Healthcare-associated infections (HCIs) continue to affect patient morbidity and mortality and contribute to the rising cost of health care. Factors associated with the rise of HCIs in patients with cancer may include an increase in antimicrobial resistance and treatment effects of radiation and chemotherapeutic agents. Infection control and prevention practices can decrease infection rates among patients with cancer. In an effort to reduce HCIs and increase awareness, an interventional study was conducted at an oncology center to investigate hand hygiene compliance of healthcare professionals before and after the introduction of a handheld sanitizer spray. Although healthcare professionals had a positive response to the spray, it did not improve compliance rates.
using Centers for Disease Control and Prevention (CDC) hand hygiene guidelines, should be implemented. In addition, data about healthcare-acquired infections should be made available to healthcare workers.

The purpose of this descriptive intervention study was to investigate hand hygiene compliance of healthcare workers at an oncology center and to determine whether the introduction of a handheld sanitizer spray increased hand hygiene compliance.

Methods

Setting and Sample

The present study was conducted at a university-affiliated oncology acute-care hospital and its associated outpatient treatment clinics in southern Florida. The setting was chosen because of the high acuity of the patient population, risks of hospital-acquired infection among immunocompromised patients, and the absence of a preexisting handheld sanitizer spray. The principle investigator (PI) and research project director obtained permission to conduct the study from the nursing and infection control administrators of the oncology center. In addition, the study was reviewed and approved by the Western Institutional Review Board (WIRB) through the Office of Human Subjects at the University of Miami in Florida.

Research team members consisted of the PI, the research project director, research assistants, graduate students, and an infection control nurse. Other research support services included statistical and computer facilities for data filing, analysis, and management of data components. Potential participants were recruited from the regular full- and part-time staff working in inpatient and outpatient units. Licensed and unlicensed healthcare professionals from nursing, respiratory therapy, patient care, and phlebotomy were invited to participate. Information sessions were held on each unit, in which the PI and project director reviewed the research proposal, purpose, methods, and data collection procedures. Potential participants who attended information sessions and expressed an interest in the research study were approached by a research team member, and written informed consent was obtained. Forty-seven healthcare workers (25 nurses and respiratory therapists [licensed healthcare professionals] and 22 patient care technicians and phlebotomists [unlicensed healthcare professionals] enrolled in the study over a period of one month.

Design

The quasi-experimental study assessed hand hygiene compliance among 47 healthcare workers before and after routine clinical procedures. Self-selected, enrolled participants completed a demographic data form and a handheld sanitizer spray feasibility questionnaire. Research assistants then observed participants to determine hand hygiene compliance. Prior to initiation of the study, a two-week observation period was completed to determine healthcare professionals’ hand hygiene practices. Following the initial observation period, healthcare professionals were observed for an additional 14 weeks with the handheld sanitizer spray. Observations of the participants before the intervention were considered the control group; observations of the participants after the intervention were considered the experimental group.

Data Collection Instruments

Data collection instruments included the demographic data form, the handheld sanitizer spray feasibility questionnaire, and the observation form. The self-report demographic data form included the following categories: gender, age, ethnicity, unit assignment, hand hygiene product used currently, number of years in health care, number of hours worked, estimated number of times hands were washed in a workday, and estimated number of pairs of gloves used in a workday. The self-report handheld sanitizer spray feasibility questionnaire collected information on frequency and ease of use, positive and negative perceptions of the spray, and overall satisfaction with the spray. The observation data collection form included pre- and postprocedure adherence to hand hygiene standards, type of procedure performed, potential for blood or body fluid exposure, length of exposure, frequency of glove changes, and use of a hand hygiene product. Inter-rater reliability was established between the research assistants to ensure consistency in the observations. Ten observations were completed by two research assistants and compared for agreement. Ninety-two percent agreement was calculated between the research assistants by comparing the numbers of agreements with the number of possible agreements (Burns & Grove, 2001).

Pilot Period

After successful recruitment and orientation of participants, a one-week pilot data collection period was completed to determine the feasibility of the data collection process. Research team members asked participants for feedback to help identify any problems or concerns and reviewed data collection procedures and study protocols. Additional morning meetings also were held to allow participants to discuss any concerns. Observation data collection forms were revised with input from team members. Amendments were made to represent all possible combinations of hand hygiene and glove use.

Data Analysis

Data analysis was performed using SPSS® (SPSS Inc.) 14.0 software, the McNemar test for nonparametric related samples, and descriptive statistics. Feasibility data were examined for trends in self-reported frequency of handheld hygiene spray use, satisfaction, ease of use, and overall perception. The research team performed 77 preintervention (control) observations and 104 postintervention (experimental) observations of 47 healthcare professionals to determine trends in the healthcare professionals’ compliance with hand hygiene standards, frequency of use for various hand hygiene products, and types of clinical procedures performed. Participants were observed daily providing that they were on the unit for procedures and research assistants were present. Most participants were observed more than once; this was determined by their availability and work schedules. Data analysis was based on observations, not individual healthcare
providers. The McNemar test was performed to compare pre- and postprocedure compliance.

