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Adherence with Universal Precautions after Immediate, Personalized Performance Feedback: An Experimental Analysis

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Abstract

This study evaluated the effects of immediate personalized performance feedback on adherence with universal precaution behaviors by health care staff. Hand hygiene was the targeted dependent variable; data on other behaviors were also analyzed. An AB multiple baseline across participants design with direct observation was the method of evaluation. The performance feedback consisted of verbal and written feedback delivered by the investigator immediately after the behaviors occurred. Feedback was delivered until the behavior reached the mastery criterion of three consecutive sessions of 100% adherence with the investigator present and five consecutive sessions of 100% adherence in the absence of the investigator but in the presence of observers. The intervention provided a quick means to bring people up to mastery levels and received positive social validity ratings. The feedback was effective at maintaining adherence near 100% throughout the 2 months of maintenance probes.

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Introduction

Hospitals and health care settings are environments prone to the possibility of infection and contamination. This is a unique work environment because people come in to a closed-in building where diseases and infections can easily run rampant. Therefore, it is no surprise that the U.S. Bureau of Labor Statistics (2007) reported that in 2006, "the incidence of occupational injury and illness in hospitals was 8.1 cases per 100 full-time workers, compared with an average of 4.4 for private industry overall" (work environment section, para. 1). This number includes such things as injuries sustained while lifting patients, equipment and machinery, and from slips and falls, but a large portion of the illnesses come from infectious diseases, such as hepatitis, AIDs, or tuberculosis.

One recent example of the risks associated with the health care industry occurred in Las Vegas, Nevada, as reported by the Southern Nevada Health District (2007). A syringe that was used to give medication to a patient was used again on the same patient with another medication. This multi-dose vial, contaminated with blood from the patient, was then used on other patients with a new needle and syringe, thus exposing other patients to bloodborne pathogens. The Southern Nevada Health District asked that anyone who had injections from this Center be tested for Hepatitis C and other bloodborne pathogens. This included anyone who had visited the clinic within an almost four year period. This episode reflected a common practice, which resulted in a huge liability and cost to the Health District, and the potential infection of 40,000 people. Shortly after the incident, the Nevada State Health Division sent out a press release

telling patients to be proactive when visiting health care facilities to ensure their own safety (appendix D).

The scare of methicillin-resistant Staphylococcus aureus (MRSA), which occurs most often among people in hospitals and health-care facilities, requires thorough infection control practices (Center for Disease Control, 2007). Boyce (2001) stated that nationwide, "projected costs of antimicrobial resistance in health care settings have been estimated to range from 1 million dollars to 30 billion dollars, with the best estimate being 4 billion dollars annually in the United States" (p. S133). The extent of the problem is poorly understood, since the health-care system lacks accurate measures of exposure. Employees and patients face unknown risks.

In 1987, the Center for Disease Control introduced Universal Precautions (UP) for all health care settings. These UPs were initially to deal with the HIV epidemic and to prevent patients with HIV from infecting other patients or health-care workers. Since 1987, the Center for Disease Control (CDC) has added to this document to further clarify and refine the initial recommendations. Currently, the CDC states on its webpage that they define UPs as a set of precautions designed to prevent transmission of bloodborne pathogens when providing health care. Under UPs, blood and designated body fluids of all patients are considered potentially infectious for HIB, HBV, and other bloodborne pathogens. UPs involve using protective barriers that would reduce the risk of exposure to blood or bodily fluids (CDC, 1988). The CDC also recommends that all health care workers should be cautious when handling needles and other sharp instruments. One additional recommendation is that "hands and other skin surfaces should be washed immediately and thoroughly if contaminated with blood or other body fluids. Hands

should be washed immediately after gloves are removed" (CDC, 1987, Use of protective barriers para. 6).

This last category of UPs, hand washing, is an interesting behavior on which to focus. Boyce and Pittet (2002) said that "failure to perform appropriate hand hygiene is considered the leading cause of health-care--associated infections and spread of multiresistant organisms and has been recognized as a substantial contributor to outbreaks". Boyce (2001) demonstrated that even though most pathogens are spread in hospitals through the hands of health care workers, many studies performed in the past 10 to 15 years have demonstrated that the adherence of health care workers with hand washing practices is low. He continues on to say that hand washing adherence is on average 40% by health care workers. Health care industries are typically high stress, high demand work environments. Registered nurses and physicians often have high levels of responsibility and complex duties (U.S. Bureau of Labor Statistics, 2007) which can contribute to the high stress of the work environment. Several articles have specifically targeted hand washing in this environment and conducted surveys to determine why hand washing adherence is so low. Some reasons that were reported included skin irritation and dryness; the patient taking priority over hand washing; sinks are not located in convenient locations; lack of role models; or simple forgetfulness. These surveys demonstrate that there are several limitations in the environment that might have an effect on washing hands (Pittet, 2000).

This low adherence in hand washing and UPs in general has not gone unnoticed. There have been several studies in the infection control literature that have targeted increasing adherence in hand washing. Kretzer and Larson (1998) focused on how to

increase adherence by looking at several theoretical frameworks. These frameworks include the Health Belief Model (HBM), the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TBS), self-efficacy, and the Transtheoretic Model. The authors review these theories in terms of where these theoretical models have been tested. They state that none of these theories has consistently been shown to predict behavior. The authors argue that these theories share similarities that could be used in an intervention to improve infection control practices. Kretzer and Larson's article does not constitute an experiment in any way, but can be looked at as more of a theoretical paper in other fields outside of the experimental analysis of behavior. The current study uses the theory and techniques of Behavior Analysis. This theory is not considered in the article and it is likely that this is a theory not typically considered in the Infection Control literature. Therefore, the current study could provides a new way of analyzing and intervening on low adherence rates that is not normally considered outside the field of Behavior Analysis.

Another study conducted on improving UPs outside of behavior analysis was done by Chatterjee, Heybrock, Plummer, and Eischen (2004). Their study was conducted in a children's hospital and focused on disposal of sharp objects, how to handle hazardous waste, isolation precautions, and the availability of personal protective equipment. They implemented a surveillance and education program to evaluate and improve adherence with written infection control policies and procedures. Their surveillance system included standardized surveillance rounds done weekly and on-site education about policies and procedures when non-adherence occurred. Adherence to correct disposal of sharp objects increased from 63% to 100%, proper hazardous waste handling improved

from 27% to 95%, correct isolation precautions increased from 44% to 88%, and availability of protective wear increased from 31% to 99%. The results from this study do not focus primarily on the UPs mentioned above, but the setting and procedures are interesting to consider. They report a dramatic increase in adherence across all behaviors with surveillance and a corrective procedure in the form of on-site education. The research design of this study limits generalization to other applications. The very limited methods section does not give a thorough description of what exactly was done. There is also a question of how many subjects were involved. Procedurally, the absence of a true baseline and only one data point for a three month period leave one to question what information is included in that data point and how the data were collected. Additionally, there is little control (e.g., no control group or staggered intervention) to indicate that these results were not due to some other factors in the environment. While this study showed large increases in adherence, without control, specified research design, or validity checks, there is no way to determine that these data are accurate.

One other notable study done by Eckmanns, Bessert, Behnke, Gastmeier, and Ruden (2006) looked at the concept of the Hawthorne effect in adherence with antiseptic hand rub. The Hawthorne effect states that when people are being watched in a research context, they will act differently than they typically would act. This study was conducted at five adult intensive care units with two observation periods. The first period involved covert observation and the second period was overt observation. The study does not specify how long each period lasted. The first period used a research nurse, who was typically reviewing patient's medical records, to collect data. Participants were blind to the true purpose. During the second period, the personnel were notified that their

"hygienic performance" would be observed. The results indicate that among the nurses, the rates of adherence during the covert period were 30%, and increased to 58% during the overt period. The authors suggest that for future studies that deal with adherence with antiseptic hand rub, data collection should either be covert or the data should take into account the difference between the two conditions. With any research study, data needs to be collected on behaviors in order to determine whether behavior is changing. Reactivity to observers is present in all studies using direction observation, and generalization of findings must be considered in light of the research procedures.

Very few experimental studies have been done in the area of infection control where variables were manipulated to determine cause and effect relationships. This is true for hand washing as well as in other UP behaviors. There seems to be a gap in the literature where true experiments are done as opposed to correlational studies. Additionally, the literature outside of behavior analysis has indicated that no "single intervention has been shown to sustain improved adherence with respect to health care workers infection control practices" (Pittet, 2000, p.383). The correlational studies reveal the extent of non-adherence and suggest areas for more controlled analysis.

Behavior analysis is an ideal method for experimentally manipulating the variables surrounding UPs and organizations and demonstrating effects. The science of behavior is based on the pioneering work of B.F. Skinner. The relations of behavior with its determining variables are studied by manipulating and controlling the variables and then observing the resulting effects on behavior. Therefore, the task of the behavioral scientist is to specify, isolate, and control behavioral variability that is due to the interaction between the organism and its environment (Skinner, 1966; Johnson & Pennypacker,

1980). One behavioral technology that has proven effective in improving organizational behavior is known as Organizational Behavior Management (OBM). OBM is a field that "focuses on observable phenomena, manipulations of environmental variables, and frequent data collection on organizationally important measures" (Sigurdsson & Austin, 2006, p. 42). This field of study may sound similar to industrial-organizational (I-O) psychology since they both look at human behavior in organizations, but they vary in numerous ways. As Bucklin, Alvero, Dickinson, Austin, and Jackson (2000) state, one of the most vital differences lies in the fact that I-O research typically relies on survey data while OBM uses direct observation as dependent variables. The main interest in OBM is to focus on the behavior itself as opposed to the internal states of behavior such as personality, attitudes, or perceptions. OBM research usually uses a within-subject design and direct observation collected repeatedly over time. OBM has been used to solve many organizational issues including production-task completion, training, self management, and, most relevant to the proposed study, health and safety. Reducing the number of accidents in an organization proves a difficult task. Accidents occur at a relatively low frequency, but when they do occur, they tend to be severe. Instead of focusing on the accidents, OBM techniques tend to focus on improving adherence with safety techniques. (Frederiksen, 1982; Sulzer-Azaroff, 1978; Alavosius, Adams, Ahern & Follick, 2000)

Several studies have focused on increasing safety in health care settings. The OBM literature uses sound methodology that can explore the function of the safety behavior as well as manipulate the environment in order to change behavior. Cunningham and Austin (2007) conducted a study in a hospital operating room and outpatient unit for increasing the use of the hands-free technique for passing sharp instruments during

surgical procedures. They observed teams of 2 to 5 people including the surgeon, a registered nurse and other health care workers. They used a multiple baseline design across participants with a treatment package of combined goal setting, task clarification, and feedback to increase use of the hands-free technique. The goal setting and task clarification were conducted at meetings prior to the start of the treatment phase. During the treatment phase, modeling was used as part of the task clarification to demonstrate safe and unsafe methods. Verbal feedback was given by the coordinator to the staff on whether or not they met their goal. The average was reported and improvements from the previous week's meeting were acknowledged. The average percentage of sharps passed in the neutral zone (hands-free technique) went from 32% in the OR and 31% in the outpatient unit during baseline to 64% in the OR and 70% in the outpatient unit. During a maintenance phase, the average percent stayed at 63% in the OR and increased to 73% in the outpatient OR.

Alavosius and Sulzer-Azaroff (1990) examined the effects of dense and intermittent feedback schedules on the safety behaviors of four direct-care workers in a medical service unit in a facility for people with developmental disabilities. The dependent variables addressed were safety behaviors in patient transfers in which the caregivers lifted and transferred individuals with physical disabilities, safe positioning of non-ambulatory patients, and feeding techniques. After baselines were established, feedback was delivered on an intermittent or a dense feedback schedule. The intermittent feedback consisted of feedback being provided weekly for performance on each occurrence of the behavior three times throughout the visit. The experimenter then returned a week later and observed and gave feedback on three occurrences. This schedule continued until the

employee had mastered the task. On the dense feedback, the experimenter would provide the same type of feedback, but it would include feedback many times a day, after every performance. This continued until the care-giver mastered the task. The analysis of schedules of feedback in this study showed that acquiring a correct procedure happened more rapidly under a dense schedule as opposed to an intermittent one. Both schedules showed an increase in acquisition of the correct procedure as well as maintenance for up to seven moths post termination of feedback.

