389	3	8/29/2011	9:40:00 AM	6206	212	AL Inside	Dispenser	5882	
390	3	8/29/2011	9:40:00 AM	6206	218	Soap	Dispenser	15	
391	3	8/29/2011	9:40:00 AM	6207	272	AL Out	Dispenser	1265	
392	3	8/29/2011	9:40:00 AM	6207	12	Door	Door	5330	
393	3	8/29/2011	9:40:00 AM	6207	2	AL Inside	Dispenser	5293	
394	3	8/29/2011	9:40:00 AM	6207	8	Soap	Dispenser	NA	Occupied
395	3	8/29/2011	9:40:00 AM	Alcove 6207	285	Soap	Dispenser	1853	
396	3	8/29/2011	9:40:00 AM	Alcove 6207	279	Alcohol	Dispenser	472	
397	3	8/30/2011	9:15:00 AM	6306	6306	AL Out	Dispenser	7266	
398	3	8/30/2011	9:15:00 AM	6306	14	Door	Door	11304	
399	3	8/30/2011	9:15:00 AM	6306	242	AL Inside	Dispenser	5965	
400	3	8/30/2011	9:15:00 AM	6306	248	Soap	Dispenser	1528	
401	3	8/30/2011	9:15:00 AM	6305	309	AL Out	Dispenser	3323	
402	3	8/30/2011	9:15:00 AM	6305	11	Door	Door	4719	
403	3	8/30/2011	9:15:00 AM	6305	295	AL Inside	Dispenser	7010	
404	3	8/30/2011	9:15:00 AM	6305	243	Soap	Dispenser	1361	
405	3	8/30/2011	9:15:00 AM	Alcove 6304	271	Soap	Dispenser	2230	
406	3	8/30/2011	9:15:00 AM	Alcove 6304	236	Alcohol	Dispenser	1357	
407	3	8/30/2011	9:15:00 AM	6303	319	AL Out	Dispenser	211	
408	3	8/30/2011	9:15:00 AM	6303	8	Door	Door	9927	
409	3	8/30/2011	9:15:00 AM	6303	277	AL Inside	Dispenser	4869	
410	3	8/30/2011	9:15:00 AM	6303	283	Soap	Dispenser	1424	

411	3	8/30/2011	9:15:00 AM	6302	265	AL Out	Dispenser	956	
412	3	8/30/2011	9:15:00 AM	6302	10	Door	Door	9561	
413	3	8/30/2011	9:15:00 AM	6302	267	AL Inside	Dispenser	7335	
414	3	8/30/2011	9:15:00 AM	6302	241	Soap	Dispenser	1392	
415	3	8/30/2011	9:15:00 AM	Alcove 6301	255	Soap	Dispenser	2339	
416	3	8/30/2011	9:15:00 AM	Alcove 6301	249	Alcohol	Dispenser	737	
417	3	8/30/2011	9:15:00 AM	Alcove 6204	230	Soap	Dispenser	2401	
418	3	8/30/2011	9:15:00 AM	Alcove 6204	224	Alcohol	Dispenser	409	
419	3	8/30/2011	9:15:00 AM	6204	21	AL Out	Dispenser	922	
420	3	8/30/2011	9:15:00 AM	6204	9	Door	Door	11810	
421	3	8/30/2011	9:15:00 AM	6204	291	AL Inside	Dispenser	3483	
422	3	8/30/2011	9:15:00 AM	6204	297	Soap	Dispenser	NA	Dead Battery
423	3	8/30/2011	9:15:00 AM	6206	311	AL Out	Dispenser	238	
424	3	8/30/2011	9:15:00 AM	6206	13	Door	Door	6065	
425	3	8/30/2011	9:15:00 AM	6206	212	AL Inside	Dispenser	5890	
426	3	8/30/2011	9:15:00 AM	6206	218	Soap	Dispenser	19	