Results

Demographic data were distributed equally between licensed (53%) and unlicensed (47%) healthcare professionals. Most participants (83%) were women. Self-reported ethnicity of the sample included African American (40.4%), Asian (27.7%), Hispanic (17%), Caucasian (6.4%), and other (6.4%); 2.1% provided no response. The majority of the participants was from the inpatient unit (64%) and worked full-time (83%). Participants' mean age was 44.46 years, and years in health care was 16.50.

Baseline feasibility data were established to determine participants’ perceptions of the handheld sanitizer spray. Overall, reactions were positive. Eighty-two percent of participants self-reported using the handheld sanitizer spray intermittently or all the time. All participants found the instructions easy to follow and 82% stated that the product was easy to use. When asked about their perceptions of the spray on their hands, 69% liked the feel of the product, 75% felt that it was not sticky, and 87% had no objection to the smell. Lastly, 89% of participants noted that their hands felt clean, with an overall positive reaction to the product (85%).

Researchers determined hand hygiene compliance by analyzing observation data that assessed whether participants used a hand hygiene product prior to or immediately following a clinical procedure. Participants understood the purpose of using a hand hygiene product before and after a clinical procedure; however, baseline compliance rates decreased from 53% (40/77) before the intervention to 49% (52/104) after the intervention. In addition, compliance rates fluctuated for each clinical procedure pre- and postintervention and rates were more consistent immediately following a clinical procedure than before a clinical procedure (see Table 1).

Discussion

The age of participants and their years in health care are consistent with national trends for nursing and other healthcare professions (U.S. Department of Health and Human Services, 2004). In addition, the positive response from healthcare workers in regard to surveying their hand hygiene behaviors is similar to another study by Eldridge et al., 2006. Observation data confirmed results of other hand hygiene compliance studies that showed increased compliance rate with the introduction of a new product (Kampf, 2004; Carr, Sullivan, Gilmore, & Rashid, 2005). The data are consistent with a study by Whitby, Mc Laws, and Ross (2006), which demonstrated that healthcare workers enjoy trying new products and use new products more consistently in clinical practice until they are no longer novelties (Bissett, 2002).

Despite the positive response, hand hygiene compliance rates remained less than optimal. The hand hygiene compliance was consistent with findings by Muto, Sistrom, & Farr, 2000, who reported only on hand hygiene compliance of healthcare professionals before clinical procedures. Although many hand hygiene studies have investigated overall hand hygiene compliance rates of healthcare workers, none has focused on adherence to hand hygiene standards specified by the CDC for hand hygiene performance before and after a clinical procedure. Healthcare workers’ hand hygiene should be investigated further to help reduce the rate of nosocomial infections among patients with cancer.

Limitations

Limitations included a small sample size. The demographics were consistent with the location of the oncology center but not representative of most locations in the United States. The sample had fewer licensed healthcare professionals than other locations in the United States. The demographics and number of licensed healthcare workers restrict generalizability of this study.

Loss of Participants

Hospitals across the country are experiencing significant turnover and vacancy (American Association of Colleges of Nursing, 2007). Reductions in staff and sick days complicated observation data collection efforts. During the course of the study, four participants withdrew, one no longer wanted to be observed, and three no longer wanted to participate but did not provide a reason. Three additional participants were lost after discontinuing employment at the oncology center. Those participants were not included in the data analysis of the study.

Accreditation Visits

The oncology center had a routine Joint Commission visit during the observation data collection period and several practice surveys for Magnet designation. Research team members maintained a low profile to avoid interfering with routine operations of the facility, coordinated their efforts with the nursing administration, and stopped data collection on days that the oncology administrators identified as highly stressful. The multiple visits from regulators and mock surveys made completing observations in the initial time frame difficult. Healthcare professionals

<table>
<thead>
<tr>
<th>GROUP</th>
<th>PREPROCEDURE COMPLIANCE</th>
<th>POSTPROCEDURE COMPLIANCE</th>
<th>McNEMAR TEST</th>
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<td>Control (N = 77)</td>
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<tr>
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<tr>
<td>Control and experimental (N = 181)</td>
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<td>54</td>
<td>145</td>
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* Level of significance p ≤ 0.05
Handheld Sanitizer Spray

Research team members started receiving complaints about the clip used to secure the handheld sanitizer spray to participants’ uniforms or lab oratory coats. Although the clip was secure on a thick belt, it was not secure on scrub uniforms or laboratory coats. Participants had to place the device in their pockets, making it less accessible for use. Research team members met with the manufacturer, and a lanyard alternative was devised so that healthcare workers could wear their personal handheld sanitizer spray around their necks for easy accessibility. Lanyards were introduced during the fourth week of the observation period (see Figure 1). Research team members were able to obtain data before and after the lanyards were introduced; however, the introduction of the lanyard had no effect on hand sanitizer use.

Nursing Implications

Although healthcare workers expressed concern about antimicrobial resistance and the spread of infections through improper hand hygiene, they continued to revert to their previous behaviors. Healthcare workers may need to be certified yearly as practitioners of safe and effective hand hygiene. Adherence to CDC standards for good hand hygiene practice must be reiterated by nurses who work in oncology. Routine debriefing sessions among healthcare workers to review data associated with nosocomial infection rates may encourage compliance. Data that effectively promote hand hygiene compliance provide the clinical evidence needed to change the behaviors of healthcare workers and ensure a safer environment for patients with cancer.

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