Following the study by Alavosius and Sulzer-Azaroff, several studies were conducted in health care settings that focused specifically on UPs. Babcock, Sulzer-Azaroff, Sanderson and Scibak (1992) conducted a study with five nurses and 12 nursing aids in a head-injury treatment hospital. A multiple baseline design across participants was used to evaluate glove use, in which nurse supervisors were given training and feedback on how to use feedback with staff. The nurses gave written feedback to employees, and those written feedback slips were counted as well as the number of gloves used. The study found that only when the trainer started giving the supervisors feedback and letters of recognition did the feedback slips increase. This study used an indirect method of intervention to increase glove wear adherence by nurses by instead targeting the supervisors. This intervention created a system that potentially could be used after the experimenters were gone, but no maintenance data were collected to determine whether the system stayed in place.

One other noteworthy study done in the field of health care, specifically infection control, which used behavior analysis, was done by DeVries, Burnette, and Redmon (1991). Individual, performance feedback was provided to four registered nurses in an

ER once every 2 weeks during the intervention. The targeted behavior was glove wearing, and feedback included: 1. Six situations in which gloves should be worn, 2. Request for behavior change, 3. Percentage of times gloves were worn over opportunities and 4. A graph with performance data of all the data points up to that date. The results showed that an average of overall performance across nurses was 40.5% during baseline to 73% during the intervention phase. DeVries, et al. (1991) and Babcock, et al. (1992) are some of the few studies that have shown increased adherence with UPs in a health care setting as a function of staff management techniques.

The above studies showed improvements in performance that are not clearly seen in literature outside of behavior analysis. As noted in several of the studies, some of the tools that are typically used by OBM practitioners include goal-setting, task clarification, training, rewards, social praise, feedback or a mixture of these tools to change behavior. In a review of the literature of articles published in the Journal of Organizational Behavior Management (JOBM), performance feedback was used as a component in 75% of the interventions (Bucklin, Alvero, Dickinson, Austin, & Jackson, 2000). Performance feedback has been used in changing a variety of behaviors from typing speed and accuracy (Tittlebach, Fields, & Alvero, 2008), to closing tasks in a restaurant (Austin, Weatherly, & Gravina, 2005), to safety behaviors in a paper mill (Cooper, 2006) and many others.

An extensive number of studies published in JOBM evaluate feedback, and two papers review performance feedback applications in behavior analysis, Balcazar, Hopkins, and Suarez (1985) and Alvero, Bucklin, and Austin (2001). Alvero, et al. (2001) covered all articles from 1985-1998 and compared the results with the paper by

Balcazar, et al. (1985). Alvero et al report that performance feedback has been defined in many different ways. Some definitions include information given regarding the quantity or quality of their past performance, information given following a particular performance, information that tells performers how well they are doing, and information about performance that allows them to adjust his or her performance. Ironically, even though performance feedback is the number one intervention used in OBM, a specific definition has yet to be made. This might be in part due to the lack of agreement about what behavioral function explains performance feedback. Some have said that it is an antecedent, some argue it serves as a reinforcer, and others say that it has several functions. In addition, establishing operation and rule-governed behavior are other potential functions mentioned.

Alvero, et al. (2001) found similar results with those found by the review by Balcazar et al. They both reported that feedback, while often effective, does not always improve performance. Alvero, et al., reported that consistent effects were found in 58% of the studies, mixed effects found in 41% of the studies, and no effects found in 1% of the studies. In both reviews, feedback with no other components was the most frequent procedure used, even though Alvero, et al., found that feedback alone was not the procedure with the most consistent effects. Interventions using feedback and any other procedure, except goal setting, had higher levels of consistent effects than feedback alone. Feedback delivered daily, monthly, and combined daily and weekly produced higher levels of consistent effects than weekly feedback. Private rather than public feedback was more frequently used. Balcazar, et al. did not find any difference in the privacy of feedback, but Alvero et al. showed that private and public feedback had more

consistent effects than private or public alone. These data indicate that feedback is a complex procedure. Variations in feedback format, timing, context, source, schedule, and other factors influence effectiveness. More research is needed to understand feedback mechanisms and guide selection of optimal feedback systems for given tasks, settings, and personnel.

Throughout this analysis of the literature of health and safety, UPs, and OBM, two articles bring performance feedback and UPs together. Stephens and Ludwig (2005) used six Certified Registered Nurse Anesthetists and one anesthesia technician in the pre-operation area of one operating room to study UPs. They used an intervention package involving training discussions, goal setting, and individualized, graphic, publicly posted feedback to increase nurse adherence with UPs. The two targeted UPs were hand washing and immediate needle disposal. The study was conducted using a multiple baseline across behaviors, in which hand washing was the first behavior and immediate needle disposal was the second targeted behavior. Observers would shadow the nurses and record on a checklist the two targeted behaviors as well as record other UP behaviors, including glove wearing and needle recapping. They checked on these behaviors as well as other "bedside manner" behaviors, including such things as greeting the patient, to determine if generalization would occur from the targeted behaviors. At the end of the intervention, a withdrawal was conducted, followed by maintenance probes.

Stephens and Ludwig (2005) found that during the hand washing intervention, there was an increase in adherence on average from 24% adherence during baseline, to 65% adherence during the intervention, to 52% during withdrawal, and 54% during the follow-up observations. The author's note that hand washing exceeded the group goal of 40%

adherence. In immediate needle disposal, overall average during baseline was 53%, increased to 58% during the intervention, and dropped down to 45% during withdrawal. The group goal of 84% adherence with immediate needle disposal was not met. The fact that health-care workers in this study set low goals for themselves is interesting. They found that there was a slight generalization to other non-targeted UP behaviors that were in a similar response class to the targeted UP behaviors. This study is the closest to the proposed study in observation of the targeted responses. The behaviors they targeted, as well as the non-targeted behaviors that were also measured serve as a good class of responses to study. This study had mixed effects and future studies should focus on getting these rates of adherence to UPs up to near 100%. Since hand washing and other UPs have been shown to be vital to maintaining a safe, infection free environment, having higher adherence rates are definitely needed

The final study that will be mentioned in this section also has many parallels to the current study. Alavosius and Sulzer-Azaroff (1986) used six direct care staff in an infirmary unit of a state school for people with developmental disabilities. The individuals in the infirmary unit had several physical handicaps and difficulties ambulating. An AB multiple baseline across participants was used to test the effectiveness of written and verbal feedback for each individual care staff. The feedback was provided to the participants immediately after performing a client lift and transfer procedure. Feedback was given by the experimenter and conducted approximately once every week. At other times observers would shadow the participants throughout their day with a checklist scoring whether they were doing the procedures correctly, but would not give them any feedback. After the participants mastered the tasks, the feedback

procedures were withdrawn. Maintenance probes were conducted up to 7 months after as follow-up. The results indicated that performance was variable during baseline and after feedback occurred, performance improved and variability decreased during the intervention. Correct safe lifting techniques were maintained with the probes during follow-up. This feedback procedure was shown to be an effective intervention, at least with this response class. This leads to the question of whether this procedure would have such effects with other behaviors. Hand washing, especially, seems to have some natural negative consequences, including skin irritation, that might weaken response maintenance.

The purpose of the current study was to integrate and replicate the above two studies. This involved incorporating private, immediate feedback such as used by Alavosius and Sulzer-Azaroff (1986) with the behaviors and settings used by Stephens and Ludwig (2005). As opposed to Stephens and Ludwig, the current study focused on bringing the behavior up to mastery, and then terminating feedback messages and probing for maintenance. Therefore, the goal of the current study was to determine whether immediate performance feedback is a useful intervention to increase adherence of hand hygiene by health care staff in the occupational health clinic of a local hospital.

Method

Setting

The study was conducted in the occupational health clinic of a local hospital. The occupational health clinic consisted of four rooms where patients were seen and an open area where laboratory work was conducted. All of the rooms included a bed, cabinets, and a sink. The laboratory area included cabinets, sinks, a chair, and a hearing booth.

The rooms and laboratory were located off of the main office. All observations took place in the four patient rooms and in the laboratory area. The clinic provided services to employees of local businesses and employees of the hospital. It was open between 8am and 5pm, Monday through Friday. The clinic would take patients with appointments, walk-ins, and vaccinations.

Participants

The participants consisted of three health care staff of varying ages. The three participants included a nurse practitioner, physician assistant, and medical assistant. The medical assistant had been a medical assistant for one year. At the clinic she worked with patients every day of the week. The nurse practitioner received her degree in 1998. She saw patients on two days of the week (Wednesday and Friday). The physician assistant received her degree in 2004. She saw patients on the other three days of the week (Monday, Tuesday, and Thursday). All three participants were females living within 40 miles of the hospital.

Subject protection.

Only subjects who signed IRB consent forms were included in the study. A verbal assent procedure was completed with all of the patients prior to having an observer enter the room. A sign was posted in the waiting room stating "At times observers follow the healthcare staff throughout the clinic to monitor quality care. The observers do not record any data on patient information and follow all HIPAA regulations. If you do not want the observer present during your visit, please let the staff know prior to your visit." The front desk attendant was instructed to direct the patients to read the sign. Additionally, prior to having the observer enter the room most participants would again

verify with the patient whether they would like the observer present during the visit. If the patient did not assent, the observer did not enter the room. The observer would also leave at any time during the visit if requested by the patients. For patients who did assent to having an observer in the room, there was no data collected on patient information, and all information discussed while observing was confidential. Only data on the checklist were recorded.

Dependent Variables

The main dependent variable targeted was the behavior of hand hygiene. This behavior was chosen because of the extensive literature that indicates hand hygiene is an important safety behavior to decrease the spread of infections. Sulzer-Azaroff and Fellner (1984) described how to narrow a large pool of safety factors down to a reasonably sized number of behaviors that will still have an impact on safety. Criteria the authors mentioned are those behaviors that can be defined as an operation, occur frequently, and are mediated by human performance. Hand hygiene fits these criteria and can be task-analyzed into a sequence of observable activities. Hand hygiene includes both hand washing and hand sanitizing since they are in the same response class. If hands are visibly soiled, hand washing needs to be done because hand sanitizing will not meet the CDC requirements. Under most other circumstances seen at the clinic, both hand sanitizing and hand washing could be done so they were grouped together to a broader category of hand hygiene.

The operational definitions originated from the CDC's definition for hand washing and hand sanitizing. Boyce and Pittet (2002) report that the CDC definition for hand washing states

> When washing hands with soap and water, wet hands first with water, apply an amount of product recommended by the manufacturer to hands, and rub hands together vigorously for at least 15 seconds, covering all surfaces of the hands and fingers. Rinse hands with water and dry thoroughly with a disposable towel. Use towel to turn off the faucet. (recommendations section, para. 2)

This definition describes the exact behaviors of washing hands. Additionally, the CDC, according to Boyce and Pittet (2002), recommends specific times and conditions when hand washing should occur, including

> 1. When hands are visibly dirty or contaminated with proteinaceous material or are visibly soiled with blood or other body fluids, wash hands with either a non-antimicrobial soap and water or an antimicrobial soap and water. 2. Decontaminate hands before having direct contact with patients. 3. Decontaminate hands before donning sterile gloves when inserting a central intravascular catheter. 4. Decontaminate hands before inserting indwelling urinary catheters, peripheral vascular catheters, or other invasive devices that do not require a surgical procedure. 5. Decontaminate hands after contact with a patient's intact skin (e.g., when taking a pulse or blood pressure, and lifting a patient). 6. Decontaminate hands after contact with body fluids or excretions, mucous membranes, nonintact skin, and wound dressings if hands are not visibly soiled. 7. Decontaminate hands if moving from a contaminated-body site to a clean-body site during patient care. 8. Decontaminate hands after contact with inanimate objects (including medical equipment) in the immediate vicinity of the patient 9. Decontaminate hands after removing gloves. (recommendations section, para. 1)

Accurate hand sanitizing included the following situations: before having direct contact with patients; before putting on sterile gloves when inserting a central intravascular catheter, indwelling urinary catheters, peripheral vascular catheters, or other invasive devices; after contact with a patient’s skin; after contact with inanimate objects near the patient; or after removing gloves. Hand antiseptic involved applying the product to one hand and rubbing the hands together to cover all visible surfaces until the hands are dry (Boyce & Pittet, 2002).