427	3	8/30/2011	9:15:00 AM	6207	272	AL Out	Dispenser	1285	
428	3	8/30/2011	9:15:00 AM	6207	12	Door	Door	5842	
429	3	8/30/2011	9:15:00 AM	6207	2	AL Inside	Dispenser	5308	
430	3	8/30/2011	9:15:00 AM	6207	8	Soap	Dispenser	224	
431	3	8/30/2011	9:15:00 AM	Alcove 6207	285	Soap	Dispenser	1863	
432	3	8/30/2011	9:15:00 AM	Alcove 6207	279	Alcohol	Dispenser	474	
433	3	8/31/2011	9:15:00 AM	6306	6306	AL Out	Dispenser	7277	
434	3	8/31/2011	9:15:00 AM	6306	14	Door	Door	11679	
435	3	8/31/2011	9:15:00 AM	6306	242	AL Inside	Dispenser	5978	
436	3	8/31/2011	9:15:00 AM	6306	248	Soap	Dispenser	1528	
437	3	8/31/2011	9:15:00 AM	6305	309	AL Out	Dispenser	3328	
438	3	8/31/2011	9:15:00 AM	6305	11	Door	Door	4925	
439	3	8/31/2011	9:15:00 AM	6305	295	AL Inside	Dispenser	7021	
440	3	8/31/2011	9:15:00 AM	6305	243	Soap	Dispenser	1363	
441	3	8/31/2011	9:15:00 AM	Alcove 6304	271	Soap	Dispenser	2237	
442	3	8/31/2011	9:15:00 AM	Alcove 6304	236	Alcohol	Dispenser	1358	
443	3	8/31/2011	9:15:00 AM	6303	319	AL Out	Dispenser	227	
444	3	8/31/2011	9:15:00 AM	6303	8	Door	Door	10369	
445	3	8/31/2011	9:15:00 AM	6303	277	AL Inside	Dispenser	4884	
446	3	8/31/2011	9:15:00 AM	6303	283	Soap	Dispenser	1427	
447	3	8/31/2011	9:15:00 AM	6302	265	AL Out	Dispenser	968	
448	3	8/31/2011	9:15:00 AM	6302	10	Door	Door	10070	

449	3	8/31/2011	9:15:00 AM	6302	267	AL Inside	Dispenser	7355	
450	3	8/31/2011	9:15:00 AM	6302	241	Soap	Dispenser	1394	
451	3	8/31/2011	9:15:00 AM	Alcove 6301	255	Soap	Dispenser	2400	
452	3	8/31/2011	9:15:00 AM	Alcove 6301	249	Alcohol	Dispenser	739	
453	3	8/31/2011	9:15:00 AM	Alcove 6204	230	Soap	Dispenser	2402	
454	3	8/31/2011	9:15:00 AM	Alcove 6204	224	Alcohol	Dispenser	409	
455	3	8/31/2011	9:15:00 AM	6204	21	AL Out	Dispenser	930	
456	3	8/31/2011	9:15:00 AM	6204	9	Door	Door	12139	
457	3	8/31/2011	9:15:00 AM	6204	291	AL Inside	Dispenser	3491	
458	3	8/31/2011	9:15:00 AM	6204	297	Soap	Dispenser	NA	Occupied
459	3	8/31/2011	9:15:00 AM	6206	311	AL Out	Dispenser	251	
460	3	8/31/2011	9:15:00 AM	6206	13	Door	Door	6497	
461	3	8/31/2011	9:15:00 AM	6206	212	AL Inside	Dispenser	5894	
462	3	8/31/2011	9:15:00 AM	6206	218	Soap	Dispenser	22	
463	3	8/31/2011	9:15:00 AM	6207	272	AL Out	Dispenser	1313	
464	3	8/31/2011	9:15:00 AM	6207	12	Door	Door	6389	