In addition to the main dependent variable of hand hygiene, other dependent variables were studied. These variables included ones similar to those of Stephens and Ludwig (2005). Glove wearing was one behavior. Gloves should be worn when in contact with blood or other potentially infectious materials. Gloves need to be removed after caring for a patient and changed during patient care if moving from a contaminated body site to a clean body site (Boyce & Pittet, 2002). Other target behaviors were "Not recapping, whereby the needle was not recapped after use (using a one-handed recapping method was acceptable); and immediately discarding of needle, whereby the needle was not laid down before disposal" (Stephens & Ludwig, 2005). In addition to UP behaviors, other behaviors observed by Stephens and Ludwig and studied in this study included: greeting the patient, telling the patient his/her name, explaining and clarifying what procedures he/she will be doing, and asking patient questions.

These other variables, besides hand hygiene, were studied to determine whether increasing adherence with hand hygiene had an impact on other safety and bedside manner behaviors. Washing hands more often and for a longer duration might take away time from these other behaviors, and a negative effect may be seen. Conversely, there might be a generalization effect that occurred when focusing on increased hand hygiene. It may be related to such behaviors as glove wearing, for instance. Finally, the multiple target behaviors allowed for the observers to be blind to the specific behavior being targeted. Observers were monitoring and collecting data on numerous behaviors which made it less likely that they knew which behavior was being targeted for intervention, and decreased bias.

Measurement System

Observers.

The observation method was direct observation by two trained observers who shadowed the participants as they completed health-care routines with patients. The two observers were research assistants with interests in psychology. Both observers received three research credits for helping with the study and mileage reimbursements for the amount of mileage from the University to the hospital. They followed the designated staff member during clinic hours on the days on which they were required to complete observations. They scored adherence with a checklist (appendix A), recording the number of those behaviors observed as well as the number of opportunities missed. A blank checklist was used with each session. The observers indicated the staff's name, the start and/or end time of the interaction with the patient, and recorded if there were any hazards present. The research assistants collected data with a checklist on all of the behaviors listed above, and were kept blind about the specific behaviors undergoing interventions. They did not know when the intervention had started or the specific intervention operations.

The observers had no physical contact with the participants. They wore hospital issued identification badges displaying their name and picture. Each observer designated days of the week that they were able to conduct observations. One observer was only able to do observations on Monday mornings. The other observer was able to conduct observations on Wednesdays and/or Fridays and other days if needed.

Observation Materials.

All of the above mentioned variables were present on a checklist which the observer used to collect data. An example of the checklist is available in the appendix A. Alavosius and Sulzer-Azaroff (1985) described creation of a checklist incorporating a task analysis. Each task was described in enough detail that a trained person was able to follow through the checklist with few errors. The checklist used was broken up into component tasks. This allowed the observers to determine whether all the steps, for instance, of the hand washing procedure, were conducted correctly and in the recommended sequence.

The checklist was created using the definitions and guidelines described by the CDC and by Stephens and Ludwig (2005). The infection control nurse for the hospital reviewed the checklist with the investigators and refined it to also include the hospital's guidelines. Both Sulzer-Azaroff and Fellner (1984) and Sigurdsson and Austin (2006), report that corroborating with the facility and experts in the field creates a checklist likely to include pertinent details. Sigurdsson and Austin (2006) additionally mentioned that two of the four institutionalism variables that have been shown to increase maintenance of a behavior include involvement of the in-house staff in the design of the management procedures and formal data collection system. While the observers techniques were being calibrated with the investigator at the hospital, further refinements were made to the checklist and definitions to make it more user-friendly, concise, and to increase the ability to have high inter-observer agreement.

Observer Training.

Prior to the start of the study, all of the research assistants were trained on recording and classifying behaviors correctly. The observer training system was similar to the

training used by Alavosius and Sulzer-Azaroff (1985). The observers were first trained on how to record data on the checklist. This included reviewing the task analysis checklist and operational definitions of each behavior. The observers were given the checklist and list of definitions prior to the first training day. In the first training session, each observer was videotaped washing their hands with no feedback. They then took a quiz over the checklist (see appendix D) to ensure that they were familiar with it. They could miss a maximum of 10 items on the quiz.

Two sets of videos were created for the observer training. The first set was made in a home setting with non-hospital employees. These videos only included hand washing, hand sanitizing, and some of the bedside manner behaviors. A second group of videos were made at the hospital. These videos were made with the help of the infection control nurse and the director of the clinic. One video in this set was a tutorial on correct hand washing procedures as well as the importance of hand washing described by the infection control nurse. In all other videos, both safe and unsafe behaviors were shown to the observers, and they scored the performance on the checklist. These videos included all of the measured behaviors except for handling and disposal of sharps. Since these were made within the actual setting when data collection would occur, the observers became fluent with measuring behavioral variation within the features of the actual work setting.

On the first training day after taking the quiz, the observers watched the tutorial about correct hand hygiene and then watched the five videos which were not conducted at the hospital. They then came back three days later to watch the set of videos from the hospital. One of the observers then watched her own hand washing. With all of these videos, the observers recorded each component as correct, incorrect, or not applicable.

Each component of the task analysis was scored as correct if its topography fit the definition and was in the correct order within the sequence. It was scored incorrect if the component was skipped, out of sequence, or was not consistent with the definition. It was scored not applicable if the circumstances as specified in the definition were not met. The observers independently met with the investigator for the training. After each video, the investigator and the observer went through the clip to check Inter-Observer Agreement (IOA). If they missed anything, they were given feedback which could include going over the definition, reviewing the video, suggestions for better quick recording techniques, and/or clarification.

After all of the vignettes were watched by the observers, they each went to the hospital with the investigator approximately one week later. During this time, the observer and the investigator shadowed health care staff and independently completed the checklist. After each patient visit, the observer and the investigator would compare data. If there was not 100% IOA, feedback was given by the investigator similar to the feedback provided with the training videos. The observers needed 100% IOA, computed item by item, with the observer over 5 consecutive sessions in order to begin collecting baseline data.

Prior to training, observers went through an orientation to the health center and health center procedures. All observers were told about the importance of confidentiality of patients and the participants, and completed all HIPAA requirements for the hospital. At this time they were also given hospital badges.

Calibration.

Second independent observers completed observations for at least 32% of the observation time periods throughout the study to ensure accurate recording and check for inter-observer agreement. The second observer's data were calculated against the first observer's by looking at agreements and disagreements. An agreement was defined as both observers scoring an occurrence as correct, incorrect, or not applicable and then taking a percentage of total intervals where two observers had the same count. This exact-count-per-interval IOA was used, which according to Cooper, Heron, and Heward (2007) is the most stringent criteria to obtain IOA. An acceptable score of inter-observer agreement was a minimum of 85%. If there was not an 85% agreement, the researcher would conduct additional training sessions until the 85% agreement was met.

Independent Variable

The independent variable closely replicated the independent variable used in the study by Alavosius and Sulzer-Azaroff (1986). The independent variable was written and verbal feedback given to each participant individually by the investigator. Throughout the intervention, the investigator observed a participant interacting with a patient and scored adherence using the feedback form in appendix B. Immediately after the first session, she explained the feedback procedure that would be used during the intervention. The investigator then gave the participant their first feedback message. After each observation by the investigator, she provided specific comments describing what parts of the hand hygiene procedures were done correctly as well as specific suggestions for how to improve the next time. While providing the verbal feedback, the participants would also be shown the feedback form to indicate which components were correct, incorrect and the situation when the behavior occurred to also provide them

written feedback. The investigator gave the participants this information at times when there were no primary observers taking data so that they remained blind to the behaviors being targeted as well as to the time of the intervention. Feedback was provided depending on the days when the participant was scheduled to work, holidays, investigator schedule and number of patients seen within the observation period. The criterion to master out of receiving feedback messages was set at 100% adherence over 3 consecutive sessions with the investigator. To master out of the intervention phase, the participant then needed to have 5 consecutive sessions with the primary observer present when no feedback messages were given and demonstrate 100% adherence. Thus, mastery required sustained adherence with the feedback source was absent.

Experimental Design

The design used was an AB multiple baseline design across participants. The baseline (A) phase was measured for a minimum of one and a half weeks for the first participant. To start the intervention (B), the data had to meet the stability criterion. The stability criterion used was that the last three data points fell within the range established in preceding baseline observations. Each participant's interventions were staggered at variable times between 1 to 3 weeks after the prior participant also depending on the stability of their data. Observers shadowed the staff during the baseline and recorded adherence with the measured behaviors.

The intervention was implemented with one participant at a time. At the end of a baseline period, a participant was informed about the process for the feedback being implemented. During the intervention, the investigator observed a participant for certain hours of designated days (depending on the schedules of the participants and other

observers). After the investigator had observed an instance of hand hygiene, she waited until the staff member had finished working with the patient and then gave the participant immediate feedback. The feedback included verbally going over whether or not the hand hygiene was done and if it was done correctly. This verbal feedback always included a statement of positive feedback, for instance "you did much better on rubbing your hands together for 15 seconds this time", etc. They were also shown the feedback form (see appendix B) while giving verbal feedback to show what behaviors were complete and which were not. Feedback sessions occurred when it fit in with the participant and investigator's schedule. Regular observations occurred at other times during the week except when the investigator was present. Each feedback session included observation of occurrences of hand hygiene and then feedback message about those behaviors.

After the intervention had been in place for all participants and adherence had met the required 100% mastery criteria for three consecutive session with the investigator and five consecutive sessions with an observer, the feedback intervention ended. Follow-ups were done to probe for maintenance of adherence. These follow-ups were conducted approximately 1 week, 2 weeks, 1 month, and 2 months after the feedback has been completed and consisted of probes at random times of the day over several weeks.

Behavioral variability can occur for many reasons (Sidman, 1961). A multiple baseline across participants design was used in this study for several reasons. The design of this study sought to control variability and demonstrate a functional relation between the dependent variables and manipulated independent variable. The design tests whether there is a correlation between baseline response rates and the direction of change with the independent variable. The procedure replicates direct manipulation of the participant's

baseline responses. By analyzing the data of three participants, it can be determined whether their baseline and intervention rates follow the same trends and directions.

It is also used because most of the threats to internal validity, as stated by Cambell and Stanley (1966), are controlled. For example, history will be controlled because the intervention for each participant occurs at different points in time. Specific events that occur that might have an effect on the intervention can be identified. Since this is a single subject design, statistical regression, selection and selection-maturation interaction will not be an issue. All participants were analyzed independently; there is no need for random selection to groups, since each participant serves as its own control. A multiple baseline design demonstrates both experimental control and in the case of this study, is an ethical design. It would not be ethical to determine whether the safety behaviors would go back to baseline with a reversal. To remove an intervention that increased adherence with safety precautions in efforts to determine whether the behaviors will go back to a lower level would not be in the best interest of the participants or patients. It could have resulted in patients and staff getting sick and/or spreading infections.

Social Validity Measures

A questionnaire was given at the end of the intervention to assess social or habilitative validity as well as confounds and practicality of the intervention. Hawkins (1991) argued that a social validity test should not just seek a second opinion, but should be used to find further behavioral and environmental resources, to suggest adjustments for future studies, or to predict or detect undesirable effects. Additionally, Wolf (1978) stated that a social validity questionnaire should get at the social significance of the goals, the appropriateness of the procedures, and the importance of the effects. The

questionnaire that was given at the end of the study is located in the appendix C and assesses the points brought up by Hawkins (1991) and Wolf (1978).

Data Analysis

The data from the checklists were analyzed using visual inspection of graphical data. Inferential statistics were not used because research shows that there was low adherence with UP behaviors in baseline and large improvements during the intervention and maintenance phase. Therefore, the changes in the graphical data are evident without statistics. Visual inspection is ideal for this study as it enabled rapid assessment of the stability of participant's responses.

Results

Observer Training and Calibration Results

On the first part of training, the quiz over the checklist, observer one missed three items while the second observer missed seven items. Following the quiz, they watched the set of videos and then completed observations at the hospital with the investigator until reaching mastery. See figures 1 and 2 for the percentage agreement for each observer during training. As the data show, the observers did not reach a high enough score with the videos to independently observe at the hospital. Observer one had an average of 79.8% and observer two had an average of 78.8% on the videos. After the videos, each observer went to the hospital with the investigator. In order to master the training period, they needed to have 5 consecutive sessions of 100% IOA between the investigator and the observer. Observer one took 34 observations over four days at the hospital to master out of the training. Observer two took nine observations over one day at the hospital prior to mastering out of the training.

Inter-observer data were taken in all three phases of the study. IOA was conducted by the investigator for 32.8% of the observations with observer one and 33.9% of the observations of observer two. Observer one had an average of 100% IOA while observer two had an average of 96.8% IOA with the investigator.

Experiment Results

Figure 3 shows the results for all three participant's hand hygiene behavior across baseline, intervention and maintenance. The x-axis provides a time series of the observations across work days. Depending on who was working and the types of patients being seen, each participant could have had zero to multiple observations in a day. The y-axis indicates the percentage of tasks on the checklists performed correctly.

Participant 1 was the first participant to receive an intervention. She had a total of 17 observations over five days in baseline. The average baseline hand hygiene adherence was 43.7% and a median of 45.5% and no trend was evident. As demonstrated in figure 4, the components she would miss most frequently were getting water before soap, rubbing hands for 15 seconds, and using a paper towel to turn off the faucet. Additionally, she would miss opportunities to wash her hands or use hand sanitizer completely.

On November 20th participant 1 had her last baseline point and started receiving feedback messages. She received a total of nine feedback messages. The first five messages were given on November 20th and the final four messages were delivered on December 1st. After receiving the last feedback message she had three consecutive observations of 100% adherence and one at 72.7% where one component was missing (water before soap). She then had five consecutive observations of 100% adherence and

mastered out of the intervention on December 12. Participant 1's average adherence during intervention was 86.9% and median of 100%. This is an increase of 43.2% average adherence between the baseline and the intervention phase. During the maintenance phase, participant 1 had an average of 96.8% and median of 100%. This is an increase of 10% average adherence between intervention and maintenance. Three of the four observations had 100% adherence. The one observation below 100% was the one month probe which was at 87.5%. The error was that she rubbed her hands for 12 seconds instead of 15 seconds.

Participant 2 was the second participant to start the intervention. She had a total of 41 observations over seven days during baseline. Her baseline average adherence with hand hygiene was 56.9% and median adherence was 63.6%. No trend was evident indicating a stable profile of safety practices. Figure 5 shows that the components she missed most frequently were rubbing hands for 15 seconds, turning the faucet off with a paper towel, and getting water before soap. The main source of error was not washing her hands or using hand sanitizer when required.

Participant 2 started feedback messages on December 1st. She received a total of nine feedback messages. The first four feedback messages were delivered on December 1st, followed by one on December 12, two on January 26th, and the final two on January 28th. Due to holidays and the participant being gone, there were several dates without observations during the intervention phase. After the final feedback message, she had five consecutive observations at 100% and mastered out of the intervention on February 2nd. Her average hand hygiene adherence during the intervention phase was 86.2% and had a

median adherence of 100%. There was an average increase from baseline to intervention of 29.3%. During maintenance probes, she had an average of 100% adherence.

Participant 3 was the last participant to start the intervention. She had a total of 21 observations over six days during baseline. Her average hand hygiene adherence during baseline was 59.0% and median adherence was 56.3%. As seen in figure 6, the components most often missed were getting water before soap, rubbing hands for 15 seconds, and turning off the faucet with the paper towel. There were four times that hand washing was not conducted when necessary and she never used hand sanitizer.

She started receiving feedback messages on December 12th which was the same day she stopped receiving feedback messages. She required a total of five feedback messages during the intervention. She mastered out of the intervention on January 7th after having five consecutive observations of 100% adherence. Her average adherence with hand hygiene during the intervention was 95.4% and the median was 100%. This is an average increase of 36.4% from baseline to intervention. During maintenance probes she had an average of 95.8%. Of the four probes, two were at 100% adherence. Her three week probe had an adherence percentage of 87.5% due to missing the component getting water before getting soap. Additionally, at her 2 month probe, she had a 95.8% because she used the same towel to turn off the faucet as she used to dry her hands. Immediately after missing that component, she realized it and washed her hands again with all of the correct components prior to touching the patient.

Generalization behaviors

Figure 7 shows the percentage of adherence with hand hygiene, the targeted behavior, as well as the behaviors tracked for generalization or decay. These behaviors

include bedside manner, proper use of sharps and proper glove wear. Bedside manner consisted of greeting the patient, telling the patient his/her name, asking the patient questions and clarifying the procedure. Proper use of sharps involves safe practice of handling sharps and proper disposal of sharps. Proper glove wear included gloves put on at the correct time and glove wear completed.

Participant 1 had an average of 97% use of bedside manner during baseline and increased to 100% in both the intervention and maintenance. During baseline, she only had two opportunities in which gloves were required, on the first occurrence she did not use gloves when required and the second time she put them on and removed them correctly resulting in a 50% average during baseline. Two opportunities occurred during intervention resulting in 100% adherence and there were no opportunities during maintenance.

Participant 2 also had an average of 97% use of bedside manner during baseline, increase to 100% during intervention and 100% during maintenance. She had five opportunities for proper glove use during baseline with an average of 97% and no opportunities seen by the observers to use gloves during intervention or maintenance. There were four opportunities for observers to see the use of sharps during baseline and she had 100% adherence with correct use of sharps. During the intervention, there were no opportunities for observers to see the use of sharps or during maintenance.

Participant 3 demonstrated bedside manner behavior in 100% of the observations during baseline, 95% during the intervention and 100% during maintenance. For proper glove wear, there was one opportunity to observe the behaviors during baseline and one opportunity during the intervention and no opportunities in maintenance. She received

100% adherence on both occurrences. There were only two opportunities to observe proper sharp use, both of which were during baseline and both times there was 100% adherence.

At this clinic, patients frequently visited and many of the patients and staff know each other. Therefore, many times the "telling the patient his/her name" was not needed and this behavior did not occur. If that was the case, the score was omitted instead of being counted incorrect. Additionally, participant 2 greeted patients in the waiting room, so there was not the possibility of hearing whether she greeted the patient or said her name. There were other times when the other bedside manners were not necessary, and those score were also omitted. For instance, during feedback messages, only hand hygiene was observed so there was no data during those sessions. Table 1 presents the opportunities to observe the behaviors for each participant through the study and the number of those opportunities that were correct.

Social Validity Questionnaire Results

On a Likert scale of 1-5, 1 was strongly disagree with the statement and 5 was strongly agree with the statement. Participants in the study reported on average that they thought the program was worth the effort (4.7), all of the participants believed that their safety behaviors improved (5), and no participant thought that the feedback was not helpful (1). The participants did report that they believed the observers had an effect on their behavior (4.3). In terms of the type of feedback they received, they agreed that the frequency (4.3) and format (4.3) of the feedback was helpful.

Discussion

The results of the current study suggest that immediate, personalized feedback is an effective intervention for increasing and maintaining improvements in hand hygiene. It decreased the variability during baseline for all of the participants. Not only did adherence rise to 100% quickly, feedback was an effective method to keep adherence up during maintenance probes. There were initially high levels of the generalized behaviors and they remained this way throughout the intervention. This indicates that engaging in hand hygiene more often and accurately did not interfere with other behaviors important to patient interaction and safety.

These conclusions can be drawn due to the multiple baseline across participants. The few studies that have looked at increasing infection control procedures and found significant effects (Chatterjee, Heybrock, Plummer, & Eischen, 2004) did not provide any evidence that the results were not due to a factor external to the independent variable being studied. The data showed that there were significant effects for all of the participants only once the independent variable was introduced. There was little change in the other behaviors that were not targeted in the intervention.

The quick increase in adherence during the intervention, as well as the high adherence rates during maintenance, makes this an ideal intervention for safety behaviors. For two of the participants, it only took two feedback messages to increase adherence to 100%. In applied settings, once it is established that there are low baseline levels of safety behaviors, it becomes necessary to provide an intervention that quickly gets adherence up to standards. The intervention does not need to be intensive; it only took a few feedback messages to get high rates of adherence as well as maintenance for at least two months for all of the participants.

This safety observation process is similar to the method used in many companies that have behavior-based safety programs. McSween (1995) described the process by which an organization can set up a safety observation process. This includes developing a checklist and target behaviors. Observers then use that checklist to record safe and unsafe behaviors throughout the company. His process does not require the use of immediate feedback, but recommends it if the observations are done by supervisors or employees who are comfortable providing peers with corrective feedback. If immediate feedback is to be given, he states that there are four basic methods for providing the feedback: stating the strengths and concerns, using the two questions method, the four step process, or a combination of these. The feedback in this study took the first approach of giving a summary of the correct components of hand hygiene that were seen and then providing constructive feedback on any parts of the observation that were of concern. McSween's company, Quality Safety Edge, and other consulting firms recommend other components in the process which were not in this study, such as graphing the data as another means of feedback and providing incentives for adherence with hand hygiene. This study provides an analysis of one aspect of a complex consulting process demonstrating that immediate, individualized feedback is an effective component.

The task was trained with total task presentation. Total task presentation is a type of teaching technique used to teach a chain of behavior. In this training technique, the task was broken down into a task analysis. All of the components were shown to the participant in the feedback form and verbally stated to them. This is as opposed to teaching them one step at a time after each observation as would occur in forward or

backward chaining, since they were already completing most of the tasks correctly. The participants completed the task and after each observation, the investigator went through the task with them and prompted them on the components that were incorrect. (Miltenberger, 2004)

Most of the errors that occurred during baseline were missing components of the task analysis of hand washing. For instance, a common component that was missed was turning off the faucet with a paper towel and not washing hands for the full 15 seconds. There were also times that they did not wash their hands when they should have, for instance before touching a patient. During initial calibration, participants made many comments that they were much more aware and were making sure to wash their hands correctly and when they should. Even though they stated this, the same errors occurred as did during baseline. This seems to indicate that the problem was that they did not know how or when to correctly wash their hands. In terms of OBM interventions, when there is a lack of ability or training, an antecedent intervention is more effective, while if there is a lack of "motivation" then a consequential intervention is considered. (Daniels & Daniels, 2006) The baseline rates and anecdotal observations of staff behavior indicate that in this setting, the low rates were due to lack of proper training.

Daniels and Daniels (2006) noted two unpublished studies conducted by Brewer (1989) and Roberts (1997) which analyzed whether feedback served as an antecedent or consequence. The studies indicated that when feedback was delivered before a session, performance improved quicker or had a higher net effect. This intervention had a similar format in that the feedback was given immediately following behavior which could serve as a consequence. But in most cases (excluding feedback given at the end of the day), the

feedback was also given within at least 1 or at most 2 hours before the behavior occurred again which could also provide evidence that it could function as a antecedent intervention. The studies mentioned by Daniels and Daniels (2006) provide evidence to suggest that feedback is most effective when it serves as a prompt or antecedent manipulation. Therefore, with this study, because the baseline rates indicate a lack of knowledge about how and when to correctly perform the behavior, this type of feedback is most likely to be effective because it is an antecedent manipulation.

Although the intervention was helpful in terms of training and as a prompt for the next occurrence of behavior, there are consequential aspects that played a key part in proper hand hygiene. The natural reinforcing consequence for proper hand hygiene is clean hands. This is a natural reinforcer. The CDC guidelines state that hand washing needs to be done prior to touching a patient and after touching a patient. Clean hands might be a reinforcer, but under many of the circumstances there was not a salient cue that their hands were dirty. Therefore, the consequence of clean hands might not have been a salient consequence since the participants would not always recognize that their hands were contaminated. At times, there could be the additional reinforcer of attention from patients or staff praising the person for good infection control or clean hands. There are also delayed consequences that are removed from the situation such as decreased chances of getting sick.

There are several negative consequences that come with correct adherence with hand hygiene. Some of these consequences could include, but are not limited to, dry and cracking hands, pain from soap or hand sanitizer, cold hands from cold water, less time to interact with the patient, more time spent in the room, or the inconvenience of washing

hands prior to writing information down. There are several immediate punishers present after washing hands and few reinforcers, only some of which are immediately present in the environment.