465	3	8/31/2011	9:15:00 AM	6207	2	AL Inside	Dispenser	5324	
466	3	8/31/2011	9:15:00 AM	6207	8	Soap	Dispenser	NA	Occupied
467	3	8/31/2011	9:15:00 AM	Alcove 6207	285	Soap	Dispenser	1870	
468	3	8/31/2011	9:15:00 AM	Alcove 6207	279	Alcohol	Dispenser	477	
469	3	9/1/2011	9:00:00 AM	6306	6306	AL Out	Dispenser	7292	
470	3	9/1/2011	9:00:00 AM	6306	14	Door	Door	12085	
471	3	9/1/2011	9:00:00 AM	6306	242	AL Inside	Dispenser	5985	
472	3	9/1/2011	9:00:00 AM	6306	248	Soap	Dispenser	1531	
473	3	9/1/2011	9:00:00 AM	6305	309	AL Out	Dispenser	3335	
474	3	9/1/2011	9:00:00 AM	6305	11	Door	Door	5093	
475	3	9/1/2011	9:00:00 AM	6305	295	AL Inside	Dispenser	7025	
476	3	9/1/2011	9:00:00 AM	6305	243	Soap	Dispenser	1363	
477	3	9/1/2011	9:00:00 AM	Alcove 6304	271	Soap	Dispenser	2241	
478	3	9/1/2011	9:00:00 AM	Alcove 6304	236	Alcohol	Dispenser	1359	
479	3	9/1/2011	9:00:00 AM	6303	319	AL Out	Dispenser	246	
480	3	9/1/2011	9:00:00 AM	6303	8	Door	Door	10807	
481	3	9/1/2011	9:00:00 AM	6303	277	AL Inside	Dispenser	4906	
482	3	9/1/2011	9:00:00 AM	6303	283	Soap	Dispenser	1431	
483	3	9/1/2011	9:00:00 AM	6302	265	AL Out	Dispenser	977	
484	3	9/1/2011	9:00:00 AM	6302	10	Door	Door	10632	
485	3	9/1/2011	9:00:00 AM	6302	267	AL Inside	Dispenser	7387	
486	3	9/1/2011	9:00:00 AM	6302	241	Soap	Dispenser	1402	

487	3	9/1/2011	9:00:00 AM	Alcove 6301	255	Soap	Dispenser	2410	
488	3	9/1/2011	9:00:00 AM	Alcove 6301	249	Alcohol	Dispenser	742	
489	3	9/1/2011	9:00:00 AM	Alcove 6204	230	Soap	Dispenser	2409	
490	3	9/1/2011	9:00:00 AM	Alcove 6204	224	Alcohol	Dispenser	411	
491	3	9/1/2011	9:00:00 AM	6204	21	AL Out	Dispenser	965	
492	3	9/1/2011	9:00:00 AM	6204	9	Door	Door	12508	
493	3	9/1/2011	9:00:00 AM	6204	291	AL Inside	Dispenser	NA	isolation Patient
494	3	9/1/2011	9:00:00 AM	6204	297	Soap	Dispenser	NA	isolation Patient
495	3	9/1/2011	9:00:00 AM	6206	311	AL Out	Dispenser	271	
496	3	9/1/2011	9:00:00 AM	6206	13	Door	Door	7062	
497	3	9/1/2011	9:00:00 AM	6206	212	AL Inside	Dispenser	5904	
498	3	9/1/2011	9:00:00 AM	6206	218	Soap	Dispenser	24	
499	3	9/1/2011	9:00:00 AM	6207	272	AL Out	Dispenser	1338	
500	3	9/1/2011	9:00:00 AM	6207	12	Door	Door	6848	
501	3	9/1/2011	9:00:00 AM	6207	2	AL Inside	Dispenser	5343	
502	3	9/1/2011	9:00:00 AM	6207	8	Soap	Dispenser	236	