As suggested by the data, the positive and constructive feedback served as the programmed reinforcer that was not naturally present in the environment. It is hard to determine whether this feedback served as a positive reinforcer or a negative reinforcer. If it was a positive reinforcer, adding the feedback would increase the probability that the participants would engage in the behavior in the future. If it was a negative reinforcer, they would engage in the correct behavior to get the investigator to stop conducting observations, since mastery meant that the investigator and observers would no longer be present.

The contrived reinforcer was then faded out and the natural consequences were the only consequences in place. Since the consequences naturally present are still mainly negative, it is possible that there were high rates during maintenance due to habit reversal. In terms of this study, a habit could be defined as a repetitive behavior that occurs under similar environmental circumstances which results in the same reinforcer. More traditionally, a habit in the Behavior Analysis literature states that it is a repetitive behavior that results in negative social or physical effects for the person. Typically, habit reversal literature has focused on habits as problem behavior such as tics, stuttering, and nervous habits. (Miltenberger, Fuqua & Woods, 1998)

Habit reversal therapy focuses on four phases: awareness training, competing response training, motivation procedures and generalization procedures. The feedback process had similarities with the awareness and competing response training. For

instance, the feedback made the participant aware of their correct and incorrect behaviors. They also become aware of when the behavior should be occurring throughout interactions with patients. They were then instructed to engage in alternate, correct responses to replace the incorrect responses. In traditional competing response training, the person would practice using the competing response for 3 minutes if the habit occurred. This method would not be practical or necessary in this type of situation. Although this only encompassed two of the phases of habit reversal training, the literature has not determined what phases of the training need to be present for habit reversal to occur. There has not been a clear behavioral account for habit reversal training. It has been speculated that it relies on rule-governed behavior because the individual prompts themselves to use the competing response when they are aware that the habit will occur. (Miltenberger, Fuqua & Woods, 1998)

Another alternative or additional explanation is that the feedback functioned as a verbal rule. The feedback consisted of stating what aspects of the behaviors were done correctly, what components of the task were missed or out of order, and under what conditions hand hygiene should be practiced in the future. These feedback messages could have served as rules for when and how to perform accurate hand hygiene. The verbal instructions provided a convenient means to provide an immediate consequence. This was effective because it was difficult to come into contact with the long term effects of the natural positive consequences (Catania, 2007). It is likely that the participants had already formed a rule from the previous training on correct hand hygiene. The old rules that they had been using were inaccurate. Engaging in that sequence of behaviors under specific times resulted in a consequence of "clean hands" which was, it could be

assumed, a reinforcer for washing hands again. When the investigator gave new rules with the feedback, the previous rules they had formed no longer could provide them with the feeling of clean hands. Therefore, the old class of behaviors went through extinction and new rules were formed. After the intervention, the reinforcer of clean hands was only present when behaving following the new rules.

Observer Training

The calibration and training process was crucial in further refining the checklist and definitions. This might explain the difference between number of sessions to mastery between observer one and two. Observer one was at the clinic for several days prior to observer two being present. Within those first few sessions, the calibrations process helped in refining the checklist and definitions for better independent agreement. Thus observer two experienced a refined training process relative to observer one.

The observer training used a similar intervention as provided to the participants in that immediate feedback was provided after each observation. Although there was no baseline data on their performance, it provides a similar effect as the intervention for the participants in the study. Once they reached mastery, they were able to maintain high levels of accuracy during the IOA checks throughout the study.

Contributions

This study adds to the literature in several ways. The data provide additional evidence that the methods used by Alavosius and Sulzer-Azaroff (1986) are effective in improving and maintaining safety behaviors. It extends the research on immediate, individualized feedback from the response class of patient lifting, to a different safety behavior of hand hygiene, in another type of healthcare setting. The authors hypothesize

that one possible explanation for the high rates in maintenance is that some of the natural reinforcing effects came into play, and it became easier to practice safe techniques. As stated earlier, there are many negative consequences that occur with the increase in adherence with hand hygiene, and regardless of these consequences, the intervention was effective at reaching mastery and maintaining high rates after the feedback was removed.

This is one of the only studies in the OBM and the Infection Control literature that has demonstrated an effective intervention to get hand hygiene up to 100% adherence. Stephens and Ludwig (2005) were able to increase hand washing from 24% adherence during baseline to 65% in intervention and 52% during withdrawal. They were not able to get hand washing up to an effective level to maintain safety for patients and staff. Our study provides a quick and proven method for improving hand hygiene for those within the areas of healthcare and behavior-based safety. This study suggests that, contrary to what has been verbally reported in surveys, some of the reason for low adherence with hand hygiene could be due to inadequate training on how to correctly wash hands according to the CDC, as well as when hand hygiene should be practiced. (Pittet, 2000)

Not only was it an effective intervention, but it had high ratings on the social validity questionnaire. The questionnaires indicated that this intervention was socially valid, which addresses the second part of the research question. When the participants were asked whether they would like to have the program continue, the average rating was 3. This was lowest score in terms of satisfaction with the program. It may be due to inaccurate wording. They might have scored this low because they did not think they needed any more feedback. They were now aware of the correct procedures for hand hygiene and were consistently at high levels of adherence. A better question would have

been to ask whether they would like to have a similar intervention with other behaviors or in different areas of the hospital. The participants also reported that they were aware of the importance of Universal Precautions and most indicated that they do not worry about contracting hospital-acquired infections in their current position. They also noted that correct adherence with Universal Precautions did not take up too much time or reduce their dexterity, criticism which were noted in previous studies as a reason for low adherence. (Pittet, 2000)

The materials produced in this study provide a task break down, checklist, and feedback form that can be used to study adherence to hand hygiene procedures. It ensures that not only is hand washing done correctly, it is also reflected in the way that the data are calculated. The literature on hand hygiene is not specific about how adherence is calculated. Adherence could be counted as a daily frequency count of occurrences of hand hygiene over opportunities available. Adherence could also be counted, as in the current study, as the number of correct components completed over the opportunities and number of possible components. This study provides a clear description of what is adherence. It adds to the already vast literature that states that hand hygiene adherence is frighteningly low. The average baseline for the participants in the current study was 53.2% adherence, which is similar to the commonly stated levels. We add to the literature by defining a technique for revealing the actual errors and omissions in UP behaviors by practicing health-care professionals.

The use of direct observation as a means of data collection is widely used in Behavior Analysis research and applied work, for instance in behavior-based safety programs. Observers can also benefit from immediate, individualized feedback and providing on-

the-job feedback can be one way to do this. Although this might be the method used for training observers, this study provides a thorough description of how the training was done so that it can be replicated and further refined in future research.

Limitations

Regardless of the controls, there were a few possible limitations to the study. One main limitation to the study is the effect of the observers shadowing the staff. The observation system is obtrusive, so it could have an effect on the behavior of the staff. It was noted in the social validity questionnaire that the participants believed the observers had an effect on their behavior. Since the observers were present during the baseline as well as the intervention, any reactivity effect from having an observer shadowing them should be equaled out across both phases. However, just having observers present does not account for the increased adherence with hand hygiene. Anecdotally, participants mentioned that the observers had an effect on their behavior frequently during the calibration phase. Since there were a couple of weeks of observations during the calibration phase, their performance likely would have started high and decreased to a more stable rate after several observations. Even if there was a reactivity effect, the participant's rates of adherence during baseline were similar to those reported in the literature, indicating a need for an intervention regardless.

There was a high level of maintenance for long durations after the feedback was given. If the participants were only adhering when the observers were present, then the data would have indicated decay in the maintenance probes if they had reverted to incorrect behaviors. There were high levels of adherence even 2 months after feedback was given and observers were infrequently present. Thus, it could be assumed that they

were practicing safe adherence even when the observers were not present. Immediately after the 1 month probe, participant 1 reported that she completely forgot that the observer was in the room and was worried she had not done everything correctly but had 100% adherence. This provided one of the only opportunities to see how the participants were behaving in the absence of observers.

Another problem with this type of observation method is its generalizability. In an everyday work environment, there is not an observer shadowing staff to ensure that they are complying. Alternatives might be using equipment to watch the behaviors as opposed to a person shadowing the staff. This alternative has a more vital disadvantage in that it will not capture all of the behaviors that are being studied. A camera could only capture certain parts of the room due to privacy concerns involving patient's rights. It would not be a good observation system to measure all behaviors. If patients started to do observations and ask questions, as recommended in the Nevada State Health Department announcement it could provide an alternative to outside observers being present. This method might not be a realistic or practical intervention. A final option for data collection would be using peer observations and feedback. This would be an ideal method. Observers being present would then be a realistic and generalizable method. This would be more of a systems level intervention that would require an additional commitment for hospital personnel.

As in any research in an applied setting, it is difficult to control for all extraneous variables, so this could be seen as a limitation. One other limitation is that there were only three participants in the study. Although this study offered three replications of the independent variable having an effect on the dependent variable, having additional

participants in the study could have provided more evidence of the intervention's effectiveness. The multiple baseline design and data provide evidence that these limitations are not issues. The change from baseline to intervention across all participants indicated that the independent variable was the factor that had an effect. And the drastic changes in all of the participant's behavior after feedback provide evidence for the intervention without the additional participants.

Future Research

One line of research can focus on refining observer training and determine the best methods for training accurate observations. Behavior Analysis can play a large part in this research since it is the science of how people learn. Immediate feedback was the method for observer training in this study. The training was done with videos in situations that were not similar to the real setting, videos in the actual setting, and observations with actual patient interaction. The training indicated that the observers learned best when they were put in the real setting. Research can determine what components of the training are key, such as the location of the training, type of feedback, how they can initially be trained on the checklist, etc. This research should be done in a more controlled manner to explore optimal observer training protocols.

The current research study could be extended and replicated. To provide more evidence that the intervention was successful in promoting maintenance, the probes could continue beyond the two month point to check for the levels of adherence. This would provide data to determine if and when adherence decays. Depending on how long it takes for adherence to decay, booster feedback messages could be provided a week or two prior to those pre-determined times to see if the adherence maintains at high levels, or if more

intensive feedback messages need to be provided again. This could provide information for creating a feedback system that ensures people receive information frequently enough to maintain high rates of adherence.

Figures 4, 5 and 6 demonstrate that most of the time, when adherence rates were below 100% due to the participant missing a component required by the CDC. During maintenance probes, there was typically at most one component of the chain that was missed. In calculating the data, the adherence rates made it necessary to complete all of those tasks or the participant was not considered to be practicing safe behavior. All of the components are required by the CDC's definition but it could be beneficial to look at whether or not, for instance, rubbing hands together for 13 seconds as opposed to 15 seconds puts the patient and staff member in danger. By placing a weight on each component, it could emphasize the components that are the most vital for infection control. Placing a weight on behaviors could also be applied to other jobs where there are several safety behaviors that need to be practiced.

As stated earlier, this study provides more evidence to suggest that immediate, personalized feedback delivered until mastery is an effective intervention to increase adherence with safety behaviors. To provide more support for this, future research could extend the same method to other safety behaviors as well as other behaviors that organizations would like to improve. Using observations, checklists and feedback is common within interventions on safety behaviors and has shown to be effective. Applying the same method of data collection and intervention to other behaviors in organizations could provide another line of research in OBM. Whether this method

works for other behaviors and what aspects of the process are crucial for different classes of behaviors in various settings could be explored.

In addition to this, analyzing what constitutes "mastery" for each behavior and in different contexts. The mastery criterion was arbitrarily chosen in the current study. Different mastery criterions could be tested and evaluated. For instance, it is possible to determine whether it is best for the mastery criterion to be demonstrated in one day or over several days. Moving the graphing method to the celebration chart and using some of the principles used in precision teaching and fluency could be beneficial for this research and OBM research in general.

Another intervention that could be investigated is the use of immediate, individualized feedback with verbal and graphic feedback. The current study used verbal and written feedback by showing the participants the checklist with the behaviors they did correctly and incorrectly. Research could use this same method although instead of written feedback, the participants would be show graphic feedback similar to that in figures 4, 5 and 6. This would demonstrate not only what they did on the last observations but also in the context of past observation. They would be able to see what they are consistently missing and how it has changed over time.