503	3	9/1/2011	9:00:00 AM	Alcove 6207	285	Soap	Dispenser	1878	
504	3	9/1/2011	9:00:00 AM	Alcove 6207	279	Alcohol	Dispenser	477	
505	3	9/2/2011	9:10:00 AM	6306	6306	AL Out	Dispenser	7301	
506	3	9/2/2011	9:10:00 AM	6306	14	Door	Door	12565	54 " height
507	3	9/2/2011	9:10:00 AM	6306	242	AL Inside	Dispenser	5994	
508	3	9/2/2011	9:10:00 AM	6306	248	Soap	Dispenser	1531	
509	3	9/2/2011	9:10:00 AM	6305	309	AL Out	Dispenser	3340	
510	3	9/2/2011	9:10:00 AM	6305	11	Door	Door	5343	52" Height
511	3	9/2/2011	9:10:00 AM	6305	295	AL Inside	Dispenser	7041	
512	3	9/2/2011	9:10:00 AM	6305	243	Soap	Dispenser	1364	
513	3	9/2/2011	9:10:00 AM	Alcove 6304	271	Soap	Dispenser	2245	
514	3	9/2/2011	9:10:00 AM	Alcove 6304	236	Alcohol	Dispenser	1359	
515	3	9/2/2011	9:10:00 AM	6303	319	AL Out	Dispenser	263	
516	3	9/2/2011	9:10:00 AM	6303	8	Door	Door	11326	31" height
517	3	9/2/2011	9:10:00 AM	6303	277	AL Inside	Dispenser	4918	
518	3	9/2/2011	9:10:00 AM	6303	283	Soap	Dispenser	1436	
519	3	9/2/2011	9:10:00 AM	6302	265	AL Out	Dispenser	989	
520	3	9/2/2011	9:10:00 AM	6302	10	Door	Door	11158	52 Inch Height
521	3	9/2/2011	9:10:00 AM	6302	267	AL Inside	Dispenser	7412	
522	3	9/2/2011	9:10:00 AM	6302	241	Soap	Dispenser	1405	
523	3	9/2/2011	9:10:00 AM	Alcove 6301	255	Soap	Dispenser	2438	

524	3	9/2/2011	9:10:00 AM	Alcove 6301	249	Alcohol	Dispenser	743	
525	3	9/2/2011	9:10:00 AM	Alcove 6204	230	Soap	Dispenser	2418	
526	3	9/2/2011	9:10:00 AM	Alcove 6204	224	Alcohol	Dispenser	411	
527	3	9/2/2011	9:10:00 AM	6204	21	AL Out	Dispenser	977	
528	3	9/2/2011	9:10:00 AM	6204	9	Door	Door	12718	41" height
529	3	9/2/2011	9:10:00 AM	6204	291	AL Inside	Dispenser	NA	Isolation Patient
530	3	9/2/2011	9:10:00 AM	6204	297	Soap	Dispenser	NA	Isolation Patient
531	3	9/2/2011	9:10:00 AM	6206	311	AL Out	Dispenser	286	
532	3	9/2/2011	9:10:00 AM	6206	13	Door	Door	7466	44" height
533	3	9/2/2011	9:10:00 AM	6206	212	AL Inside	Dispenser	5919	
534	3	9/2/2011	9:10:00 AM	6206	218	Soap	Dispenser	25	
535	3	9/2/2011	9:10:00 AM	6207	272	AL Out	Dispenser	1353	
536	3	9/2/2011	9:10:00 AM	6207	12	Door	Door	7316	48" height
537	3	9/2/2011	9:10:00 AM	6207	2	AL Inside	Dispenser	5360	
538	3	9/2/2011	9:10:00 AM	6207	8	Soap	Dispenser	243	
539	3	9/2/2011	9:10:00 AM	Alcove 6207	285	Soap	Dispenser	1885	