Research should extend the studies of the components of feedback. This intervention showed an evident change in the behavior of the participants but it is not clear exactly which principle can account for the effect. The research could further parse out the various aspects of feedback by systematically testing the components of feedback. It could provide an easier means for determining whether feedback should be used after

an initial assessment has been conducted demonstrating whether an antecedent or consequential intervention is necessary.

One way that could look beyond antecedent and consequential aspects is by looking at rule-governed behavior in the context of feedback. A modification to the current study would be to give the participants various pre-determined rules to see which rules have an effect on their behavior. This could extend into the four ways in which feedback can be given as stated by McSween (1995). Future research could empirically determine the effects of using one method over another or how the different feedback methods could be combined. This study provides evidence that the strengths and concerns method is effective; more research could compare and contrast this with the other methods.

Since the behavior of hand washing and hand sanitizing needs to be done frequently in healthcare, it could be considered a habit. The habit reversal literature does not account for other behaviors beyond problem behaviors and this could provide a new line of research in the habit reversal literature and well as extend the definition currently used for habits. The habit reversal therapy process could be applied to other highly repetitive tasks, such as line assembly work, to determine if it is effective as an intervention to change behaviors.

It could also be explored as to how to effectively take this intervention to a systems level. Research should analyze and determine how this method can be modified and generalized to the whole hospital where there might be more resistance, different environments and more participants. One way of doing this would be to evaluate whether it is practical and effective to use peer and supervisors to do observations and

provide feedback. Extensions of the observer training could provide a method to accurately train hospital employees to do observations and provide positive, constructive feedback. A line of research should also look at how different observers and feedback providers bring people up to mastery and how well it maintains. For instance, would participants reach mastery quicker if it was their boss providing feedback as opposed to a person outside the organization?

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TABLES

Table 1

	Participant 1		Participant 2		Participant 3	
	Opportunities	Correct	Opportunities	Correct	Opportunities	Correct
Greets the patient	39	39	35	35	28	28
Tells the patient her name	22	20	0	0	7	5
Asks the patient questions	38	38	46	45	27	27
Explains and clarifies the procedure	36	36	49	49	24	24
Total number of observations	40		59		35	

Table 2

	Social Validity Survey Results	
	Question	**Average Rating out of 5 (1- Strongly Disagree 5- Strongly Agree)**
1	The safety program was worth the effort	4.7
2	I would like the program to continue	3
3	The feedback was not helpful to me	1
4	I believe my safety behaviors improved as a result of the program	5
5	I am more satisfied with my job as a result of the program	3
6	I liked receiving individualized feedback about my performance	4
7	My work environment is designed and organized to facilitate safe job performance	5
8	All of the necessary supplies to help prevent accidental exposure to bodily substances are readily available	5
9	I redesigned my work set-up to remind myself to practice the safe behaviors	3
10	My safety practices are considered when I receive performance evaluations by my supervisor	3.3
11	Management (immediate supervisor and higher) show concern and commitment regarding safety issues	5
12	I worry about the risk of contracting hospital acquired infections through my work	2
13	Practicing Universal Precautions (UPs) decreases my risk of contracting hospital-acquired infections	5
14	The observers had an effect on my behavior	4.3
15	Following UP practices are too time consuming	1
16	Following UP practices decreases my dexterity	1.6
17	I would contact my supervisor or Employee Health if I were accidentally exposed to body fluid substances	5
18	I consider the feedback acceptable in this environment	5
19	I am satisfied with my level or compliance with Universal Precautions	5
20	The frequency of the feedback was helpful	4.3
21	The format of the feedback was helpful	4.3
22	The program was stressful to participant in.	2.3