540	3	9/2/2011	9:10:00 AM	Alcove 6207	279	Alcohol	Dispenser	479	

Appendix F: Observer data set

Date	Time Interval	Room	Activity	Opportunities
8/22/2011	13:00-13:15	6204	3	5
8/22/2011	13:15-13:30	6204	2	8
8/22/2011	13:30-13:45	6204	0	1
8/22/2011	13:30-13:45	6204	0	1
8/22/2011	13:45-14:00	6204	0	4
8/22/2011	14:00-14:15	6204	0	4
8/22/2011	14:15-14:30	6204	0	1
8/22/2011	14:30-14:45	6204	2	3
8/22/2011	14:45-15:00	6204	4	6
8/22/2011	13:00-13:15	6207	0	1
8/22/2011	13:15-13:30	6207	0	8
8/22/2011	13:30-13:45	6207	0	4
8/22/2011	13:45-14:00	6207	0	0
8/22/2011	14:00-14:15	6207	0	0
8/22/2011	14:15-14:30	6207	0	0
8/22/2011	14:30-14:45	6207	1	3
8/22/2011	14:45-15:00	6207	1	3
8/22/2011	13:00-13:15	6206	0	1
8/22/2011	13:15-13:30	6206	3	3
8/22/2011	13:30-13:45	6206	0	1
8/22/2011	13:45-14:00	6206	0	0
8/22/2011	14:00-14:15	6206	1	1
8/22/2011	14:15-14:30	6206	0	0
8/22/2011	14:30-14:45	6206	1	1
8/22/2011	14:45-15:00	6206	1	1
8/23/2011	08:00-08:15	6306	2	5
8/23/2011	08:15-08:30	6306	2	3
8/23/2011	08:30-08:45	6306	1	2
8/23/2011	08:45-09:00	6306	3	2
8/23/2011	09:00-09:15	6306	2	3
8/23/2011	09:15-09:30	6306	3	5
8/23/2011	09:30-09:45	6306	1	6
8/23/2011	09:45-10:00	6306	9	13
8/23/2011	08:00-08:15	6305	2	8
8/23/2011	08:15-08:30	6305	1	2
8/23/2011	08:30-08:45	6305	5	4
8/23/2011	08:45-09:00	6305	4	2
8/23/2011	09:00-09:15	6305	2	2

8/23/2011	09:15-09:30	6305	2	4
8/23/2011	09:30-09:45	6305	1	2
8/23/2011	09:45-10:00	6305	12	9
8/23/2011	08:00-08:15	6302	4	11
8/23/2011	08:15-08:30	6302	0	0
8/23/2011	08:30-08:45	6302	0	1
8/23/2011	08:45-09:00	6302	2	1
8/23/2011	09:00-09:15	6302	2	3
8/23/2011	09:15-09:30	6302	2	1
8/23/2011	09:30-09:45	6302	1	4
8/23/2011	09:45-10:00	6302	3	10
8/23/2011	08:00-08:15	6303	0	1
8/23/2011	08:15-08:30	6303	1	2
8/23/2011	08:30-08:45	6303	3	2
8/23/2011	08:45-09:00	6303	0	0
8/23/2011	09:00-09:15	6303	3	3
8/23/2011	09:15-09:30	6303	1	1
8/23/2011	09:30-09:45	6303	4	5
8/23/2011	09:45-10:00	6303	1	2
8/24/2011	10:00 -1015	6207	1	6
8/24/2011	10:15-10:30	6207	0	5
8/24/2011	10:30-10:45	6207	1	1
8/24/2011	10:45-11:00	6207	1	2
8/24/2011	11:00-11:15	6207	2	2
8/24/2011	11:15-11:30	6207	2	3
8/24/2011	11:30-11:45	6207	3	6
8/24/2011	11:45-12:00	6207	2	2
8/24/2011	10:00 -1015	6206	0	7
8/24/2011	10:15-10:30	6206	0	0
8/24/2011	10:30-10:45	6206	5	9
8/24/2011	10:45-11:00	6206	2	4
8/24/2011	11:00-11:15	6206	0	1
8/24/2011	11:15-11:30	6206	0	3
8/24/2011	11:30-11:45	6206	1	2
8/24/2011	11:45-12:00	6206	1	0
8/24/2011	10:00 -1015	6204	2	4
8/24/2011	10:15-10:30	6204	0	0
8/24/2011	10:30-10:45	6204	0	0
8/24/2011	10:45-11:00	6204	0	0
8/24/2011	11:00-11:15	6204	0	3
8/24/2011	11:15-11:30	6204	4	5

8/24/2011	11:30-11:45	6204	1	2
8/24/2011	11:45-12:00	6204	0	0
8/25/2011	12:00-12:15	6306	1	3
8/25/2011	12:15-12:30	6306	0	1
8/25/2011	12:30-12:45	6306	0	0
8/25/2011	12:45-13:00	6306	0	2
8/25/2011	13:00-13:15	6306	1	5
8/25/2011	13:15-13:30	6306	0	4
8/25/2011	13:30-13:45	6306	0	3
8/25/2011	13:45-14:00	6306	0	4
8/25/2011	12:00-12:15	6305	1	3
8/25/2011	12:15-12:30	6305	0	7
8/25/2011	12:30-12:45	6305	0	1
8/25/2011	12:45-13:00	6305	0	1
8/25/2011	13:00-13:15	6305	0	0
8/25/2011	13:15-13:30	6305	0	0
8/25/2011	13:30-13:45	6305	0	1
8/25/2011	13:45-14:00	6305	0	2
8/25/2011	12:00-12:15	6302	2	5
8/25/2011	12:15-12:30	6302	1	2
8/25/2011	12:30-12:45	6302	0	1
8/25/2011	12:45-13:00	6302	0	0
8/25/2011	13:00-13:15	6302	1	4
8/25/2011	13:15-13:30	6302	1	3
8/25/2011	13:30-13:45	6302	0	7
8/25/2011	13:45-14:00	6302	0	12
8/25/2011	12:00-12:15	6303	4	4
8/25/2011	12:15-12:30	6303	1	2
8/25/2011	12:30-12:45	6303	2	2
8/25/2011	12:45-13:00	6303	1	4
8/25/2011	13:00-13:15	6303	2	2
8/25/2011	13:15-13:30	6303	0	0
8/25/2011	13:30-13:45	6303	1	1
8/25/2011	13:45-14:00	6303	0	2
8/26/2011	13:00-13:15	6303	0	1
8/26/2011	13:15-13:30	6303	0	0
8/26/2011	13:30-13:45	6303	0	1
8/26/2011	13:45-14:00	6303	2	2
8/26/2011	13:00-13:15	6302	2	2
8/26/2011	13:15-13:30	6302	0	1
8/26/2011	13:30-13:45	6302	3	1

8/26/2011	13:45-14:00	6302	2	5
8/26/2011	13:00-13:15	6305	1	2
8/26/2011	13:15-13:30	6305	0	3
8/26/2011	13:30-13:45	6305	3	1
8/26/2011	13:45-14:00	6305	0	1
8/26/2011	13:00-13:15	6306	0	1
8/26/2011	13:15-13:30	6306	1	2
8/26/2011	13:30-13:45	6306	4	3
8/26/2011	13:45-14:00	6306	0	2
8/26/2011	13:00-13:15	6203	0	1
8/26/2011	13:15-13:30	6203	1	5
8/26/2011	13:30-13:45	6203	1	4
8/26/2011	13:45-14:00	6203	0	3
8/26/2011	13:00-13:15	6206	1	1
8/26/2011	13:15-13:30	6206	2	3
8/26/2011	13:30-13:45	6206	1	3
8/26/2011	13:45-14:00	6206	0	4
8/26/2011	13:00-13:15	6207	0	0
8/26/2011	13:15-13:30	6207	0	0
8/26/2011	13:30-13:45	6207	1	2
8/26/2011	13:45-14:00	6207	0	1