FIGURES

Figure 1

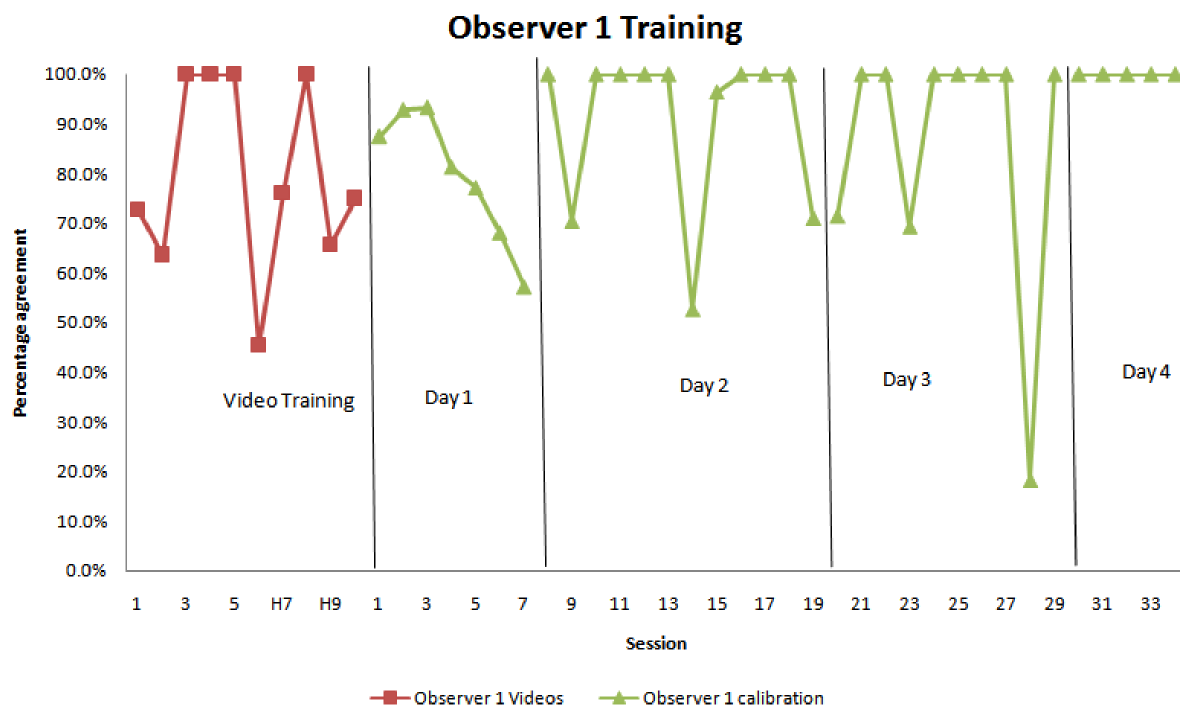


Figure 2

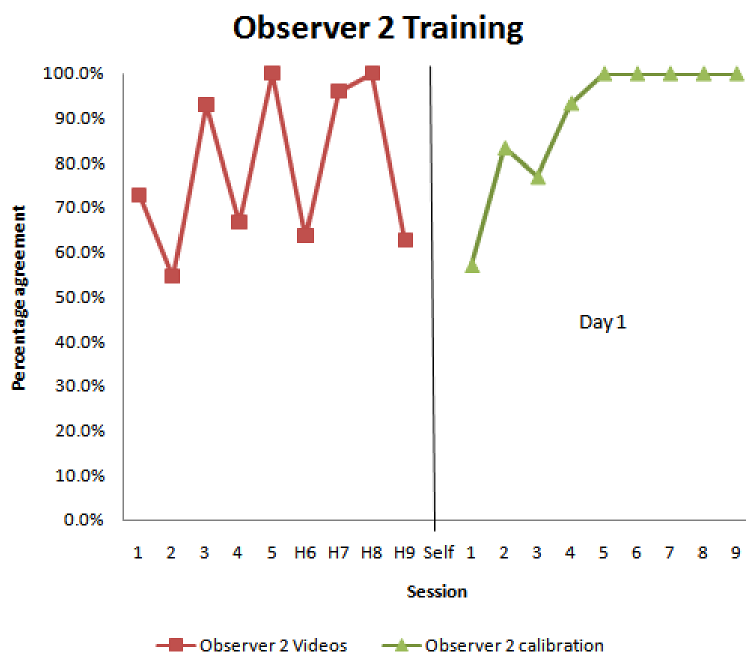


Figure 3

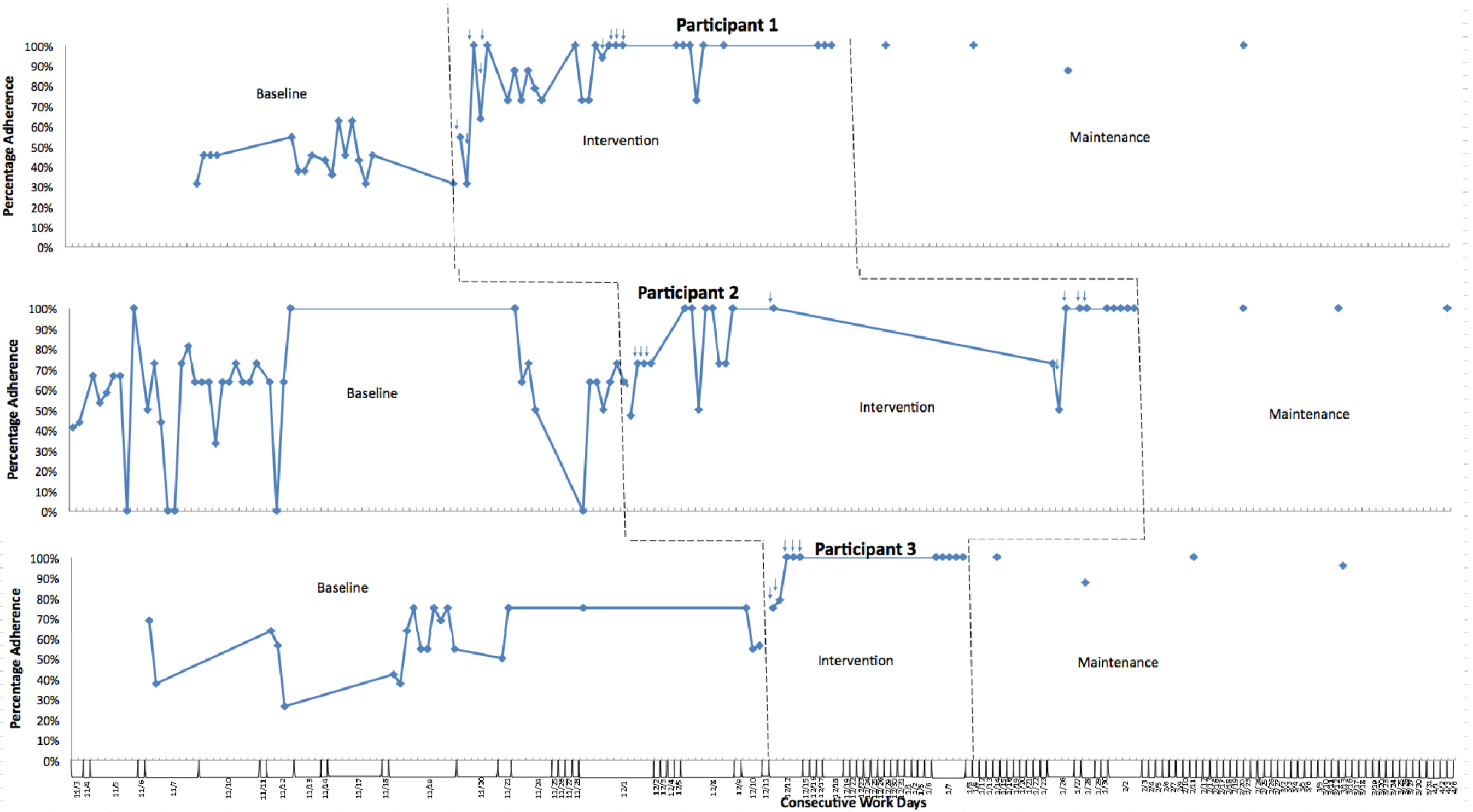


Figure 4

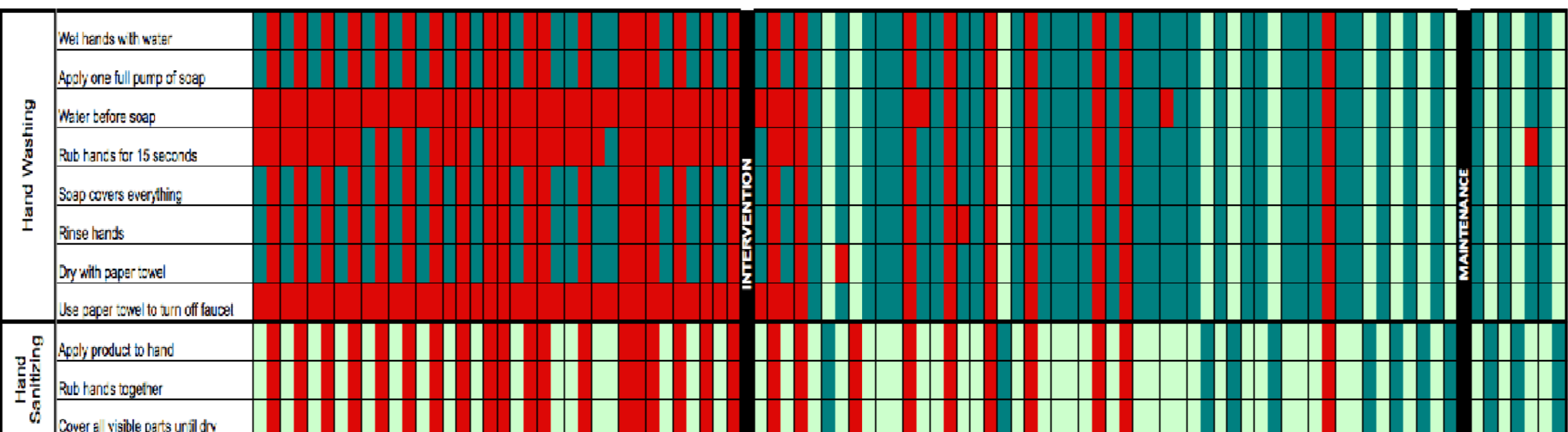


Figure 5

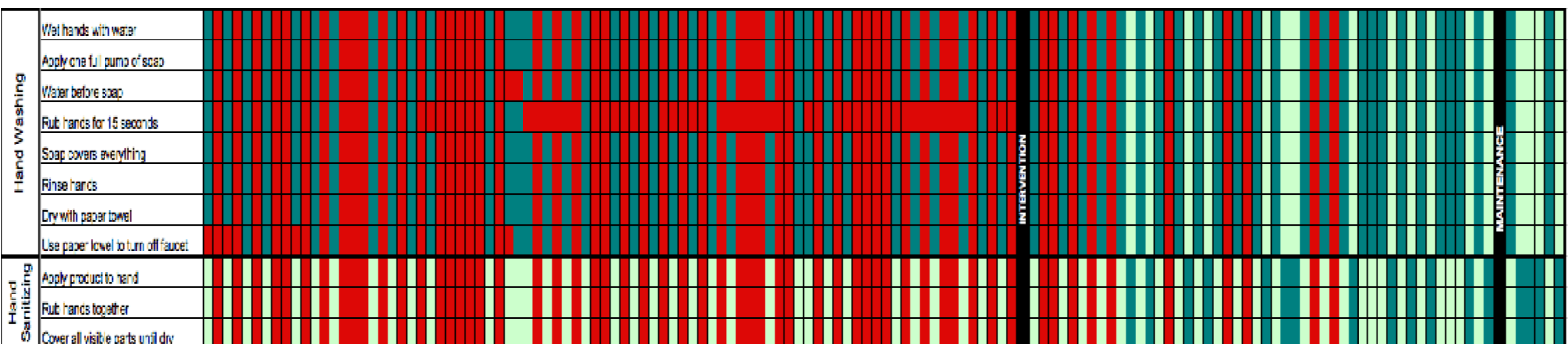


Figure 6

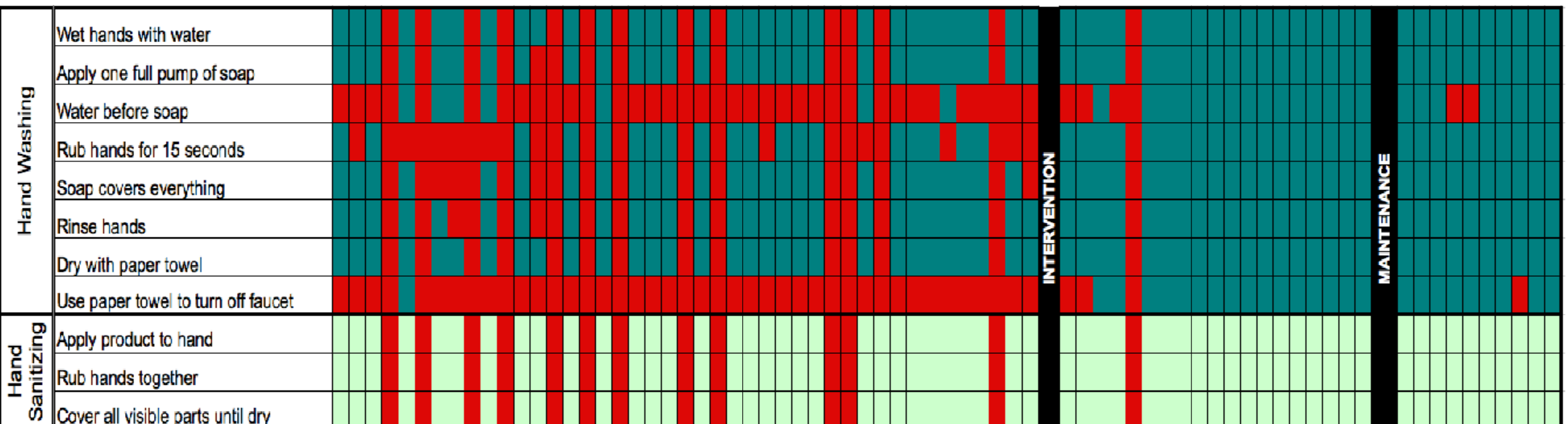
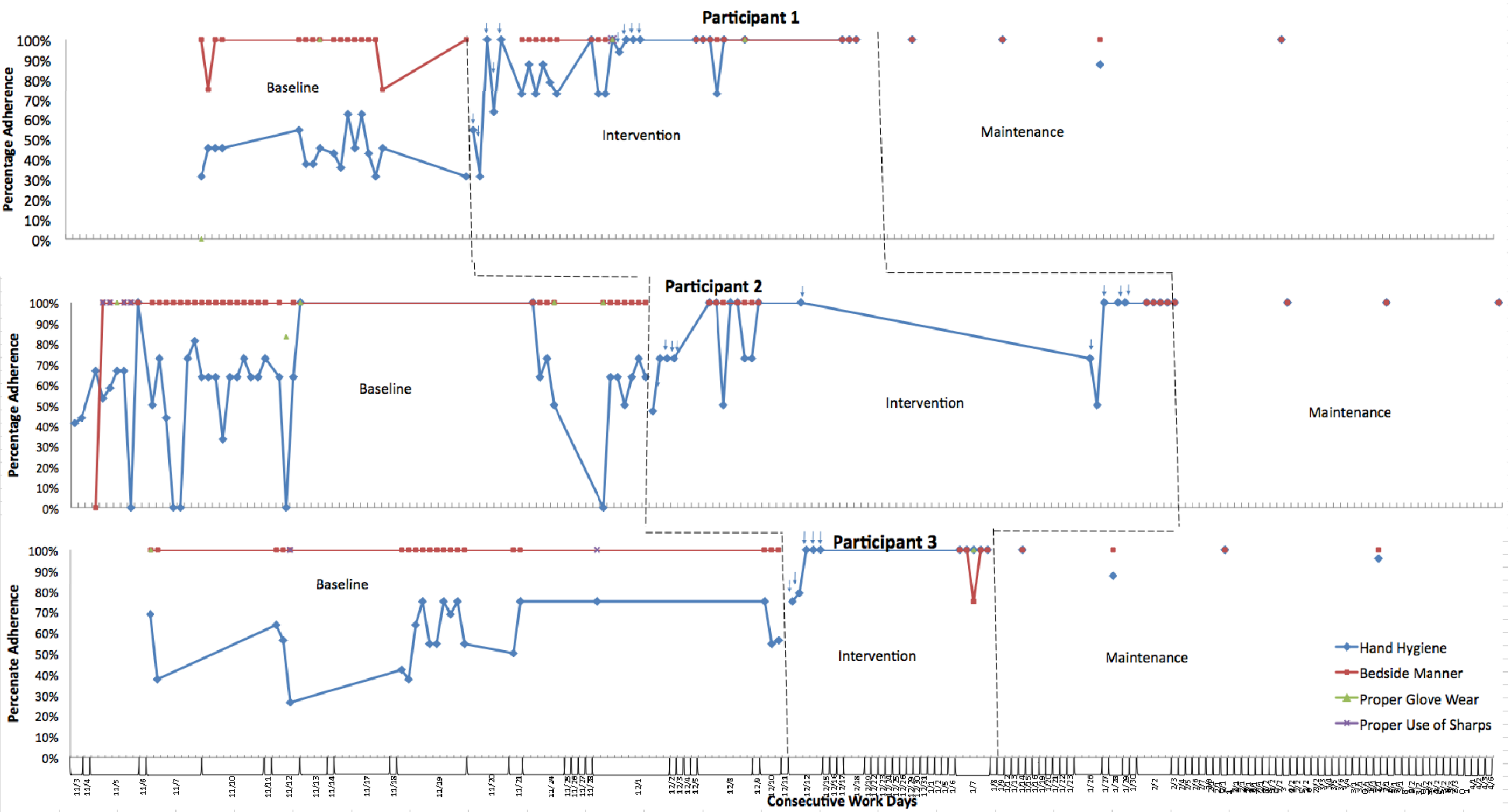


Figure 7



APPENDICES

Appendix A

Safety Behavior Checklist

Date_______________________ Observer (circle) M J W Participant code___________
Time Appointment Started_____ Time Appointment Ended______ Where conducted _______
Patient is: Male__________ Female_____________
Hazards present: blood____ body fluid_____ bandage_____ other, describe_________________

One time occurrence behaviors:

Behavior	Yes	No	Comments
1. Greets the patient			
2. Tells the patient his/her name			
3. Asks the patient questions			
4. Explains and clarifies procedure			
5. Safe practice of handling sharps			
6. Proper disposal of sharps			

Multiple occurrence behaviors:

	Behavior	Y	N	"w"	Y	N	"w"	Y	N	"w"	Y	N	"w"
HAND SANITIZER	Apply product to one hand												
	Rub hands together												
	Cover all visible parts of hands and fingers until hands are dry												
	If not initiated: state the environmental interference												
HAND WASHING	Wet hands with water												
	Apply one full pump of soap												
	Hands wet before getting soap												
	Rub hands with friction for at least 15 seconds (can be in or out of water as long as friction is applied for full time)												
	Soap covers backs of hands, palms, and wrists and hands are below the level of the elbows												
	Rinse hands until all visible soap has been rinsed off												
	Dry hands with new paper towel												
	Use new paper towel to turn off faucet												
	If not initiated: state the environmental interference												
GLOVE WEAR	Gloves put on at correct time												
	If not initiated: state the environmental interference												
GLOVE REMOVAL	Grasp outside of glove with opposite gloved hand: peel off												
	Hold removed glove in gloved hand												
	Slide fingers of ungloved hand under remaining glove at wrist												
	Peel glove off over first glove												
	Discard gloves in waste container												
	If not initiated: state the environmental interference												
	Comments												

Operational Definitions and Elaborations of checklist

General Directions:

- Use one sheet for each occurrence. One occurrence is counted as visit between a patient and healthcare worker, the occurrence is over when they leave the room.
  Example:
  - In moving from the lab to the room with the same patient and same healthcare worker, use one sheet for the lab and one sheet for the room.
  - With one patient who is seen by two different healthcare workers at different times, there will be two sheets, one for each healthcare workers interaction.
- Check yes or no for anytime an occurrence of a behavior occurs. If there was no opportunity for the behavior to occur: write either N/A, cross out the box or leave blank.

Response Definitions

1. **Greets the patient** – this includes the following statements:
   a. "Hi",
   b. "Hello"
   c. "How are you (today)" (and any variations on this),
   d. "Good morning/afternoon/evening"
2. **Tells his/her name –** this can include the following phrases:
   a. "My name is _____"
   b. "I am _______"
3. **Asks the patient questions** – this includes any questions regarding the patient's information or history
4. **Explains and clarifies the procedure**– this can include any of the following:
   a. Summarizing the presenting condition (i.e. give blood pressure)
   b. Gives any information about the procedure
   c. Answers questions regard procedure
5. **Safe practice of handling sharps** – the needle was not recapped after use. One handed method is acceptable or use of a safety device is acceptable
6. **Proper disposal of sharps** – the needle was not laid down on any surface before disposal and was placed in a safety sharp container
7. **Hand Sanitizer -** only when hands are **NOT VISIBLY SOILED** (wrong if hands are soiled and use hand sanitizer)
   When:
   a. Before contact with patient's skin
   b. After contact with a patient's skin
   c. Before donning sterile gloves
   d. After removing gloves
   e. After contact with inanimate objects (including medical equipment) in the immediate vicinity of the patient

- *If there was no hand sanitizing when there should have been then count it as missed occurrence of hand sanitizing as long as the hands were not visibly dirty (e)*

or fits (f). If there is NO HANDSANITIZER present, count as a missed occurrence of hand washing.

8. **Hand washing** - when hands are or are not visibly soiled
   When:
   a. Before contact with patient's skin
   b. After contact with a patient's skin
   c. Before donning sterile gloves
   d. After removing gloves
   e. Hands are visibly dirty or visibly soiled with blood or other bodily fluids
   f. After contact with body fluids or excretions, mucous membranes, nonintact skin, and wound dressings
   - *If there was no hand sanitizing or hand washing when there should have been and there is no hand sanitizer present, count as a missed occurrence of hand washing.*
9. **Glove wearing** – includes putting gloves on with all five fingers in the correct location and the gloves completely covering the hand and fingers.
   When:
   a. Moving from contaminated site to clean body site on the same patient
   b. Moving from patient to touching surface
   c. Draw blood, start IVs, suctioning, providing wound care or oral care, and preparing or giving medications. Presence of visible blood, stool or bodily fluids
   d. Cleaning or handling objects, materials or surfaces contaminated with body substances
   e. When there will be contact with chemicals
   f. Cuts or scraps on employees hands
   g. Contact precaution sign on patient door
   h. Handling trash bag, linen bag or residents' clothing
10. **Glove Removal**
   When:
   a. Moving from contaminated site to clean body site on the same patient
   b. Moving from patient to touching surface
   c. Gloves visibly soiled
   d. Gloves torn
   e. Moving between patient contacts, when moving from same patient "dirty" task that involves non-intact skin, mucous membrane or blood or body fluid to another task or "clean" area

Environmental Interferences

(use the below number and letter, i.e. 1a under "w" if the behavior does not occur)

1. **Inaccessible supplies –** defined as:
   a) HW: Soap out of arms reach or not in room
   b) HW: Towel out of reach or not in room
   c) HW: Sink out of reach or not in room
   d) HS: Sanitizer out of arms reach or not in room
   e) GW: Gloves out of arms reach or not in room
   f) GW: Trash can out of reach or not in room
2. **Physical Appearances on Staff**–defined as:
   a) Hands are visibly dry (includes cracked or flaky skin)
   b) Visible sores on hands

c) Bandaids/bandages on hands
d) Artificial fingernails or finger nails longer than ¼-inch long

3. **Patient Priority** – defined as:
    a) Patient vocalizes or demonstrates that they are in immediate pain
    b) Patient asks more than 8 questions during appointment
    c) Safety danger of leaving the patient
4. **Time** – defined as:
    a) 15 minutes before closing of the health center or before shift ends
    b) Staff member vocalizes that they have limited time

Appendix B

Safety Behavior Feedback Form

Date______________________ Participant code _____________

Time Appointment Started_____ Time Appointment Ended______ Where conducted ______

	Behavior	Y	N	Y	N	Y	N	Y	N
HAND SANITIZER	Apply product to one hand								
	Rub hands together								
	Cover all visible parts of hands and fingers until hands are dry								
	Before contact with patients skin								
	After contact with a patient's skin								
	Before donning sterile gloves								
	After removing glove								
	After contact with inanimate object in immediate vicinity of the patient								

	Behavior	Y	N	Y	N	Y	N	Y	N
HAND WASHING	Wet hands with water								
	Apply one full pump of soap								
	Hands wet before getting soap								
	Rub hands with friction for at least 15 seconds (can be in or out of water as long as friction is applied for full time)								
	Soap covers backs of hands, palms, and wrists and hands are below the level of the elbows								
	Rinse hands until all visible soap has been rinsed off								
	Dry hands with new paper towel								
	Use new paper towel to turn off faucet								
	Before contact with patients skin								
	After contact with a patient's skin								
	Before donning sterile gloves								
	After removing glove								
	After contact with inanimate object in immediate vicinity of the patient								
	Hands are visibly dirty or visibly soiled with blood or other bodily fluids								
	After contact with body fluids or excretions, mucous membranes, nonintact skin, and wound dressings								

- Hand sanitizer can only be used when hands are NOT visibly soiled
- *If there was no hand sanitizing when there should have been then count it as missed occurrence of hand sanitizing as long as the hands were not visibly dirty (e) or fits (f). If there is NO HANDSANITIZER present, counted as a missed occurrence of hand washing.*

Appendix C
Social Validity Questionnaire

	Strongly Disagree				Strongly Agree
1. The safety program was worth the effort.	1	2	3	4	5
2. I would like the program to continue.	1	2	3	4	5
3. The training sessions were not helpful to me.	1	2	3	4	5
4. I believe my safety behaviors improved as a result of the program.	1	2	3	4	5
5. I am more satisfied with my job as a result of the program.	1	2	3	4	5
6. The program was stressful to participate in.	1	2	3	4	5
7. I personally intended to achieve the unit goals.	1	2	3	4	5
8. I discussed the safety behaviors and/or graph with others.	1	2	3	4	5
9. I looked at the graph after each update	1	2	3	4	5
10. I liked receiving individual feedback about my performance.	1	2	3	4	5
11. My work environment is designed and organized to facilitate safe job performance.	1	2	3	4	5
12. All of the necessary supplies to help prevent accidental exposure to body substances are readily available for my use.	1	2	3	4	5

	Strongly Disagree				Strongly Agree
13. I redesigned my work set-up to remind myself to practice the safety behaviors.	1	2	3	4	5
14. My safety practices are considered when I receive performance evaluations by my supervisor.	1	2	3	4	5
15. Management (immediate supervisor and higher) show concern and commitment regarding safety issues.	1	2	3	4	5
16. I worry about the risk of contracting hospital-acquired infections through my work.	1	2	3	4	5
17. Practicing UPs (UPs) decreases my risk of contracting hospital-acquired infections.	1	2	3	4	5
	1	2	3	4	5
18. Following UP practices is too time-consuming.	1	2	3	4	5
19. Following UP practices decreases my dexterity.	1	2	3	4	5
20. I would contact my supervisor or Employee Health if I were accidentally exposed to body fluid substances at work.	1	2	3	4	5
21. I consider the training that incorporates fluency acceptable in this environment.	1	2	3	4	5
22. I am satisfied with my level of adherence with UPs.	1	2	3	4	5

APPENDIX D

Richard Whitley
Administrator

State Health Officer

Contact Name: Martha Framsted
Phone Number: 775-684-4014
Date: March 3, 2008

NEVADA STATE HEALTH DIVISION

NEWS RELEASE

**Patients Urged to Ask Questions
Prior to Surgical Procedure**

Carson City – The Nevada State Health Division is encouraging patients to be proactive about impending surgical procedures by asking their health care provider about office protocols and standards prior to receiving a surgical procedure. Prompted by the recent investigation into a Southern Nevada Ambulatory Surgery Center's (ASC) medical practices and as a way to help alleviate patient fears and anxiety regarding infection control practices at their selected facility, the State Health Division offers the following suggested questions a patient may ask their service provider:

- Can you assure me that I am safe in your facility from the transmission of communicable diseases?
- How does the staff at this facility conduct sterilization of diagnostic equipment after each patient use?
- Are single or multiple dose vials used at the facility? Are label instructions followed specifically?
- Are syringes and needles disposed of after each use?
- Has your facility ever received a complaint of the spread of an infectious disease to another patient as a result of staff practices?

Patients can also request a copy of the facility's Infection Control Policies. In addition, a patient can request a copy of the most recent federal survey or complaint survey (if any) conducted at the facility by the Nevada State Health Division's Bureau of Licensure and Certification by writing to:

Nevada State Health Division
Bureau of Licensure and Certification
4220 S. Maryland Parkway, Bldg. D, Ste. 810
Las Vegas, Nevada 89119
702.468.6515

You can also contact BLC via email: BLCweb@health.nv.gov

--MORE--

Richard Whitley, Administrator

If you have questions or concerns about insurance coverage or about payment for testing related to this incident, contact the Nevada Division of Insurance at 1-888-872-3234.

Facts About Ambulatory Surgery Centers and the Bureau of Licensure and Certifications Role

- "Ambulatory Surgical Center" or "ASC" includes any facility that operates exclusively for the purpose of providing surgical services to patients not requiring hospitalization.
- There are 50 ASCs licensed in Nevada. Approximately 30 of these facilities are located in Southern Nevada. Some of these primarily provide endoscopic procedures. Others provide more extensive surgeries, but only for patients that will not require more than 24 hours in recovery before leaving the facility.
- The Bureau of Licensure and Certification (BLC) conducts a licensure inspection of ASCs before the can accept patients. The purpose of the inspection is to determine if the facility meets construction requirements and state health care regulations. BLC may conduct Medicare certification inspections after a facility has accepted patients, or the facility may be inspected by an accrediting agency for Medicare certification. After these initial inspections, BLC conducts complaint investigations whenever there are alleged violations of regulatory requirements.
- The Centers for Medicare and Medicaid Services (CMS) contracts with BLC to conduct inspections of all health care facilities in Nevada. This contract prioritizes the inspections and has set the minimal inspection periods for ASCs at one inspection every six years.
- In 2007, BLC received a total of four ASC complaints. To date in 2008, BLC has received five ASC complaints. All complaints are prioritized and scheduled for investigation based on their priority.
- Following an investigation, an ASC is notified of any deficiencies. If the facility fails to make corrections, BLC may take action against the facility, including terminating the business's license if the facility fails to make corrections for compliance with federal Medicare regulations.

The State Epidemiologist, Dr. Ihsan Azzam, issued a technical bulletin to all ASCs and health care providers. The bulletin can be accessed by going to:
http://health.nv.gov/docs/hepctechnicalbulletin.pdf

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Appendix E
Quiz
Observer checklist

Directions: This is to ensure that you are very familiar with the checklist before we start training on the videos and before making observations at the clinic. The answers do not need to be verbatim, but they should reflect the correct procedures and times when procedures should be used.

1. There are three ways in which staff can explain or clarify the procedure, list the three type:
   a. ____
   b. ____
   c. ____
2. When is it acceptable to use hand sanitizer over hand washing?
3. Under what situations should **hand washing** be done?
   a. ____
   b. ____
   c. ____
   d. ____
   e. ____
   f. ____
4. State the missing task in the sequence for glove removal:
   a. Grasp outside of glove with opposite gloved hand: peel off
   b. Hold removed glove in gloved hand
   c. Slide fingers of ungloved hand under remaining glove at wrist
   d. ____
   e. Discard gloves in waste container
5. When should gloves be removed?
   a. ____
   b. ____
   c. ____
   d. ____
   e. ____
6. What are the four categories of environmental interferences:
   a. ____
   b. ____
   c. ____
   d. ____
7. What are the four statements that can be counted as “greeting the patient”?

a. ______________________________
b. ______________________________
c. ______________________________
d. ______________________________

8. Under what conditions should gloves be worn?
    a. ______________________________
    b. ______________________________
    c. ______________________________
    d. ______________________________
    e. ______________________________
    f. ______________________________
    g. ______________________________
    h. ______________________________
    i. ______________________________
9. What step is missing in the steps for hand sanitizing?
    a. Apply product to one hand
    b. Rub hands together
    c. ______________________________
10. What is considered “safe practice of handling sharps”?